

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

**5-Year Review:
Summary and Evaluation**



Lathrop Management Area, Bay County. Photos by Vivian Negrón-Ortiz

**U.S. Fish and Wildlife Service
Southeast Region
Panama City Field Office
Panama City, Florida**



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

I. GENERAL INFORMATION

A. Methodology used to complete the review

This review was accomplished using information obtained from the plant's 1994 Recovery Plan, peer reviewed scientific publications, unpublished field survey results, reports of current research projects, unpublished field observations by Service, State and other experienced biologists, and personal communications. These documents are on file at the Panama City Field Office. A *Federal Register* notice announcing the review and requesting information was published on April 16, 2008 (73 FR 20702). Comments received and suggestions from peer reviewers were evaluated and incorporated as appropriate (see appendix A). No part of this review was contracted to an outside party. This review was completed by the Service's lead Recovery botanist in the Panama City Field Office, Florida.

B. Reviewers

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C. Background

- 1. FR Notice citation announcing initiation of this review:**
73 FR 20702 (April 16, 2008).

2. **Species status:** Unknown (Recovery Data Call 2008); the species status is unknown until all the Element Occurrences¹ (EO's) are revisited.
3. **Recovery achieved:** 2 (26-50% recovery objectives achieved); see section II.B.3 for details on recovery criteria and how each criterion has or has not been met.
4. **Listing history:**
Original Listing
FR notice: 57 FR 19813 (May 8, 1992)
Date listed: June 8, 1992
Entity listed: species
Classification: threatened
5. **Associated rulemakings:**
Not applicable
6. **Review History:**
Status Review: No formal 5-year reviews have been conducted on this plant since the Recovery Plan was written and approved.
Recovery Data Calls:
2000, 2001, 2002, 2003; 2004; 2005; 2006; 2007; 2008
7. **Species' Recovery Priority Number at start of review (48 FR 43098):**
8. *Macbridea alba* is assigned a recovery priority of 8 because the degree of threat to its persistence is moderate, it is a species, and has a high recovery potential.
8. **Recovery Plan:**
Name of plan: 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).
Date issued: June 22, 1994

II. REVIEW ANALYSIS

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

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any vertebrate wildlife. This definition limits listing DPS to only vertebrate species of fish and wildlife. Because *M. alba*

¹ Element Occurrence (EO): an area of land and/or water in which a species or natural community is, or was, present. For species, it corresponds with the local population (portion of a population or a group of nearby populations). It is also referred to as occurrence, location, or site.

is a plant, the DPS policy is not applicable and not addressed further in this review.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan containing objective, measurable criteria? The recovery plan 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 (ANF) are secure, and to conserve the species outside the ANF by protecting habitat through land acquisition, and changes in management practices on government land, rights-of way (ROW), 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.

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?

No. The recovery criterion was based on the available data at the time the plan was published. The plan is 15 years old and lacks recent published and unpublished scientific information.

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)?

No. The recovery plan only addressed factor 1 (Present or threatened destruction, modification or curtailment of its habitat or range).

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.

As stated above, the recovery plan lists a delisting criterion of adequately protect and manage 15 populations distributed throughout the species' historical range for 10 years. This recovery criterion addresses factor 1. Factor 2 was addressed in the recovery plan as a threat, but recovery criteria were not stipulated (see section II.C.2.b). Factor 3 is not relevant to *M. alba*. Factors 4 and 5, although relevant to this species, were not addressed by the Recovery Plan.

We are going to summarize our progress under existing recovery actions. Recovery actions 1-5 address factor 1.

Recovery Action 1: Protect population in ANF and on other public lands

At present, we have about 21 protected locations with an estimated 3,967 to 7,262 plants. See below information, and section C.1 for further details on number of

plants and distribution.

1.1. Management/general monitoring in ANF

This action has been partially met. Management is an ongoing action conducted by the Forest Service. The ANF has a yearly 120,000+ acre prescribed burning program. According to L. Kirn (2009, pers. comm.), two to three compartments, i.e., management units which contains more than one population of *M. alba*, are burned every year during the growing and dormant seasons, or both.

