

**Braun's Rockcress**  
*(Arabis perstellata)*

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



(photo by John MacGregor, KSNPC)

**U.S. Fish and Wildlife Service  
Southeast Region  
Kentucky Ecological Services Field Office  
Frankfort, Kentucky**

**5-YEAR REVIEW**  
**Braun's rockcress / *Arabis perstellata***

**I. GENERAL INFORMATION**

**A. Methodology used to complete the review**

Public notice was provided in the *Federal Register* on July 28, 2006 (71 FR 42871), and a 60-day comment period was opened. During this comment period, we obtained information on the status of this species from several experts. Additional data was obtained from the recovery plan, peer-reviewed scientific literature, and unpublished field observations by Service, State, and other experienced biologists. Once all known literature and information was collected for this species, Dr. Michael A. Floyd, Recovery Biologist with the Kentucky Ecological Services Field Office, completed the review. The draft document was peer-reviewed by Deborah White, Kentucky State Nature Preserves Commission (KSNPC), Frankfort, Kentucky; David Lincicome, Tennessee Department of Environment and Conservation (TDEC), Nashville, Tennessee; and Dr. Ronald Jones, Eastern Kentucky University, Richmond, Kentucky. Comments received were incorporated as appropriate (see Appendix A).

**B. Reviewers**

**Lead Field Office:** Dr. Michael A. Floyd, Kentucky Ecological Services Field Office, (502) 695-0468, ext 102

**Cooperating Field Office:** Geoff Call, Cookeville, Tennessee Ecological Services Field Office, 931-528-6481

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

**C. Background**

**1. FR Notice citation announcing initiation of this review:** July 28, 2006; 71 FR 42871.

**2. Species status:** 2009 Recovery Data Call; Stable. The majority of the populations occur in Kentucky, and the last significant (range-wide) survey for Kentucky populations was conducted by KSNPC in 2002. Since that time, KSNPC has conducted qualitative surveys at these sites on a three- to five-year rotation. Searches by KSNPC from 2006 to 2009 produced seven new occurrences. Surveys were completed for all Tennessee populations in 2003 and 2008. In 2003, two additional populations were found in Rutherford and Wilson counties in TN. The Wilson County, Tennessee population was a new county record. Results of the 2008 surveys indicated that all the Tennessee populations were stable.

**3. Recovery achieved:** 2 (2 = 26% to 50% of recovery objectives achieved).

**4. Listing history:**

Original Listing

FR notice: 60 FR 56-61

Date listed: January 3, 1995

Entity listed: Species

Classification: Endangered

**5. Associated rulemakings:**

Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Arabis perstellata* (Braun's Rock-cress); Final rule; June 3, 2004; 69 FR 31459.

**6. Review History:**

Recovery Plan for *Arabis perstellata*, 1997.

Recovery Data Call, 2000 - 2009

**7. Species' Recovery Priority Number at start of review (48 FR 43098):**

5, Degree of threat is considered to be high, recovery potential is estimated as low, and taxonomic level is species.

**8. Recovery Plan**

Name of plan: Recovery Plan for *Arabis perstellata* Braun (Braun's Rockcress)

Date issued: July 22, 1997

**II. REVIEW ANALYSIS**

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

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any vertebrate wildlife. This definition limits listing a DPS to only vertebrate species of fish and wildlife. Because the DPS policy is not applicable to this plant, it 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? 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.**

Braun's rockcress will be considered for downlisting or reclassification from endangered to threatened status upon completion of the following (USFWS 1997):

- a. 10 geographically distinct self-sustaining populations consisting of 50 plants or more each are protected within a significant portion of the species' range in Kentucky and Tennessee. Protection can be achieved through ownership by government or private actions. It can also include legal dedication or the placement of conservation easements on private land. Site registry may be used to protect up to three sites, but this form of protection will be preferred for lower-quality sites. Site registry involves simply registering a site that is unique and important for native plant conservation with the State. It is voluntary and allows a landowner to join in conservation efforts, but places no restrictions on the landowner;
- b. At least half of these populations should contain 100 plants or more;
- c. It must be demonstrated that these populations are stable or increasing through five years of monitoring; and
- d. All protected sites must have management plans or agreements in place that ensure the long-term maintenance of Braun's rockcress habitat.

Braun's rockcress will be considered for delisting upon completion of the following:

- a. 20 geographically distinct self-sustaining populations, also consisting of 50 or more plants each, are protected in Kentucky and Tennessee;
- b. These populations are stable or increasing after another five years of monitoring following reclassification; and
- c. Registry agreements may be used for up to six of these sites.

