

**Canby's Dropwort
(*Oxypolis canbyi*)**

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



Photograph courtesy of Dr. L.L. Gaddy

**U.S. Fish and Wildlife Service
Southeast Region
South Carolina Ecological Services Field Office
Charleston, South Carolina**

5-YEAR REVIEW
Canby's dropwort (*Oxypolis canbyi*)

I. GENERAL INFORMATION

A. Methodology used to complete the review: In conducting this 5-year review, we relied on available information pertaining to historic and current distributions, life histories, and habitats of this species. Our sources include the final rule listing this species under the Endangered Species Act (Act); peer reviewed scientific publications; unpublished field observations by the U.S. Fish and Wildlife Service (Service), State and other experienced biologists; unpublished survey reports; and notes and communications from other qualified biologists or experts. A *Federal Register* notice announcing the initiation of this review and requesting information was published on July 28, 2006 (71 FR 42871), and a 60-day comment period was opened. Comments and suggestions regarding the review were received from botanical experts from Service field offices and state agencies within the known range. Comments received were evaluated and addressed, as appropriate (see Appendix A).

B. Reviewers

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

Lead Field Office - Charleston, SC, Ecological Services Field Office, Edwin EuDaly (retired) and Craig Aubrey, 843-727-4707

Cooperating Office(s) - Athens, GA, Ecological Services, Pete Patavinna, 706-613-9493, extension 236; Raleigh, NC, Ecological Services, Dale Suiter 919-856-4520 extension 18.

C. Background

- 1. Federal Register Notice citation announcing initiation of this review:** July 28, 2006, 71 FR 42871.
- 2. Species status:** The 2010 Recovery Data Call determined that the status of the species is unknown. Except for a single visit to many of the known populations in 2006 (Gaddy 2006), there is very little information regarding the status of the species. As discussed below, routine monitoring of populations, at a level of detail sufficient to determine whether populations are stable, increasing or decreasing and whether they are likely to represent self-sustaining populations is needed.
- 3. Recovery achieved:** 2 (26-50% recovery objectives achieved)

4. **Listing history**
Original Listing
Federal Register Notice: 51 FR 6690
Date listed: February 25, 1986
Entity listed: Species
Classification: Endangered
5. **Review History:** Recovery Data Call 1999 – 2010
Recovery Plan – 1990
5-year review November 6, 1991 (56 FR 56882) - In this review, different species were simultaneously evaluated with no in-depth assessment of the five factors, threats, etc. as they pertained to the different species' recovery. In particular, no changes in status were proposed for this plant.
6. **Species' Recovery Priority Number at start of review (48 FR 43098):**
5. This number indicates Canby's dropwort has a high degree of threat and low recovery potential.
7. **Recovery Plan:** Canby's Dropwort Recovery Plan, April 10, 1990

II. REVIEW ANALYSIS

- A. **Application of the 1996 Distinct Population Segment (DPS) policy**
Canby's dropwort is a plant and, therefore, not covered by the DPS policy. The DPS policy will not be addressed further in this review.
- B. **Recovery Criteria**
 1. **Does the species have a final, approved recovery plan containing objective measurable criteria? Yes**
 2. **Adequacy of recovery criteria**
 - a. **Do the recovery criteria reflect the best available and most up-to-date information on the biology of the species and its habitat? Yes**
 - b. **Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria? Yes**
 3. **List the recovery criteria as they appear in the recovery plan and discuss how each criterion has or has not been met, citing information.**
The recovery plan states that Canby's dropwort shall be considered for removal from the Federal list when the following criteria are met.

1. It has been determined that at least 14 of the currently extant populations¹ are self-sustaining and that necessary management actions have been undertaken by the landowners or cooperating agencies to ensure their continued survival.

