

Short-leaved rosemary
(*Conradina brevifolia*)

5-Year Review:
Summary and Evaluation

U.S. Fish and Wildlife Service
Southeast Region
South Florida Ecological Services Office
Vero Beach, Florida

5-YEAR REVIEW
Short-leaved rosemary/*Conradina brevifolia*

I. GENERAL INFORMATION

A. Methodology used to complete the review: This review is based on monitoring reports, surveys, and other scientific and management information, augmented by conversations and comments from biologists familiar with the species. The review was contracted to Linda G. Chafin with the State Botanical Garden of Georgia in Athens, Georgia and finalized by the species' recovery lead at the South Florida Ecological Services Office. Literature and documents used for this review are on file at the South Florida Ecological Services Office. All recommendations resulting from this review are a result of thoroughly reviewing the best available information on the short-leaved rosemary. Public notice of this review was given in the Federal Register on April 26, 2007, with a 60-day public comment period. Comments and suggestions regarding the review were received from peer reviews from outside the Service (see Summary of peer review). Comments received were evaluated and addressed as appropriate.

B. Reviewers

Lead Region: Southeast Region, Kelly Bibb, (404) 679-7132

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C. Background

1. FR Notice citation announcing initiation of this review: April 26, 2007. 72 FR 20866.

2. Species status: Decreasing (2007 Recovery Data Call). Short-leaved rosemary is protected on 10.5 of 19 sites where it occurs. However, this species appears to be experiencing a moderate long-term decline.

3. Recovery achieved: 1 (0-25% recovery objectives achieved) (2007 Recovery Data Call).

4. Listing history

Original Listing

FR notice: 58 FR 37432

Date listed: July 12, 1993

Entity listed: Species

Classification: Endangered

5. Associated rulemakings: N/A

6. Review History:

Final Recovery Plan: 1999

Recovery Data Call: 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007

7. Species' Recovery Priority Number at start of review (48 FR 43098): 8C (a species with a moderate degree of threat and high recovery potential that is in conflict with construction or other development projects or other forms of economic activity).

8. Recovery Plan or Outline

Name of plan: South Florida Multi-Species Recovery Plan (MSRP)

Date issued: May 18, 1999

Dates of previous plans: Recovery Plan for nineteen central Florida scrub and high pineland plants (revised). June 20, 1996; Recovery plan for eleven Florida scrub plant species. January 29, 1990.

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 Endangered Species Act (Act) 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 and 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? No. The criteria do not reflect the current state of knowledge about the distribution and range of short-leaved rosemary.

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. Not all of the listing factors relevant to the species are addressed in the recovery criteria.

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. For threats-related recovery criteria, please note which of the 5 listing factors are addressed by that criterion. If any of the 5 listing factors are not relevant to this species, please note that here.

The recovery plan (Service 1999) presents criteria for reclassification from endangered to threatened. There are no criteria for delisting because of the limited data on the biology, ecology, and management needs of the species.

1. Enough demographic data are available to determine the appropriate numbers of self-sustaining populations required to ensure 20-90% probability of persistence for 100 years.

There are no demographic data available for short-leaved rosemary; nor is there a current assessment of the number of extant populations. The occurrences on managed areas have not been assessed beyond a casual determination of presence or absence, with the exception of Lake Wales Ridge State Forest (LWRSF). Most of the occurrences on private lands have not been documented in more than two decades.

Keith Clanton, formerly a biologist for LWRSF and currently a graduate student at the University of Central Florida (UCF), has begun a dissertation on the short-leaved rosemary at LWRSF. He has counted nearly 7,000 plants and logged coordinate information on their locations. However, demographic data from his research will not be available for several years and will pertain only to the populations on LWRSF.

2. These populations, within the historic range of short-leaved rosemary, are adequately protected from further habitat loss, degradation, and fire suppression.

This criterion will not be met until the number of self-sustaining populations is determined and those populations are adequately protected.

