CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

Other proposals

A. Proposal

Delete *Kalmia cuneata* from Appendix II.

B. Proponent

The United States of America

C. Supporting Statement

1. Taxonomy

1.0 Division:	Magnoliophyta (angiosperms; flowering plants)	
1.1 Class:	Magnoliopsida (dicotyledons)	
1.2 Order:	Ericales	
1.3 Family:	Ericaceae	
1.4 Species:	*Kalmia cuneata* Michaux 1803	
1.5 Scientific synonyms:	*Chamaedaphne cuneata* (Michaux) O. Kuntze (1891)	
1.6 Common names:	English:	white wicky, laurel
	French:	none
	Spanish:	none
1.7 Code Number:	–	

2. Biological Parameters

Kalmia cuneata is a small (0.5-2.0 meters), upright, sparsely branched, deciduous shrub of the Heath Family (Ericaceae). The line drawing (Figure 1) of *Kalmia cuneata* presented in Rayner's (1980) status survey is reproduced for this proposal. The drawing depicts a flowering stem (a), closeups of a mature flower (c) and fruit (b), and a closeup of a young stem showing typical stipitate-glandular pubescence (d).

2.1 Distribution

Kalmia cuneata is an endemic of the southeastern Coastal Plain of the United States (van Eerden 1995, TNC 1998). Van Eerden (1995) verified 78 extant populations of *K. cuneata*, 76 of them in North Carolina. A range map depicting the distribution of *Kalmia cuneata* by county, adapted from van Eerden (1995), is presented as Figure 2.

Kalmia cuneata is restricted to pocosin communities in the Sandhills and Inner Coastal Plain of North Carolina and the Sandhills of South Carolina, an area of fluvial sand and gravel deposits adjacent to the Fall-line Piedmont (Rayner 1980, van Eerden 1995, TNC 1998). Pocosin communities are characterized by strongly acidic and nutrient-poor sandy humus, muck or peat soils supporting a generally dense shrub layer composed of evergreen heaths and hollies (Richardson 1981, Weakley and Schafale 1991). Fire naturally occurred in nearly all pocosin

communities and plays an important role in successional dynamics. Pocosin vegetation is also strongly influenced by hydrologic conditions (van Eerden 1995).

2.2 Habitat availability

Kalmia cuneata is limited to moist ecotones between streamhead pocosins (linear shrub swamps along small creeks and headwater stream branches) and longleaf pine (*Pinus palustris*)/wiregrass (*Aristida stricta*) communities in the Carolina sandhills (Rayner 1980, Van Eerden 1995, TNC 1998). Farther out on the Coastal Plain, the ecotone may be along sand rim margins of Carolina bays or even within the bays (TNC 1998).

Frequent fire disturbance is important to this species' success (van Eerden 1995, TNC 1998)(see Section 4.2.3). Successional changes that occur in the absence of fire most likely lead to the decline *K. cuneata* since it occurs among many shrub species with which it cannot successfully compete (Rayner 1980, van Eerden 1995). Four of the six historic locations where *K. cuneata* could not be relocated by Rayner (1980) had not been burned in many years. The entire habitat of this species may be in transition as a result of fire suppression (Rayner 1980).

2.3 Population status

There are two main centers of abundance of *K. cuneata*: the Sandhills Region of North Carolina and the Inner Coastal Plain Region in Bladen and Cumberland Counties, North Carolina. Eleven North Carolina populations of *K. cuneata* contain more than 500 stems each, several of these extending to many thousands of stems (van Eerden 1995, North Carolina Plant Conservation Program 1996).

Only two populations are currently known in South Carolina. Historical populations in other areas of the South Carolina Sandhills and eastern North Carolina have probably been extirpated or greatly reduced in extent and number over the last 200 years (van Eerden 1995).

Kalmia cuneata is considered Vulnerable (G3)[1] throughout its range (TNC 1998). In North Carolina, this species is considered Vulnerable (S3)[2](TNC 1998). In South Carolina, it is considered Critically Imperiled (S1)[3](TNC 1998).

Habitat loss due to land development, conversion to agriculture or silviculture, and fire suppression are the main threats to this species (TNC 1998)(see Section 2.7). Though the overall number of *K. cuneata* occurrences is high, the overall health of many of these occurrences is threatened by loss of habitat from fire suppression and land conversion, especially in the Cape Fear Valley (van Eerden 1995).

2.4 Population trends

Although the overall range of *K. cuneata* is about the same now as it was historically, most of the current populations are confined to a small portion of that range (TNC 1998). The abundance of *K. cuneata* in the Cape Fear Valley in Bladen and southern Cumberland Counties, North Carolina, and the Sandhills Region in Hoke, Richmond, and Scotland Counties, North Carolina suggests that they have always been strongholds for the species (van Eerden 1995).

Kalmia cuneata appears to be secure in the North Carolina Sandhills Region (van Eerden 1995). The bulk of known populations occur on Fort Bragg and the Sandhills Game Land, properties which are well-protected and managed with prescribed burning. Populations on these properties

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1 Vulnerable - Vulnerable globally either because very rare and local throughout its range, found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extinction. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.

