Canby's Dropwort
(Oxypolis canbyi)

5-Year Review:
Summary and Evaluation

Sudie Thomas monitoring Canby's dropwort at Lisa Mathews Memorial Bay, Bamberg County, SC

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

January 2022

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the final rule listing this species under the Endangered Species Act (Act); peer reviewed scientific publications; unpublished field observations by the U.S. Fish and Wildlife Service (Service), State and other experienced biologists; unpublished survey reports; and notes and communications from other qualified biologists or experts.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 recovery call was held January 20, 2021. After the call, subject matter experts shared recommended future recovery actions and information on a newly introduced South Carolina Canby's dropwort population located in Berkeley County. A Federal Register notice announcing the initiation of this review and requesting information was published on June 23, 2021 (86 FR 32965), and a 60-day comment period was opened. We received public comments from Frank Holleman stating that Canby's dropwort should remain an endangered species because, 1) the Clean Water Act provides no federal protection for Canby's dropwort wetland habitat; 2) the species has had severe habitat degradation of its wetland habitat throughout the species' range due to ditching, draining, agriculture, and development; and 3) continued intensive management is necessary to maintain suitable habitat.

B. Reviewers

Lead Region: South Atlantic-Gulf Region, Atlanta, GA; Carrie Straight; (404) 679- 7226; carrie_straight@fws.gov

Lead Field Office: South Carolina Ecological Services Field Office, Charleston, SC, April Punsalan, 843-727-4707, extension 40432; april_punsalan@fws.gov.

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Raleigh Ecological Services Field Office, Dale Suiter 919-856-4520 extension 18; dale_suiter@fws.gov.

C. Background

1. **Federal Register Notice citation announcing initiation of this review:**
   June 23, 2021; 86 FR 32965

2. **Listing history**
   Original Listing
   Federal Register Notice: 51 FR 6690

Date listed: February 25, 1986
Entity listed: Species
Classification: Endangered

3. **Review History:**
1990 Recovery Plan
2010 5-Year Review: Status of species unknown, no status change.
2015 5-Year Review: Status of the species unknown, no status change.

4. **Species' Recovery Priority Number at start of review (48 FR 43098):**
Canby's dropwort was assigned a recovery priority number of 5, based on (1) a high degree of threat, and (2) a low potential of achieving recovery.

5. **Recovery Plan:**
Canby's Dropwort Recovery Plan, April 10, 1990. (Murdock and Rayner 1990)

II. REVIEW ANALYSIS

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

The Act defines species as including any subspecies of fish, wildlife, or plants, and any DPS of any species of vertebrate wildlife. This definition limits the DPS policy to only vertebrate species of fish and wildlife. Because the species under review is a plant and the DPS policy is not applicable.

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 populations are self-sustaining and that necessary management actions have been undertaken by the landowners or cooperating agencies to ensure their continued survival.

There are eleven extant Canby's dropwort populations that meet the protected and managed recovery criterion. Whether these populations are self-sustaining is questionable. A self-sustaining Canby's dropwort population, determined by species experts, would

contain at least 1000 stems for five or more years (Jeff Glitzenstein and Lisa Kruse, pers. comm., 2021). To date, there are four Canby's dropwort populations out of the original 14 from the 1994 Recovery Plan that meet the recovery criteria of self-sustaining and protected: Pristine Pine Preserve (MD), Lisa Mathews Memorial Bay (SC), and Big Dukes Pond and Woodward (GA).

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

This criterion has been partially met. One new Canby's dropwort population (Oakland Plantation in Berkeley County, SC) was found in 2018, and one new Canby's dropwort population was introduced (Brubaker Farm in Berkeley County, SC). Efforts are underway to reintroduce Canby's dropwort at the Big Cypress Meadow, NC.

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.

There are eleven populations (five in South Carolina, five in Georgia, and one in Maryland) that are currently protected and managed to some degree by landowners or cooperating agencies. This is an increase of three populations from the 2015 5-year review. Several of these populations are not self-sustaining due to lack of management or hydrological degradation. This criterion has been partially met.