There are only eight sites (representing eight populations) that are currently protected and managed to some degree by landowners or cooperating agencies. This includes four sites in South Carolina (Monkey Meadow Bay in Clarendon County, Crosby Oxypolis Heritage Preserve in Colleton County, Tibwin Savannah in Charleston County, and Lisa Mathews Bay in Bamberg County), three sites in Georgia (Big Dukes Pond Natural Area in Jenkins County, Oakbin Pond in Dooly County, and Neyami Savannah site in Lee County), and one site in Maryland (Crescent Preserve in Queen Ann's County). The Nature Conservancy owns a portion of the bay inhabited by Canby's dropwort in North Carolina (Big Cypress Meadow in Scotland County); however, the portion of the bay that Canby's dropwort is known from is not protected (Dale Suiter, U.S. Fish and Wildlife Service, personal communication 2010), and the species was not observed when the site was surveyed in 2004 (LeGrand 2005), 2006 (Gaddy 2006), or 2009 (Dale Suiter, U.S. Fish and Wildlife Service, personal communication 2010).

More research and survey assessments of these sites are needed to determine if these populations are self-sustaining. However, it is unlikely that all eight of the protected populations are self-sustaining because of offsite threats and inadequate management resources. For example, with regard to the Oakbin site, the watershed contributing to the small preserve is intensively managed for agriculture, beaver flooding is maintaining water levels at levels above that optimum for Canby's dropwort, and high levels of nutrients draining into the preserve are affecting plant species composition. As another example, inability to acquire necessary permissions from adjacent property owners is impacting the ability of managers to use prescribed fire at the Big Dukes Pond Natural Area. (see section II.C.2.a. for more information on these sites). This criterion has not been met.

2. Through reintroduction, rehabilitation and/or discovery of new populations, five additional self-sustaining populations exist within the species historical range.

¹ For the purposes of this 5-year review, except in the case of Crosby Oxypolis Heritage Preserve and Crosby North (Colleton County, SC), we are assuming that each location (or site) that the species is known from represents a separate population. In the case of Crosby Oxypolis Heritage Preserve and Crosby North, it is likely that a single population of plants historically occurred that was subsequently divided by the construction of a road. In all other cases, each site is found in a distinct wetland that is geographically separated from other sites. Given the reproductive biology of the plant and the isolated nature of the wetlands, assuming that each site represents a separate population appears to be warranted.

An additional 29 sites (representing 28 new populations) have been discovered since the species was listed in 1990. Most of these sites are on private land and the land use and status of most of these sites is unknown. More research and survey assessments of these sites are needed to determine if these populations are self-sustaining (see section II.C.2.a. for more information).

3. All 19 populations and their habitat are protected from present and foreseeable human-related and natural threats that may interfere with the survival of any of the populations.

Only eight populations (four in South Carolina, three in Georgia, and one in Maryland) are currently protected and managed to some degree by landowners or cooperating agencies. It is unlikely that all eight of these populations are self-sustaining because of offsite threats and inadequate management resources (see section II.C.2.a. for more information). This criterion has not been met.

C. Updated Information and Current Species Status

Canby's dropwort is a perennial herb with erect or ascending stems and stands 0.8 to 1.2 meters (2.6-3.9 feet) tall. The slender leaves are hollow and quill-like. The small five-parted flowers are borne on compound umbels and have white petals and pale green sepals, some of which are tinged with red. The plant has a slight dill fragrance. The flowers are bisexual and/or unisexual, and appear from mid-August to early October. There may be some self-pollination but the flowers are protandrous (anthers release their pollen before the stigma of the same flower is receptive), indicating some outcrossing. There is no information on pollinators of this species. The fruit is a strongly-winged, 4-6 mm long, schizocarp (a dry fruit that splits into two or more closed, one-seeded parts once it matures). Canby's dropwort has a distinctive stoloniferous rhizome (rhizomes that grow stolon-like stems) with lower internodes that are a pink or purple color. This rhizome readily distinguishes Canby's dropwort from similar species such as *Oxypolis filiformis* (water cowbane). Reproduction is primarily asexual through rooting at the nodes of the rhizomes. This is a strongly clonal species and therefore can form large numbers of stems under favorable habitat conditions (Murdock and Rayner 1990).

About 53 populations have been documented over the last 30 years in Maryland, North Carolina, South Carolina and Georgia. The species has been extirpated from Sussex County, Delaware. Presently, one population each exists in Queen Anne's County, Maryland and Scotland County, North Carolina. Thirty-three populations have been documented in the following South Carolina counties: Allendale, Bamberg, Barnwell, Berkeley, Clarendon, Colleton, Florence, Hampton, Lee, Orangeburg, Richland, Sumter and Williamsburg. Eighteen populations have been documented in the following Georgia counties: Burke, Dooly, Jenkins, Lee, Screven and Sumter. Most of the populations are small, but South Carolina and Georgia still support some large populations.