The ANF has an on-going timber-related management/monitoring study in the Hunt Timber Sale: pre- and post-harvest survey data have been collected in two sites (L. Kirn, 2009, pers. comm.). In addition, several years of monitoring data (e.g., documenting presence/absence in each population, and qualitative visual estimate of the density of white-birds-in-a-nest) have been collected in three permanent plots. However, these data were not available for evaluation.

1.2. Conduct population biology studies

This action has been partially met. Studies of germination and seed bank, one aspect of population biology, have been conducted by Schulze et al. (2002). Since seed production has been documented for this species, but seedlings have rarely been observed in natural populations, the authors investigated the viability of dry-stored and of experimentally buried seeds, the timing of germination, and whether a persistent seed bank was present. The authors observed in the field that seeds germinated while in the infructescences (the fruiting stage of the inflorescence), suggesting that the matured ovules lack dormancy, in addition to the possibility of viviparous seedlings. About 87% of dry-stored seeds were viable (or germinable) for six months after dispersal, but viability of dry-stored and of buried seeds was insignificant after one year. They concluded that a persistent seed bank is not present, based on the lack of emergence of seedlings from soil that was field collected prior to seed dispersal. This lack of seed dormancy and seed bank means that if the established individuals are eliminated, a population cannot re-establish itself. In addition, preserving genetic diversity in an *ex-situ* facility is not recommended due to the poor viability of dry-stored seeds. In general, Schulze et al. (2002) recommend preserving and protecting established individuals.

Other population biology studies such as the effects of prescribed fire on demography have not been carried out (see section IV, action 6).

Recovery Action 2: Manage rights-of-way

This is an ongoing action. *Macbridea alba* is found scattered under the Apalachicola National Forest Utility ROW of SR 65. Protective measures have been established with Talquin Electric during annual maintenance and the upcoming pole replacement.

Management for other *M. alba* elements of occurrences found in ROW outside SR 65 has not been initiated.

Recovery Action 3: Protect and manage these plants outside Apalachicola National Forest.

3.1. Secure protection

To date, 10 protected populations have been secured: two populations on the St. Joseph Buffer Preserve (SJBP), Gulf County; one population at Lathrop Bayou, Bay County; one population at Box-R Wildlife Management Area (Box-R WMA), Franklin County; and six populations at Tate's Hell State Forest, Franklin County.

Coastal Plains Institute, founded by Dr. D. Bruce Means (ecologist consultant, Tallahassee, FL, means@bio.fsu.edu), has purchased a 130 acre tract 2.5 mi NW of Sumatra (L. Kirn, ANF, 2009, pers. comm.). Since the inception of prescribed burns, numerous *M. alba* plants have been proliferated on it (D.B. Means, 2009, pers. comm.).

3.2. Develop and implement management and monitoring plans for protected sites

This recovery action has been partially met. Management plans have been developed and implemented by the: Florida Fish and Wildlife Conservation Commission (FWCC) for the Box-R Wildlife Management Area (Box-R WMA) (FWCC 2006); Bureau of Land Management (BLM) and the St. Joe Timberland Company (Timberland Company) for the Lathrop Bayou (BLM 2003).

Box-R WMA consists of 8,397 acres in Franklin County that was purchased by the State of Florida from St. Joe Timberland Company; it is managed by the FWCC. Management involves application of prescribed fire every 2-3 years and controlling traffic from off road vehicles. FNAI has recorded one EO of *M. alba* within Box-R WMA, and two EO's within a one-mile buffer around the Box-R WMA; monitoring has not been initiated.

The management plan for the 539 acres of Lathrop Bayou property, located at the eastern end of East Bay (Bay County), focuses on habitat improvements to benefit endemic plants and animals (e.g., prescribed burns, management of red-cockaded woodpecker, and monitoring of several plants and animals). Lathrop Bayou is owned by the BLM (189 acres), St. Joe Timberland Company (206 acres), and the Genecov Group (144 acres; BLM 2003).

About 103 *M. alba* plants have been recorded since the implementation of surveys in 2002 (L. Keppner, 2008, pers. comm.).

Permanent marked plots were established in 2008 at the SJBP (J. Huffman, 2008, pers. comm.) to monitor *M. alba* seasonal changes and response to prescribed burnings.