C. Updated Information and Current Species Status

1. Biology and Habitat

A detailed summary of Canby's dropwort biology and life history can be found in the listing rule, 2010 and 2015 5-year reviews (Service 1986, 2010, and 2015, respectively). New or updated information can be found below.

a. Abundance, population trends, demography:

As described above in the recovery plan review and below in the distribution section (section II.C.1.d.), there are currently 11 Canby's dropwort populations that are protected and receiving some sort of management, which is an increase of three since the last review. Overall, across the species range, 18 populations remain extant; this number includes one introduced population (Brubaker Farm, Charleston County, SC).

b. Taxonomic classification or changes in nomenclature:

Canby's dropwort taxonomic genus name changed from *Oxypolis* to *Tiedemannia* (Fiest et al. 2012). This change in taxonomy is supported by southeastern taxonomists and plant experts and is accepted in Weakley's Flora of the Southeastern United States (2020). According to Weakley the three taxa of *Oxypolis* with quill- or rachis-leaves are placed in the *Tiedemannia* genus. This change in taxonomy does not impact the status of the listed entity and until the taxonomic change is formalized in the Federal Register, we will continue to use the name of the current listed entity, *Oxypolis canbyi*.

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

Canby's dropwort has relatively high genetic diversity in comparison to other rare herbaceous plants. A study conducted from thirty nuclear allozyme loci revealed that there

were two genetically distinct groups: (1) Southwest and South-central Georgia, and (2) Eastern/Coast of Georgia, South Carolina, and Maryland. Canby's dropwort populations in southeast Georgia have the highest genetic diversity. The eastern Georgia and South Carolina populations have low to moderate genetic diversity with the Maryland populations containing the lowest genetic diversity (Hamrick et al. 2019). The Maryland genetic diversity suggests that the population was founded by a long-distance founder event (Hamrick et al. 2019).

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, etc.):

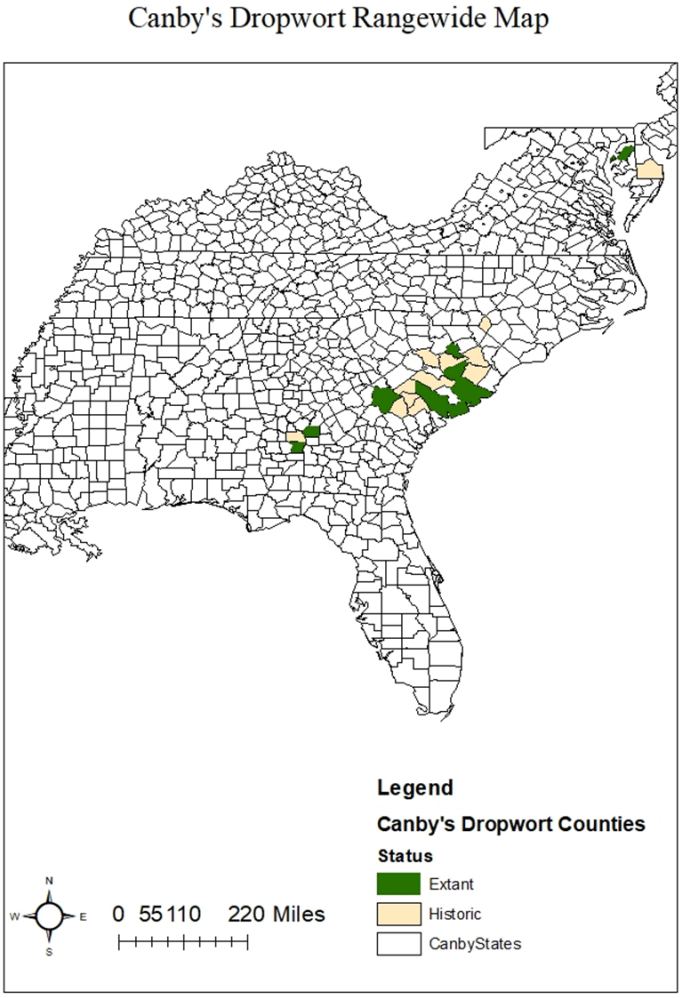

Figure 1: The rangewide distribution of Canby's dropwort (*Oxypolis canbyi*).