The database of the Florida Natural Area Inventory (FNAI) contains 35 element occurrence records (EORs) for short-leaved rosemary as of 23 July 2008 (this does not include the probably false record in Osceola County, discussed below; hereafter the total number of FNAI EORs will be considered to be 35). Eighteen of the known EORs are on private land, and 17 are on public lands. An analysis of recent aerial photographs of these 35 occurrences indicates that 10 sites on private land have been destroyed or are tiny parcels surrounded by development that are likely to be destroyed (EORs 6, 15, 17, 18, 22, 23, 24, 29, 31, 32) (FNAI 2008). Aerial photographs indicate that of the 35 occurrences, 25 are likely extant. Of these 25 likely extant occurrences, eight occur on privately owned lands. Seventeen occurrences are protected on five managed areas – Lake Wales Ridge State Forest (LWRSF), Lake Wales Ridge Wildlife Environmental Area (LWRWEA), Saddle Blanket Lakes Preserve, Sun Ray Preserve, and Hickory Lake Scrub County Park. Four extant occurrences on private land are proposed for acquisition by the Florida

Forever Board of Trustees: Sunray/Hickory Lake South, unacquired portion of Silver Lake, Avon Park Lakes, and Crooked Lake West. Assuming that these four sites are acquired and managed for conservation, a total of 20 sites will be protected, leaving five other possibly intact sites unprotected. These five unprotected sites (FNAI EORs 2, 7, 12, 13, 30) appear from aerial photographs to be possible candidates for conservation acquisition based on apparent size and vegetation cover. Field surveys of these sites are recommended if landowner permission can be obtained.

However, completion of all proposed conservation purchases and protection of other private sites may not adequately protect this species. According to Turner et al. (2006), protection of existing occurrences by conservation land acquisition and management may not be sufficient to prevent extinction of short-leaved rosemary. They predict that this species may need translocation and propagation to ensure its survival. However, the recommendation by Turner et al. is based on distribution data (FNAI 2008) that has not been field-checked and updated in most cases for more than 10 years.

Decisions to undertake a program of captive propagation and translocation should be based on current information from experts about the reproductive biology, distribution, demography, and patterns of genetic structure in this species (Hufford and Mazer 2003).

This criterion addresses factors A and D.

3. These sites are managed to maintain sand pine scrub.

This criterion will not be met until the number of self-sustaining populations is determined and those populations are adequately protected and managed.

Short-leaved rosemary appears to be killed by fire, but, like several other shrubs and woody mints that occur in scrub habitats, it readily germinates after a burn. Anecdotal evidence suggests that short-leaved rosemary responds well to logging and fire, as indicated by the abundance of plants at LWRSF in 2008, five years following a prescribed burn conducted by helicopter in 2003 (A. Malatesta, Florida Department of Agriculture and Consumer Services [FDACS], pers. comm. 2008b).

To perpetuate populations of short-leaved rosemary, land managers must employ prescribed fire programs that mimic the intensities and return intervals of natural fire regimes that are characteristic of scrub communities (Turner et al. 2006). The State and county agencies and the private organization (The Nature Conservancy [TNC]) which own and manage populations of short-leaved rosemary are dedicated to managing their scrub sites to maintain scrub communities and their rare and endemic plant species. The Ten-Year Resource Management Plan for the Lake Wales Ridge State Forest includes several objectives related to the use of fire to maintain scrub communities (e.g., applying an aggressive program of seasonally based prescribed fire in all fire-maintained natural communities, restoring degraded areas to their

natural ecosystem function and return natural fire return intervals, and completing an annual update of their Fire Management Plan [FDACS 2006]). The management plan for the LWRWEA states: "Management of the LWRWEA will focus on perpetuation of native plant communities and their associated endemic species, particularly state and federally listed species... Land management activities will be designed to protect...species by producing a mosaic of disturbance scenarios over the landscape. Prescribed fire will be the primary means of achieving this objective" (Florida Fish and Wildlife Conservation Commission [FWC] 2002). TNC manages two sites, Saddle Blanket Lakes Preserve and Sunray Preserve, with prescribed fire. Presumably the three sites proposed for acquisition by Florida Forever will also be managed for conservation.

