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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R4–ES–2010–0059; 92220–1113–0000–C6]

RIN 1018–AW26

Endangered and Threatened Wildlife and Plants; Removal of Echinacea tennesseensis (Tennessee Purple Coneflower) From the Federal List of Endangered and Threatened Plants

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule; availability of final post-delisting monitoring plan.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service or USFWS), are removing the plant *Echinacea tennesseensis* (commonly referred to as Tennessee purple coneflower) from the List of Endangered and Threatened Plants. This action is based on a thorough review of the best scientific and commercial data available, which indicate that this species has recovered and no longer meets the definition of threatened or endangered under the Endangered Species Act of 1973, as amended (Act). Our review of the status of this species shows that populations are stable, threats are addressed, and adequate regulatory mechanisms are in place so that the species is not currently, and is not likely to again become, an endangered species within the foreseeable future in all or a significant portion of its range. Finally, we announce the availability of the final post-delisting monitoring plan for *E. tennesseensis.*

DATES: This rule is effective on September 2, 2011.

ADDRESSES: Copies of the post-delisting monitoring plan are available by request from the Tennessee Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**) or online at: *http://www.fws.gov/cookeville/* and *http://www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Mary E. Jennings, Field Supervisor, U.S. Fish and Wildlife Service, Tennessee Ecological Services Field Office, 446 Neal Street, Cookeville, TN 38501 (telephone 931/528–6481; facsimile 931/528–7075). Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 800/877–8339, 24 hours a day, 7 days a week.

SUPPLEMENTARY INFORMATION:

Previous Federal Actions

Section 12 of the Act (16 U.S.C. 1531 *et seq.*) directed the Secretary of the Smithsonian Institution to prepare a report on those plants considered to be endangered, threatened, or extinct. On July 1, 1975, the Service published a notice in the **Federal Register** (40 FR 27824) accepting the Smithsonian report as a petition to list taxa named therein under section 4(c)(2) [now 4(b)(3)] of the Act and announced our intention to review the status of those plants. *Echinacea tennesseensis* was included in that report (40 FR 27873). Tennessee purple coneflower is the common name for *E. tennesseensis;* however, we will primarily use the scientific name of this species throughout this final rule.

On June 16, 1976, we published a proposed rule in the **Federal Register** (41 FR 24524) to designate approximately 1,700 vascular plant species, including *Echinacea tennesseensis,* as endangered under section 4 of the Act. On June 6, 1979, we published a final rule in the **Federal Register** (44 FR 32604) designating *E. tennesseensis* as endangered. The final rule identified the following threats to *E. tennesseensis:* Loss of habitat due to residential and recreational development; collection of the species for commercial or recreational purposes; grazing; no State law protecting rare plants in Tennessee; and succession of cedar glade communities in which *E. tennesseensis* occurred.

On February 14, 1983, we published the Tennessee Coneflower Recovery Plan (Service 1983, 41 pp.), a revision of which we published on November 14, 1989 (Service 1989, 30 pp.). On September 21, 2007, we initiated a 5-year status review of this species (72 FR 54057). On August 12, 2010, we published a proposed rule to remove *Echinacea tennesseensis* from the List of Endangered and Threatened Plants, provided notice of the availability of a post-delisting monitoring plan, and opened a 60-day public comment period (75 FR 48896).

Species Information

A member of the sunflower family (Asteraceae), *Echinacea tennesseensis* is a perennial herb with a long, fusiform (*i.e.,* thickened toward the middle and tapered towards either end), blackened root. In late summer, the species bears showy purple flower heads on one-to-many hairy branches. Linear to lance-shaped leaves up to 20 centimeters (cm; 8 inches (in.)) long and 1.5 cm (0.6 in.) wide arise from the base of *E. tennesseensis* and are beset with coarse hairs, especially along the margins. The ray flowers (*i.e.,* petals surrounding the darker purple flowers of the central disc) are pink to purple and spread horizontally or arch slightly forward from the disc to a length of 2–4 cm (0.8–1.8 in.).

The following description of this species' life history is summarized from Hemmerly (1986, pp. 193–195): Seeds are shed from plants during fall and winter and begin germinating in early March of the following year, producing numerous seedlings by late March. Most of the seedling growth occurs during the first 6 or 7 weeks of the first year, during which plants will grow to a height of 2–3 cm (0.8–1.2 in) or less. Plants remain in a rosette stage and root length increases rapidly during these weeks. Plants can reach sexual maturity by the middle of their second growing season and only small losses in seed viability have been observed after a period of 5 years in dry storage (Hemmerly 1976, p. 17). However, Baskin and Baskin (1989, p. 66) suggest that *Echinacea tennesseensis* might not form persistent seed banks, based on results of field germination trials. Individuals of *E. tennesseensis* can live up to at least 6 years, but the maximum lifespan is probably much longer (Baskauf 1993, p. 37).

Echinacea tennesseensis was first collected in 1878 in Rutherford County, Tennessee, by Dr. A. Gattinger and later described by Beadle (1898, p. 359) as *Brauneria tennesseensis* on the basis of specimens collected by H. Eggert in 1897 from ''a dry, gravelly hill'' near the town of LaVergne. Fernald (1900, pp. 86–87) did not accept Beadle's identification of *B. tennesseensis* as a distinct species, instead he merged it with the more widespread *E. angustifolia.* This treatment was upheld by many taxonomists until McGregor (1968, pp. 139–141) classified the taxon as *E. tennesseensis* (Beadle) Small, based on examination of materials from collections discussed above and from collections by R. McVaugh in 1936. As McGregor (1968, p. 141) was unable to locate any plants while conducting searches during the months of June through August, 1959–1961, he concluded that the species was very rare or possibly extinct in his monograph of the genus *Echinacea.* The species went unnoticed until its rediscovery in a cedar glade in Davidson County as reported by Baskin *et al.* (1968, p. 70), and subsequently in Wilson County by Quarterman and Hemmerly (1971, pp. 304–305), who also noted that the area

believed to be the type locality for the species was destroyed by the construction of a trailer park.

More recently, Binns *et al.* (2002, pp. 610–632) revised the taxonomy of the genus *Echinacea* and in doing so reduced *Echinacea tennesseensis* to one of five varieties of *E. pallida.* Their taxonomic treatment considers *E. pallida* var. *tennesseensis* (Beadle) Small to be a synonym of their *E. tennesseensis* (Beadle) Binns, B. R. Baum, & Arnason, comb. nov. (Binns *et al.* 2002, pp. 629). However, this has not been unanimously accepted among plant taxonomists (Estes 2008, pers. comm.; Weakley 2008, pp. 139–140). Kim *et al.* (2004) examined the genetic diversity of *Echinacea* species and their results conflicted with the division of the genus by Binns *et al.* (2002, pp. 617–632) into two subgenera, *Echinacea* and *Pallida,* one of which—*Echinacea*—included only *E. purpurea.* Mechanda *et al.* (2004, p. 481) concluded that their analysis of genetic diversity within *Echinacea* only supported recognition of one of the five varieties of *E. pallida* that Binns *et al.* (2002, pp. 626–629) described, namely *E. pallida* var. *tennesseensis.* While Mechanda *et al.* (2004, p. 481) would also reduce *E. tennesseensis* from specific to varietal status, the conflicting results between these two investigations point to a lack of consensus regarding the appropriate taxonomic rank of taxa within the genus *Echinacea.* Because clear acceptance of the taxonomic revision by Binns *et al.* (2002, pp. 610–632) is lacking, and Flora of North America (*http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=250066491,* accessed December 3, 2009) and a flora under development by Weakley (2008, pp. 139–140) both retain specific status for *E. tennesseensis,* we continue to recognize *E. tennesseensis* as a species for the purposes of this rule.

Echinacea tennesseensis is restricted to limestone barrens and cedar glades of the Central Basin, Interior Low Plateau Physiographic Province, in Davidson, Rutherford, and Wilson Counties in Tennessee (Tennessee Department of Environment and Conservation (TDEC) 2006, p. 2). These middle Tennessee habitats typically occur on thin plates of Lebanon limestone that are more or less horizontally bedded, though interrupted by vertical fissures in which sinkholes may be readily formed (Quarterman 1986, p. 124). Somers *et al.* (1986, pp. 180–189) described seven plant community types from their study of 10 cedar glades in middle Tennessee. They divided those communities into xeric (dry) communities, which occurred in locations with no soil or soil depth less than 5 cm (2 in.), and subxeric (moderately dry) communities that occurred on soils deeper than 5 cm (2 in.) (Somers *et al.* 1986, p. 186). Quarterman (1986, p. 124) noted that soil depths greater than 20 cm (8 in.) in the vicinity of cedar glades tend to support plant communities dominated by eastern red cedar (*Juniperus virginiana*) and other woody species. Somers *et al.* (1986, p. 191) found *E. tennesseensis* in four of the community types they classified, but could not determine the fidelity of the species to a particular community type because it only occurred on three of the glades they studied and was infrequently encountered in plots within those sites. The communities where *E. tennesseensis* occurred spanned two xeric and two subxeric types. The xeric community types, named for the dominant species that either alone or combined constituted greater than 50 percent cover, were the (1) *Nostoc commune* (blue-green algae)—*Sporobolus vaginiflorus* (poverty dropseed) and (2) *Dalea gattingeri* (purpletassels) communities. The subxeric types were the (1) *S. vaginiflorus* and (2) *Pleurochaete squarrosa* (square pleurochaete moss) communities. Mean soil depths across these communities ranged from 4.1 to 7.7 cm (1.6 to 3.0 in.) (Somers *et al.* 1986, pp. 186–188).

When *Echinacea tennesseensis* was listed as endangered in 1979 (44 FR 32604), it was known only from three locations, one each in Davidson, Rutherford, and Wilson Counties. When the species' recovery plan was completed in 1989, there were five extant populations ranging in size from approximately 3,700 to 89,000 plants and consisting of one to three colonies each (Clebsch 1988, p. 14; Service 1989, p. 2). The recovery plan defined a population as a group of colonies in which the probability of gene exchange through cross pollination is high, and a colony was defined as all *E. tennesseensis* plants found at a single site that are separated from other plants within the population by unsuitable habitat (Service 1989, p. 1). While analysis of genetic variability within *E. tennesseensis* did not reveal high levels of differentiation among these populations (Baskauf *et al.* 1994, p. 186), recovery efforts have been implemented and tracked with respect to these geographically defined populations. The geographic distribution of these populations and the colonies they are comprised of was updated in a status survey of *E. tennesseensis* by TDEC (1996, Appendix I) to include all known colonies at that time, including those from a sixth population introduced into glades at the Stones River National Battlefield. For the purposes of this rule, we have followed these population delineations and have assigned most colonies that have been discovered since the status survey was completed to the geographically closest population.

The six *Echinacea tennesseensis* populations occur within an approximately 400 square kilometer (km^2; 154 square miles (mi^2)) area and include between 2 and 11 colonies each. In 2005, TDEC and the Service confirmed the presence of *E. tennesseensis* at 36 colonies and counted the number of flowering stems in each (TDEC 2006, pp. 4–5). Fifteen of these are natural colonies, and 21 of the 36 colonies have been established through introductions for the purpose of recovering *E. tennesseensis* (TDEC 1991, pp. 3–7; TDEC 1996, Appendix I; Lincicome 2008, pers. comm.). Three of these introduced colonies constitute the sixth population that was established at a Designated State Natural Area (DSNA) in the Stones River National Battlefield in Rutherford County (TDEC 1996, Appendix I). We do not consider 2 of the 21 introduced colonies as contributing to recovery and do not include them in our analysis of the current status of *E. tennesseensis* for reasons explained in the Recovery section of this rule. An additional introduced colony that was not monitored during 2005, but for which TDEC maintains an element occurrence record, brings the number of introduced colonies we consider here to 20 and the total number of colonies considered for this rulemaking to 35.