2 Vulnerable - Vulnerable in the state either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences.

3 Critically Imperiled - Critically imperiled in the state because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the state. Typically 5 or fewer occurrences or very few remaining individuals or acres.

can be expected to remain stable or increase over time as a result of controlled burning programs. A number of populations located on private land in the region have been extirpated since 1980. Other populations located on private lands will probably decline over time due to the lack of periodic disturbance (except for those found along powerline rights-of-way, which may persist indefinitely)(van Eerden 1995).

In South Carolina, *Kalmia cuneata* is truly a rare plant with only two known occurrences, both located on the Sandhills National Wildlife Refuge (SNWR) in Chesterfield County. Other populations once known from the northern sandhill counties of the State have apparently been extirpated. The likelihood of discovering new populations on other lands is low, due to habitat fragmentation and pervasive fire suppression. The SNWR populations appear to be secure; prescribed burning on the property is maintaining suitable habitat and stimulating vegetative reproduction in at least one of the populations (van Eerden 1995).

The bulk of significant populations of *K. cuneata* in the Inner Coastal Plain are located on private land. These cannot be considered secure due to the constant threat of destruction from land conversion. Populations on publicly owned land can probably also not be considered secure due to gradual loss of habitat from fire suppression. All populations in the region are probably in decline due to fire suppression (except those found along powerline rights-of-way, which are stabilized to increasing in size due to periodic mowing). Although *K. cuneata* is currently common in Bladen County and southern Cumberland County, the long-term outlook for the species is poor unless more of the private land populations are protected and fire is reintroduced (van Eerden 1995).

In summary, *K. cuneata* appears to have declined in the eastern and southern portions of its range over the last several hundred years due to loss of habitat from fire suppression and land conversion. Declines will continue to occur throughout its range, except on publicly owned lands in the Sandhills Region. Protection and management efforts should be focused on populations in the Inner Coastal Plain of North Carolina (van Eerden 1995).

2.5 Geographic trends

Kalmia cuneata was historically known from the Sandhills region of northeastern South Carolina in Chesterfield, Darlington, and Kershaw counties and the Sandhills region and Coastal Plain of southeastern North Carolina in Bladen, Craven, Cumberland, Hoke, Moore, Pender, Richmond, and Scotland counties (based on herbarium collections). This represented collections made between Michaux's 1794 type collection in Camden, Kershaw County, South Carolina and Rayner's 1980 status survey. It is not possible to determine if this distribution represents the true historic range of the species since dramatic changes in habitat conditions have occurred over the past two centuries, due to land conversion and fire suppression (van Eerden 1995).

Rayner (1980) documented the loss of *K. cuneata* from six historical locations. However, subsequent survey work has identified new subpopulations on Fort Bragg and Camp MacKall military reservations and Sandhills Game Land in North Carolina (van Eerden 1995, TNC 1998).

The current and historic range of *Kalmia cuneata* is presented in Tables 1 and 2 (from van Eerden 1995). A current total of 78 extant populations are located in eight of the eleven counties with historical collections. The bulk of these populations occur in Bladen, Hoke, Richmond, and Scotland counties, North Carolina (van Eerden 1995).

2.6 Role of species in its ecosystem

Kalmia cuneata is a spring- and summer-flowering perennial. It reproduces by rhizomes and seeds. Like other members of the genus, *K. cuneata* is primarily an insect-pollinated species (Ebinger 1974, van Eerden 1995, TNC 1998).

No birds are known to forage on the hard capsules and minute seed of *K. cuneata* (van Eerden 1995).

Certain ericaceous understory plants of temperate forests, such as *Kalmia* spp., proliferate following forest clear-cutting and fire. Rapid vegetative growth of these plants may affect

conifer regeneration due to their strong competitive abilities and allelopathic properties. Mallik (1996) has found in *K. angustifolia*-black spruce ecosystems of Eastern Canada, that the phenolic substances released by the *Kalmia* may bring about long-term habitat change by increasing soil acidity, altering available nutrients, and inducing iron pan formation. These changes in the post-disturbed *Kalmia*-dominated habitats may lead to the irreversible conversion of forests into heaths (Mallik 1996).

2.7 Threats

As noted above (Section 2.3), habitat loss due to land development, conversion to agriculture or silviculture, and fire suppression are the main threats to this species (van Eerden 1995, TNC 1998).

Land Conversion. Loss of habitat through drainage of Carolina bays and shrub pocosins and conversion to agriculture, silviculture, or other uses is a major threat to *K. cuneata*. However, since most land conversion occurred prior to intensive plant inventories, the relative loss of this species in these areas is unknown (TNC 1998). Table 3 (from van Eerden 1995) reveals that 4 of the 11 largest (A-ranked) known populations of *K. cuneata* occur on private land. These sites are particularly threatened by land conversion.

Fire Suppression. Loss of habitat through fire suppression is the primary threat to *K. cuneata*, especially on private lands (except for those along powerline easements)(van Eerden 1995). Even on properties with active fire management, land managers must determine optimal fire frequency and timing. On small properties, especially where surrounded by human development, fire management may be restricted and may not be adequate for the successful long-term health of *K. cuneata* habitats and the other longleaf pine/wiregrass communities associated with it (TNC 1998). In addition to maintaining suitable habitat conditions, fire is important to *K. cuneata* for stimulating vegetative reproduction and possibly for promoting sexual reproduction (van Eerden 1995, TNC 1998).