This plant grows in Coastal Plain habitats including pond cypress savannas, wet pineland savannas, wet meadows, Carolina bays, sloughs, and around the edges of cypress-pine ponds. The healthiest populations usually occur in open savannas, bays or ponds which are wet most of the year and have a sparse or non-existent canopy. Although there are a large number of Carolina bays in South Carolina and Georgia, most do not support the savanna conditions necessary for Canby's dropwort. The pond cypress savanna wetlands are quite rare (Bennett and Nelson 1991) and are considered globally imperiled (NatureServe 2009). The wetlands that support Canby's dropwort typically have loam or clay soils and a high water table (Gaddy 2006, NatureServe 2009).

Gaddy (2006) conducted plant surveys and ecological assessments on 23 of the known sites (representing 22 populations) in South Carolina, Georgia and North Carolina. Most sites (20) had a canopy dominated by pond cypress (*Taxodium ascendens*), two sites had no canopy, and one site was dominated by swamp tupelo (*Nyssa biflora*). Pond cypress trees at nearly every site were much older than their stunted appearance indicated. Dominant species in the shrub layer of the study sites included red maple (*Acer rubrum*) at three sites, myrtle-leaved holly (*Ilex myrtifolia*) at three sites, and pond cypress at seven sites. In the herbaceous layer, the distinctive, grassy sedge *Carex striata* (= *C. walteriana*) was dominant or co-dominant at 11 sites, and *Rhynchospora inundata* and *Panicum hemitomum* were dominant or co-dominant at four sites (Gaddy 2006).

Soil profiles at most of the 23 study sites included loams with some organic matter in the topsoil and sandy gravels and clays in the subsoil. However, seven sites had clay soil with no topsoil, organic matter, or loam in their profiles. Most sites had an A horizon of a few to 15 cm deep, followed by a B layer of sandy, gravelly clay, followed by a grayish-white clay hardpan. The clay hardpan was usually located at a depth of 20-30 cm. Soils represented at the 23 sites included Grady loam (six sites), Coxville fine sand, (four sites), Seagate fine sand (two sites), Rembert sandy loam (two sites), and Pantego loam (two sites)(Gaddy 2006).

Gaddy (2006) reported that most of the 23 sites were dry (no surface water) when sampled in the late summer and fall of 2006. Average water marks on the buttresses of the canopy trees ranged from 0 to 75 cm with a mean of 29.1 cm at the 23 sites. He reported that anecdotal and historical climatic data indicate that water levels fluctuate dramatically in the bays and depressions in which Canby's dropwort has been found and in most pond cypress ponds and savannas. Other reports indicate that the largest and most vigorous populations are found in bays and ponds that are flooded during most of year (NatureServe 2009). During droughts, surface water will not be present even in these frequently flooded sites. Flooding during the growing season and water level fluctuations help limit canopy density and growth of vegetation that would compete with Canby's dropwort. There is no new taxonomic or genetic information on this plant species.

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

a. Present or threatened destruction, modification or curtailment of its habitat or range: The most significant threat to Canby's dropwort is the direct loss or alteration of its rare wetland habitat. Ditching and draining of wetland areas, primarily for agriculture and silviculture, have reduced the frequency, depth and duration of surface water, lowered the groundwater table, and changed the vegetative composition in many areas of the mid-Atlantic coastal plain where the species historically occurred. Reducing surface water, changing soil moisture levels and lowering of the water table enables other plants to become established, modifies vegetative succession, and makes sites less conducive overall to the plant's growth and reproduction (Murdock and Rayner 1990). As a result, many sites have been invaded by shrubs and some sites have been planted in pine. Other sites have been dredged thus breaking the clay hardpan and draining the wetland (Murdock and Rayner 1990, Gaddy 2006).

Gaddy (2006) visited 32 previously documented Canby's dropwort sites (23 were inventoried in detail) and reported that only a few were in pristine condition in 2006. He noted that pond cypress wetlands were usually modified first by logging, then ditching, and finally, dredging, if water was still persistent at the site. Dredging allows water to drain out of the wetland by breaking through the clay hardpan. He reported that one site in Clarendon County, South Carolina, which supported Canby's dropwort as recently as 1984, had been planted in pines. Another Clarendon County site had been dredged, penetrating the hardpan and draining the wetland. Other study sites had been ditched and subsequently invaded by shrubs and saplings (under undisturbed conditions, high water levels prevent or limit the invasion of shrubs in the wetlands).