There is one remaining disjunct population in the northeast, located in Queen Anne's County, Maryland, the remaining extant Canby's dropwort populations occur in the Southeast in South Carolina and Georgia.

Delaware
In the 1990 Recovery Plan, there was one reported extirpated population from Sussex County. There is not much information on this population.

Maryland
Pristine Pine's Preserve located in Queen Anne's County, contains a stable to increasing Canby's population. As a protected and well-managed The Nature Conservancy (TNC) site, this Canby's population counts towards the recovery of the species. This site is fire maintained and management with prescribed fire in years 2015 and 2017 resulted in a population boom, with numbers going from 121 stems in 2015 to 3805 stems in 2020 (Deborah Landau, pers. comm., 2021).

North Carolina
A historic Canby's population occurs at Big Cypress Meadow located in Scotland County. This population was last seen 2004 with two stems reported. The population gradually decreased: 1980: 10,000 plants; 1986: 10,000 plants; 1987: 2000-3000 plants; 1992: 100+ plants seen; 2004: two stems reported (North Carolina Heritage Program, 2020). Lack of fire and management likely caused the population decline.

South Carolina
There are 31 historic Canby's dropwort populations in SC. To date, six of these are extant (Table 1). Five are protected (Crosby Heritage Preserve (HP), Longleaf HP, Oakland Plantation, Lisa Mathews Memorial Bay, and Brubaker Farm) and one is not protected (Monkey Bay). The Oakland Plantation population is a newly discovered stable, protected population (Table 1). The Brubaker Canby's dropwort population is a newly introduced population to a wetland area in Charleston County that is managed with fire. Three Canby's dropwort populations meet recovery objectives, stable, managed, and protected: Lisa Mathews Memorial Bay, Oakland Plantation, and Longleaf Heritage Preserve. All three of these recovery populations are managed with fire.

Table 1. Extant Canby's dropwort populations in South Carolina.

Population Name	County	Protected Yes/No*	Managed	Number of Individuals**
Lisa Mathews Memorial Bay	Bamberg	Yes, SCNPS	Yes	10,000
Oakland Plantation	Berkeley	Yes, CE	Yes	5,000+
Brubaker Farm	Charleston	Yes, CE	Yes	100-200
Monkey Bay	Clarendon	No	No	50
Crosby HP	Colleton	Yes, SCDNR	No	500-750
Longleaf HP	Lee	Yes, SCDNR	Yes	100-200

*Agencies responsible for protected sites SCNPS = South Carolina Native Plant Society; CE = private landowner with a conservation easement, and SCDNR = South Carolina Department of Natural Resources.
** Number of individuals includes a mix of estimates of number of individuals and stem counts.

Georgia

There are nine Canby's dropwort populations in Georgia that no longer occur: two are extirpated, three have a historic status, and four have a failed to find status (Lisa Kruse, pers. comm. and unpublished data, 2021). To date, 12 Canby's dropwort populations occur in Georgia (Table 2). Five populations are protected and four of these populations appear stable to increasing with 200 to 10,000 individuals (Table 2). Seven Canby's populations remain unprotected, and the majority contain 100-200 individuals (Table 2).

Table 2. Extant Canby's dropwort populations in Georgia.

Population Name	County	Protected Yes/No	Managed	Number of Individuals
Big Dukes Pond Wildlife Management Area	Jenkins	Yes, GADNR, CE	Yes	>1000
Woodward Canby's Dropwort Preserve	Dooly	Yes, CE	Yes	>10,000
Neyami Savanna, GA Department of Transportation	Lee	Yes, CE	Yes	<1000
Perrin Pond	Burke	No	No	150-200
Layfield Pond	Dooly	No	No	10-100
Black Pond, Wetland Reserve Easement	Jenkins	Yes, CE	Yes	10-100
Forrester Flats	Lee	No	Unknown	100-200
Oakbin Pond, TNC	Dooly	Yes, TNC CE	Yes	200
Roadside Park	Lee	No	Yes	<100
West Daniel Pond	Burke	No	No	4
Greater Unadilla Pond	Dooly	No	No	10-100
Harmony Church Pond	Dooly	No	Unknown	10-20

*Agencies responsible for protected sites CE = private landowner with a conservation easement, GADNR = Georgia Department of Natural Resources, and TNC = The Nature Conservancy.