At the time of listing (60 FR 56-61), Braun's rockcress was threatened primarily by destruction or adverse modification of its habitat (Listing Factor A - present or threatened destruction, modification or curtailment of its habitat or range). Specifically, these threats included residential, commercial, or industrial

development; livestock grazing and trampling; timber harvesting; and competition with native and exotic weedy species, especially the European garlic mustard (*Alliaria petiolata*). These threats are on-going and are addressed by the recovery criteria. A study of the effects of garlic mustard on Braun's rockcress establishment, growth, and survival is currently underway by KSNPC (T. Littlefield, pers. comm., 2010); preliminary results are expected later in 2010.

The inadequacy of existing regulatory mechanisms (Listing Factor D) also represents a threat to the species. The majority of Braun's rockcress occurrences occur on private land; consequently, they are vulnerable to landowner activities that might result in some kind of habitat disturbance. Disturbance (take) of plants on private property is not prohibited by the Endangered Species Act. Furthermore, the species is state listed as endangered in Kentucky (KSNPC 2005), but this designation conveys no legal protection within the state. The remaining listing factors are not relevant to Braun's rockcress because they constitute little or no threat to the species. Consequently, these factors were not addressed by the recovery criteria and will not be covered further in this five-year review.

When the recovery plan was completed in 1997 (USFWS 1997), the distribution of *A. perstellata* was limited to 25 extant occurrences (see definition in paragraph below) in Henry, Franklin, and Owen counties, Kentucky and 3 extant occurrences in Davidson and Rutherford counties, Tennessee. An additional eight Kentucky occurrences and four Tennessee occurrences were presumed to be extirpated. The primary threats to the species were listed as loss of habitat through exotic plant invasion, grazing or other direct impacts, and development (primarily home and road construction). All known occurrences were located on private property, and site protection efforts in Kentucky (by KSNPC) had resulted in natural area registry agreements with two adjacent landowners to protect a single occurrence. A registry agreement had also been finalized for the Scales Mountain occurrence in Rutherford County, Tennessee (registry agreements are nonbinding formal agreements made with landowners who are amenable to voluntary conservation on their property).

An occurrence was defined in the recovery plan (USFWS 1997) as a group of plants separated from other plants by geographic and/or habitat discontinuity, such as roads or streams, or by a distance of approximately 0.5 mile. All subsequent discussions of the term "occurrence" in this five-year review will be based on this definition. The recovery plan goes on to state that "an occurrence may or may not be a true population" (USFWS 1997), and more detailed demographic studies are needed to determine the degree of geographic/habitat isolation needed to be considered a true population. Within Kentucky, the number of populations of Braun's rockcress is roughly equal to the number of occurrences (Deborah White, personal communication, KSNPC, 2007). Within Tennessee, TDEC has chosen to combine some of their occurrences, resulting in a total of 5 populations comprised by 12 separate occurrences.

Subsequent to completion of the recovery plan (USFWS 1997), the Service designated critical habitat for *A. perstellata* at 22 specific geographic areas (units) in Kentucky (17 units) and Tennessee (5 units) (69 FR 31460). These units encompassed 1,600 acres of upland habitat, specifically 810 acres in Kentucky and 790 acres in Tennessee. At the time of this critical habitat designation, *A. perstellata* was known from 42 populations in Kentucky and Tennessee.

Based on current monitoring and distributional data compiled by KSNPC and TDEC (D. White, pers. comm., 2010; TDEC 2009), the number of extant occurrences (populations) in Kentucky and Tennessee is now 42 (42) and 12 (5), respectively (Tables 1 and 2). Sixteen of Kentucky's occurrences occupy critical habitat for the species; one of these occurrences [#39, Unit 11] is now considered extirpated by KSNPC. Eleven of Tennessee's 12 occurrences occupy critical habitat for the species. Long-term, quantitative monitoring data is unavailable for most of these occurrences, but qualitative estimates of occurrence size and quality are made typically at three- to five-year intervals. These evaluations are used to rank each occurrence with respect to size and viability, condition of the habitat, and degree of threat. The following specifications were used to rank the occurrences:

- a. A (excellent estimated viability): 200 or more plants, where little or no habitat restoration is needed; site is at least 10 acres of continuous forest;
- b. B (good estimated viability): 100 to 199 plants, where little habitat restoration is needed; site is at least 10 acres of continuous forest;
- c. C (fair estimated viability): 50 to 100 plants, where the habitat is degraded; site with less than 10 acres of continuous forest;
- d. D (poor estimated viability): Fewer than 50 plants, where the habitat is degraded; sites with less than 10 acres of continuous forest.