Of the 32 sites visited, five had been completely drained, five had been invaded by shrubs, seven sites had at least one ditch in the wetland, and four had been selectively or completely logged. Only nine of the 23 sites inventoried in detail were considered high quality sites with low disturbance (Gaddy 2006). Once the habitat is disturbed by extensive ditching, dredging and/or planting to pines, it will no longer support Canby's dropwort. Depending on the severity of the habitat degradation, subsequent restoration may not be feasible.

Table 1 presents the cumulative number of populations reported in 1990 and 2006, the number of protected populations in 2006 and the number of sites with Canby's dropwort present in 2006. The cumulative number of reported sites increased from 25 in 1990 to 53 in 2006. However, some of these population sites have not been surveyed in many years and have probably been eliminated. Only eight populations were at least partially owned and managed by natural resource agencies or conservation organizations in 2006.

Table 1. Cumulative number of reported extant Canby's dropwort populations in 1990 and 2006 the number of protected populations in 2006 and the number of sites with Canby's dropwort known to be present in 2006.

State	County	Populations 1990	Populations 2006	Protected Populations 2006	Sites with Canby's Dropwort Known to be Present 2006
MD	Queen Anne's	1	1	1	1
NC	Scotland	1	1	0	0
SC	Allendale	1	3	0	0
	Bamberg	1	2	1	0
	Barnwell	2	2	0	0
	Berkeley	1	1	0	0
	Charleston	0	1	1	1
	Clarendon	4	9	1	1
	Colleton	1*	1*	1**	1
	Florence	0	1	0	1
	Hampton	1	3	0	0
	Lee	1	2	0	1
	Orangeburg	1	4	0	1
	Richland	1	1	0	0
	Sumter	0	1	0	0
	Williamsburg	1	2	0	0
GA	Burke	0	2	0	0
	Dooly	4	5	1	1
	Jenkins	0	3	1	2
	Lee	4	4	1`	1
	Screven	0	4	0	0
Total		25	53	8	11

* In 2006, a second site (Crosby North) was discovered across the road from Crosby Oxypolis Heritage Preserve. Therefore, this one population in 2006 represents two sites.

**While Crosby Oxypolis Heritage Preserve is protected, Crosby North is not.

Only 11 of the sites were reported to have Canby's dropwort present in 2006 (Gaddy 2006; Lisa Kruse, Georgia Department of Natural Resources, personal communication 2007, Deborah Landau, The Nature Conservancy, personal communication 2007): however, not all known Canby's dropwort sites were surveyed that year. Stem numbers of Canby's dropwort at a site may fluctuate widely from year to year because of differences in precipitation and other habitat conditions. At some viable sites, stems may not emerge for a year or more and support numerous stems in subsequent years. Most of the sites visited in 2006 were dry (no standing water) in the summer; however, winter 2006 precipitation in Georgia, South Carolina and North Carolina was normal while spring precipitation was below normal. The precise relationship between Canby's

dropwort numbers and precipitation has not been established (Gaddy 2006). Therefore, the presence or absence of stems for one year is of limited value in determining the viability of a population.

Table 2 summarizes data on habitat quality provided by Gaddy (2006) and Deborah Landau (The Nature Conservancy, personal communication 2007) for sites surveyed in 2006. Even though the cumulative total of reported sites and populations has increased since 1990, there were only 12 high quality sites and 16 moderate quality sites reported in 2006. Most survey effort has been concentrated on higher quality sites. Additional effort is needed to determine the status of the remaining sites even though many of these sites are smaller and likely to be of lower quality or no longer viable as Canby's dropwort habitat.

Table 2. Quality of habitat at 34 known Canby's dropwort sites (representing 33 populations) in 2006. Habitat quality classifications for the 33 sites surveyed in North Carolina, South Carolina, and Georgia is summarized from Gaddy (2006), is qualitative in nature, and is based largely upon the degree of disturbance of the sites. Habitat quality for the Maryland site is based upon information provided by Deborah Landau (The Nature Conservancy, personal communication 2007).