Table 3. Cumulative number of extant Canby's dropwort populations in 1990, 2006, 2014, and 2021. The number of protected populations in paratheses.

State	County	Populations 1990	Populations 2006	Populations 2014	Populations 2021
MD	Queen Anne's	1	1	1 (1)	1 (1)
NC	Scotland	1	1	0	0
SC	Allendale	1	3	0	0
	Bamberg	1	2	2 (2)	1 (1)
	Barnwell	2	0	0	0
	Berkeley	1	0	0	1 (1)
	Charleston	0	1	1 (1)	1 (1)
	Clarendon	4	1	0	0
	Colleton	1	1	1 (1)	1 (1)
	Florence	0	0	0	0
	Hampton	1	0	0	0
	Lee	1	0	1 (1)	1 (1)
	Orangeburg	1	0	0	0
	Richland	1	0	0	0
	Sumter	0	0	0	0
	Williamsburg	1	0	0	0
GA	Burke	0	2	2 (0)	2 (0)
	Dooly	4	5	5 (1)	5 (2)
	Jenkins	0	3	2 (2)	2 (2)
	Lee	4	4	4 (2)	3 (1)
	Screven	0	4	0	0
Total		**25**	**8**	**18 (11)**	**18 (11)**

e. Propagation and Safeguarding:
Canby's dropwort seed germination takes a long time, approximately one year or more. Cold stratification and scarification do not increase germination rates. Seeds left in horse troughs at State Botanical Garden at Georgia in Athens, germinated after three years (Heather Alley, pers. comm., 2021). Because of the long process and time to germinate from seeds, future research should include how to propagate this species from rhizome cuttings and maintain genetic diversity.

2. Five Factor Analysis (threats, conservation measures and regulatory mechanisms)
A detailed summary of Canby's dropwort threats can be found in the listing rule, 2010 and 2015 5-year reviews (Service 1986, 2010, and 2015, respectively). New or updated information can be found below.

a. Present or threatened destruction, modification or curtailment of its habitat or range:
The most significant threat to Canby' dropwort is the direct loss or alteration of its 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 occurs. 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). Fire suppression has also led to woody plant succession and reduced open, grassy wetland habitats (NatureServe 2020). As a result, many sites have been invaded by shrubs and some sites have been planted in pine. Other sites have been modified with heavy equipment (e.g., excavated or dredged) thus breaking the clay hardpan and draining the wetland (Murdock and Rayner 1990; Gaddy 2016).

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

c. Disease or predation:

Larvae of black swallowtail butterfly (*Papilio polyxenes asterius*) have been noted on Canby's dropwort and have impacted 17 to 23% of the stems within a population at Crosby Oxypolis HP (Herrick Brown, pers. comm. 2010; Johnny Stowe, South Carolina Department of Natural Resources, pers. comm. 2010). The black swallowtail larvae do not appear to have an impact on the stability of Canby's dropwort populations given that the larvae feed on the stems after the plant has flowered and most of the plants have set seed. As mentioned, 17 to 23% of the stems are impacted, but the herbivory does not appear to be a significant impact on reproduction.

d. Inadequacy of existing regulatory mechanisms:

A 5-year status review is expected to assess the regulatory mechanisms protecting the species outside of its protections under the Act. Because the Act only grants protection to plants when a federal nexus is involved (e.g., federal permit required, federal funded projects). Canby's dropwort does not have as many protections as its wildlife counterpart. Additionally, under current definition of "waters of the United States" isolated wetlands are not considered jurisdictional wetlands by the U.S. Army Corps of Engineers (Corps). As such, the Corps does not regulate impacts to the isolated wetlands where Canby's dropwort occurs and there is no federal nexus protecting this species under the ESA for these activities. 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 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). Canby's dropwort receives some protection from state rare plant protection laws in Maryland, North Carolina, South Carolina, and Georgia (see below).