Eighteen of the known EORs are on private land and are presumably not being managed to maintain scrub habitat. Until an adequate number of these occurrences are protected by conservation purchase, easement, or ecological management plans this criterion will not be met. This criterion addresses factor A.

4. Monitoring demonstrates that these sites support sufficient population sizes, are distributed throughout the historic range, and are sexually or vegetatively reproducing at sufficient rates to maintain the population.

This criterion will not be met until the number of self-sustaining populations is determined and those sites and populations are adequately protected, managed, and monitored. Since there has been no determination of population numbers, this criterion has not been met and cannot fully be met until demographic studies have been conducted. Except for the preliminary or anecdotal observations at LWRSF, no monitoring programs are in place for this species on any of the managed areas where it occurs beyond a casual assessment of its presence or absence. This criterion addresses factor A.

Factor C is not relevant to this species.

C. Updated Information and Current Species Status

1. Biology and Habitat

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. Very little is known about the biology or ecology of short-leaved rosemary. While several studies have addressed federally listed species and their habitats on the Lake Wales Ridge (LWR), short-leaved rosemary has not been included or was, at best, briefly mentioned (Weekley et al. 2001, Menges et al. 2007, Archbold Biological Station [ABS] 2007, Clarke et al. 2007, Clarke et al. 2008, Weekley et al. 2008). Observations of longevity have been made only in cultivation; plants at Bok Tower Gardens (BTG) live 5 - 10 years (C.Peterson, BTG, pers. comm. 2008b).

The FNAI database contains 35 EORs for short-leaved rosemary (not including the record which is probably in error - see below, C.1.d.). The majority of short-leaved rosemary sites have not been surveyed since 1998 or before (FNAI 2008). Only two new occurrences have been discovered since 1999, when the recovery plan was published.

Of the 35 EORs, 17 occur on 5 conservation areas and are presumed or known to be extant. These areas are: LWRSF (FNAI EORs 3, 5, 10, 20, 21, 37); LWRWEA (FNAI EORs 9, 11, 14, 19, 26, 33, 36, 38); Hickory Lake Scrub, Polk County Natural Resources Division; (FNAI EOR 4); and TNC's Saddle Blanket Lakes Preserve and Sunray Preserve (FNAI EORs 8, 35).

Eighteen EORs occur on privately owned, non-conservation land. Recent aerial photographs show that 10 of these 18 sites have been destroyed or are likely to be destroyed due to their small size and proximity to development (FNAI EORs 6, 15, 17, 18, 22, 23, 24, 29, 31, 32).

Four privately owned occurrences are proposed for acquisition by the Florida Forever Board of Trustees: Sunray/Hickory Lake South (FNAI EOR 16), Avon Park Lakes (FNAI EOR 25), Crooked Lake West (FNAI EOR 34), and the unacquired portion of Silver Lake (FNAI EOR 19 - part of this occurrence is protected on Silver Lake, part remains on private land). They are presumably intact and still supporting short-leaved rosemary, although no data have been collected from these sites since 1998, 1998, 1986, and 1987, respectively.

Five of the privately owned sites (FNAI EORs 2, 7, 12, 13, 30) that are not proposed for Florida Forever acquisition have not been surveyed for short-leaved rosemary since the 1980s. Four of these five privately owned sites appear on aerial photographs to be fairly intact and supported large numbers of short-leaved rosemary when last surveyed. FNAI EOR 2 had 500 vigorous plants in 1983, FNAI EOR 7 had 10,000 plants in 1983, FNAI EOR 12 had 1,000 plants in 1983, FNAI EOR 13 had 2,000 plants in 1987; for FNAI EOR 30, no abundance data was given but the site appears large and intact. These sites should be priorities for field surveys and, depending on the results of surveys, considered for conservation purchase.

There are no quantitative data available on population trends of short-leaved rosemary across its range. NatureServe (2008) describes the "Global Short Term Trend" for the species as: "rapidly declining to declining (decline of 10-50%)" and the "Global Long Term Trend" as "moderate decline (decline of 25 - 50%)," but there is no indication as to the source of these statements.