State	County	High Quality Sites 2006	Moderate Quality Sites 2006	Low Quality Sites 2006	Unknown Quality Sites 2006
MD	Queen Anne's	1	0	0	0
NC	Scotland	0	1	0	0
SC	Allendale	1	1	0	1
	Bamberg	2	0	0	0
	Barnwell	1	0	0	1
	Berkeley	0	0	0	1
	Charleston	1	0	0	0
	Clarendon	1	2	4	2
	Colleton	0	2*	0	0
	Florence	0	1	0	0
	Hampton	1	1	0	1
	Lee	1	0	0	1
	Orangeburg	1	1	0	2
	Richland	0	1	0	0
	Sumter	0	0	0	1
	Williamsburg	0	1	0	1
GA	Burke	1	0	0	1
	Dooly	0	1	1	4
	Jenkins	1	1	0	1
	Lee	1	1	0	2
	Screven	0	2	0	2
Total		13	16	5	21

* Represents one population.

On sites that are not actively disturbed by logging, ditching or dredging, habitat management is often needed to prevent encroachment of shrubs or trees that increase evapotranspiration, lower the water table and shade out Canby's dropwort. Periodic fires probably limited this encroachment under natural conditions but many sites are no longer surrounded by pine forest subject to regular fires and few sites are managed with prescribed burning. An example is the Big Cypress Meadow which is owned by The Nature Conservancy and is the only site in North Carolina. Young trees, shrubs and maidencane have invaded much of the meadow and the number of Canby's dropwort has declined from as many as 10,000 plants in 1986 to only a few plants in recent years and none in 2006 (Gaddy 2006).

In contrast, one site that has been burned recently is the Lisa Matthews Memorial Bay (Bamberg County, South Carolina) which is owned and managed by the South Carolina Native Plant Society. At this site, Canby's dropwort increased from 215 plants in 2005 to over 600 plants in 2006 (Gaddy 2006). If prescribed fire is not feasible, manual clearing of encroaching vegetation can be effective. At the Maryland site, hand clearing was initiated in 2003 to remove *Acer rubrum* (red maple), *Liquidambar styraciflua* (sweet gum) and *Diospyros virginiana* (persimmon) trees that were rapidly expanding and shading out the Canby's dropwort. The number of plants increased from 33 in 2004 to 136 in 2006 (Deborah Landau, The Nature Conservancy, personal communication 2007).

Even where Canby's dropwort habitat is owned by public resource agencies or conservation organizations, threats remain to the long term viability of most sites. The protected sites are limited in size and in some cases only include part of the suitable, occupied habitat. Most of the protected sites do not have significant control of adjacent land use. Therefore, offsite development could increase or decrease surface water runoff and lower or raise the water table and make the habitat unsuitable. In addition, to remain viable the site itself may need to be managed with prescribed fire or manual clearing to control encroachment of shrubs and trees. Funding and personnel are necessary to monitor habitat conditions and to implement any needed management actions; but these resources may not be available for all conservation sites. Conflicting management goals or landowner preferences on partially owned sites can also limit implementation of management actions, such as prescribed burning, that would improve Canby's dropwort habitat.

b. Overutilization for commercial, recreational, scientific, or educational purposes: Overutilization is not considered a threat at this time.

c. Disease or predation: The larvae of black swallowtail butterfly (*Papilio polyxenes asterius*), scale insects and grasshoppers are known to feed on and sometimes damage the plant (Murdock and Rayner 1990). There have been no studies to determine the relative importance of insect feeding activity on Canby's

dropwort populations or whether this activity represents a threat to the species.

d. Inadequacy of existing regulatory mechanisms: There is currently little regulatory protection of Canby's dropwort habitat. The U.S. Army Corps of Engineers (Corps) generally does not regulate dredge and fill activities in isolated wetlands because of a 2001 U.S. Supreme Court opinion. The 2001 opinion was issued in the Solid Waste Agency of Northern Cook County (SWANCC) v. the U.S. Army Corps of Engineers *et al.* and ruled in favor of SWANCC. The Corps' requirement for a Clean Water Act Section 404 permit to fill isolated wetlands to construct a landfill was overturned. The Corps had asserted jurisdiction on the isolated intrastate waters based solely on use by migratory birds (Findlaw 2007). Since that ruling isolated wetlands are generally not considered jurisdictional by the Corps. Therefore, there is no Federal nexus and consultation under section 7 of the Endangered Species Act is not required. Because Canby's dropwort grows only in isolated wetlands, there is currently no Federal regulatory control of actions that would affect its habitat.