Recovery Action 4: Systematics and other studies

4.1. Genetic structure of *M. alba*

This recovery action has been met (see section II.C.1.b)

4.2. Comparison of *M. alba* and *M. carolinensis*

This is an ongoing action. Chromosome studies of the two species of *Macbridea* indicated that they have the same ploidy level, i.e., $2n=18$, with nearly identical chromosome length range (2.5-4 μm for both species) (Cantino 1985). This finding leaves open the possibility that they could be a single species or two subspecies. J. Walker (USDA, 2008, pers. comm.) and her graduate student are conducting a genetic study of these two species. Therefore, this action has been partially met.

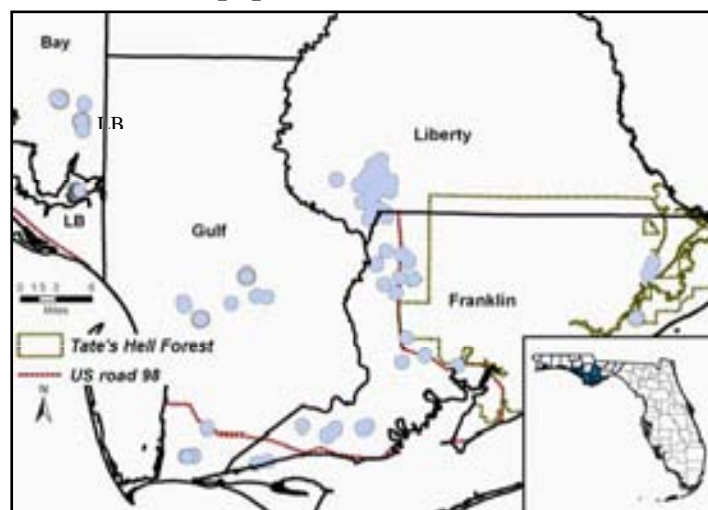
Recovery Action 5: Garden propagation and reintroduction.

This recovery action has not been initiated. According to Schulze et al. (2002) study, an *ex-situ* collection of seeds is not recommended due to the lack of dormancy, and poor viability of dry-stored seeds. Although conserving this species *in-situ* is the best option, an *ex-situ* collection of established seedlings and adults is recommended.

C. Updated Information and Current Species Status

1. Biology and Habitat

a. Abundance, population trends



White birds-in-a-nest is endemic to the Florida Panhandle, and occurs in Bay, Gulf, Franklin, and Liberty Counties (Fig. 1). Several locations appear to be extirpated by development, and/or habitat modification. We have poor information regarding trends because: surveys were conducted irregularly and based on

Fig. 1. Map of Florida (inset) showing the counties and locations of *M. alba*. LB= Lathrop Bayou

either presence/absence and/or qualitative visual estimate of the density of white birds-in-a-nest (Jenkins et al. 2007, Kirn, 2009, pers. comm.); most sites were visited only once; and the actual counts of plants were rarely provided. The information below is organized by county.

Bay County

Surveys conducted in Bay County locations between 1991 and 2008 indicated the presence of five locations (Fig. 1), but the actual counts of plants were not provided (with the exception of 10-25 and 12 plants for two EO's); most of the sites were referred to as 'competition very severe, population size reduced'. These EO's were not re-surveyed until 2008, but plants were not located by the FWS botanist. Surveys conducted from 2002 to 2006 revealed a total of 103 plants for the protected Lathrop Bayou location. However, more plants have been found following the continuation of prescribed burns (F. Winters, BLM, 2008, pers. comm.).

Gulf County

Four surveys conducted in Gulf County locations between 1988 and 2008 indicated the presence of 10 locations, totaling 504 to 1,004 plants (Fig. 1; FNAI 2008). Seventy percent of those locations were surveyed only once or twice, but the current status of the plants and/or populations is unknown. Twenty percent of the locations were found in moderate to dense pine plantations, or with a 'habitat drastically changed' (FNAI 2008).

Two populations are protected and managed at SJPB (J. Huffman, 2008, pers. comm.). These populations, one of which was discovered in 2008, contain 280 individuals.

Franklin County

Nine surveys conducted in Franklin County between 1963 and 2008 indicated the presence of 22 locations, totaling 1,145 to 1,564 plants. Sixty four percent of these locations were surveyed only once; therefore the current number of plants and status of these populations are unknown. Thirty two percent of the sites were surveyed twice; only one site was surveyed three times. Eight percent of the EO's showed declines, with a total of 98 % decline in plant number. These sites were found in a dense, lightly bedded pine plantation. In contrast, twenty percent of EO's showed an increase, with a total of a 77 % increase in plant numbers due to finding new sub-EO's.