In assessing the status of *Echinacea tennesseensis* for this final rule, with respect to the recovery criterion described below, we use data from flowering stem counts conducted by the Service and TDEC (2006, pp. 4–5) in 2005 (Table 1), qualitative data collected at various times since the initial discovery of each colony (TDEC 1996, Appendix I), and quantitative monitoring data from nine natural colonies and five introduced colonies (Tables 2 and 3) (Drew 1991, p. 54; Clebsch 1993, pp. 11–16; Drew and Clebsch 1995, pp. 62–67; TDEC unpublished data). In order to address comments we received in response to the proposed delisting rule, the Service and TDEC undertook a thorough review of the monitoring data collected by TDEC and reanalyzed those data to produce ratios among juvenile and adult stage-classes (Table 2) and to produce density estimates with confidence

intervals for each monitored site (Table 3).

Table 1 in the proposed rule to delist *Echinacea tennesseensis* (75 FR 48896, August 12, 2010) provided estimates of the numbers of individuals in each colony, which were produced based on relationships reported by TDEC (2006, p. 2) between numbers of flowering stems and other demographic classes. Table 1 is revised in this final rule to report only the numbers of flowering stems that were counted at each natural and introduced colony during 2005. We removed the estimates of numbers of adults and total numbers of plants that appeared in the proposed rule because those estimates were based on ratios among stage classes that were calculated using data from a single year, in which the ratio of other stage classes to adults was the highest observed during any year of monitoring for *E. tennesseensis,* and those data were only from naturally occurring colonies.

TABLE 1—SUMMARY OF TENNESSEE PURPLE CONEFLOWER POPULATIONS AND COLONIES. INCLUDES DATA ON ORIGIN, WHETHER COLONIES ARE SECURE OR SELF-SUSTAINING, AND FLOWERING STEM COUNTS FROM 2005 SURVEYS

[* = Colonies selected for post-delisting monitoring.]

Population	Population name	Colony No.	EO No.	Ownership	Origin	Year First observed	Secure Y/N	Self-Sustaining Y/N	Flowering stems
1	Mount View	1.1	001	TDEC–DNA[a].	Natural	1963	Y	Y	5,430
		1.2	022	COE[b]	Introduced.	1990	Y	Y	252
		1.4	031	COE	Introduced.	1989	Y	Y	596
Totals									6,278
2	Vesta	2.1	011	Private	Natural	1970	N	Y	2,820
		*2.1	006	TDEC–DNA	Natural	1988	Y	Y	4,970
		2.2	002	TDEC–DNA	Natural	1980	Y	Y	4,274
		2.3	038	TDF[c] (DSNA[d]).	Introduced.	1983	Y	Y	139
		2.4	039	TDF (DSNA).	Introduced.	1983	N	N	1
		*2.6	040	TDEC–SP	Introduced.	1982	N	Y	252
		2.7	048	TDF (DSNA).	Introduced.	2003	N	N	6
		2.8	050	TDEC–DNA	Natural	2003	Y	Y	2,143
		+2.9	053	Private	Introduced.	2006	N	Y	n/a
Totals									14,605
3	Vine	*3.1	005	TDF (DSNA)/ private.	Natural	1979	Y	Y	7,555
		*3.2	016	TDEC–DNA	Natural	1989	Y	Y	12,457
		3.2	015	Private	Natural	1989	N	Y	432
		3.2	012	Private	Natural	1989	N	Y	610
		*3.2	017	TDEC–DNA	Natural	1989	Y	Y	12,457
		3.3	014	Private	Natural	1989	N	N	11
		*3.4	021	Private (DSNA).	Natural	1990	Y	Y	12,979
		3.5	013	Private	Natural	1989	N	Y	2,529
		3.6	018	Private	Natural	1989	N	Y	157
		3.7	007	Private	Introduced.	1979	N	Y	1,705
		*3.8	030	TDF	Introduced.	1990	N	Y	1,863
		3.9	036	TDF	Introduced.	1989	Y	Y	2,744
		3.10	033	Private	Natural	1999	N	Y	5,374
		3.11	041	Private	Natural	1998	N	Y	1,935
								Totals	62,808
4	Allvan	*4.2	027	COE (DSNA).	Introduced.	1989	Y	Y	6,183
		*4.3	047	COE	Introduced.	1989	N	Y	385
									6,568
5	Couchville	*5.1	010	TDEC–DNA	Natural	1984	Y	Y	7,353
		5.2	020	Private	Natural	1990	N	Y	392
		5.3	024	TDEC–SP	Introduced.	1985	N	Y	1,607
		5.4	035	TDEC–SP	Introduced.	1991	Y	Y	863
		5.4	026	TDEC–SP	Introduced.	1989	Y	Y	987
		*5.5	025	TDEC–SP	Introduced.	1987	N	Y	1,300

TABLE 1—SUMMARY OF TENNESSEE PURPLE CONEFLOWER POPULATIONS AND COLONIES. INCLUDES DATA ON ORIGIN, WHETHER COLONIES ARE SECURE OR SELF-SUSTAINING, AND FLOWERING STEM COUNTS FROM 2005 SURVEYS—Continued

[* = Colonies selected for post-delisting monitoring.]

Population	Population name	Colony No.	EO No.	Ownership	Origin	Year First observed	Secure Y/N	Self-Sustaining Y/N	Flowering stems
		5.6	032	TDEC–SP	Introduced.	1989	Y	Y	846
		5.7	008	TDEC–SP	Natural ...	1981	N	N	17
		5.8	049	COE (DSNA).	Introduced.	2000	Y	Y	101
Totals	.....	.....	.....	.....	.....	.....	.....	.....	13,466
6	Stones River National Battlefield.	*6.1	009	NPS[e] (DSNA).	Introduced.	1970	Y	Y	2,535
		6.2	028	NPS (DSNA).	Introduced.	1995	Y	Y	237
		6.3	029	NPS (DSNA).	Introduced.	1991	Y	Y	852
Totals	.....	.....	.....	.....	.....	.....	.....	Totals	3,624
Grand Totals.	.....	.....	.....	.....	.....	.....	.....	.....	107,349

[a] Tennessee Department of Environment and Conservation—Division of Natural Areas Designated State Natural Areas (DSNA).
[b] U.S. Army Corps of Engineers.
[c] Tennessee Division of Forestry.
[d] DSNA that are not owned by TDEC–DNA.
[e] National Park Service.
[+] Colony 2.9 was not monitored during 2005, because it was not reported to TDEC–DNA until 2006, at which time there were thousands of plants (Lincicome 2006, pers. comm).

TABLE 2—RATIO OF JUVENILES TO ADULT DETERMINED FROM STAGE-SPECIFIC COUNT DATA ACQUIRED DURING SAMPLING BY DREW (1991, P. 54) FOR 1987, CLEBSCH (1993, P. 11) FOR 1992, AND TDEC (UNPUBLISHED)

[* Colony 4.1 was destroyed circa 2004–2005.]

Origin	Colony No.	EO No.(s)	1987	1992	1998	2000	2001	2004	2006	2008	Colony mean
Natural	1.1	1	1.58	.....	1.78	.....	2.47	10.37	.....	1.06	3.45
	1.2	22	.....	2.76	.....	.....	.....	.....	.....	.....	n/a
	2.1	6	3.45	.....	0.94	2.60	1.67	9.43	.....	1.16	3.21
	3.1	5	2.49	.....	2.01	.....	2.78	14.52	.....	0.91	4.54
	3.2	12, 15–17	.....	1.94	.....	.....	.....	.....	.....	.....	n/a
	3.4	21	.....	2.00	.....	.....	.....	10.96	.....	1.38	4.78
	3.5	13	.....	1.88	.....	.....	.....	.....	.....	.....	n/a
	4.1*	3	2.21	.....	1.82	.....	2.03	12.03	.....	.....	4.52
	5.1	10	4.77	.....	5.19	2.64	1.42	8.27	.....	0.92	3.87
Introduced	3.8	30	.....	.....	.....	.....	.....	.....	6.17	.....	n/a
	4.2	27	.....	.....	.....	.....	.....	.....	4.78	.....	n/a
	4.3	47	.....	.....	.....	.....	.....	.....	11.95	.....	n/a
	5.5	25	.....	.....	.....	.....	.....	.....	4.12	.....	n/a
	6.1	9	.....	.....	.....	.....	.....	.....	5.18	.....	n/a
	Annual mean		2.90	2.15	2.35	2.62	2.07	10.93	6.44	1.08	.....

TABLE 3—ESTIMATED MEAN DENSITY PER SQUARE METER OF ECHINACEA TENNESSEENSIS AND 95% CONFIDENCE INTERVAL. DATA SOURCES INCLUDE DREW AND CLEBSCH (1995, P. 62) FOR 1987 AND TDEC (UNPUBLISHED).

[* Colony 4.1 was destroyed circa 2004–2005.]

Origin	Colony No.	EO No.	1987	1998		2000		2001		2004		2006		2008	
			Mean	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Natural	1.1	1	12.90	41.63	42.25			25.56	20.57	44.03	37.33	.....	.....	9.71	8.02
	2.1	6	13.10	30.59	12.01	21.33	8.95	16.38	6.70	48.45	16.59	.....	.....	13.83	3.40
	3.1	5	20.70	58.20	23.84			51.77	29.82	92.45	30.73	.....	.....	18.79	7.27
	3.4	21								65.33	41.07	.....	.....	20.93	12.47
	*4.1	3	6.20	25.50	63.35			14.13	21.98	15.36	24.37	.....	.....	.....	.....
	5.1	10	6.20	27.75	11.84	7.82	3.78	8.56	3.10	15.03	6.16	.....	.....	4.76	1.79
Introduced	3.8	30	.....	.....	.....	.....	.....	.....	.....	.....	.....	3.15	6.24	.....	.....
	4.2	27	.....	.....	.....	.....	.....	.....	.....	.....	.....	11.60	12.98	.....	.....
	4.3	47	.....	.....	.....	.....	.....	.....	.....	.....	.....	19.50	34.91	.....	.....
	5.5	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	12.03	8.96	.....	.....

TABLE 3—ESTIMATED MEAN DENSITY PER SQUARE METER OF *Echinacea tennesseensis* AND 95% CONFIDENCE INTERVAL. DATA SOURCES INCLUDE DREW AND CLEBSCH (1995, P. 62) FOR 1987 AND TDEC (UNPUBLISHED).—Continued

[* Colony 4.1 was destroyed circa 2004–2005.]

Origin	Colony No.	EO No.	1987	1998		2000		2001		2004		2006		2008	
			Mean	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
	6.1	9	.....	.....	.....	.....	.....	.....	.....	.....	.....	41.37	47.09	.....	.....

Natural colonies, or those not known to have been established through introductions, included 83,895 flowering stems in 2005 (TDEC 2006, p. 6). Introduced colonies, excluding the two mentioned above, accounted for 23,454 flowering stems (TDEC 2006, p. 6). Natural colonies constituted approximately 78 percent of the total flowering stems and introduced colonies approximately 22 percent. In this rule, we use the colony numbers reported by TDEC (1996, Appendix I) and have sequentially assigned additional colony numbers to those which have been discovered since that report was issued. In some instances, there are gaps evident in the sequence of colony numbers discussed, representing colonies that have been documented in the past but were either extirpated or of unknown status at the time of this rule.