In South Carolina and Georgia, where almost all Canby's dropwort populations occur, there are no State laws that protect the isolated wetlands that provide Canby's dropwort habitat. Maryland and North Carolina, with one Canby's dropwort population each, do regulate isolated wetlands and therefore offer some protection to the habitat (Maryland Department of the Environment 2010, North Carolina Department of Environment and Natural Resources 2010).

The Endangered Species Act prohibits the taking of endangered plants from Federal lands without a permit and regulates trade of listed plants. In addition, the Endangered Species Act prohibits the malicious damage or destruction of plants on Federal lands; and, their removal, cutting, digging, damaging, or destroying in knowing violation of any state law or regulation, including criminal trespass law. The State of Maryland prohibits taking of the species from private property without the landowner's permission and from State property without a permit and regulates trade in the species (Code of Maryland regulations 08.03.08). The State of North Carolina prohibits taking of the plant without a permit and the landowner's permission and regulates trade (North Carolina General Statute 19-B, 202.12-202.19). The State of Georgia prohibits digging, removal, or sale of State listed plants from public lands without the approval of the State management authority, and regulates sale or transport of State listed plants from private property (Georgia Wildflower Preservation Act of 1973). The State of South Carolina does not have any regulations that protect endangered plants on private land. However, regulations prohibit the unauthorized taking of plants from South Carolina Heritage Preserves and State Parks (South Carolina Code of Laws: Sections 50-11-2200, 50-11-2210, and 51-3-140).

e. Other natural or manmade factors affecting its continued existence:
We not aware of any other natural or manmade threats to the species.

D. Synthesis – Although the cumulative number of reported Canby’s dropwort sites and populations has increased since 1990, the number of known high quality and moderate quality sites remains below 30. Little progress has been made in protecting the species and only eight populations are protected to some degree. At least two of these eight populations remain vulnerable to degradation because of partial ownership, off-site impacts and habitat management constraints. The 1990 recovery plan states that the long term survival of 19 populations is needed to ensure recovery of the species.

Habitat loss and modification remain the greatest threat to the survival of Canby’s dropwort. Several sites (and populations) have been lost or significantly degraded due to logging, ditching or dredging. For example, of the 32 sites that Gaddy (2006) visited in South Carolina, North Carolina, and Georgia in 2006, five had been completely drained, five had been invaded by shrubs, seven had at least one ditch in the wetland, and four had been selectively or completely logged. There is no regulatory protection of Canby’s dropwort habitat in Georgia and South Carolina where almost all of the populations occur. There is some State regulatory protection of the two sites in Maryland and North Carolina.

Despite the fact that it has been listed as endangered since 1986, relatively little progress has been made with regard to recovering *Oxypolis canbyi*. Dedicated research to the life history and biological requirements of Canby’s dropwort has not been extensive. Other than annual counts at the single known Maryland site and Gaddy’s (2006) survey of known sites in North Carolina, South Carolina, and Georgia, there has been no extensive survey and population assessment work. Perhaps most importantly, the overwhelming majority of known populations is neither protected nor managed for the benefit the species. One-half of the 32 sites that Gaddy (2006) surveyed were either overgrown, had been logged, or had been hydrologically altered. No laws exist throughout the majority of the species’ range that preclude further loss or degradation of its habitat. Due to the lack of progress meeting the recovery criteria and continued threats to the species, Canby’s dropwort still meets the definition of endangered under the Endangered Species Act.

III. RESULTS

A. Recommended Classification:

 X **No change is needed**

IV. RECOMMENDATIONS FOR FUTURE ACTIONS –

1. Work with state agencies, land trusts, and other conservation organizations to protect and manage (e.g., use prescribed fire or other habitat management techniques to

control encroachment of undesirable trees and shrubs) known Canby's dropwort populations.