Short-leaved rosemary occurrences at some protected conservation sites are quite large and appear either stable or increasing in size; these include LWRSF (Malatesta 2008c; G.R.Knight, FNAI, pers. comm. 2008, K.Clanton, UCF, pers.

comm. 2008), Saddle Blanket Lakes Preserve (B.Pace-Aldana, TNC, pers. comm. 2006, Knight pers. comm. 2008), and LWRWEA (Knight pers. comm. 2008). Plant abundance at Hickory Lake Scrub County Park may have declined although plants are still relatively common there (T.Biehl, Polk County Environmental Lands Stewardship Program, pers. comm. 2008, Knight pers. comm. 2008).

Quantitative data are available for a few sites. The occurrences of short-leaved rosemary on LWRSF have been visited and counted several times over the last 20 years. This population has always been notable. It was described by Gary Schultz, FNAI ecologist, as having more than 5,000 plants – “too many to count” – in 1983 (FNAI 2008). In an unpublished summary, Anne Malatesta, Division of Forestry District Biologist, assessed the species’ status as stable/increasing on LWRSF based on data collected by Carl Weekley, ABS ecologist, who counted more than 2,565 plants in 1998, and on a report by Kris Delaney of 5,381 plants counted during a 2005-2008 survey (Malatesta 2008c). Keith Clanton (pers. comm. 2008) recently counted nearly 7,000 short-leaved rosemary plants and recorded location information.

These figures may be somewhat misleading. In a report to the Service describing population trends on LWRSF (FDACS 2007), Division of Forestry biologists stated: “The current estimated minimum population size is approximately double that estimated in 1988. Such increases should be regarded with skepticism as a significant portion of the population ‘growth’ owes to the addition of the area between School Bus Road and Lake Arbuckle. This area was placed under the management of the Florida Division of Forestry between the survey of 1988 and the survey of 2006...short-leaved rosemary has not been found on any of the LWRSF tracts other than the original tract (i.e., Arbuckle).” In other words, the increase in the number of plants on LWRSF is largely due to an increase in the size of the area surveyed, as opposed to any actual population increase on the site. However, this upward trend is supported by anecdotal observations. According to Anne Malatesta, biologist at LWRSF, short-leaved rosemary appears to be increasing in response to prescribed fires and post-hurricane clearing in 2005 that resulted in opening up the canopy in sand pine scrub (Malatesta pers. comm. 2008a).

The population at Saddle Blanket Lakes, now owned by TNC, contained more than 1,000 plants in 1983 (FNAI EOR 8). This population is not monitored by TNC but is described by Beatriz Pace-Aldana, TNC biologist: “*Conradina [brevifolia]* occurs throughout the burned and unburned scrubs of our Saddle Blanket Scrub Preserve and seems stable, so at this time it is not a high priority species for us. We have observed that seedlings come up in burned areas.” (Pace-Aldana pers. comm. 2006).

The LWRWEA is owned and managed by FWC; it consists of 19 sites scattered over the LWR. There are seven FNAI EORs for the LWRWEA (9, 11, 14, 19, 26, 33, 36, 38), dating from 1980 - 2002, with updates as recently as April 2008.

These occurrences probably total more than several thousand plants. ABS is currently conducting rare plant monitoring on scrub sites owned by FWC. To date, short-leaved rosemary has been searched for on the Carter Creek North and Silver Lakes units of the LWRWEA; it has been found only on Silver Lakes (S.Smith, ABS, pers. comm. 2008).

Hickory Lake Scrub County Park was described in 1983 as having “1000s of plants” (FNAI EOR 4). In 1998, three separate occurrences at this site were described by FNAI as, respectively, occasional, locally common, and abundant, greater than 500 plants. Tabitha Biehl, with Polk County’s Environmental Lands Program, recently mapped two sites, with a total of 75-150 plants (Biehl pers. comm. 2008a). The decline in numbers at this site may be due to lack of fire; it may also be an apparent decline because the earlier data may have been recorded from a larger area than is currently included in the current park (Biehl pers. comm. 2008b).