Disease and Predation. In his 1994 status survey, van Eerden (1995) observed no evidence of disease or predation upon *K. cuneata*. Other members of the genus *Kalmia* have foliage which is poisonous to cattle and sheep (van Eerden 1995), although young shoots of *K. latifolia* are often browsed by deer (Ebinger 1974). The chemical properties of *K. cuneata* are unknown (van Eerden 1995).

3. Utilization and Trade

3.1 National utilization

Kalmia cuneata is an attractive shrub, of interest to gardeners, although not as commonly cultivated as *K. latifolia* (Southall and Nelson 1978, Mathew 1994).

Kalmia cuneata is not collected from the wild to any appreciable extent (van Eerden 1995, North Carolina Plant Conservation Program 1996). One reason for this low collection rate is that the primary habitat, pocosin communities, may have been overlooked by collectors in the past (just as they are today) due to the generally low diversity levels they support and the difficulty of surveying them. Additionally, *K. cuneata* is easy to overlook if not in flower (or fruit). This is especially true in ecotonal situations where plants can be widely scattered. Another likely factor is that *K. cuneata* has always been a rare plant and a rather difficult one to find in the field (van Eerden 1995).

3.2 Legal international trade

No international trade in either wild-collected or artificially propagated *K. cuneata* has been reported within the last decade (WCMC *in litt.*, 1999). U.S. Fish and Wildlife, Office of Management Authority, CITES Annual Report Data for the years 1994-97 shows no trade in *K. cuneata* in recent years (FWS 1998).

3.3 Illegal trade

No have been no reported occurances of illegal trade in this species; nor have there been any reports of illegal collection from the wild.

3.4 Actual or potential trade impacts

At this time, the impact of international trade on the status of this species appears to be negligible, as it is neither reported in trade, nor is there evidence of illegal collection from the wild.

3.5 Artificial propagation for commercial purposes (outside country of origin)

Many *Kalmia* spp. are artificially propagated for commercial pur-ses (Hortus Third 1976, Bailey 1949, Griffiths 1994). They are generally hardy and very ornamental. *Kalmia latifolia* is the most popular and widely available *Kalmia* species, with a number of cultivars available.

Kalmia spp. can be propagated by seeds sown in pans of sandy peat or sphagnum and set outdoors the following year; also by cuttings of half-ripened wood under glass, by layers, and cultivars by veneer grafting (Hortus Third 1976).

Kalmia cuneata is easily propagated by seed under controlled greenhouse conditions if the seeds are first cold-stratified for several months (Southall and Nelson 1978, van Eerden 1995). Germination rates for non-stratified seed grown under controlled conditions are unknown.

4. Conservation and Management

4.1 Legal Status

4.1.1 National

Kalmia cuneata is not listed as either threatened or endangered under the provisions of the Endangered Species Act of 1973, as amended.

Kalmia cuneata is listed as an "Endangered-Special Concern" taxon in North Carolina. Such status provides protection under the State's Plant Protection and Conservation Act of 1979. Plants may not be removed from the wild except when a permit is obtained for research, propagation, or rescue (Weakley 1993). Propagated plant material may be traded or sold under specific regulations (Weakley 1993, TVA Regional Natural Heritage Project 1998). However, this listing is currently being modified as a result of van Eerden's (1995) recent rangewide survey which determined that this species is more abundant than once thought (Murdock *in litt*. 1999, Frost *in litt.* 1999).

Kalmia cuneata is listed as "of National Concern" by the South Carolina Advisory Committee, an unofficial listing for plants that offers no further legal protection (South Carolina Heritage Trust 1993, van Eerden 1995, Murdock *in litt.* 1999).

The pocosin wetlands *K. cuneata* occupies are currently regulated by Section 404 of the Clean Water Act. This legislation regulates the discharge of material into wetlands of the United States and establishes a permit program to ensure that discharges comply with environmental regulations. Activities in pocosins, such as land clearing using mechanical equipment or ditching, require permits under Section 404.

The ability of individuals and organizations to conduct prescribed burns for the management of *K. cuneata* on private lands is limited, in part due to state laws in North Carolina which discourage most types of prescribed burning (van Eerden 1995).

4.1.2 International

Kalmia cuneata is considered Rare[4] by IUCN (Vulnerable[5] in North Carolina and Endangered[6] in South Carolina)(Walter and Gillett 1998). This species has been listed in Appendix II of CITES since 1983.

4.2 Species management

4.2.1 Population monitoring

The Sandhills region of the Carolinas has been botanically explored in the past, but not intensively or on a species-specific basis. The same can be said for the thousands of Carolina bays (now mostly degraded or lost to development). Inventory work such as Rayner's status survey (1980), Carter's North Carolina Sandhills Survey (1982), the Fort Bragg/Camp MacKall rare plant inventory (TNC 1993), and van Eerden's status survey (1995) have been crucial in determining the actual population status of *K. cuneata*.

4.2.2 Habitat conservation

Sixty-one of the 106 known current and historic populations of *K. cuneata* occur on public land (see Table 4 from van Eerden 1995). Van Eerden (1995) found that those *K. cuneata* populations that occur on public lands (i.e., Fort

Bragg, Sandhills Game Land, Sandhills National Wildlife Refuge, Jones Lake State Park) are relatively secure due to protection and active prescribed burning programs.