Recovery

Section 4(f) of the Act directs us to develop and implement recovery plans for the conservation and survival of endangered and threatened species unless we determine that such a plan will not promote the conservation of the species. The Act directs that, to the maximum extent practicable, we incorporate into each plan:

(1) Site-specific management actions that may be necessary to achieve the plan's goals for conservation and survival of the species;

(2) Objective, measurable criteria, which when met would result in a determination, in accordance with the provisions of section 4 of the Act, that the species be removed from the list; and

(3) Estimates of the time required and cost to carry out the plan.

However, revisions to the list (adding, removing, or reclassifying a species) must reflect determinations made in accordance with sections 4(a)(1) and 4(b) of the Act. Section 4(a)(1) requires that the Secretary determine whether a species is endangered or threatened (or not) because of one or more of five threat factors. Therefore, recovery criteria must indicate when a species is no longer endangered or threatened by any of the five factors. In other words, objective, measurable criteria, or recovery criteria contained in recovery plans, must indicate when we would anticipate an analysis of the five threat factors under section 4(a)(1) would result in a determination that a species is no longer endangered or threatened. Section 4(b) of the Act requires that the determination be made ''solely on the basis of the best scientific and commercial data available.''

Thus, while recovery plans are intended to provide guidance to the Service, States, and other partners on methods of minimizing threats to listed species and on criteria that may be used to determine when recovery is achieved, they are not regulatory documents and cannot substitute for the determinations and promulgation of regulations required under section 4(a)(1) of the Act. Determinations to remove a species from the list made under section 4(a)(1) of the Act must be based on the best scientific and commercial data available at the time of the determination, regardless of whether that information differs from the recovery plan.

In the course of implementing conservation actions for a species, new information is often gained that requires recovery efforts to be modified accordingly. There are many paths to accomplishing recovery of a species, and recovery may be achieved without all criteria being fully met. For example, one or more recovery criteria may have been exceeded while other criteria may not have been accomplished, yet the Service may judge that, overall, the threats have been minimized sufficiently, and the species is robust enough, that the Service may reclassify the species from endangered to threatened or perhaps delist the species. In other cases, recovery opportunities may have been recognized that were not known at the time the recovery plan was finalized. These opportunities may be used instead of methods identified in the recovery plan.

Likewise, information on the species may be learned that was not known at the time the recovery plan was finalized. The new information may change the extent that criteria need to be met for recognizing recovery of the species. Overall, recovery of species is a dynamic process requiring adaptive management, planning, implementing, and evaluating the degree of recovery of a species that may, or may not, fully follow the guidance provided in a recovery plan.

Thus, while the recovery plan provides important guidance on the direction and strategy for recovery, and indicates when a rulemaking process may be initiated, the determination to remove a species from the Federal List of Endangered and Threatened Wildlife is ultimately based on an analysis of whether a species is no longer endangered or threatened. The following discussion provides a brief review of recovery planning for *Echinacea tennesseensis* as well as an analysis of the recovery criteria and goals as they relate to evaluating the status of the species.

We first approved the Tennessee Coneflower Recovery Plan on February 14, 1983 (Service 1983, 41 pp.) and revised it on November 14, 1989 (Service 1989, 30 pp.). The recovery plan includes one delisting criterion: *Echinacea tennesseensis* will be considered recovered when there are at least five secure wild populations, each with three self-sustaining colonies of at least a minimal size. A colony will be considered self-sustaining when there are two juvenile plants for every flowering one. Minimal size for each colony is 15 percent cover of flowers over 669 square meters (m^2; 800 square yards (yd^2); 7,200 square feet (ft^2)) of suitable habitat. Establishing multiple populations during the recovery of endangered species serves two important functions:

(1) Providing redundancy on the landscape to minimize the probability that localized stochastic disturbances will threaten the entire species, and

(2) Preserving the genetic structure found within a species by maintaining the natural distribution of genetic variation among its populations.

In the case of *Echinacea tennesseensis,* the need for multiple distinct populations to maintain genetic structure is diminished, as Baskauf *et al.* (1994, p. 186) determined that the majority of genetic variability within this species is maintained within each

population rather than distributed among them. These data were not available at the time the recovery plan was completed. With respect to redundancy, the current number of *E. tennesseensis* colonies exceeds the total number recommended by the recovery plan for delisting this species, and we believe the current distribution of secured colonies among geographically distinct populations, which are separated by distances of 1.8 to 9 miles (2.9–14.5 km), is adequate for minimizing the likelihood that isolated stochastic disturbances would threaten species.

The criterion in the recovery plan for delisting *Echinacea tennesseensis* has been met, as described below. Additionally, the level of protection currently afforded to the species and its habitat, as well as the current status of threats, are outlined below in the Summary of Factors Affecting the Species section.

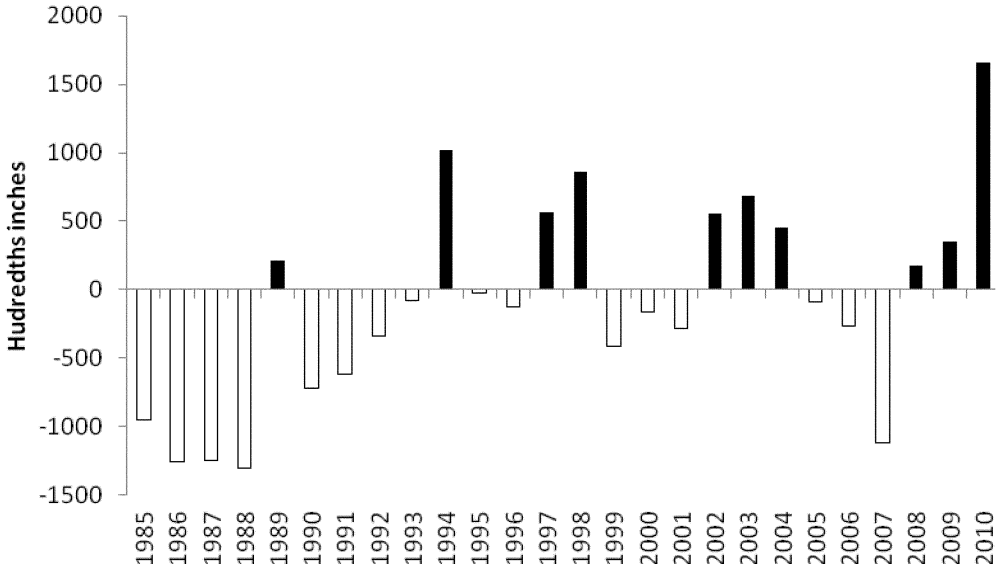
There currently are six geographically defined *Echinacea tennesseensis* populations, including the five described in the recovery plan (Service 1989, pp. 3–7) and one introduced population at the Stones River National Battlefield (TDEC 1996, Appendix I). Within these populations, there currently are 19 colonies of *E. tennesseensis* that occur entirely or mostly on protected lands, with five of the populations containing three or more colonies each. The Allvan population is the lone exception, as only one of its two colonies is secure at this time. The 19 secured colonies accounted for 88,773 flowering stems in 2005, or approximately 83 percent of the flowering stems observed; whereas, colonies that we do not consider secure accounted for 18,576 flowering stems, or approximately 17 percent of the flowering stems observed (TDEC 2006, pp. 4–5).

While data on numbers of juvenile plants have not been collected from all colonies, monitoring data that have been collected for this demographic attribute (see Table 2 above) have typically exceeded the value used in defining self-sustaining in the recovery plan—*i.e.,* that there be two juvenile plants for every flowering adult in a colony. The mean ratio of juvenile to adult plants in natural colonies, for a given year of monitoring, has ranged from 1.08 to 10.93, based on data collected at two to six sites per year in 1998, 2000, 2001, 2004, and 2008 (see Table 2 above). The mean of this ratio for each of these natural colonies across all years exceeds the ratio of two juveniles per adult. Ratios of juvenile to flowering adult plants in introduced colonies were first estimated during 2006, when the mean was found to be 6.44 juveniles per adult from a single year of data collected at six introduced colonies and the ratio for each of these colonies was greater than 4 juveniles per adult (see Table 2 above). Based on these data, we believe that those colonies for which ratios of juvenile to adult stage-classes are available meet the required ratio of two juveniles per adult that the recovery plan uses in defining self-sustaining. We believe that these data are representative of the status of *Echinacea tennesseensis* generally given the distribution of monitored colonies among each of the six populations used for tracking recovery efforts.

We reached our conclusion that this criterion has been achieved in spite of the 2008 assessment data which indicate that the ratio of juveniles to adults was less than 2.0 at the five colonies that were assessed. Drew and Clebsch (1995, p. 67) witnessed considerable variability in mortality rates among stage classes of permanently-tagged *Echinacea tennesseensis* individuals measured over the periods 1987–1988 and 1988–1989, which they attributed to interannual variability in rainfall. Based on observations in their first year of study, they determined that seedlings—plants with a cumulative leaf length less than 30 cm (11.8 in)—had a high probability (*i.e.,* approximately 50 percent) of dying during drought conditions (Drew and Clebsch 1995, p. 66) (reference ''Summary of Factors Affecting the Species'' section for the discussion of the coneflower mature plant's attributes that allow it to endure and remain viable through periods of drought).

However, we have not been able to establish a clear relationship between the amount of rainfall and the ratio of juveniles to adults. We acquired data for monthly departures from normal rainfall for the period 1985 through 2010, collected at the Nashville International Airport, from the National Climatic Data Center (2011) to use in assessing available quantitative monitoring data on *Echinacea tennesseensis* for patterns related to growing season precipitation data. Figure 1 presents data on the cumulative departure from normal rainfall during March through August for each year. In reviewing these data for potential influence of growing season rainfall on *E. tennesseensis* ratios of juveniles to adults, we find no clear pattern. For example, Figure 1 suggests that less than normal growing season rainfall during the period 1985 through 1987 would likely have created conditions in which moisture-related stress could have affected plant populations but that situation is not supported by the juvenile-to adult ratios provided in Table 2 for that same time span which show four out of five colonies sampled during 1987 exceeded the two-to-one ratio recommended by the recovery plan. This absence of a clear relationship leads us with no clear conclusion as to why the ratio of juveniles to adults declined in 2008 but we will track this ratio closely as part of our post-delisting monitoring program to ensure that the ratio of juveniles to adults remains at or above the target value in the future.

Figure 1. March through August cumulative departure from normal rainfall (hundredths inches) for each year, 1985 - 2010, at Nashville International Airport (NCDC 2011).



As part of the delisting criterion stated in the recovery plan, each self-sustaining colony should consist of 15 percent cover of flowers over 669 m^2 (800 yd^2, 7,200 ft^2) of suitable habitat, which has not been met in all cases. However, we have determined that this recommendation of percent coverage of flowers over a particular habitat acreage does not reflect the best available scientific information. Drew and Clebsch (1995, pp. 61–67) conducted monitoring during 1987 through 1989 that established baseline conditions for five of the colonies included in the recovery plan (Service 1989, pp. 3–7); in doing so, they found that percent flower cover of *Echinacea tennesseensis* at these sites ranged from 2 to 12 percent, never exceeding the 15 percent threshold stipulated in the recovery plan. Total percent cover of all vegetation in the habitats where these colonies occur ranged from 42 to 59 percent, meaning that *E. tennesseensis* would have to have constituted 25 to 40 percent of the total vegetative cover to have occupied 15 percent flower cover in these sites. In contrast, *E. tennesseensis* only constituted between 5 and 22 percent of total vegetative cover in plots studied by Drew and Clebsch (1995, p. 63). In addition to the fact that the recovery plan articulated a standard for percent coverage of flowers that was not met by the reference colonies known to exist when the plan was published, a disadvantage of using cover estimates for monitoring a rare species such as *E. tennesseensis* is that this value can change during the course of a growing season; density estimates, on the other hand, remain fairly stable once seedlings have become established following germination (Elzinga *et al.* 1998, p. 178).