Occurrence ranks of all known sites produced the following results:

<u>Kentucky</u>	<u>Tennessee</u>
A - 3 occurrences	A - 6
B - 9	B - 3
C - 13	C - 2
D - 17	D - 1

Protection efforts in Kentucky and Tennessee have culminated in registry agreements for 9 occurrences (6 populations) (EO #13 [Strohmeier Tract], 16, 45, 48, 51 in Kentucky and EO #5, 8, 16, and 17 in Tennessee) and conservation easements at two Kentucky populations (EO #13 [Feindell Tract] and 32 [Cove

Springs Park, owned by the City of Frankfort and purchased with Kentucky Heritage Land Conservation Trust funding]). As mentioned above, site registry agreements are nonbinding formal agreements made with landowners who are amenable to voluntary conservation on their property. The landowner agrees to contact the responsible state agency if the status of these populations changes or ownership changes. Typically, these agreements are developed when (1) a landowner does not want to sell their property, (2) the state agency cannot afford to purchase the property but wants to remain in contact with the landowner, and (3) the population is not of sufficient quality to warrant purchase and establishment of a nature preserve but does warrant some low level “protection” or involvement. These agreements do not provide any permanent or long-term protection for the plants, but the plants are afforded limited protection through typical trespass laws.

Conservation easements are also voluntary agreements with the landowner that restricts some landowner activities and sometimes provides conservation benefits through development of a management plan that provides restoration and recovery benefits to listed species. These agreements represent a legal, binding document that formally expresses the agency’s interest in working on the property with the landowner and establishes the limits of those areas to which the easement applies. The landowner retains the right to use their property as long as the agreed-upon easement is maintained.

Three, additional Kentucky populations are afforded some protection because they occur on publicly owned lands, specifically Kentucky River Wildlife Management Area (EO #19, owned and managed by Kentucky Department of Fish and Wildlife Resources [KDFWR]), Salato Wildlife Education Center (EO #41, KDFWR), and T. N. Sullivan Wildlife Management Area (EO #53, KDFWR). Plants occupying these areas are afforded some protection because these areas will not be subject to future development; however, the lands are open to public use and are not managed specifically for the protection and recovery of rare plants.

Two Kentucky populations are located on state nature preserves managed by KSNPC. As explained above, an A-ranked population (EO #50) in Franklin County was protected through the dedication of Rivercliffs State Nature Preserve (SNP) in 2002. The previous landowner agreed to dedicate his property (a total of 112 acres) to KSNPC so that the preserve could be established and then managed by personnel with KSNPC. The agreement precludes the development of the property and prohibits many activities that would be harmful to the biological and ecological elements of the site. An additional 98 acres was added to the preserve in 2009, bringing the total acreage to 210 acres (T. Littlefield, pers. com., 2010).

Another Franklin County population (EO#33) was protected through purchase and dedication of Rockcross Hills SNP in 2007. The purchase was completed using Recovery Land Acquisition funds (Section 6 of the Endangered Species

Act) provided by the Service. This A-ranked occurrence is part of an approximately 65-acre tract situated along a small, wooded ravine leading to the Kentucky River in Franklin County. A portion of this property containing *A. perstellata* was designated as critical habitat (Unit 8) in 2004.

### **Summary**

Delisting and downlisting criteria have not been achieved for Braun's rockcress, but recovery progress has been made. Currently, 31 populations consisting of 50 or more plants (A-, B-, or C-ranked occurrences) occur within Kentucky and Tennessee. Six of these populations have been protected through registry agreements, one additional Kentucky population has been protected through a conservation easement, and two Kentucky populations have been protected through land purchase (preserve dedications). Three additional Kentucky populations are afforded some protection due to their location on state wildlife management areas (WMAs). Management plans are lacking for populations located on WMAs and some of the populations protected by registry agreements. Long-term, quantitative, monitoring data does not exist for these populations, but these sites have been visited repeatedly by KSNPC over the last 10 years and evaluated qualitatively (number of plants, status or rank, and level of disturbance).