In 2008, five of six known EO's were examined at Tate's Hell State Forest (Franklin Co.) in the peak of flowering season (Jenkins 2008; Negron-Ortiz 2008 field work). About 21 plants were recorded for three EO's; plants weren't observed for one location; and one site was not located. Prescribed fire is needed for most locations to reverse shrub encroachment.

Liberty County

The Florida Natural Areas Inventory surveys show the ANF as having 28 FNAI locations or EO's with multiple subpopulations. However, this species is almost continuously spread throughout large sections of the forest, and since many data points mix between many EO's, this would technically make these EO's equal to 11 (points within 1 km should all be associated with one EO; A. Jenkins, 2008, pers. comm.; Fig. 1).

Nine surveys conducted between 1978 and 2007 indicated the presence of 3,559 to 6851⁺ plants (Fig. 1; FNAI 2008). These occurrences are protected and managed at the ANF (L. Kim, ANF, 2008, pers. comm.).

b. Genetics, genetic variation, or trends in genetic variation:

Godt et al. (2004) used starch gel electrophoresis to describe allozyme diversity and genetic structure in this threatened species. Ten populations were analyzed with an average sample size of 47 plants per population, resulting in 22 loci. Fifty percent (11) of the 22 allozyme loci were found to be polymorphic, with 32 % to 50 % of loci polymorphic within populations. Despite a relatively high proportion of polymorphic loci, gene diversity is low possibly due to the restricted range of the species. Among populations gene diversity ranged from 0.078 to 0.123, thus genetic identity was high. Therefore, compared to other mints the data indicate that *M. alba* is genetically depauperate.

c. Taxonomic classification or changes in nomenclature:

Kingdom:	Plantae
Division:	Magnoliophyta
Class:	Rosopsida
Order:	Lamiales
Family:	Lamiaceae
Genus:	<i>Macbridea</i> Elliott ex Nutt.
Species:	<i>alba</i> Chapman
Common name:	White birds-in-a-nest

Recent molecular studies attempted to clarify the relationships within and among members of the subtribe Melittidinae (Lamiaceae) and whether the members form a monophyletic group. Phylogenetic studies indicated that *Macbridea* Elliott ex Nutt. and other mint genera endemic to North America form a monophyletic group within the tribe Synandreae (Scheen 2008). Within this natural group, *Synandra* is sister to *Macbridea*, and the two species, *M. alba* and *M. caroliniana*, are sister to a group consisting of *Brazoria*, *Warnockia*, and *Physostegia*. This monophyletic group is strongly correlated with their geography (Scheen 2008). No other taxonomic studies have been conducted on *Macbridea*.

Description: This perennial herb usually has one stem (often clothed with long, multicellular hairs) which may be branched. The leaves are oblanceolate or

spatulate, mostly in 6-8 pairs. White flowers are born from May through July in compressed thyrses (dense flower cluster in which the main axis is racemose and the branches are cymose). The small clusters of white buds and flowers look like eggs and little bird heads in a nest. Each flower is bisexual, has a green calyx and a white two lipped-corolla about 2.5-3 cm long; the pistil and filaments are white, and the anthers purple basally. Each flower can produce four nutlets (small fruit similar to a nut), which are about 2-2.5 mm long, narrowly obovate in outline, and light brown (Godfrey and Wooten 1981, Godt et al. 2004).

d. Spatial distribution, trends in spatial distribution or historic range:

Macbridea alba is endemic to the Florida panhandle and is still restricted to the same four counties: Bay, Gulf, Franklin, and Liberty. In 1992 when the species was listed, the majority of the populations (65 % of the occurrences) were found or known to occur in the ANF, Liberty Co. (USFWS 1992). Based on current survey information, only 40 % of the current occurrences are within ANF (FNAI 2008). However, this number could be misleading because this species is quite abundant, almost continuously distributed throughout large sections of the forest (Negrón-Ortiz, FWS, 2008, pers. obs.), specifically in areas properly managed with prescribed burns.