The recommendation that each colony occupy 669 m^2 (800 yd^2, 7,200 ft^2) of suitable habitat does not reflect the range of variability observed in several natural colonies that have been discovered since the recovery plan was completed. Many of these colonies are constrained by the small patches of cedar glade habitat where they occur and provide evidence of a wider range of natural variability in habitat patch size and colony size in this species that was not recognized at the time the recovery plan was published.

We believe that either total counts of plants in various stage classes within a colony of *Echinacea tennesseensis,* or sampling within a known area to generate density estimates (TDEC 2005, pp. 3–4, 16–20), provide superior metrics over cover estimates for monitoring trends in population size. Various sampling designs have been used to estimate density per square meter in one or more colonies of each *E. tennesseensis* population, providing long-term monitoring data to use in judging their stability (Drew and Clebsch 1995, p. 62; TDEC unpublished data). We acknowledge that the confidence intervals are large, reflecting the variability in the data used to produce many of the density estimates (see Table 3 above) produced from the monitoring data for 1998 through 2008. Further, Drew and Clebsch (1995, p. 62) did not provide a measure of precision for the estimated densities they reported from 1987 for some colonies. However, these are the best scientific data available for judging the stability of these populations since initial monitoring data were collected in 1987. We believe that the available quantitative data demonstrate that while *E. tennesseensis* densities fluctuate over time, the species' density has remained comparable to reference values provided by Drew and Clebsch (1995, p. 62). The exception to this trend is colony 4.1, which was located in a heavily disturbed site and was destroyed sometime after monitoring was conducted during 2004 and before flowering stems were counted at each colony in 2005. Prior to its destruction, estimated densities at this colony exceeded the reference values. Despite the loss of this colony, the recovery criterion for *Echinacea tennesseensis* has been met.

While quantitative monitoring data are not available for all *Echinacea tennesseensis* colonies, we believe these monitoring results are indicative of the species' overall viability because they are distributed among its six populations. The monitoring data discussed above in relation to the recovery criterion definition of self-sustaining provide a measure of the sustainability of both natural and introduced populations and also demonstrate the temporal variability both in density and relative abundances of juvenile and adult stage classes. These data, combined with flowering stem counts at all colonies in 2005 (Table 1, TDEC 2006, pp. 4–5) and qualitative data (TDEC 1996, Appendix

I, TDEC 2010) for all colonies documenting whether they have persisted over time, changed dramatically in abundance, or are threatened by natural or human-caused factors, are adequate for judging whether the colonies should be considered self-sustaining. Using these data we have determined that 31 out of the total 35 colonies are self-sustaining, 19 of which are the colonies described above as secure. We discuss the available data for each colony below under the subheading *Recovery Action (5): Monitor colonies and conduct management activities, if necessary, to maintain the recovered state in each colony.*

The current recovery plan identifies six primary actions necessary for recovering *Echinacea tennesseensis:*

(1) Continue systematic searches for new colonies;

(2) Secure each colony;

(3) Provide a seed source representative of each natural colony;

(4) Establish new colonies;

(5) Monitor colonies and conduct management activities, if necessary, to maintain the recovered state in each colony; and

(6) Conduct public education projects.

Each of these recovery actions has been accomplished. The Service entered into a cooperative agreement with TDEC in 1986, as authorized by section 6 of the Act, for the conservation of endangered and threatened plant species, providing a mechanism for TDEC to acquire Federal funds that have supported much of the work described here. The State of Tennessee and other partners have provided matching funds in order to receive funding from the Service under this agreement.

Recovery Action (1): Continue Systematic Searches for New Colonies

There were eight colonies of *Echinacea tennesseensis* known to exist when the recovery plan was completed (Service 1989, pp. 3–7). TDEC and its contractors conducted searches of cedar glades, identified through the use of aerial photography and topographic maps, during the late 1980s through 1990 and found five previously unknown colonies of *Echinacea tennesseensis* (TDEC 1991, p. 1). Two of these colonies were considered additions to the Vine population (TDEC 1991, p. 2), or population 3 as described in the recovery plan (Service 1989, pp. 4–5). One colony was considered an addition to the Mount View population (TDEC 1991, p. 2), or population 1 of the recovery plan (Service 1989, p. 3). A fourth colony was considered an addition to the Couchville population (TDEC 1991, p. 3), or population 5 of the recovery plan (Service 1989, p. 7). The fifth colony was smaller, not in a natural setting, and not assigned to any of the recovery plan populations in the TDEC report (1991, p. 2). Other colonies have been discovered during the course of surveys conducted in the cedar glades of middle Tennessee, and the number of extant natural colonies now totals 15. A summary of the currently known populations (as well as the natural and introduced colonies they are comprised of) is provided in Table 1 above, and in the discussion concerning recovery action number (5). Because systematic searches for new colonies have been conducted since the completion of the recovery plan and have led to the discovery of previously unknown colonies, we consider this recovery action to be completed.

Recovery Action (2): Secure Each Colony

We have assessed the security of each *Echinacea tennesseensis* colony based on observations about threats and defensibility ranks reported in the 1996 status survey of this species (TDEC 1996, Appendix I) and information in our files concerning protection actions, such as construction of fences. We consider 14 of the 16 colonies within DSNAs to be secure. The only exceptions to this determination are colonies 2.4 and 2.7, which lie within portions of the extensive Cedars of Lebanon State Forest DSNA that have been threatened by past outdoor recreational vehicle (ORV) use or are generally degraded cedar glade habitat. The State of Tennessee's Natural Area Preservation Act of 1971 (T.C.A. 11–1701) protects DSNAs from vandalism and forbids removal of endangered and threatened species from these areas. TDEC monitors these sites and protects them as needed through construction of fences or placement of limestone boulders to prevent illegal ORV access. We do not consider secure the nine colonies that exist only on private land and are not under some form of recovery protection agreement. The introduced population at the Stones River National Battlefield DSNA consists of three secured colonies requiring no protective management, as access is controlled by the National Park Service (NPS). The site where these colonies are located became a DSNA in 2003.

The recovery plan states that *Echinacea tennesseensis* will be considered recovered when there are ''at least five secure wild populations, each with three self-sustaining colonies of at least a minimal size.'' There are now 19 secure, self-sustaining colonies of *E. tennesseensis* distributed among six populations (see Table 1 above), fulfilling the recovery plan intentions of establishing a sufficient number and distribution of secure populations and colonies to remove the risk of extinction for this species within the foreseeable future. Therefore, we consider this recovery action completed.

Recovery Action (3): Provide a Seed Source Representative of Each Natural Colony

The Missouri Botanical Garden (MOBOT), an affiliate institution of the Centers for Plant Conservation (CPC), collected accessions of seeds from each of the six populations currently in existence during 1994 (Albrecht 2008a pers. comm.) and from four of those populations during 2010 (Albrecht 2010, pers. comm.). This collection is maintained according to CPC guidelines (Albrecht 2008b, pers. comm.). Five of the accessions taken by MOBOT were provided to the National Center for Genetic Resource Preservation (NCGRP) in Fort Collins, Colorado, for long-term cold storage. The NCGRP protocol is to test seed viability every 5 years for accession, and MOBOT also tests seed viability on a periodic basis and collects new material for accessions every 10 to 15 years (Albrecht 2008b, pers. comm.).

While these accessions do not contain seed from every unique colony, they represent each of the populations of *Echinacea tennesseensis.* These accessions provide satisfactory material should establishment of colonies from reintroductions or additional introductions become necessary in the future, as Baskauf *et al.* (1994, pp. 184–186) concluded that there is a low level of genetic differentiation among populations of *E. tennesseensis* and the origin of seeds probably is not a critical concern for establishing new populations. Therefore, we consider this recovery action completed.

Recovery Action (4): Establish New Colonies

TDEC (2006, pp. 3–6) reported flowering stem counts for 21 introduced colonies, but we have eliminated two of these from our analysis of the current status of *Echinacea tennesseensis.* One of these excluded colonies was introduced into a privately owned glade well outside of the known range of the species in Marshall County, consists of only a few vegetative stems, and is of doubtful viability. The other introduced colony that we excluded is located in Rutherford County, approximately 7 miles from the nearest *E. tennesseensis* population, and is believed to contain hybrids with *E. simulata.* Hybridization

between these two species has not been reported at any other site. The number of flowering stems reported from the monitored colonies during 2005 ranged from only 1 to 6,183, and only one of these colonies had fewer than 100 flowering stems (TDEC 2006, pp. 4–5). An additional introduced colony (2.9) that was not surveyed during 2005, but contained thousands of plants in 2006 (Lincicome 2006, pers. comm.), brings the number of extant introduced colonies to 20. These 20 colonies were established at various times since 1970, through the introductions of seed or transplanted individuals (TDEC 1991, pp. 3–7; TDEC 1996, Appendix I; Lincicome 2008, pers. com.), often from an undocumented or mixed origin with respect to the source populations (Hemmerly 1976, p. 81; Hemmerly 1990, pp. 1–8; TDEC 1991, pp. 4–8; Clebsch 1993, pp. 8–9). Numerous nurseries have grown *E. tennesseensis* for the purpose of providing seeds and plants for establishing new colonies (TDEC 1991, pp. 3–8). Baskauf *et al.* (1994, pp. 184–186) determined that less than 10 percent of the genetic variability of *E. tennesseensis* is distributed among populations and concluded from this low level of differentiation that the origin of seed used in establishing new populations probably is not a critical consideration. We summarize the distribution of these introduced colonies among *E. tennesseensis* populations in the discussion concerning recovery action number (5) below. Because 20 new colonies have been established, we consider this recovery action completed.

Recovery Action (5): Monitor Colonies and Conduct Management Activities, if Necessary, To Maintain the Recovered State in Each Colony

Drew and Clebsch (1995, pp. 62–67; Drew 1991, pp. 9–11) conducted the first monitoring of *Echinacea tennesseensis* during the summer of 1987, in the primary colony of each of the five populations included in the recovery plan (Service 1989, pp. 3–7). For this monitoring effort, all non-flowering *E. tennesseensis* were classified as juveniles during quadrat sampling. Clebsch (1993, pp. 11–16) sampled four additional colonies during 1992, and provided ratios among life stage-classes and estimates of total individuals for each, but did not estimate mean density per square meter. Based on results of demographic research by Drew (1991), Clebsch (1993, p. 11) modified stage-class definitions as follows: Adults were plants that produced flowering stems, juveniles were non-flowering plants with cumulative leaf length greater than 30 cm (11.8 in.), and seedlings were non-flowering plants with cumulative leaf length less than 30 cm (11.8 in.).

TDEC (unpublished data) monitored each of the colonies that Drew and Clebsch (1995, pp. 62–67) sampled and one of the colonies Clebsch (1993, pp. 9–11) sampled one or more times in the years 1998, 2000, 2001, 2004, and 2008, and conducted the first quantitative monitoring of five introduced colonies in 2006. TDEC characterized stage classes as follows: Adults are plants that produce flowering stems; juveniles are non-flowering plants with leaves greater than 2 cm (.79 in.) in length; seedlings are non-flowering plants with leaves less than 2 cm (.79 in.) in length.

Table 1, above, lists each of the populations and associated colonies, the date they were first recorded in the Tennessee Natural Heritage Inventory Database (TDEC 2010), the number of flowering stems observed at the colony in 2005 (TDEC 2006, pp. 4–5), whether they are of natural or introduced origin, and whether we consider them to be secure or self-sustaining. Tables 2 and 3, above, present ratios among juvenile and adult stage-classes and estimates of *Echinacea tennesseensis* mean density per square meter that have been produced from monitoring efforts.