The status of occurrences and trends of short-leaved rosemary on private lands is unknown; however, analysis by the author of recent aerial photographs indicates that many of these sites are destroyed or likely to be destroyed. Given the rapid pace of development in central Florida, the long-term prospects for privately owned populations are poor (Turner et al. 2006). No demographic studies have been conducted for short-leaved rosemary.

b. Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding): Population genetic data was used to assess patterns of genetic structure in *C. brevifolia* (Edwards 2007). Very little genetic structure was evident, suggesting high levels of gene flow among populations. This was contrary to expectations, given that populations of *C. brevifolia* are highly fragmented. Edwards (2007) concluded that population fragmentation does not appear to have reduced gene flow. However, these are long-lived shrubs and extant individuals mostly pre-date fragmentation. As a result, current levels of gene flow are likely to be manifested only in seeds, seedlings, and post-fragmentation recruits.

c. Taxonomic classification or changes in nomenclature: There have been no changes in nomenclature for short leaved rosemary. Some botanists have questioned the validity of species status for short-leaved rosemary, viewing it as indistinct from false rosemary (Service 1999). A population genetic study (Edwards et al. in review) was conducted to understand the species boundaries and patterns of genetic structure in *Conradina*. *C. brevifolia* was found to be genetically distinct from *C. canescens* and should be treated as a distinct species. This research confirmed the results of earlier studies by the same authors (Edwards et al. 2006).

d. Spatial distribution, trends in spatial distribution or historic range (e.g., corrections to the historical range, change in distribution of the species' within its historic range): Short-leaved rosemary occurs in Highlands and Polk Counties, Florida (58 FR 37432) and is restricted to an area of less than 2,023 hectares (4,999 acres) in the central portion of the LWR; it is more restricted than most other rare endemic scrub plants (Service 1999).

The range of short-leaved rosemary has been increasingly fragmented since it was first documented; at least 10 of the 36 FNAI EORs have been destroyed or are likely to be destroyed (FNAI EORs 6, 15, 17, 18, 22, 23, 24, 29, 31, 32). No new populations have been reported to FNAI since 1998 despite extensive, ongoing research and surveys on the LWR. Friedman et al. 1993 as cited in Turner et al. (2006) estimate that approximately 85% of scrub and sandhill habitat on the LWR has been lost and that the remaining 15% exists largely as fragments surrounded by development and citrus groves.

Turner et al. (2006) analyzed short-leaved rosemary distribution data and concluded that the combination of small area of occupancy and limited geographical extent places short-leaved rosemary at high risk of extinction. Given that their analyses included one EOR that is in error (see below) and 10 EORs that are likely destroyed, the prospects for extinction for short-leaved rosemary are presumably worse than estimated in the Turner et al. (2006) analysis.

The FNAI database contains 36 EORs for short-leaved rosemary, with last observation dates ranging from 1983 to 2008. All but one of these EORs occurs on the LWR within a narrow, north-south oriented band of less than 2,000 hectares in southern Polk County and northern Highlands County. The single outlier (FNAI EOR 28) is based only on a written report to FWC (Christman 1988) and is mapped in eastern Osceola County, on Bull Creek Wildlife Management Area, approximately 65 kilometers from the closest population in Polk County. The FNAI database contains no information on this occurrence's size or status. Turner et al. (2006) include this occurrence based on the FNAI EOR only. No voucher specimens from Osceola County for either short-leaved rosemary or false rosemary have been deposited at the three major Florida herbaria, University of Florida, University of South Florida, and Florida State University. This report is very likely in error.

Recent aerial photography indicates that 10 populations of short-leaved rosemary have been or likely will be destroyed by clearing and development (FNAI EORs 6, 15, 17, 18, 22, 23, 24, 29, 31, 32). Most of the destroyed or potentially destroyed populations occur near the north and south ends of the central core of populations.

e. Habitat or ecosystem conditions (amount, distribution, and suitability of habitat): Short-leaved rosemary occurs on xeric white sands that support

evergreen oak-Florida rosemary-sand pine scrub. Overall, approximately 85% of scrub and sandhills of the LWR have been lost to commercial and residential development, citrus production, and other agricultural uses (Weekley et al. 2008). Forty-seven percent of the white sand habitats (includes both scrub and scrubby flatwoods) on the LWR have been converted to other uses (Weekley et al. 2008). Short-leaved rosemary habitat occurs primarily in the southern end of the LWR (90% in Polk and Highlands Counties). Although short-leaved rosemary is more restricted than most other rare endemic scrub plants, this is not due to a lack of white sand habitat. Extensive areas of potential habitat are unoccupied by this species, possibly due to fire suppression and to inherent limitations to dispersal (Weekley et al. 2008).