Most locations in Bay, Gulf, and Franklin counties are separated by clear cuts, pine plantations or residential/commercial development. Development has resulted in extirpation of populations, and has left other sites highly fragmented.

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

In general, plants are found in mesic pine flatwoods, wet savannas, seepage slopes, and ecotones between pine flatwoods and titi-swamps (Schulze et. al 2002). There are several locations within the ANF where small populations are growing on, or along, sandhill ecotones. The wettest sites occupied by these plants are grassy seepage bogs on gentle slopes at the edge of forested or shrubby wetlands. White birds-in-a-nest also occurs in drier sites with longleaf pine and runner oaks (USFWS 1992), as well as along associated roadsides. The Gulf coastal lowlands near the entrance of the Apalachicola River in the Florida Panhandle provide the grassy habitat on poorly drained, infertile soils that is required by *M. alba*.

f. Other:

Reproduction and Pollination

Macbridea alba is a hermaphroditic species capable of both sexual and vegetative (via rhizomes) reproduction (Godt et al. 2004). This species is capable of both

outcrossing and selfing. However, selfed seeds exhibit inbreeding depression (Godt et al. 2004).

Pitts-Singer et al. (2002) studied the pollinator-plant relationship at two sites located on the ANF. Twenty inflorescences were observed for 34 hours over five days. The authors observed 70 visits of nine insect and spider species. Since only bumble bees (*Bombus* spp.) were large enough to make contact with the reproductive structures of the flowers, the authors concluded that bumble bees are the potential pollinators of *M. alba*. Thus, bumble bees are probably critical to the long-term persistence of *M. alba* because they provide a mechanism for ensuring seed set, and facilitate gene flow between plants and plant populations (Negrón-Ortiz, pers. interpretation).

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

a. 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, and fire management and suppression in this region have changed the ecosystems. The threats are discussed in more detail below:

1. Pulpwood production in the outer Coastal Plain in the Apalachicola Basin

The timber industry in North Florida became well established in the 1850s (FNAI 2005). It started in Franklin County in the 1870s and continued to be a prominent industry until the mid-1990s (Howell and Hartsell 1995). The St. Joe Paper Company had close to a million acres in timber in the eastern region of the panhandle. The Company also owned a paper mill in Port St. Joe until it was sold and shut down in 1999; therefore this industry is no longer considered a primary threat.

2. Coastal real estate and road development

Urban development continues to threaten white birds-in-a-nest. The St. Joe Company owns extensive areas of land in Northwest Florida, and focuses on commercial and residential development along roadways and near or within business districts in the region. Urbanized land in Florida, statewide, is projected to double by 2060 along with doubling of the population to 36 million (<http://www.1000friendsofflorida.org/PUBS/2060/01-Northwest-Florida>). According to the study, much of the new development will be focused along roadways.

Many *M. alba*'s locations are found along US 98 and other state roads. Construction activity may directly kill individual plants or convert habitat to unsuitable space; widening may convert native habitat to managed road side; and culvert modification may change drainage patterns, which may change seasonal hydrology. Therefore, road widening and new roads continue to pose a threat to the species from habitat loss.

3. Fire suppression

Suppression of fire during the dormant season continues to threaten the pineland and savanna's flora, as fire is an important factor in the maintenance of flatwoods (Abrahamson and Hartnett 1990). Fire influences community structure and composition (Abrahamson and Hartnett 1990), and with insufficient frequency in longleaf pine communities, a woody midstory quickly develops (Glitzenstein et al. 1995), negatively affecting the understory diversity.

Thus, fire suppression continues to be a threat to *M. alba*. Lack of fire, and subsequent growth of shrubs (particularly encroachment of *Cyrilla racemiflora* L., commonly known as swamp titi) and saplings in the understory, inhibits this species emergence (Negrón-Ortiz, 2008, pers. observ.; FNAI 2008). Declining fire frequency reduces *M. alba* abundance in areas where it was previously observed in great quantities (FNAI 2008). In recently burned areas, however, plant emergence is prolific within two years of the fire event (F. Winters, 2008, pers. comm.). The ANF utilizes a 3-5 yr interval burn rotation.