The Mount View population (number 1 in the recovery plan) consisted of a single known colony when the recovery plan was completed (Service 1989, p. 3). This population now includes two more colonies, both introduced, in addition to the original colony 1.1, which is located in Mount View DSNA. These three colonies are located within an approximately 2.5 km^2 (1 mi^2) area in Davidson County. The total number of flowering stems counted in the Mount View population in 2005 was 6,278. In 1987, Drew and Clebsch (1995, p. 62) estimated the size of the population at colony 1.1 to be 12,000 plants occupying an area of 830 m^2 (8,934 ft^2). TDEC (2006, p. 4) reported 5,430 flowering stems at this site (colony 1.1) in 2005. The mean ratio of juveniles to adults for this colony over 5 years of monitoring is 3.45 (Table 2) and density estimates (Table 3) have remained comparable to or have exceeded the initial estimate provided by Drew and Clebsch (1995, p. 62) for 1987. Colony 1.2 was discovered on private land in 1990 (TDEC 1996, Appendix I, p. III), and Clebsch (1993, p. 18) estimated there were 9,057 plants, bearing 3,506 flowering heads, occupying an area of 682 m^2 (7,341 ft^2) in 1992. The colony on private land was bulldozed in 1999. Colony 1.2 now consists of plants introduced onto adjacent U.S. Army Corps of Engineers (COE) lands to provide long-term protection (TDEC 2003, p. 2). While colony 1.2 was reduced in size when the private lands where it occurred were developed, the colony has increased in size since it was relocated onto COE lands and a fence was constructed. TDEC (2006, p. 4) counted 252 flowering stems at colony 1.2 in 2005. Colony 1.4 also was established on COE lands, near a public use area at J. Percy Priest Reservoir, using plants grown at Tennessee Tech University and was estimated to have consisted of 70–80 plants in 1996 (TDEC 1996, Appendix I, p. V). TDEC (2006, p. 5) reported there were 596 flowering stems at colony 1.4 in 2005. Each of the colonies in the Mount View population is considered secure, and the available quantitative and qualitative data indicate they are self-sustaining.

The Vesta population (number 2 in the recovery plan) consisted of two known colonies when the recovery plan was completed (Service 1989, pp. 3–4). This population now consists of eight colonies primarily located within an area of approximately 3 km^2 (1.5 mi^2) in Wilson County. Five of these colonies (2.3, 2.4, 2.6, 2.7, and 2.9) were introduced. Colony 2.1 occurs primarily in the Vesta Cedar Glade DSNA, with approximately 15 percent lying outside the DSNA on private lands. Drew and Clebsch (1995, p. 62) estimated that this colony consisted of 20,900 plants occupying an area of 1,420 m^2 (15,285 ft^2) in 1987. TDEC (2006, p. 4) counted 7,790 flowering stems at this colony in 2005. The mean ratio of juveniles to adults for this colony over 6 years of monitoring is 3.21 (Table 2), and density estimates (Table 3) have remained comparable to the initial estimate provided by Drew and Clebsch for 1987 (1995, p. 62). Colonies 2.2 and 2.8 are located entirely within the Vesta Cedar Glade DSNA in glade openings that are separated by forested habitat; colony 2.2 was reported in the recovery plan to have consisted of approximately 5,000 plants occupying an area of approximately 140 m^2 (1,500 ft^2), in addition to several small clumps that Hemmerly (1976, pp. 81) established from seed. TDEC (1996, Appendix I, p. VII) estimated this colony occupied an area of 374 m^2 (4,026 ft^2) in 1996, and counted 4,274 flowering stems at this colony in 2005 (TDEC 2006, p. 4). Colony 2.8 is located in a glade opening, approximately one-tenth of a mile southwest of colony 2.2, and TDEC (2006, p. 5) counted 2,143 flowering stems at this colony in 2005. Colonies 2.3, 2.4, and 2.7 are located in the Cedars of Lebanon State Forest DSNA.

Colony 2.3 was planted in 1983 with seeds produced in a Tennessee Valley Authority greenhouse from Vesta population stock; in 1996, TDEC (1996, Appendix I, p. VIII) observed 50 to 100 plants occupying an area of approximately 15 m^2 (161 ft^2). TDEC (2006, p. 5) reported there were 139 flowering stems here in 2005. Only one flowering stem was observed at colony 2.4 in 2005 (TDEC 2006, p. 5). Colony 2.7 is a small occurrence believed to have been introduced, but for which no reliable data prior to 2005 exist, at which time 6 flowering stems were counted at this site (TDEC 2006, p. 5). Colony 2.6 was planted at the entrance to Cedars of Lebanon State Park prior to 1982 and was observed in 1996 to include approximately 100 plants (TDEC 1996, Appendix I, p. XI); in 2005 there were 252 flowering stems (TDEC 2006, p. 5). Colony 2.9 was introduced into a powerline right-of-way on private land adjacent to Cedars of Lebanon State Forest in 1994, and was brought to TDEC's attention in 2006, at which time there were thousands of plants (Lincicome 2006, pers. comm.). Of the four secure colonies (2.1, 2.2, 2.3, and 2.8) in this population, available quantitative and qualitative data demonstrate that three are self-sustaining. We do not have historic data for colony 2.8, which was first observed in 2003, but the large number of flowering stems at this colony in 2005 suggests that it also should be self-sustaining. The total number of flowering stems counted in the four secure and self-sustaining colonies of the Vesta population was estimated to be 14,346 in 2005. Colonies that we do not consider secure accounted for 259 flowering stems in 2005.

The Vine population (number 3 in the recovery plan) consisted of three known colonies at the time the recovery plan was completed (Service 1989, pp. 4–6). This population now consists of 11 colonies located within an area of approximately 17 km^2 (7 mi^2) in Wilson and Rutherford Counties. Three of these colonies (3.7, 3.8, and 3.9) were introduced. Approximately two-thirds of the land on which colony 3.1 is located lies within Vine Cedar Glade DSNA, with the remaining one-third on private land. Drew and Clebsch (1995, p. 62) estimated that colony 3.1 consisted of 20,200 plants occupying an area of 800 m^2 (8611 ft^2) in 1987. TDEC (1996, Appendix I, p. XI–XII) reported the plants occupied about 760 m^2 in 1996, and counted 7,555 flowering stems at this colony in 2005 (TDEC 2006, p. 4). The mean ratio of juveniles to adults for this colony over 5 years of monitoring is 4.54 (Table 2) and density estimates (Table 3) have remained comparable to the initial estimate provided by Drew and Clebsch for 1987 (1995, p. 62). Most of colony 3.2 is located in a site recently acquired by TDEC using a Recovery Land Acquisition Grant and matching State funds for addition to the State's natural areas system and was estimated in the recovery plan to contain as many as 50,000 plants (Service 1989, p. 5). Data are summarized here for four element occurrences that TDEC tracks and which make up this colony. Clebsch (1993, p. 16) estimated a total of 94,537 plants at this colony in 1996, with 29,014 flowering heads, occupying an area of 5,889 m^2 (63,389 ft^2), and found that the ratio of juveniles to adults was 1.94; in 2005 there were 25,956 flowering stems (TDEC 2006, p. 4). The portions of the colony that lie entirely or mostly within the recently protected lands contained 24,914 of these flowering stems. Colonies 3.3 through 3.7 occur on private land. Colony 3.3 is located in a site that was highly disturbed and consisted of 90 plants in 1996 (TDEC 1996, Appendix I, p. XIV). This colony contained 11 flowering stems in 2005 (TDEC 2006, p. 4), and remains a small colony of questionable viability today. Colony 3.4 is located in the Gattinger Glade and Barrens DSNA, which is owned by the developers of the Nashville Super Speedway who donated a conservation easement to the State of Tennessee. Clebsch (1993, p. 16) estimated there were 71,576 plants at colony 3.4 in 1992, with 13,355 flowering heads. TDEC estimated this colony occupied an area of 2,723 m^2 (23,310 ft^2) in 1996, and reported there were 12,979 flowering stems at this colony in 2005 (TDEC 2006, p. 4). The mean ratio of juveniles to adults for this colony over 3 years of monitoring is 4.78 (Table 2). Clebsch (1993, pp. 9–11) did not provide density estimates for this colony in 1992; however, density estimates produced from monitoring conducted by TDEC in 2004 and 2008 are comparable to those generated for other long-term monitoring sites (Table 3). While damage from ORV use has been observed at this colony in the past (TDEC 1996, Appendix I, p. XV), it has not been noted since the site became a DSNA, and we consider it secure. Clebsch (1993, p. 18) estimated a total of 15,769 plants bearing a total of 3,058 flowering heads at colony 3.5 in 1992, with a ratio of 1.88 juveniles to adults, occupying an estimated area of 669 m^2 (7,201 ft^2). TDEC (1996, Appendix I, p. XVI) observed that the density of plants had decreased at this colony in 1996, while the plants occupied a larger area—an estimated 1,483 m^2 (15,963 ft^2). TDEC (2006, p. 4) reported 2,529 flowering stems were present at this colony in 2005. TDEC (1996, Appendix I, p. XVII) observed about 50 plants in a 1-m^2 (11-ft^2) area at colony 3.6 in 1996, and in 2005 there were 157 flowering stems counted in this colony. Colony 3.7 was established from seeds planted in 1978 and 1979, on private property owned by a native plant enthusiast. While many plants were killed during drought conditions in 1980, TDEC (1996, Appendix I, p. XVIII) reported that there were approximately 250 plants at this colony in 1985, and between 300 and 500 plants in 1996. TDEC (2006, p. 4) reported there were 1,705 flowering stems at this colony in 2005. Colonies 3.8 and 3.9 were established from seeds planted into two sites at Cedars of Lebanon State Forest in 1990 and 1991. In 1996, TDEC (1996, Appendix I, p. XIX) counted 452 plants by surveying eight glades/barrens within the larger complex where colony 3.8 is located. TDEC (2006, p. 5) reported there were 1,863 flowering stems at colony 3.8 in 2005. TDEC (1996, Appendix I, p. XX) observed approximately 200 to 300 plants occupying an estimated area of 51 m^2 (549 ft^2) at colony 3.9 in 1996; in 2005, there were 2,744 flowering stems counted at this colony (TDEC 2006, p. 5). We have no data prior to 2005 for colonies 3.10 and 3.11, both of which are located on private land. In 2005, TDEC (2006, p. 5) reported there were 5,374 flowering stems at colony 3.10, which is located near the Nashville Super Speedway; there were 1,935 flowering stems at colony 3.11. Available quantitative and qualitative data indicate that the four secure colonies (*i.e.,* 3.1, 3.2, 3.4, and 3.9) in this population are self-sustaining, as are six of the non-secure colonies (Table 1). The total number of flowering stems in secured and self-sustaining colonies of the Vine population was 48,192 in 2005. Colonies that we do not consider secure accounted for 14,616 flowering stems in 2005.