### **C. Updated Information and Current Species Status**

The evaluation of recovery criteria (including discussions of relevant listing factors and a summary of the species' current status) provided in Section II.B is sufficient to evaluate the species listing classification, and no further analysis is necessary in this section (II.C). Information on biology and habitat can be found in the recovery plan (USFWS 1997) and other references such as Braun (1956). A recent study not referenced in the recovery plan was by Baskauf and Jinks (2008), who investigated the population genetics of Braun's rockcress in Kentucky and Tennessee using isozymes as genetic markers (isozymes are enzymes that differ in amino acid sequence but catalyze the same chemical reaction). They examined a total of seven populations (three in Kentucky and four in Tennessee) and determined that the species had low levels of genetic variability, with virtually no variability within a given population. Populations were also similar genetically, with only slight allelic differences between populations in Kentucky and Tennessee. Given that the only variation observed for the species occurred between Kentucky and Tennessee populations, Baskauf and Jinks (2008) suggested that protection of populations in both states should be a conservation priority for the species.

### **D. Synthesis**

Braun's rockcress is a perennial herb that grows on shaded slopes of calcareous, mesophytic and sub-xeric forests in north-central Kentucky and north-central Tennessee. The species was originally described by E. Lucy Braun (1940) based on her discovery of the species in Kentucky in 1936. Within Kentucky, the species is currently restricted to 42 populations (42 occurrences) in three counties (Franklin, Henry, Owen), all of which are associated with the Kentucky River or its tributaries (primarily Elkhorn Creek). The



five, extant Tennessee populations (12 occurrences) occupy portions of two counties, Davidson and Rutherford, with the majority of these situated along the Stones River.

The recovery plan (USFWS 1997) and subsequent critical habitat rule (69 FR 31460) listed the primary threats to the species as alteration or loss of habitat through development (primarily home and road construction), competition with native and exotic weedy species, grazing and trampling, and timber harvesting (Listing Factor A - present or threatened destruction, modification or curtailment of its habitat or range). These threats still exist. The most severe threat appears to be competition from exotic plants such as European garlic mustard and amur honeysuckle (*Lonicera maackii*). Management schemes for the control of these and other weedy species are being tested by KSNPC and TDEC, but these species continue to increase in number and spread into natural areas. Listing Factor D (Inadequacy of existing regulatory mechanisms) also represents a threat to the species. Most populations occur on private property and are vulnerable to landowner activities that might result in some kind of habitat disturbance. Within Kentucky, the species' endangered status is only a KSNPC designation that carries no legal protection (KSNPC 2005).

At the time of listing, this species had a high degree of threat and a low recovery potential, resulting in a recovery priority number of 5 for the taxonomic level of species. At present, the Service does not have any additional information to suggest that the degree of threat or the recovery potential has changed. Therefore, we believe the recovery priority for Braun's rockcress should remain at 5 (moderate threat, high recovery potential, species level taxonomy).

The recovery criteria listed above in Section 2.E have not been met for delisting of this species. There appears to be a sufficient number of A-, B-, and C-ranked populations (31) to satisfy the recovery criteria goal of 20 self-sustaining populations, but an insufficient number of populations have been permanently protected. At present, some progress has been made toward achieving downlisting criteria. Protection has been achieved through registry agreements (6 populations), conservation easements (1 population), preserve dedications (2 populations), and the creation of WMAs (3 populations). Monitoring data is available to show that some of these populations have been stable or increasing for a five-year period as required in the recovery plan, but management plans have not been prepared or implemented for all these populations. Because of the restricted distribution of the species, extirpation of some occurrences, continued threats, and lack of progress toward achievement of recovery criteria, we believe that the status of *A. perstellata* should remain as endangered.

### **III. RESULTS**

#### **A. Recommended Classification:**

  X   No change is needed

#### IV. RECOMMENDATIONS FOR FUTURE ACTIONS -

- Continue range-wide surveys to locate unknown populations; visit and evaluate all known populations on a three-year rotation
- Continue to develop methods for controlling exotic or native weedy species; continue to evaluate the adverse effects of exotics such as garlic mustard
- Continue implementation of all management and protective actions for permanently protected occurrences on SNPs
- Work cooperatively with the Kentucky Department of Fish and Wildlife Resources and KSNPC to develop management plans and conservation agreements for populations occupying Kentucky WMAs
- Continue to pursue protection (through registry agreements, easements, or land purchases) of populations located on private property
- Continue to investigate the life history, ecological requirements, and genetic diversity of the species