Several studies have shown that frequent prescribed fire regimes are important for maintenance of flatwoods diversity (Hiers et al. 2007). Therefore, frequent prescribed burnings, i.e., 4-5 yr intervals, are needed to maintain optimal *M. alba* populations.

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

The Recovery Plan identified this threat for *M. alba*. Specifically, the Plan suggested that the use of the savannas in ANF for educational purposes and tourism could create risks of casual collecting during the flowering season. Currently, there is no evidence to suggest that this factor is a threat (L. Kirn, 2009, pers. comm.), but this could eventually become a concern.

c. Disease or predation

There is no evidence to suggest that disease or predation are threats.

d. Inadequacy of existing regulatory mechanisms:

Section 7(b)(4) and 7(b)(2) of the Act generally do not apply to listed plants species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession 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. 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 as long as the activity is permissible under state/local laws. The State requires permission of private landowners for collecting of state-listed plants from their property.

Macbridea alba is protected under Florida State Law, chapter 85-426, which includes preventions of taking, 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 (<http://www.virtualherbarium.org/EPAC>).

Bay County code of ordinance (chapter 19- Environmental Standards), under sections 1907 and 1909, provides restrictions, constraints and requirements to protect and preserve designated habitat conservation areas for rare, threatened, or endangered species, and wetlands (<http://www.municode.com/Resources/gateway.asp?pid=14281&sid=9>). Gulf, Franklin, and Liberty Counties do not have such regulations.

Highway ROW maintenance activities are not always reviewed for threatened and endangered species impact. However, if there is an activity (e.g., construction, reconstruction, or maintenance projects) affecting protected species, then the Service can request a consultation with the Florida Department of Transportation under the Act (M. Mittiga, 2009, pers. comm.). In the Apalachicola National Forest SR 65 ROW, it should conform to specifications and coordination between Talquin Electric, FDOT and the Service. Currently, these protections are inadequate; see section IV, action 1.

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

Herbicide. While the Recovery Plan 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 ROWs, we no longer consider this a threat to white birds-in-a-nest because mowing is now the common practice to maintain ROWs in Florida. Franklin and Liberty counties allow only "spot treatment" due to impacts concerning the ANF and waters within Apalachicola Bay and River basin.

D. Synthesis

Macbridea alba is mainly threatened by habitat destruction/modification. Urban development, timbering, and inadequate fire management, i.e., fire suppression, are the main pressures reducing or eliminating individual populations.

This species occurs in fire-prone habitats. Lack of fire, or reduced fire frequency, and subsequent growth of shrubs and saplings in the understory, reduces *M. alba* abundance in areas where it was previously at high density. Where fire management is implemented, it stimulates the emergence of individuals and maintains healthy, stable populations. No problems have been detected with disease and predation.

The species occurs on both private and public lands. In many of these populations, the total number of plants is high (see population section for Liberty Co.), and can be maintained with adequate management and conservation. Informal consultation has resulted in minimizing impacts from development, specifically for ANF SR 65. To date, only 10 protected populations (with about 408 plants) outside ANF have been secured. As an endemic species restricted to four counties with populations occurring on private lands and ROWs, white birds-in-a-nest is threatened by intense development pressures, since urbanized land is projected to increase two-fold in the near future. In addition, the populations cannot re-establish themselves due to the lack of seed dormancy and seed bank. Thus, permanent protection and management are necessary to conserve this species, as is surveying for current and potentially new sites.

Macbridea alba should remain as a threatened species due to the present low population density (estimated 9,736 plants throughout the current distribution), and because the present threat of habitat modification via development and road construction and maintenance remains significant. Studies have demonstrated variation among the number of plants necessary for a population to survive risks of extinction (Given 1994, Matthies et al. 2004, Menges 1990). However, Matthies et al. (2004) study of 379 populations of eight threatened species in northern Germany demonstrated that very small populations face a considerable risk of extinction, while the risk for populations with more than 1,000 individuals was very small. Consequently, since most of the *M. alba* populations have less than 1,000 individuals, any impact to existing populations could cause loss of these populations.

III. RESULTS

A. Recommended Classification:

No change is needed

B. New Recovery Priority Number: 8c

As the species is in conflict with development and growth, the conflict category 'c' has been added to the Recovery Priority number.

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

1. Manage ROW

Continue fostering conservation practices for utility and highway ROWs with the Forest Service, Talquin Electric, FDOT, and USFWS; a management plan should be developed and implemented.