2. Five-Factor Analysis

a. Present or threatened destruction, modification, or curtailment of its habitat or range: The most recent information on the magnitude of threats to short-leaved rosemary is in Turner et al. (2006). In that report, the authors estimate that approximately 85% of scrub and sandhill habitat on LWR have been lost and that the remaining 15% exists largely as fragments surrounded by development and citrus groves. Short-leaved rosemary habitat has been increasingly fragmented since it was first documented; at least 10 of the original 36 FNAI EORs are destroyed or likely to be destroyed (FNAI EORs 6, 15, 17, 18, 22, 23, 24, 29, 31, 32). Turner et al. (2006) found that short-leaved rosemary has a geographic extent of approximately 234 kilometers² (23,400 hectares) and an area of occupancy on conservation lands (no data available for private lands) of 9 kilometers² (900 hectares) and is one of 8 rare scrub species whose small area of occupancy and limited geographical extent places it at high risk of extinction. They state that considering short-leaved rosemary's area of occupancy and geographic extent, conservation land acquisition may not be adequate to prevent its extinction "...even if all of the unprotected areas targeted for protection are secured, [short-leaved rosemary] will remain at great risk of extinction" Turner et al. (2006). Given that the analyses regarding area of occupancy and geographic extent are based largely on data (FNAI 2008) which have not been updated in most cases for more than 10 years, and given the pace and extent of habitat destruction on the LWR, it is likely that the actual geographic extent for short-leaved rosemary is smaller than calculated by Turner et al. (2006). Given that "area of occupancy" data were not available for private lands, it is probable that this number is higher than estimated by Turner et al. (2006).

The Service believes that the most important conservation measures for short-leaved rosemary are land acquisition, conservation, restoration, and management. From 1992-2005, the State of Florida spent more than \$68 million to acquire conservation land on the LWR; an additional 10,000 hectares are proposed for acquisition (Turner et al. 2006). Federal and county agencies and non-government organizations supplemented State purchases, bringing the total amount of protected land on LWR to 23,711 hectares in a patchwork of preserves,

refuges, state forests, parks, and wildlife and environmental areas. Weekley et al. (2008) state that “about eleven percent of the Lake Wales Ridge is currently protected in conservation lands, i.e., lands acquired by government or non-government organizations for the protection, maintenance and/or restoration of native ecosystems.” However, even if current land acquisition plans for LWR are completely successful, only 7.5% of the xeric upland habitats that existed on LWR prior to widespread human settlement will have been preserved (Turner et al. 2006). Habitat loss and fragmentation and range reduction for this species is a significant and on-going threat.

b. Overutilization for commercial, recreational, scientific, or educational purposes: There is commercial trade of short-leaved rosemary because it is easily propagated and has been put in cultivation. Commercial trade should not adversely impact the species in the wild, provided that it is dependent upon cultivated plants and not plants removed from the wild. However, indiscriminate collecting of plants from the wild was identified as a potential threat in the original listing package. There is no data to suggest that overutilization for commercial purposes is a major threat to this species at this time. It is unknown if this could become a major threat in the future.

c. Disease or predation: This factor was not identified as a threat to short-leaved rosemary in the original listing package. No diseases or predators have been observed to affect short-leaved rosemary in the LWR protected areas. We do not have evidence to suggest that disease or predation are a threat to this plant at this time.

d. Inadequacy of existing regulatory mechanisms: The Endangered Species Act 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.