4.2.3 Management measures

There are no comprehensive management programs in place to manage populations of *K. cuneata* or to ensure sustainable regeneration from utilization of the species. Key stewardship needs for this species include (1) conducting prescribed burns during the winter (for initial fuel-reduction burns) and the growing season; (2) protecting extant populations and their associated habitat from soil disturbance and alteration of hydrology; and (3) monitoring extant populations for responses to current land management practices (TNC 1998). Programs of prescribed burning (van Eerden 1995) maintain *K. cuneata* populations on some public lands. The Forest Service (van Eerden 1995) discourages prescribed burns in pocosin areas. Management activities on privately owned lands are unknown, except for powerline and gasline easements that are periodically mowed (or, in one case, treated with herbicide). Little in the way of prescribed burning occurs on private lands, especially in and around the pocosin habitats that *K. cuneata* occupies (van Eerden 1995).

4.3 Control measures

4.3.1 International trade

International trade does not appear to be a factor affecting the status of this species at this time. Therefore, no controls are necessary.

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4 Taxa with small world populations that are not at present 'Endangered' or 'Vulnerable,' but are at risk. These taxa are usually localized within restricted geographical areas or habitats or are thinly scattered over a more extensive range.

5 Taxa believed likely to move into the 'Endangered' category in the near future if the causal factors continue operating. Included are taxa of which most or all the populations are decreasing because of over-exploitation, extensive destruction of habitat or other environmental disturbance; taxa with populations that have been seriously depleted and whose ultimate security has not yet been assured; and taxa with populations that are still abundant but are under threat from severe adverse factors throughout their range.

6 Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included are taxa whose numbers have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be immediate danger of extinction. Also included are taxa that may be extinct but have definitely been seen in the wild in the past 50 years.

4.3.2 Domestic measures

See Section 4.1.1.

5. Information on Similar Species

In addition to *K. cuneata*, six other species of *Kalmia* L. (mountain laurels) are native to the United States. *Kalmia cuneata* is clearly distinguished from other species of *Kalmia* by numerous morphological features (Ebinger 1974, Southall and Hardin 1974). Vegetatively, *Vaccinium tenellum* is similar, but is only 0.5 m tall and has small glandular teeth on the leaf margins. *Gaylussacia frondosa* also has similar shaped leaves, but the plant's crown spreads widely, and the leaves are glabrous with little yellow resin dots beneath (TNC 1998).

6. Other Comments

Comments were sought via a public notice (July 8, 1999) in the U.S. *Federal Register* (64(130): 36893-36916). A draft of this proposal was also sent to appropriate agencies in the States where this species occurs. The U.S. Fish and Wildlife Service received no comments from individuals, agencies, or organizations concerning submission of this proposal.

7. Additional Remarks

This species does not qualify for retention in Appendix II, according to Resolution Conf. 9.24, since it is not known to be in trade, nor is it known, inferred, or projected that harvesting specimens from the wild for international trade has, or may have a detrimental impact on the species. Thus, it does not meet the criteria for inclusion of species in Appendix II in Accordance with Article II, Paragraph 2(a), as outlined in Resolution Conf. 9.24, Annex 2a. Members of the Plants Committee endorsed delisting of *Kalmia cuneata* at the Eighth meeting of the Plants Committee in Darwin, Australia, June 1999.

8. References

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Figure 1. Line drawing of *Kalmia cuneata*. Copied from Rayner (1980).