2. Establish an *ex-situ* collection of seedlings and adults.
3. Conduct population biology studies at ANF
 - a. Compare the demographic performance of *M. alba* in pinelands and road habitats
 - i) Survey for seedling recruitment and survival of tagged individuals (plant height and reproduction) for a period of 3-5 years in roadside populations of SR 65 and pinelands.
 - ii) Perform germination experiments
4. Revisit and conduct inventories (e.g., the total number of individuals, number of flowering vs. non-flowering plants, presence of visitors to the flowers, and whether seedling recruitment is occurring) on all the historical locations.
5. Conduct surveys/inventories on potentially new sites. This action can include the use of species distribution modeling methods to initially determine potential sites, with subsequent validation or inspection of the sites for plants.
6. Implement monitoring for selected populations in Bay, Gulf, Franklin, and Liberty counties. Note: Bay (Lathrop Bayou) and Gulf (SJBP) have a monitoring program. A similar monitoring protocol should be followed, thus results can be comparable across sites.

Monitoring should examine density and abundance of individuals. Observations of flowering and fruiting are important and should be integrated with variables such as plant size and seedling data. Since *M. alba* occurs in fire prone habitats, the effect of this disturbance (including winter vs. growing season prescribed fire, fire frequency, intensity, duration, and timing) on survival and fecundity should be also monitored. Such studies should be conducted on large, protected and managed populations. Plants should be monitored several times during a 12-month cycle (e.g., flowering and fruiting seasons) the first year, then annually or biannually over an extended number of years. The results would help determining the smallest size at which a population can exist without facing extinction, i.e., the minimum viable population size.
7. The recovery plan should be updated to define objective measurable criteria and better address the five factors.

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U.S. FISH AND WILDLIFE SERVICE

5-YEAR REVIEW of *Machiridea alba* (White birds-in-a-nest)

Current Classification: Threatened

Recommendation resulting from the 5-Year Review

No change is needed

Reclassification Priority Number: 8C

The review was completed by botanist Dr. Vivian Negrón-Ortiz, Panama City Field Office.

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve _____ Date _____

REGIONAL OFFICE APPROVAL:

Lead Regional Director, Fish and Wildlife Service

Approve  _____ Date 5-16-05

Vivian Negrón-Ortiz

APPENDIX A
Summary of peer review for the 5-year review of
***Macbridea alba* (White birds-in-a-nest)**

A. Peer Review Method:

The document was peer-reviewed internally by Lorna Patrick and Janet Mizzi in the Panama City Field Office. Once the comments were added to the document, it was sent to two outside reviewers (see below). The outside peer reviewers were chosen based on their qualifications and knowledge of the species.

B. Peer Review Charge: The below guidance was provided to the reviewers.

1. Review all materials provided by the Service.
2. Identify, review, and provide other relevant data that appears not to have been used by the Service.
3. Do not provide recommendations on the Endangered Species Act classification (e.g., endangered, threatened) of the species.
4. Provide written comments on:
 - Validity of any models, data, or analyses used or relied on in the review.
 - Adequacy of the data (e.g., are the data sufficient to support the biological conclusions reached). If data are inadequate, identify additional data or studies that are needed to adequately justify biological conclusions.
 - Oversights, omissions, and inconsistencies.
 - Reasonableness of judgments made from the scientific evidence.
 - Scientific uncertainties by ensuring that they are clearly identified and characterized, and those potential implications of uncertainties for the technical conclusions drawn are clear.
 - Strengths and limitation of the overall product.
5. All peer reviews and comments will be public documents, and portions may be incorporated verbatim into our final document with appropriate credit given to the author of the review.

C. Summary of Peer Review Comments/Report

Ms. Faye Winters provided a few editing comments via phone conversation. She corrected the number of acres of the Lathrop Bayou and the number of plants found at the BLM property.

Ms. Louise Kirn provided a few comments related to management/monitoring at the ANF (Recovery action 1.1; see L. Kirn, personal communications). She provided the information for the Coastal Plains Institute, and corrected the information related to manage ROW along SR 65 (Recovery criterion 2).

D. Response to Peer Review

All of peer reviewers' comments were evaluated and incorporated where appropriate.