No populations of short-leaved rosemary have been documented on federally owned lands. Approximately one-half of the extant populations of short-leaved rosemary occur on lands owned by the State and are, therefore, covered by the “Preservation of Native Flora of Florida” law. The remaining populations occur on private lands and can be legally destroyed. Therefore, half of the known populations are unprotected under existing regulations. As a result, existing regulatory mechanisms are inadequate to protect the species.

e. Other natural or manmade factors affecting its continued existence: No other natural or manmade factors are known to affect the continued existence of short-leaved rosemary.

D. Synthesis - The recovery plan (Service 1999) for short-leaved rosemary contains objective, measurable criteria for reclassification but not for delisting. Short-leaved rosemary occurs in Highlands and Polk Counties, Florida (58 FR 37432) and is restricted to an area of less than 2,023 hectares in the central portion of the LWR. The species is found nearly throughout its historical range, although the remaining habitat is largely fragmented. Extensive areas of potential habitat are unoccupied by this species, possibly due to fire suppression and inherent limitations to dispersal (Weekley et al. 2008).

The FNAI database contains 36 EORs for this species, but one is likely in error. No new occurrences have been discovered since 2002. Prior to 1998, 18 occurrences were documented on privately owned land. Recent aerial photographs show that 6 of these sites have been completely destroyed, and 12 sites appear to support lightly- to moderately-disturbed scrub and, presumably, short-leaved rosemary. Several of these appear to be large, high quality sites that supported large numbers of short-leaved rosemary when last surveyed. Seventeen EORs occur on five conservation managed areas and are presumed or known to be extant. Where protected and ecologically managed, populations are quite large and appear to be stable or increasing in size. No recent field work has been conducted to determine the species' current distribution or the status of all known populations. No research studies have addressed its demography or response to fire or other management regimes.

Land conservation and ecological management may not be adequate to protect this species from extinction (Turner et al. 2006). Turner et al. (2006) found that short-leaved rosemary's small area of occupancy and limited geographical extent places it at high risk of extinction and may warrant translocation and/or captive propagation to ensure its survival.

Nothing is known, beyond anecdotal observations, about demographics or population trends. Without this information, the long-term prospects for this species' survival cannot be assessed. The lack of monitoring data and recent field surveys makes it difficult to assess if changes in the species' status have occurred. Because habitat degradation, destruction, and fragmentation continue to occur and the geographic range of the species is limited, short-leaved rosemary continues to meet the definition of endangered under the Act.

III. RESULTS

A. Recommended Classification:

No change is needed

IV. RECOMMENDATIONS FOR FUTURE ACTIONS

High priority recovery actions:

- Continue to acquire sites for conservation.
- Manage conservation sites to maintain scrub habitat.
- Monitor species' response to management actions.
- Conduct basic research into biology and ecology.

Revisions or updates of recovery plans:

The species' recovery plan should be updated to include delisting criteria, but the lack of information should be addressed before the recovery plan is revised.

Data and information needs:

- Conduct field surveys of all occurrences on private land to determine their status, gathering quantitative data where possible.
- Conduct field surveys of all occurrences on managed areas, gathering quantitative data as a baseline for conducting monitoring studies.
- Establish a close working relationship between agencies and organizations that collect, manage, and use data on LWR species to ensure data sharing. If all agencies and organizations have current and complete data, land management and spending priority decisions will be better informed.
- Conduct research on basic biology and ecology of the species (e.g., demographic studies, population viability and risk assessment analyses, analysis of habitat and microhabitat characteristics, determination of optimal management requirements).
- Monitor managed populations to determine responses to management actions, and human and natural disturbances.
- Continue to research propagation, translocation, and reintroduction techniques and consider maintaining germplasm in long-term storage.

Ex-situ conservation:

Maintain plants in the national plant collection at Historic Bok Sanctuary conservation garden as well as germplasm in long-term storage (Center for Plant Conservation 2008). Currently, short-leaved rosemary populations are not well represented in the germplasm collection at Historic Bok Sanctuary, where only 180 living individuals, all from a single population, are maintained and where there is no stored seed (Peterson, pers. comm. 2008a).