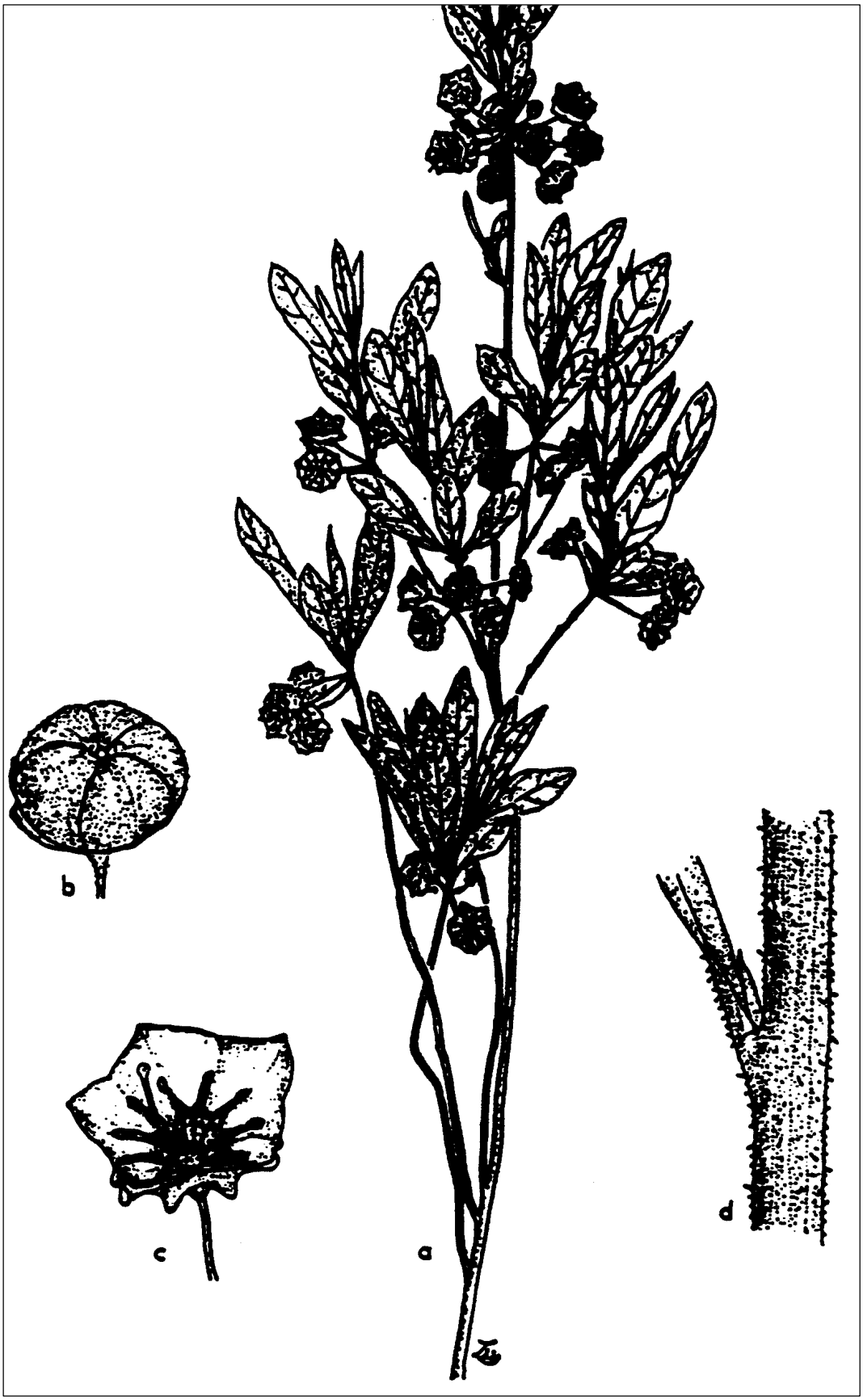
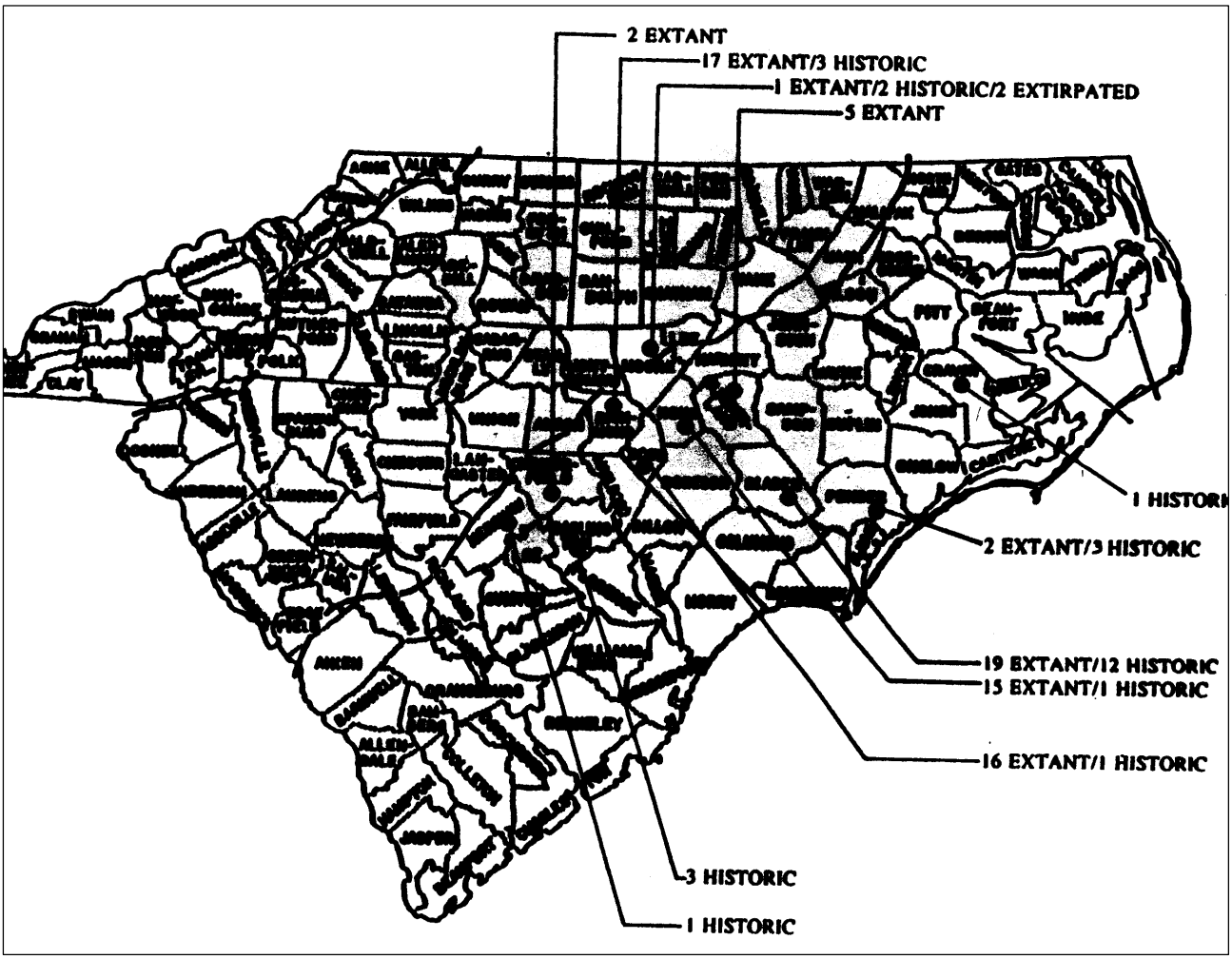


Figure 2. Range map of *Kalmia cuneata* (extant and historic occurrences).