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 public 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:
Climate change could further impact populations in degraded wetland habitat. As global temperatures rise, timing of water availability becomes less predictable with both increases in intense precipitation events, flooding, and episodic ecological droughts (Intergovernmental Panel on Climate Change (IPCC) 2021). An increase in drought frequency and a decrease in appropriately timed precipitation events would negatively impact Canby's dropwort by changing the hydrological conditions of freshwater depressional wetlands.

D. Synthesis

Historically, Canby's dropwort occurred in Delaware, Maryland, North and South Carolina, and Georgia. Today, Canby's dropwort only occurs in three states: Maryland, South Carolina, and Georgia. Further, Canby's range within these states has been reduced greatly overtime with Canby's dropwort being extirpated from 11 counties since the time it was listed. Habitat loss and wetland degradation combined with lack of habitat management through natural or prescribed fire has resulted in a continued decline of this species since its listing. To date, seventeen populations remain extant, and one population has been introduced, bringing the total number of extant populations to 18. Eleven Canby's dropwort populations are partially protected. Because many populations are owned by several landowners, protection and management of populations is difficult to achieve. Species experts defined a self-sustaining population as having a minimum of 1000 stems for five years. Currently, only five Canby's dropwort populations have 1000 stems or more. These populations occur in a small part of the species' former range in Maryland, South Carolina, and Georgia with populations being extirpated from Delaware and North Carolina. Because of existing and future threats and the limited number of populations that appear to be self-sustaining, this species still meets the definition of an endangered species.

III. RESULTS

A. Recommended Classification:

_X_ No change is needed

IV. RECOMMENDATIONS FOR FUTURE ACTIVITIES

1. Protect known Canby's dropwort populations on private lands with conservation easements or Wetland Reserve Program Easements such as Monkey Bay in Clarendon County, SC, Perrion Pond (Burke County), Layfield Pond (Dooly County), Forrester Flats (Lee County), Roadside Park (Lee County), West Daniels Pond (Burke County), Greater Unadilla Pond (Dooly County), and Harmony Church Pond (Dooly County), GA.

2. Improve extant populations with fewer than 1,000 individuals by removing shrub/tree encroachment with prescribed fire, canopy thinning, or other techniques:

a. **Crosby Heritage Preserve,** Colleton County, SC.
b. **Monkey Bay,** Clarendon County, SC.
c. **Black Pond,** Jenkins County, GA.
d. **Harmony Church Road**, Dooly County, GA.
e. **Greater Unadilla Pond**, Dooly County, GA.

3. Search for new populations on property that has suitable habitat within the species range.

4. Propagate and reintroduce Canby's dropwort by rhizome cuttings in a way that retains genetic diversity (e.g., taking rhizome cuttings from multiple individuals).

5. Collect seeds from all populations across the range to safeguard at a Center for Plant Conservation Site, such as North Carolina Botanical Garden (NCBG).

V. REFERENCES

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U.S. FISH AND WILDLIFE SERVICE
5-Year Review of Canby's Dropwort (*Oxypolis canbyi*)

Current Classification: Endangered

Recommendation resulting from the 5-Year Review:

_X_ No change is needed

Review Conducted By: April Punsalan, South Carolina Ecological Services Field Office

FIELD OFFICE APPROVAL:

Field Supervisor, South Carolina Ecological Services Field Office, Fish and Wildlife Service

Approve: THOMAS MCCOY Digitally signed by THOMAS MCCOY Date: 2022.01.05 13:30:39 -05'00' Date: January 5, 2022

** Since 2014, Southeast Region Field Supervisors have been delegated authority to approve 5-year reviews that do not recommend a status change*

COOPERATING REGIONAL OFFICE APPROVAL:

We emailed this 5-year review to the North Atlantic-Appalachian Regional office for their concurrence prior to finalizing the document. We will retain any comments that we received, as well as verification of concurrence from other regions, in the administrative record for this 5-year review.