The Allvan population (number 4 in the recovery plan) consisted of one known colony (4.1) at the time the recovery plan was completed; two other colonies had been extirpated from this population (Service 1989, p. 6). This population now consists of two introduced colonies on public lands, as colony 4.1 has been lost to disturbance. Drew and Clebsch (1995, pp. 62–64) estimated a total of 3,700 plants at colony 4.1 in 1987, occupying an estimated area of 470 m^2 (5,059 ft^2), and

noted the vegetation at this site differed from the other colonies probably as a result of human disturbance. TDEC (1996, Appendix I, p. XXI) noted the poor condition of *Echinacea tennesseensis* plants during a site visit to colony 4.1 in 1996, and observed no plants at this colony in 2005 (TDEC 2006, p. 4). The mean ratio of juveniles to adults for this colony over 4 years of monitoring was 4.52 (Table 2) and density estimates (Table 3) were comparable to or exceeded the initial estimate provided by Drew and Clebsch for 1987 (1995, p. 62), until the colony was destroyed sometime after monitoring was conducted during 2004 and before flowering stems were counted at each colony in 2005. Colonies 4.2 and 4.3 were established from seeds and cultivated juveniles planted on COE lands at J. Percy Priest Reservoir in the years 1989 through 1991 (TDEC 1991, pp. 5–6), and earthen berms have been constructed at both sites to deter ORV traffic and reduce visibility of these colonies. In 1996, colony 4.2 contained many robust adult plants, but few seedlings and non-flowering adults, in an area of 32 m^2 (344 ft^2) (TDEC 1996, Appendix I, p. XXII). In 2005, TDEC reported there were 6,183 flowering stems at colony 4.2. TDEC first conducted quantitative monitoring at this colony in 2006, when the ratio of juveniles to adults they sampled was 4.78 (Table 2). The estimated mean density was 11.60 *E. tennesseensis* per square meter (Table 3). This secure colony is located in the Elsie Quarterman Cedar Glade DSNA, on COE lands at J. Percy Priest Reservoir, and appears to be self-sustaining based on the quantitative and qualitative data available. Colony 4.3 is located near the COE Hurricane Public Access Area. In 1996, this colony consisted of many robust adult plants and abundant juveniles in an area of about 68 m^2 (732 ft^2) (TDEC 1996, Appendix I, p. XXIII). In 2005, TDEC (2006, p. 5) counted 385 flowering stems at this colony. TDEC (unpublished data) first conducted quantitative monitoring at this colony in 2006, when the ratio of juveniles to adults they sampled was 11.95 (Table 2). The estimated mean density was 19.50 *E. tennesseensis* per square meter (Table 3). However, we acknowledge that the confidence intervals for the density estimates at both sites are large, reflecting a high degree of variability among the transects that were sampled at each colony. We believe that colony 4.3 is self-sustaining; however, it is vulnerable to impacts from illegal ORV access as noted above. Based on available data, colony 4.2 is the only secure and self-sustaining colony in the Allvan population.

The Couchville population (number 5 in the recovery plan) consisted of a single known colony spanning approximately eight privately owned tracts when the recovery plan was completed (Service 1989, p. 7). This population now consists of three natural and five introduced colonies, all located within an approximately 2.8-km^2 (1.1-mi^2) area of Davidson and Rutherford Counties on lands owned by the State of Tennessee (except for colony 5.2, which is on private land). Drew and Clebsch (1995, p. 62) estimated a total of 89,300 plants at colony 5.1 in 1987, occupying an estimated area of 13,860 m^2 (149,189 ft^2). TDEC (2006, p. 4) reported there were 7,353 flowering stems at this site in 2005. The mean ratio of juveniles to adults for this colony over 6 years of monitoring is 3.87 (Table 2) and density estimates (Table 3) have remained comparable to the initial estimate provided by Drew and Clebsch for 1987 (1995, p. 62). Colony 5.2 is divided between two privately owned properties. The plants in this colony are found in habitats of varying quality, having been subjected to past disturbance in some places, and in 1993, vegetative plants were observed occupying an area of approximately 1,823 m^2 (19,623 ft^2) (TDEC 1996, Appendix I, p. XXV). TDEC (2006, p. 4) reported there were 392 flowering stems at this colony in 2005. Colonies 5.3 through 5.6 were established from seed and juveniles planted at Long Hunter State Park during 1989 through 1991. TDEC (1996, Appendix I, p. XXVI) observed 428 plants at colony 5.3 in 1996, and noted that they were spread out over a wide area; in 2005, TDEC (2006, p. 4) reported there were 1,607 flowering stems at this colony. TDEC (1996, Appendix I, p. XXVII) observed that a thriving population containing thousands of individuals had become established at colony 5.4 by 1996, and that the plants north of the road dividing this colony occupied an area of 2,153 m^2 (23,175 ft^2); in 2005, TDEC (2006, p. 5) counted 863 and 987 flowering stems on the north and south sides of the road, respectively. Colony 5.5 consisted of less than 200 total plants occupying an estimated area of 53 m^2 (570 ft^2) in 1996 (TDEC 1996, Appendix I, pp. XXVIII–XXIX); in 2005, there were 1,300 flowering stems (TDEC 2006, p. 4). TDEC (unpublished data) first conducted quantitative monitoring at this colony in 2006, when the ratio of juveniles to adults they sampled was 4.12 (Table 2) and the estimated density was 12.03 *Echinacea tennesseensis* per square meter (Table 3). Colony 5.6 consisted of approximately 2,000 plants occupying an area of 51 m^2 (549 ft^2) in 1996 (TDEC 1996, Appendix I, p. XXIX–XXX); in 2005, there were 846 flowering stems (TDEC 2006, p. 5). Colony 5.7, for which no historic monitoring data are available, is the only naturally occurring colony at Long Hunter State Park. TDEC (2006, p. 4) counted 17 flowering stems here in 2005. Colony 5.8 was established in 2000 at the Fate Sanders Barrens DSNA, located on COE lands at J. Percy Priest Reservoir. This colony is located approximately 3.5 km (2.8 mi) southeast of colony 5.3 in the Couchville population. TDEC planted 199 plants into two areas at this colony in 2000 (Lincicome 2008, pers. comm.) and counted 101 flowering stems in 2005 (TDEC 2006, p. 5). Based on available qualitative and quantitative data, we believe that the secure colonies (5.1, 5.4, 5.6, and 5.8) in the Couchville population are self-sustaining,. We believe that three of the four colonies we consider not secure are also self-sustaining. The total number of flowering stems from the Couchville population in secure and self-sustaining colonies was 10,150 in 2005. Colonies that we do not consider secure accounted for an estimated 3,316 flowering stems in 2005.

The Stones River National Battlefield population (*i.e.,* population 6, not included in the recovery plan) consists of three colonies established through introductions into an area that is now a DSNA. Colony 6.1 was established from seeds introduced by Hemmerly in 1970 (1976, pp. 10, 81) as part of investigations into seedling survival under field conditions. This colony consists of two groupings of plants, one of which consisted of 3,880 plants and the other of 28 plants in 1995; the colony occupied an area of 39 m^2 (420 ft^2) in 1996 (TDEC 1996, Appendix I, p. XXXI). TDEC (2006, p. 4) counted 2,535 flowering stems at this colony in 2005. TDEC first conducted quantitative monitoring at colony 6.1 in 2006, when the ratio of juveniles to adults they sampled was 5.18 (Table 2). The estimated mean density was 41.37 *Echinacea tennesseensis* per square meter (Table 3), but the confidence interval at this site was large, reflecting a high degree of variability among the sampled transects, some of which contained no plants. Colonies 6.2 and 6.3 are thought to have been established by a neighbor of the battlefield in the mid-1990s (Hogan 2008, pers. comm.) and consisted of 134 and 401 plants, respectively, in 1995 (TDEC 1996, Appendix I, p. XXXII). In 2005, TDEC

(2006, p. 4) counted 237 flowering stems at colony 6.2 and 852 flowering stems at colony 6.3. The total number of flowering stems in the Stones River National Battlefield population in 2005 was 3,624 (TDEC 2006, 4). Based on available quantitative and qualitative data, we believe all colonies in this population are secure and self-sustaining.

Numerous partners are involved in managing *Echinacea tennesseensis* populations on their lands. TDEC compared management options at the Vesta Cedar Glade DSNA, including mowing, discing, burning, and application of selective herbicides for removal of grasses (Clebsch 1993, pp. 2–8). TDEC and TNC have used grazing of goats, mechanical removal, and herbicide applications to control woody species encroachment on the margins of cedar glade openings at Mount View Glade DSNA (TDEC 2003, pp. 4–9). TDEC applies prescribed fire or mechanical removal, as needed and within constraints imposed by locations within the urban interface, to control woody species, including the invasive exotic privet (*Ligustrum* sp.), at many DSNAs where *E. tennesseensis* occurs; these include Mount View Glade, Vesta Cedar Glade, Vine Cedar Glade, Cedars of Lebanon State Forest Natural Area, Gattinger's Cedar Glade and Barrens, Elsie Quarterman Cedar Glade, Fate Sanders Barrens, and Couchville Cedar Glade and Barrens. TDEC works with the Tennessee Division of Forestry (TDF) to ensure that colonies in the Cedars of Lebanon State Forest, which includes three DSNAs, receive necessary management and collaborates with TDF to implement all prescribed burns that are conducted on DSNAs. TDEC also has cooperated with COE on construction of fences or earthen berms around sites at J. Percy Priest Reservoir that have been threatened by urban encroachment and illegal ORV use. The NPS monitors the introduced population at the Stones River National Battlefield and controls woody plant encroachment and vegetation succession in the glade openings where the colonies occur, as necessary.

Because TDEC and other entities have monitored *Echinacea tennesseensis* populations many times since the time of listing and have managed colonies on protected lands to minimize threats from vegetation succession and ORV use, and will continue to do so in the foreseeable future, we consider this recovery action completed.

Recovery Action (6): Conduct Public Education Projects

Echinacea tennesseensis was featured in newspaper (Paine 2002, p. 6B) and magazine (Simpson and Somers 1990, pp. 14–16; Campbell 1992, p. 32; Daerr 1999, p. 50) articles to educate the general public about the species, the cedar glade ecosystem it occupies, and the conservation efforts directed towards them. The Service published ''An Educator's Guide to the Threatened and Endangered Species and Ecosystems of Tennessee,'' which includes instructional materials about the cedar glades of middle Tennessee and two Federally listed plant species found in the glades, *E. tennesseensis* and *Astragalus bibullatus* (Pyne's ground-plum) (Service no date, pp. 50–53). TDEC personnel periodically lead guided wildflower walks in the cedar glades DSNAs and educate the public about *E. tennesseensis* and other Federal and State listed plant species during those walks. In 2000, TDEC published 10,000 copies of an educational poster featuring Tennessee's rare plants, including *E. tennesseensis.* Because numerous public education projects have been conducted, we consider this recovery action completed.

Summary of Comments and Recommendations

During the open comment period for the proposed rule (75 FR 48896, August 12, 2010), we requested that all interested parties submit comments or information concerning the proposed delisting of *Echinacea tennesseensis.* We directly notified and requested comments from the State of Tennessee. We contacted all appropriate State and Federal agencies, county governments, elected officials, scientific organizations, and other interested parties and invited them to comment. We also published a newspaper notice in The Tennesseean, a newspaper serving the middle Tennessee region where *E. tennesseensis* occurs, inviting public comment.

As stated in the proposed rule (75 FR 48896, August 12, 2010), we accepted comments for 60 days, ending October 12, 2010. During the comment period, we received comments from two individuals.

In accordance with our peer review policy published on July 1, 1994 (59 FR 34270), and the Office of Management and Budget's (OMB) December 16, 2004, Final Information Quality Bulletin for Peer Review, we solicited independent opinions from 4 knowledgeable individuals who have expertise with the species, who are within the geographic region where the species occurs, or are familiar with the principles of conservation biology. We received comments from one of the peer reviewers.

We reviewed all comments received from the peer reviewer and the public for substantive issues and new information regarding the proposed delisting of *Echinacea tennesseensis.* Substantive comments received during the comment period are addressed below and, where appropriate, incorporated directly into this final rule and into the post-delisting monitoring plan.