Map copied from Manual of the vascular flora of the Carolinas (Radford, Ahles and Bell, 1968).

Table 1. Range of *Kalmia cuneata*. Populations are classified into seven categories, based on data from 1994 field surveys. The number of populations in each status category is reported for each country.

RANK

A - populations with greater than 500 stems.
B - populations with 200-500 stems.
C - populations with 50-200 stems.
D - populations with 1-50 stems.
PX - possibly extirpated populations.
X - known extirpated populations.
? - rank unknown (populations not surveyed).

NORTH CAROLINA

COUNTY	A	B	C	D	PX	X	?	TOTALS
BLADEN	5	5	0	10	4	0	7	31
CRAVEN	0	0	0	0	0	0	1 (PX)	1
CUMBERLAND	1	3	0	1	0	0	0	5
HOKE	3	4	5	3	1	0	0	16
MOORE	0	0	0	1	0	2	2	5
PENDER	1	0	1	0	0	0	3	5
RICHMOND	0	4	7	6	1	0	2	20
SCOTLAND	1	4	6	5	0	0	1	17

SOUTH CAROLINA

COUNTY	A	B	C	D	PX	X	?	TOTALS
CHESTERFIELD	2	0	0	0	0	0	0	2
DARLINGTON	0	0	0	0	0	0	3 (PX)	3
KERSHAW	0	0	0	0	0	0	1 (PX)	1
Totals	13	20	19	26	6	2	20	106

Table 2. Summary table of *Kalmia cuneata* populations.

RANK

A - populations with greater than 500 stems
B - populations with 200-500 stems
C - populations with 50-200 stems
D - populations with 1-50 stems
PX - possibly extirpated populations
X - known extirpated populations
? - rank unknown (populations not surveyed)

TREND

↓ - population decreasing (based on comparison of stem numbers and on condition of habitat)
↑ - population increasing (based on comparison of stem numbers and on condition of habitat)
= - population stabilized
? - population trend unknown
N - new population; predicted future trends of the population are provided in parentheses.
PX - possibly extirpated
X - extirpated

OWNER

AB - Angola Bay Game Lands (NC Wildlife Resources Commission)
BLSF - Bladen Lakes State Forest (NC Forestry Commission)
BUSHY - Bushy Lake State Natural Area (NC Dept. of Environ., Health, and Nat. Resources)
DOA - McCain tract (NC Department of Agriculture)
FB - Fort Bragg Military Reservation (Dept. of Defense)
HSGL - Holly Shelter Game Land (NC Wildlife Resources Commission)
JONES - Jones Lake State Park (NC Dept. of Environ., Health, and Nat. Resources)
NCBG - Gordon Butler Nature Preserve (NC Botanical Garden)
P - private
SGL - Sandhills Game Land (NC Wildlife Resources Commission)
SINGLE - Singletary Lake State Park - (NC Dept. of Environ., Health, and Nat. Resources)
USFWS - Sandhills National Wildlife Refuge (US Fish and Wildlife Service)

Pop	County	Owner	Trend	Size stems seen (estimate)	Rank
NC-001	NC-BLAD	P	↓ (PX)	NOT FOUND	PX
NC-002	NC-CUMB	BUSHY	=↓?	500 (1,000,000)	A
NC-003	NC-PEND	HSGL	↓?	NOT FOUND	?
NC-004	NC-BLAD	SINGLE	=↓?	35	D
NC-005	NC-BLAD	P	=↓?	1000 (40,000)	A
NC-006	NC-RICH	P	↓	27	D
NC-007	NC-MOOR	P	X	NOT FOUND	X
NC-008	NC-BLAD	P	=?	45	D
NC-009	NC-BLAD	P	↓?	37	D
NC-010	NC-SCOT	SGL	=↑	214	B
NC-011	NC-BLAD	P	↓ (PX)	41	D
NC-012	NC-CUMB	NCBG	=?	220-385	B
NC-013	NC-MOOR	DOA	↓=	150+	B
NC-014	NC-MOOR	P	N (↓)	11	D
NC-015	NC-BLAD	P	?	NOT SURVEYED	?
NC-016	NC-SCOT	SGL	=	65	C
NC-017	NC-BLAD	BLSF	=↓?	100 (3000)	A/B
NC-018	NC-RICH	SGL	=↑	320	B
NC-019	NC-RICH	SGL	=↓?	189	C
NC-020	NC-RICH	SGL	↓ (PX)	NOT FOUND	PX
NC-021	NC-RICH	SGL	=↑?	36	D
NC-022	NC-BLAD	BLSF	↓ (PX)	NOT FOUND	PX
NC-023	NC-BLAD	BLSF	↓ PX	NOT FOUND	PX
NC-024	NC-RICH	SGL	=↑	465	B
NC-025	NC-RICH	SGL	=↑	155	C
NC-026	NC-RICH	SGL	↓=?	100	C
NC-027	NC-SCOT	SGL	=↑	49	C
NC-028	NC-SCOT	SGL	↓	16	D
NC-029	NC-SCOT	SGL	=	271	B
NC-030	NC-RICH	SGL	?	NOT SURVEYED	?