V. REFERENCES

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**U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW OF SHORT-LEAVED ROSEMARY (*CONRADINA BREVIFOLIA*)**

Current Classification Endangered
Recommendation resulting from the 5-Year Review

- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed

Appropriate Listing/Reclassification Priority Number, if applicable _____

Review Conducted By Linda G. Chafin, State Botanical Garden of Georgia

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve [Signature] Date 7-15-08

The lead Field Office must ensure that other offices within the range of the species have been provided adequate opportunity to review and comment prior to the review's completion. The lead field office should document this coordination in the agency record.

REGIONAL OFFICE APPROVAL:

The Regional Director or the Assistant Regional Director, if authority has been delegated to the Assistant Regional Director, must sign all 5-year reviews.

for Lead Regional Director, Fish and Wildlife Service

Approve [Signature] Date 8/8/08

The Lead Region must ensure that other regions within the range of the species have been provided adequate opportunity to review and comment prior to the review's completion. If a change in classification is recommended, written concurrence from other regions is required.

Cooperating Regional Director, Fish and Wildlife Service

Concur Do Not Concur

Signature _____ Date _____

Summary of peer review for the 5-year review of Short-leaved rosemary (*Conradina brevifolia*)

A. Peer Review Method: The Service conducted peer review. Three peer reviewers were selected by the Service. Individual responses were requested and received from each of the peer reviewers.

B. Peer Review Charge: See attached guidance.

C. Summary of Peer Review Comments/Report: The reviewers felt the five-year review was thorough and all agreed with the conclusions of the review. One peer reviewer pointed out changes in numbers and protection status of FNAI element occurrence records and suggested minor edits to the wording of the text. Another reviewer agreed with the conclusion that not enough data are available to assess the adequate number of self-sustaining populations in order to assure the persistence of the species, but objected to the wording of the criterion itself. The same reviewer questioned the data sources and conclusions from Turner et al. (2006); and cautioned against using this report's conclusions as a basis for undertaking a captive propagation and translocation program. This reviewer also contributed useful taxonomic data from a recently conducted population genetic study. A third peer reviewer provided information regarding the status of ex situ populations of short-leaved rosemary as well as protocols for propagation and ex situ maintenance of plants.

D. Response to Peer Review: A new data request was submitted to FNAI and updated element occurrence records were received; these data were incorporated into the status review. In addition, suggested minor edits were made. Edits were made to reflect concerns about the adequacy of the recovery criterion, and suggestions for revising the criterion were incorporated. The reviewer's concern about reliance on Turner et al. (2006) was partially addressed via edits. In addition, potential limitations to Turner et al. (2006) data sources (primarily FNAI) were emphasized at length in the text. Changes were made to the text to reflect this reviewer's caution regarding translocation and propagation. However, given that the analyses and conclusions of Turner et al. (2006) are widely accepted in the Lake Wales Ridge science and conservation communities, this report and its conclusions are legitimately used as a primary source for the status review. In response to comments, information regarding the number and condition of plants in ex situ collections were added to the text. The status review format does not provide an opportunity for incorporating the protocols for propagation and ex situ maintenance of plants.

Guidance for Peer Reviewers of Five-Year Status Reviews
U.S. Fish and Wildlife Service, South Florida Ecological Services Office

February 20, 2007

As a peer reviewer, you are asked to adhere to the following guidance to ensure your review complies with U.S. Fish and Wildlife Service (Service) policy.

Peer reviewers should:

1. Review all materials provided by the Service.
2. Identify, review, and provide other relevant data apparently not used by the Service.
3. 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 that potential implications of uncertainties for the technical conclusions drawn are clear.
 - Strengths and limitation of the overall product.
5. Keep in mind the requirement that the Service must use the best available scientific data in determining the species' status. This does not mean the Service must have statistically significant data on population trends or data from all known populations.

All peer reviews and comments will be public documents and portions may be incorporated verbatim into the Service's final decision document with appropriate credit given to the author of the review.

Questions regarding this guidance, the peer review process, or other aspects of the Service's recovery planning process should be referred to Cindy Schulz, Endangered Species Supervisor, South Florida Ecological Services Office, at 772-562-3909, extension 305, email: Cindy_Schulz@fws.gov.