Issue 1: One commenter requested that we address the site quality for the colonies that comprise the Allvan population and the growth of these colonies over time compared to other colonies, despite the fact that this population is not needed to meet the criteria in the recovery plan that there must be five populations with three secure and self-sustaining colonies each. This request was made because Drew and Clebsch (1995, p. 64) observed during surveys conducted in 1987 that the Allvan site, where colony 4.1 was located, had a much different plant community assemblage than other *Echinacea tennesseensis* sites due to human disturbance and because the commenter apparently believed that colonies 4.2 and 4.3 also were located at this disturbed site.

Response: Drew and Clebsch (1995, p. 62) concluded that human disturbance had altered the vegetation community at the site where the original colony (4.1) of the Allvan population was located. The dominant species they observed at the Allvan site (*Grindelia lanceolata, Silphium trifoliatum,* and *Aster pilosus* var. *priceae*) were absent or present in low frequency at other sites. Conversely, the dominant species from the other sites were only present in low frequency and numbers at the site of colony 4.1. These differences were likely attributable to the intensive use that this site, owned by a trucking company, had experienced. The portion of the property where *E. tennesseensis* once occurred was used in the past as a discard site for old engine parts and other assorted scrap materials (TDEC 1996, Appendix I, p. XXI). As noted above, the colony at this site was destroyed prior to flowering stem counts in 2005.

Colonies 4.2 and 4.3 of the Allvan site were both established on COE lands, in distinct sites from colony 4.1, from introductions during the years 1989 through 1991. In contrast to the site conditions where colony 4.1 was once located, TDEC (1996, Appendix I, pp.

XXI–XXIV) described the habitat at these sites as ''dry barrens and glades'' (colony 4.2) and ''open gravelly glades and barrens'' (colony 4.3), but made no observations of atypical composition of associated species present at these sites. While we do not have numbers to specifically address growth rates in colonies 4.2 and 4.3, in the section above addressing recovery action (5), we discuss quantitative monitoring data collected at each of these sites in 2006. Both of these colonies are also included in the Post-delisting Monitoring Plan for *Echinacea tennesseensis.*

Issue 2: Two commenters supported the use of analyzing variability and trends over time in density metrics derived from count data as a measure of population size, rather than using the Recovery Plan criterion that minimal size for each colony be 15 percent cover of flowers over 800 square yards of suitable habitat. However, one of these commenters expressed concern that the proposed delisting rule reported only one census of the total number of flowering stems along with an extrapolated total number of plants and number of adults (*i.e.,* flowering plants). This commenter noted that ''by choosing to report counts from only one year, annual count fluctuation and sample area size are not considered.'' This commenter suggested that stem counts collected by Drew and Clebsch (1995) from their sample plots in the first census of the species in 1987 could be used to establish reference densities, and that more recent site densities calculated from flowering stem counts would be an acceptable substitute for the objective size criterion provided in the Recovery Plan.

Response: We have incorporated available quantitative data on density estimates and ratios of juveniles to adults into this final rule. We did not use data from the 2005 flowering stem counts conducted at all sites (TDEC 2006, pp. 4–5) to estimate flowering stem densities, because the area surveyed was not documented during that effort. We agree with the commenter that estimating the total number of individuals in a colony based on flowering stem counts from a single year is not appropriate and have removed those estimates from Table 1 in this rule, as explained above in the Species Information section.

Issue 3: Two commenters requested more information be presented on the status of the *Echinacea tennesseensis* populations as it relates to the Recovery Plan criterion that defines self-sustaining populations as those in which there are two juvenile plants for every flowering plant. Specifically, one commenter noted that the proposed rule to delist *E. tennesseensis* reported that six colonies were sampled once for the juvenile stage class, in 2006, and that the average of these colonies did not meet this criterion. This commenter noted that it was unclear whether these sampled colonies that did not meet the self-sustaining criterion were included in the group of colonies reported in the rule to be self-sustaining, adding that regular recruitment is required for the persistence of a population, or in this case, an introduced colony. The other commenter noted that one must assume that this criterion was applied when determining whether to classify a population as self-sustaining in Table 1 of the proposed rule. Both commenters also requested additional detail concerning how the ratios were derived that were used to estimate (1) numbers of adults based on counts of flowering stems, and (2) numbers of seedlings from estimated numbers of adults, in order to yield the estimated numbers of individuals that were reported in Table 1 of the proposed rule. Specifically, one of the commenters questioned whether the multiplier used to calculate the ratio was an average calculated across monitored colonies, whether multiple years of data were used in calculating this ratio, and whether the accuracy of the ratio in estimating population sizes had been field tested. This commenter also recommended reporting confidence intervals with these estimates to provide a measure of their precision.

Response: The Service and TDEC undertook a thorough review of the monitoring data collected by TDEC and reanalyzed those data to produce ratios among juvenile and adult stage-classes (Table 2, above) and to produce density estimates with confidence intervals for each monitored site (Table 3, above). In doing so, we found errors in the analysis used to determine ratios of juveniles to adults for the introduced colonies for the year 2006. We have incorporated those corrections and provide colony numbers for each colony for which these ratios have been calculated (Table 2, above). We have removed estimates of numbers of adults and total numbers of individuals from Table 1 in this rule, as explained above in the Species Information section. While quantitative data are not available for all colonies to use in determining whether they are self-sustaining, we believe that quantitative data from a representative sample of colonies combined with available qualitative data provide an adequate basis for determining whether the colonies are self-sustaining, as explained above in the Recovery section. Table 1, above, provides a list of all colonies considered in this rule along with our determination of whether each colony is secure, self-sustaining, or both.

Issue 4: Two commenters raised issues related to potential threats associated with climate change, including possible disruption of pollinator services due to potential changes in flowering periods and pollinator behavior; lack of a persistent seed bank to provide resilience to multiple drought years or extreme climatic events; and the potential for increased drought frequency or severity to impact juvenile plants. One of these commenters noted the findings of Drew and Clebsch (1995) that plants with total leaf length < 30 cm were susceptible to a higher rate of mortality due to low drought tolerance. This commenter also pointed out that, according to National Drought Mitigation Center (2010) data, middle Tennessee experienced drought years in 2007 and 2008, including an exceptional drought period from August to September of 2007, and that this drought could have impacted juvenile and other stage classes.

Response: To the extent possible, we address threats related to climate change in the section Summary of Factors Affecting the Species. We do not have sufficient data concerning pollinators of *Echinacea tennesseensis,* their phenology in relation to phenology of *E. tennesseensis,* or potential for changes to the phenology of either to specifically address this comment. However, we have no specific data to suggest that climate change is currently a threat to *E. tennesseensis* or will be in the foreseeable future. We have incorporated information on drought conditions in Middle Tennessee during 2007 and 2008, as well as data on monthly departures from normal rainfall for the period 1985 through 2010, into this rule in the section Recovery and discuss them in relation to available monitoring data.

Summary of Factors Affecting the Species

Section 4 of the Act and its implementing regulations (50 CFR part 424) set forth the procedures for listing, reclassifying, or removing species from the Federal Lists of Endangered and Threatened Wildlife and Plants. ''Species'' is defined by the Act as including any species or subspecies of fish or wildlife or plants, and any distinct vertebrate population segment of fish or wildlife that interbreeds when mature (16 U.S.C. 1532(16)). Once the ''species'' is determined we then evaluate whether that species may be

endangered or threatened because of one or more of the five factors described in section 4(a)(1) of the Act. We must consider these same five factors in reclassifying or delisting a species. We may delist a species according to 50 CFR 424.11(d) if the best available scientific and commercial data indicate that the species is neither endangered nor threatened for the following reasons: (1) The species is extinct; (2) the species has recovered and is no longer endangered or threatened; and/or (3) the original scientific data used at the time the species were classified was in error.

Under section 3 of the Act, a species is ''endangered'' if it is in danger of extinction throughout all or a ''significant portion of its range'' and is ''threatened'' if it is likely to become endangered within the foreseeable future throughout all or a ''significant portion of its range.'' The word ''range'' refers to the range in which the species currently exists, and the word ''significant'' refers to the value of that portion of the range being considered to the conservation of the species. The ''foreseeable future'' is the period of time over which events or effects reasonably can or should be anticipated, or trends extrapolated. A recovered species is one that no longer meets the Act's definition of endangered or threatened. Determining whether or not a species is recovered requires consideration of the same five categories of threats specified in section 4(a)(1) of the Act. For species that are already listed as endangered or threatened, the analysis for a delisting due to recovery must include an evaluation of the threats that existed at the time of listing, the threats currently facing the species, and the threats that are reasonably likely to affect the species in the foreseeable future following the delisting or downlisting and the removal of the Act's protections.

The following analysis examines all five factors currently affecting, or that are likely to affect *Echinacea tennesseensis* within the foreseeable future. In making this final determination, we have considered all scientific and commercial information available, which includes information received during the public comment period on our proposed delisting rule (75 FR 48896, August 12, 2010), reanalyzed data from monitoring conducted during 1998 through 2004, and monitoring data collected in 2008 (TDEC unpublished data).

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

The final rule to list *Echinacea tennesseensis* as endangered (44 FR 32604) identified the following habitat threats: Habitat loss due to residential and recreational development and succession of cedar glade communities in which the species occurred.

Losses of cedar glade habitat and colonies of *Echinacea tennesseensis* to residential development have posed a significant threat to *E. tennesseensis.* At the time of listing, one population of *E. tennesseensis* had been reduced in size due to housing construction and another was destroyed during the construction of a trailer park. The three extant occurrences at that time were all located on private lands, one of which was imminently threatened by surrounding residential development. This Davidson County occurrence has since been protected as a DSNA. Approximately two-thirds of the Wilson County occurrence that was on public lands is now a DSNA, and one-third remains on private lands. The Rutherford County occurrence was located in a gravel parking lot of a commercial property and has been destroyed. Since the time of listing, protection of natural colonies on publicly owned conservation lands and establishment of additional colonies through introductions have effectively diminished the threat residential development once posed to the survival of *E. tennesseensis.*

The final listing rule for *Echinacea tennesseensis* described recreational development as a threat facing the Davidson County (*i.e.,* Mount View) population, but did not specifically address the nature of the recreational development. The Mount View, Allvan, and Couchville populations occur in close proximity to J. Percy Priest Reservoir, construction of which was completed in 1967. It is possible that development of recreational facilities following completion of the reservoir presented a threat to *E. tennesseensis* or cedar glade habitats. However, four of the secure and self-sustaining colonies (*i.e.,* colonies 1.2, 1.4, 4.2, and 5.8) are located within the now-protected lands buffering the reservoir, three of which were designated as Environmentally Sensitive Areas in the J. Percy Priest 2007 Master Plan Update (U.S. Army Corps of Engineers 2007, pp. 3–1—4–3). Therefore, recreational development no longer poses a threat to the survival of *E. tennesseensis.*

There are now 27 colonies, distributed among the six populations of *Echinacea tennesseensis,* which occur entirely or primarily on conservation lands in either State or Federal ownership. The lone exception to public ownership of these conservation lands is the Gattinger Glade DSNA, which is managed by TDEC but privately owned and protected under a conservation easement. We consider 19 of these colonies to be secure and self-sustaining. Sixteen colonies, all but two of which are secure, are located entirely or primarily within DSNAs that were designated at various times between 1974 and 2009. TDEC manages most of these DSNAs, in some cases cooperatively with TDF, for the purpose of conserving *E. tennesseensis* and the cedar glades and barrens ecosystem that the species depends on for its survival. All but one of these DSNAs lie within or adjacent to State or Federal conservation lands that provide complementary conservation benefits by maintaining functioning ecosystems within which these colonies occur and harboring additional protected colonies of *E. tennesseensis.*

The non-DSNA lands in the Cedars of Lebanon State Forest also contain three colonies, therefore providing a large, protected cedar glade and forest ecosystem connected to the Vesta Cedar Glade, Vine Cedar Glade, and Cedars of Lebanon State Forest DSNAs. An additional colony is located at the Cedars of Lebanon State Park, which is adjacent to the Cedars of Lebanon State Forest. Long Hunter State Park contains six colonies and provides a functioning ecosystem buffer to the Couchville Cedar Glade and Barrens DSNA. COE lands at J. Percy Priest Reservoir provide habitat for three colonies in addition to the colonies in the Elsie Quarterman Cedar Glade and Fate Sanders Barrens DSNAs that lie within these lands. The Gattinger Cedar Glade is the only DSNA on private land that contains a colony of *Echinacea tennesseensis.* While this property is not buffered by other public lands, it lies within a large tract of land owned by the Nashville Super Speedway, which has been a partner in the conservation of *E. tennesseensis.* The three colonies at Stones River National Battlefield are included among the 16 within DSNAs, and lie within a protected buffer provided by NPS lands.