Pop	County	Owner	Trend	Size stems seen (estimate)	Rank
NC-031	NC-PEND	P	=↑	135	C
NC-032	NC-BLAD	P	↓	5	B
NC-033	NC-MOOR	P	?	NOT SURVEYED	?
NC-034	NC-NOXE	PB	=↑	NOT SURVEYED	C
NC-035	NC-NOXE	PB	=↑?	NOT SURVEYED	B
NC-036	NC-NOXE	PB	=↑	NOT SURVEYED	C
NC-037	NC-NOXE	PB	=↑?	NOT SURVEYED	C
NC-038	NC-NOXE	PB	=↑	NOT SURVEYED	A/B
NC-039	NC-MOOR	P	X	NOT FOUND	X
NC-040	NC-BLAD	BLSF	↓=?	50	B
NC-041	NC-BLAD	BLSF	?	NOT SURVEYED	?
NC-042	NC-BLAD	BLSF	↓ (PX)	NOT FOUND	PX
NC-043	NC-PEND	P	?	NOT FOUND	?
NC-044	NC-CRAV	P	? (PX)	NOT FOUND	? (PX)
NC-045	NC-MOOR	P	?	NOT SURVEYED	?
NC-046	NC-RICH	P	↓=	NOT SEEN (PARTIAL SURVEY)	B/C
NC-047	NC-NOXE	PB	↑=	NOT SURVEYED	A
NC-048	NC-NOXE	PB	↑=	NOT SURVEYED	C
NC-049	NC-PEND	AB	N (=↑)	70 (40,000)	A
NC-050	NC-RICH	P	↓ ?	40 (PARTIAL SURVEY)	C
NC-051	NC-NOXE	P	↓ (PX)	NOT FOUND	PX
NC-052	NC-RICH	SBL	?	NOT SURVEYED	?
NC-053	NC-RICH	SBL	N (↓)	8	B
NC-054	NC-NOXE	PB	=↑	NOT SURVEYED	A
NC-055	NC-NOXE	PB	=↑	NOT SURVEYED	B
NC-056	NC-NOXE	PB	=↑	NOT SURVEYED	B
NC-057	NC-NOXE	PB	=↑	NOT SURVEYED	B
NC-058	NC-NOXE	PB	=↑	NOT SURVEYED	C
NC-059	NC-SCOT	CRA	=↑	NOT SURVEYED	B
NC-060	NC-SCOT	SBL	N (=)	15	B
NC-061	NC-SCOT	SBL	N (=)	2	B
NC-062	NC-RICH	SBL	N (=↑)	64	B
NC-063	NC-RICH	SBL	N (=↓)	66	C
NC-064	NC-NOXE	PB	N (=↑)	150 (+)	B
NC-065	NC-RICH	SBL	=↑	35	C
NC-066	NC-BLAD	P	N (↓=?)	106	B/C
NC-067	NC-CUMB	P	N (↓=?)	75 (SEVERAL HUNDRED)	B
NC-068	NC-BLAD	P	N (=↓?)	61 (SEVERAL THOUSAND)	B
NC-069	NC-CUMB	P	N (↓)	1	B
NC-070	NC-BLAD	P	N (=↓)	7	B
NC-071	NC-BLAD	P	N (=↓)	8	B
NC-072	NC-BLAD	P	N (=↓)	75 (2000)	A
NC-073	NC-BLAD	P	N (=↓)	3	B
NC-074	NC-BLAD	P	N (=↓)	300 (THOUSANDS)	A
NC-075	NC-CUMB	P	N (=↓)	172 (HUNDREDS)	B
NC-076	NC-SCOT	SBL	N (=↑)	465	A
NC-077	NC-BLAD	P	N (=↓)	90 (THOUSANDS)	B
NC-078	NC-BLAD	P	N (=↑)	15	B (A?)
NC-079	NC-BLAD	P	N (=↑)	150	B
NC-080	NC-SCOT	SBL	N (=↑)	41	C
NC-081	NC-BLAD	P	N (=↓)	285 (30,000)	A
NC-082	NC-RICH	SBL	N (↓)	5	B
NC-083	NC-SCOT	SBL	N (=↑)	38	C
NC-084	NC-SCOT	SBL	N (=)	100-200	C
NC-085	NC-SCOT	SBL	N (↓=)	30	B
NC-086	NC-SCOT	SBL	N (↓=)	15	B
NC-087	NC-SCOT	SBL	N (=↑)	150-200	B
NC-088	NC-SCOT	SBL	N (=)	74	C
NC-089	NC-RICH	SBL	N (=↓)	89	C
NC-090	NC-MOOR	P	N (=↑)	15	B
NC-091	NC-RICH	SBL	N (=)	20+	B (B?)
NC-092	NC-RICH	SBL	N (=)	2	B
NC-093	NC-BLAD	JONES	?↓	NOT SURVEYED	B
NC-094	NC-BLAD	P	?	NOT SURVEYED	?
NC-AN1	NC-BLAD	P	?	NOT SURVEYED	?
NC-AN2	NC-BLAD	P	?	NOT SURVEYED	?