#### V. REFERENCES -

- Baskauf, C. and N. Jinks. 2008. The population genetics of *Arabis perstellata* using isozymes. Unpublished report submitted to Tennessee Department of Environment and Conservation, Nashville, Tennessee. 14 pp.
- Braun, E. L. 1940. New plants of Kentucky. *Rhodora* 42:47-49.
- Braun, E. L. 1956. Growth habits of *Arabis perstellata*. *Rhodora* 58 :292-295.
- Jones, R. L. 1991. Status survey report on *Arabis perstellata* var. *perstellata*. Unpublished report prepared for Kentucky State Nature Preserves Commission, Frankfort, Kentucky and U. S. Fish and Wildlife Service, Asheville, North Carolina.
- Littlefield, T. 2010. Personal communication regarding a study on the effects of garlic mustard on Braun's rockcress (email correspondence). Kentucky State Nature Preserves Commission, Frankfort, Kentucky.
- U. S. Fish and Wildlife Service. 1995. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for *Arabis perstellata*. Final rule. 60 FR 56-61.
- U. S. Fish and Wildlife Service. 1997. Recovery Plan for *Arabis perstellata* Braun (Braun's Rockcress), Atlanta, Georgia, 21 pp.
- U. S. Fish and Wildlife Service. 2004. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for *Arabis perstellata* (Braun's Rock-cress); Final rule. 69 FR 31460.

Tennessee Department of Environment and Conservation. 2009. 2008 Population monitoring of *Arabis perstellata* in Tennessee. Unpublished report submitted to U. S. Fish and Wildlife Service, Cookeville, Tennessee. 15 pp.

White, D. 2010. Personal communication regarding current status of Braun's rockcress occurrences in Kentucky (email correspondence). Kentucky State Nature Preserves Commission, Frankfort, Kentucky.

**Peer Reviewers:**

Ms. Deborah White, Natural Heritage Branch Manager, Kentucky State Nature Preserves Commission, Frankfort, Kentucky

Mr. David Lincicome, Rare Plant Protection Program, Tennessee Department of Environment and Conservation, Nashville, Tennessee

Dr. Ronald Jones, Professor, Department of Biological Sciences, Eastern Kentucky University, Richmond, Kentucky

**U.S. FISH AND WILDLIFE SERVICE  
5-YEAR REVIEW of Braun's rockercress (*Arabis perstellata*)**

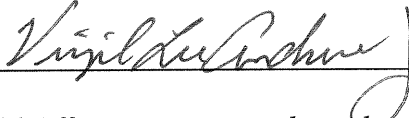
Current Classification: Endangered  
Recommendation resulting from the 5-Year Review

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

Review Conducted By Dr. Michael A. Floyd, Kentucky Field Office, Frankfort, Kentucky

**FIELD OFFICE APPROVAL:**

Lead Field Supervisor, Fish and Wildlife Service

Approve  Date 5/4/10

*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.*

*Acting*  
Lead Regional Director, Fish and Wildlife Service

Approve  Date 5-28-10

*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.*

**APPENDIX A: Summary of peer review for the 5-year review of Braun's rockcress  
(*Arabis perstellata*)**

**A. Peer Review Method:** The draft document was peer-reviewed by Deborah White, KSNPC, Frankfort, Kentucky; David Lincicome, TDEC, Nashville, Tennessee; and Dr. Ronald Jones, Eastern Kentucky University, Richmond, Kentucky. Comments received were incorporated as appropriate.

**B. Peer Review Charge:** Peer reviewers were asked to read the 5-year review and provide any comments, both editorial and content. Peer reviewers were not asked to provide recommendations on the classification of the species.

**C. Summary of Peer Review Comments/Report:** Peer reviews were mainly editorial in nature with very minor substantive comments to the content. Substantive comments included (1) detailed descriptions of registry agreements and conservation easements by Deborah White, who recommended that we include these descriptions in the review (2) details from Deborah White regarding the acquisition and dedication of Rockcress Hills SNP in Kentucky; and (3) details from David Lincicome regarding the number of populations/occurrences and registry agreements in Tennessee.

**D. Response to Peer Review:** General edits and minor substantive changes were added to the review as appropriate. More substantive comments summarized above were addressed as follows: (1) detailed descriptions of registry agreements and conservation easements were added to the text as recommended by Deborah White; (2) details on Rockcress Hills SNP were added as recommended by Deborah White; and (3) information provided by David Lincicome on Tennessee populations and registry agreements was added to the review.