2. Work with partners to implement routine monitoring of populations, at a level of detail sufficient to determine whether populations are stable, increasing or decreasing and whether they are likely to represent self-sustaining populations.
3. Improve our understanding of the relationship between precipitation (and other site parameters) and Canby's dropwort plant numbers. This information will be essential to an informed interpretation of observation or monitoring data, especially with respect to defining thresholds for management action/intervention.
4. Determine objective, quantitative criteria for self-sustaining populations.
5. Assess sites that were not visited during 2006 for current viability as Canby's dropwort habitat. Revisit sites surveyed by Gaddy (2006) to determine if the habitat quality has changed.

V. REFERENCES

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW OF CANBY'S DROPWORT

Current Classification: Endangered
Recommendation resulting from the 5-Year Review

 X No change is needed

REVIEW CONDUCTED BY: Ed EuDaly (retired) and Craig Aubrey

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 8/31/10

REGIONAL OFFICE APPROVAL:

for

Lead Regional Director, Southeast Region, Fish and Wildlife Service

Approve  Date 9-13-10

Appendix A

Summary of peer review for the 5-year review of Canby's dropwort

A. Peer Review Method: Following the completion of the draft 5-year review, we requested and received comments from the following species experts on the draft document: Dr. L.L. Gaddy (Terra Incognita), Dr. Bert Pittman (South Carolina Department of Natural Resources), and Ms. Lisa Kruse (Georgia Department of Natural Resources). We considered and incorporated suggested changes and comments as appropriate.

B. Peer Review Charge/Guidance:

We included the following language in our letter requesting peer review of the draft 5-year review.

A 5-year review is a periodic analysis of a species' status conducted to ensure that the listing classification of a species as threatened or endangered on the List of Endangered and Threatened Wildlife and Plants (List) (50 CFR 17.11 – 17.12) is accurate. The 5-year review is required by section 4(c)(2) of the Endangered Species Act of 1973, as amended (ESA). A Federal Register notice announcing the review for Canby's dropwort and requesting information was published on July 28, 2006. I have completed the draft 5-year review and am requesting your review of the draft document.

I am requesting that you consider the following in your response:

- comment on data or analyses used in the review;
- identify oversights, omissions, and inconsistencies;
- provide advice or reasonableness of judgments made from the scientific evidence;
- ensure that scientific uncertainties are clearly identified and characterized, and that potential implications of uncertainties for the technical conclusions drawn are clear;
- provide advice on the strengths and limitations of the overall product

However, please do not provide recommendations on the ESA classification of the species. The Service must make that determination.

Please contact Ed Eudaly at 843-727-4707 ext. 227 or ed_eudaly@fws.gov if you have any questions. I appreciate your efforts in reviewing this document and providing comments by June 18, if possible.

C. Summary of Peer Review Comments/Reports:

A summary of peer review comments is provided below. The complete set of comments is available at the Charleston Ecological Services Field Office, U.S. Fish and Wildlife Service, 176 Croghan spur Road, Suite 200, Charleston, South Carolina, 29407.

Dr. L.L. Gaddy, Terra Incognita, Columbia, South Carolina: Dr. Gaddy suggested several minor edits. In addition, he provided clarification regarding appropriate soils and canopy structure for Canby's dropwort.

Dr. Bert Pittman, South Carolina Department of Natural Resources, Columbia, South Carolina: Dr. Pittman commented: (1) that the plant's elongated and distinctive stoloniferous rhizomes aid in species identification, as well as help the plant persist in unfavorable ecological conditions, (2) on the potential to successfully manage the species' habitat; (3) on the level of protection for the species and its habitat in South Carolina; and (4) on the rarity of the species' habitat,

Ms. Lisa Kruse, Georgia Department of Natural Resources, Social Circle, Georgia: Ms. Kruse requested small edits to the tables and that the definition of "population site" be clarified. She recommended additional language regarding the Georgia Wildflower Preservation Act of 1973. Ms. Kruse also noted the importance of: (1) understanding the potential impact of factors such as precipitation on annual population size; (2) annual monitoring of sites, especially those that have not been monitored in several years; (3) implementing appropriate habitat management for the species.

D. Response to Peer Review:

Overall, reviewers felt the draft document adequately characterized the known information on the status and threats to the species. The Service incorporated (or verified that the document addressed the comment) all minor edits from peer reviewers.