Pop	County	Owner	Trend	Size stems seen (estimate)	Rank
NC-AM3	NC-BLAD	P	?	NOT SURVEYED	?
NC-AM4	NC-BLAD	P	?	NOT SURVEYED	?
NC-AM5	NC-PEND	P	?	NOT SURVEYED	?
NC-AM6	NC-SCOT	P	?	NOT SURVEYED	?
SC-001	SC-DARL	P	? (PX)	NOT SURVEYED	? (PX)
SC-002	SC-KERS	P	? (PX)	NOT FOUND	? (PX)
SC-003	SC-DARL	P	? (PX)	NOT SURVEYED	? (PX)
SC-004	SC-CHES	USFWS	-	254	A
SC-005	SC-CHES	USFWS	H (=?)	337	A
SC-AM1	SC-DARL	P	? (PX)	NOT SURVEYED	? (PX)

Table 3. Summary of population trends and ranks on public and private lands.

KEY-
TREND

- S - populations stable (to possibly increasing) in size.
- SD - populations stable to decreasing in size.
- DR - populations decreasing.
- D? - populations probably decreasing in size (populations surveyed but not found).
- ? - unknown (populations not surveyed).
- X - populations extirpated.

RANK

- A - populations with greater than 500 stems.
- B - populations with 200-500 stems.
- C - populations with 50-200 stems.
- D - populations with 1-50 stems.
- PX - possibly extirpated populations.
- X - known extirpated populations.
- ? - rank unknown (populations not surveyed).

Owner	TREND S	SD	DR	D?	?	X	RANK A	B	C	D	PX	X	?
DOD - FORT BRAGG	13	-	-	-	-	-	3	3	5	2	-	-	-
DOD - CAMP MACKALL	1	-	-	-	-	-	-	1	-	-	-	-	-
NC DOT GAME - GORDON BUTLER	1	-	-	-	-	-	1	-	-	-	-	-	
NC DOA - MCCAIN NAT AREA	-	-	1	-	-	-	-	1	-	-	-	-	-
NCDENR - BLADEN LAKES SF	-	1	1	3	1	-	1	-	-	1	3	-	1
NCDENR - BUSHY LAKE SNA	-	1	-	-	-	-	1	-	-	-	-	-	-
NCDENR - JONES LAKE SP		-	-	-	1	-	-	-	-	1	-	-	-
NCDENR - SINGLETARY LK. SP	-	1	-	-	-	-	-	-	-	1	-	-	-
NC WRC - ANGOLA BAY GL	1	-	-	-	-	-	1	-	-	-	-	-	-
NC WRC - HOLLY SHELTER GL	-	-	-	1	-	-	-	-	-	-	-	-	1
NC WRC - SANDHILLS GL	20	6	3	1	2	-	1	6	12	10	1	-	2
USFWS - SANDHILLS NWR	2	-	-	-	-	-	2	-	-	-	-	-	-
PRIVATE	5	13	7	5	13	2	4	8	2	11	2	2	16
TOTALS	43	22	12	10	17	2	13	20	19	26	6	2	20

Table 4. Publicly owned and managed properties with essential *Kalmia cuneata* habitat.

COUNTY	PROPERTY	AGENCY	ACREAGE	# OF KACU POPS**
SC-CHEST	NATL. WILDLIFE REFUGE	US FISH AND WILDLIFE	45,000	2
SC-CHEST/DARL	SANDHILLS STATE FOREST	SC FORESTRY COMMISSION	46,000	0
NC-SCOT/RICH/MOORE	SANDHILLS GAME LAND	NC WILDLIFE RES. COMM.	60,000	32
NC-SCOT/RICH	CAMP MACKALL	DEPT. OF DEFENSE	6,900	1
NC-HOKE/CUMB/ MOOR/HARN	FORT BRAGG	DEPT. OF DEFENSE	120,000	13
NC-HOKE	MCCAIN TRACT	NC DEPT. OF AG.	1,700	1
NC-MOORE	WEYMOUTH WOODS ST. PARK	NC DENNR	676	0
NC-CUMB	BUSHY LAKE STATE NAT. AREA	NC DENNR	2,500	1
NC-CUMB	GORDON BUTLER PRESERVE	NC BOT. GARDEN	7	1
NC-BLAD	BLADEN LAKES STATE FOREST	NC FORESTRY COMM.	32,500	6
NC-BLAD	JONES LAKE STATE PARK	NC DENNR	2,208	1
NC-BLAD	SINGLETARY LAKE STATE PARK	NC DENNR	649	1
NC-PEND/DUPL	ANGOLA BAY GAME LAND	NC WILDLIFE RES. COMM.	20,000	1
NC-PEND	HOLLY SHELTER GAME LAND	NC WILDLIFE RES. COMM.	48,500	1
		TOTAL	386,640 ACRES	

** - INCLUDES EXTANT AND HISTORIC KACU (KALMIA CUNEATA) POPULATIONS.