**Table 1. Summary of Kentucky Occurrences for Braun's rockcress, *Arabis perstellata***

<b>Element Occurrence #</b>	<b>Site Name</b>	<b>Critical Habitat (69 FR 31460-31496)</b>	<b>Public Land</b>	<b>Protection Agreements</b>	<b>Management* (Y/N)</b>	<b>EORank</b>
1	Skyview Drive	Unit 1				C
2	Backbone South					D
3	Peask Mill High School					X
4	Benson South					D
5	Juniper Hill					D
6	Snow Hill Road North					X
8	Benson Vally Woods	Unit 2				C
10	Cedar Run					D
11						C
12	Frankfort Fish Hatchery					D
13	Stohmeirers Hill	Unit 10		Registry Agreement and Cons. Easement	Some	B
14	Penitentiary Creek					X
15	K. River Bluff near Glass Pond					X
16	Rockcress Woods	Unit 6		Registry Agreements (2)	Limited garlic mustard removal	C
19	Kentucky River WMA	Unit 14	Kentucky River WMA (KDFWR)		Under review	C
20	Backbone North	Unit 17				D
22	Red Bridge Ridge	Unit 3				B
23	Backbone East					D
24	Saufley Woods	Unit 13				B
25	Stoney Creek					C
30	Dobner Farm Site					D
31	Adkins Site					D
32	Cove Springs		Cove Spring (City of Frankfort)	Cons. Easement (HLCF)		D
33	Hoover Site	Unit 8	Rockcress Hills SNP (KSNPC)			A
34	Longs Ravine	Unit 9				C
37	Peaks Mill West					B
38	Severn Crk Site					D

39	US 127/Severn Crk Site	Unit 11				X
40						C
41	Salato Wildlife Center	Unit 4	Salato Wildlife Ed. Center (KDFWR)		Under review	D
42	Craddeck Bottom Bluff	Unit 16				C
43	N. of Monterey	Unit 15				B
44	Shadrock Ferry Rd.	Unit 7				B
45	Camp Pleasant Woods	Unit 12		Registry Agreement	Y, rehabilitating upper slope	B
46	Holmes Street					D
47	S of Capitol					D
48	Leeland Valley			Registry Agreement	Y, LIP garlic mustard removal.	B
49	Colston Lane					D
50	River cliffs	Unit 5	Rivercliffs SNP (KSNPC)		Y	A
51	Far Side Farm (Tucker Creek)			Registry Agreements (2)	Y, limited LIP garlic mustard removal.	C
53	Sullivan WMA		Sullivan WMA (KDFWR)		Under review	C
54	Camp Pleasant South					B
56	Switzer Ravine					A
57	Grindstone Creek					C
60	Ottusville SE					C
61	Ottusville East					D
62	Sand Ripple					C
63	Vaughns Branch					D



**Table 2. Summary of Tennessee Occurrences for Braun's rockcress, *Arabis perstellata***

Population	EO#	Site Name	Critical Habitat	County	2003	2004	2005	2007	2008	Rank	Last Obs.
1*	5	Scales Mountain Knobs (c-e)	CH	Rutherford	>200		>200	>200	854	A	30-Apr-2008
	15	Scales Mountain Knob (w)	CH	Rutherford	>50				46	C	30-Apr-2008
	16	Indian Mountain	CH	Rutherford	409				see EO8	A	24-Apr-2008
	8	Indian Mountain	CH	Rutherford	>200		>1,000		2072+	A	24-Apr-2008
	17	Indian Mountain	CH	Rutherford	50				see EO8	C	24-Apr-2008
2	6	Sophie Hill	CH	Rutherford	36				47	D	13-May-2008
	13	Sophie Hill	CH	Rutherford	>200				511	A	12-May-2008
	9	Townsel Hill	CH	Rutherford	>200				299	A	13-May-2008
	10	Townsel Hill	CH	Rutherford	>100				108	B	12-May-2008
3	12	Grandfather Knob (2 sites)	CH	Wilson	ca 125				204	B	7-May-2008
4	14	Versailles Knob	CH	Rutherford	>200				229	A	16-May-2008
5	18	Cole Knob		Rutherford		>1,000			1,283	B	1-May-2008
	4	NW Waltherhill		Rutherford						H	9-Apr-1966
	2	Charleston Road Site		Davidson						XN	28-Mar-1961
	1	Fuqua Road Bluffs		Davidson						H	28-May-1960
	3	Percy Priest Dam		Davidson						H	3-Apr-1968

\*EOs # 5, 8, 16, and 17 are protected via a Natural Areas Registry Agreement with the landowner