We believe the colonies that are located in DSNAs or on recently acquired lands that will be added to Tennessee's natural area system, with the exceptions of colonies 2.4 and 2.7, will receive adequate long-term protection and necessary management to control vegetation succession and disturbance from human activities, given the statutory protections afforded these lands and TDEC's demonstrated

commitment to protecting lands through this mechanism and to maintaining the quality of habitats in the DSNAs. Colonies 2.4 and 2.7 contain an estimated 1 and 6 flowering stems, respectively. The lack of long-term protection and management for these two colonies will not have a significant effect on the status of the species, as these two colonies represent less than one percent of the Vesta population. We expect that the delisting of *Echinacea tennesseensis* would not weaken TDEC's commitment to the conservation of these DSNAs, several of which harbor one or more Federally listed plant species other than *E. tennesseensis.* We have also identified five colonies on public lands outside of DSNAs that we consider secure.

Illegal ORV activity remains an issue for three colonies on public lands, which we have not counted among the 19 secure colonies. TDEC has worked to reduce this threat in several DSNAs by constructing barbed wire fences and barriers using limestone boulders. The COE has also extended efforts in the form of constructing fences or earthen berms or both near three colonies on lands at J. Percy Priest Reservoir to reduce this threat. Damage from ORV activity was noted by TDEC (1996, Appendix I) at only one of the 9 colonies located exclusively on private lands that are not under recovery protection agreements, none of which were counted among the 19 secure colonies in this rule. While illegal ORV use remains a concern throughout the range of *Echinacea tennesseensis* (TDEC 1996, p. 21 and Appendix I), we do not have evidence to suggest that such activity is occurring at a magnitude that makes *E. tennesseensis* likely to become endangered in the foreseeable future.

Habitat loss or modification in the form of ORV activity has been observed at four colonies (TDEC 1996, Appendix I), and recovery protection agreements are lacking at nine colonies that exist solely on private lands, leaving them vulnerable to habitat disturbance. However, we believe that *Echinacea tennesseensis* is neither endangered nor threatened as a result of habitat loss or modification because there are 19 secure and self-sustaining colonies distributed among six geographically defined populations. Management of these colonies to reduce threats to *E. tennesseensis* and its habitat is coordinated by TDEC in cooperation with other partners. Examples of these management activities were provided under number (5) in the Recovery section.

The listing rule for *Echinacea tennesseensis* (44 FR 32604) identified vegetation succession as a threat to the species and the cedar glades it depends on for its survival. A status survey for the species, completed in 1996 (TDEC 1996, p. 22), did not address this threat in its analysis of factors affecting the survival of the species, but it did recommend controlling vegetation succession at some sites in the appendix containing population and site status reports. TDEC has developed a program for managing vegetation succession and other threats to cedar glades on DSNAs inhabited by *E. tennesseensis* and two other Federally listed species, and continues to work cooperatively with TDF, Tennessee State Parks, and COE to manage potential threats in habitats where colonies exist on properties belonging to these agencies. Further, we are not aware of any colonies of *E. tennesseensis* that have been lost to vegetation succession.

Summary of Factor A: Because we expect that the lands containing the 19 secure and self-sustaining colonies, which accounted for approximately 83 percent of the total flowering stems estimated to exist in 2005, will remain permanently protected and will be managed to maintain cedar glade habitat and no known colonies have been lost to vegetation succession, we find that the present or threatened destruction, modification, or curtailment of its habitat or range has been effectively diminished to the point that it is no longer a threat to *Echinacea tennesseensis.*

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The final rule to list *Echinacea tennesseensis* as endangered (44 FR 32604) identified collection for commercial and recreational purposes as a threat to the species. Limited digging, presumably for horticultural purposes, has been observed in the past at five colonies of *E. tennesseensis,* three (*i.e.,* colonies 5.3, 5.5, and 5.6) of which are located in high visibility areas within Long Hunter State Park (TDEC 1996, p. 21). We do not consider these three colonies or a fourth (*i.e.,* colony 3.5) located on private land to be secure for the purposes of this rule. We consider colony 4.2, where digging has been observed in the past, to be secure because it became a DSNA in 1998, and no evidence of digging at this site has been recorded since 1996. *Echinacea tennesseensis* that originated from natural populations, but is now grown from seed or vegetative propagules produced in nurseries, is available for interstate commerce from one nursery under the authority of the Act through a section 10(a)(1)(A) permit. These plants are also for sale by multiple nurseries only within Tennessee, thus not requiring a permit under section 10(a)(1)(A) of the Act. TDEC regulates commerce of plants listed as endangered by the State of Tennessee through issuance of permits for this purpose, as authorized by the Tennessee Rare Plant Protection Act of 1985 (T.C.A. 11–26–201). There are also at least two cultivars of *E. tennesseensis,* which are of hybrid origin, now available for interstate commerce and easily found on the Internet. We do not believe cultivars are a threat to the Tennessee purple coneflower because planting of these individuals is not allowed on public and state owned property where wild populations occur.

The genus *Echinacea* has long been used for medicinal purposes by Native Americans and is commercially available as a popular homeopathic supplement. However, the primary species used in commercial medicinal applications and studied for their medicinal properties do not include *E. tennesseensis* (Senchina *et al.* 2006, p. 1). We are not aware of collections of this species being taken for this purpose and do not believe this poses a threat to this species currently or into the foreseeable future.

Summary of Factor B: Echinacea tennesseensis and hybrids displaying the attractive traits of the species are readily available commercially, and poaching has been observed in the past at only five colonies, one of which we counted as secure in our analysis for this delisting rule because this colony became a DSNA in 1998, and no evidence of activity has occurred since 1996. In addition, *E. tennesseensis* is not among the primary species of *Echinacea* used for medicinal applications. Therefore, we find that overutilization for commercial, recreational (*i.e.,* gardening), scientific, or educational purposes is no longer a threat to *E. tennesseensis.*

Factor C. Disease or Predation

The listing rule for *Echinacea tennesseensis* (44 FR 32604) stated that light grazing occurred at colony 3.2 but acknowledged that the degree of threat, if any, posed by this grazing was uncertain. A robust population of *E. tennesseensis* remains at this site today, much of which was recently acquired by TDEC for addition to Tennessee's natural area system. Deer browse has been identified as an impact at the three colonies in Stones River National Battlefield (TDEC 1996, Appendix I, pp. XXXI–XXXIII) and at colony 5.5 (TDEC 2007, p. 5). However, we have no data

to suggest that such browsing currently threatens these colonies, which have persisted since being established by introductions 10 or more years ago.

Summary of Factor C: Because we have no data to suggest that either grazing or deer browse threaten any colonies, we find that disease or predation is not a threat to *Echinacea tennesseensis.*

Factor D. The Inadequacy of Existing Regulatory Mechanisms

When *Echinacea tennesseensis* was listed, the final rule to list *E. tennesseensis* as endangered (44 FR 32604) identified the lack of State protections as a threat to the species. *Echinacea tennesseensis* is now listed as endangered by the State of Tennessee and is protected under the Tennessee Rare Plant Protection Act of 1985 (T.C.A. 11–26–201), which forbids persons from knowingly uprooting, digging, taking, removing, damaging, destroying, possessing, or otherwise disturbing for any purpose, any endangered species from private or public lands without the written permission of the landowner. While this legislation does not forbid the destruction of *E. tennesseensis* or its habitat with landowner permission, neither does the Act afford such protection to listed plants. Regardless, as discussed in Factor A above, destruction, modification, or curtailment of its habitat or range is no longer a threat. Furthermore, those colonies located in DSNAs are afforded additional protection by the State of Tennessee's Natural Area Preservation Act of 1971 (T.C.A. 11–1701), which protects DSNAs from vandalism and forbids removal of State endangered and threatened species from these areas.

Summary of Factor D: While it is possible that the State of Tennessee could determine that *Echinacea tennesseensis* should be removed from the State's endangered plant list of Tennessee if the species is removed from the Federal List of Endangered and Threatened Plants, we believe that the protected status of the lands where the 19 secure colonies currently exist will continue to provide adequate regulatory protection for those colonies even if State delisting occurs. Therefore, we find that the inadequacy of existing regulatory mechanisms is no longer a threat to *E. tennesseensis.*

Factor E. Other Natural or Manmade Factors Affecting Its Continued Existence

TDEC (1996, p. 2) identified low levels of genetic variability in *Echinacea tennesseensis* as a threat but did not report any deleterious effects of diminished genetic variability, such as inbreeding depression, that would indicate this factor poses a threat to this species. Baskauf *et al.* (1994, p. 186) documented low levels of genetic variability in *E. tennesseensis,* but also observed that this species is not devoid of genetic variability and is evidently well adapted to its cedar glade habitat. They noted that given the relatively large sizes of many of the naturally occurring populations, random genetic drift should not erode genetic variability in *E. tennesseensis* very rapidly. They suggested that dramatic population fluctuations or extinction and colonization events could have occurred historically and eroded genetic variability (Baskauf *et al.* 1994, p. 186). However, it is possible that this species might never have possessed high levels of genetic variability (Walck *et al.* 2002, p. 62). Reduction of genetic diversity could affect the viability of the introduced colonies, as they could be subject to losses in genetic variability that result from establishing colonies from a subset of the total genetic structure found in the species (*i.e.,* the founder effect) (Allendorf and Luikart 2007, p. 129). We have no information concerning the genetic structure of introduced colonies compared to naturally occurring ones, but this could be a factor to investigate if introduced colonies are found to be less stable than natural colonies through future monitoring. At this time, however, we do not believe that low genetic variability threatens *E. tennesseensis.*

The Intergovernmental Panel on Climate Change (IPCC) concluded that evidence of warming of the climate system is unequivocal (IPCC 2007a, p. 30). Numerous long-term climate changes have been observed including changes in arctic temperatures and ice, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves, and the intensity of tropical cyclones (IPCC 2007b, p. 7). While continued change is certain, the magnitude and rate of change is unknown in many cases. Species that are dependent on specialized habitat types, that are limited in distribution, or that have become restricted to the extreme periphery of their range will be most susceptible to the impacts of climate change. As stated above, *Echinacea tennesseensis* is only found in limestone barrens and cedar glades habitats of the Central Basin, Interior Low Plateau Physiographic Province, in Davidson, Rutherford, and Wilson Counties in Tennessee. Within this ecosystem, *E. tennesseensis* inhabits both xeric (dry) communities, where there is no soil or soil depth less than 5 cm (2 in.) and subxeric (moderately dry) communities on soils deeper than 5 cm (2 in.).

Estimates of the effects of climate change using available climate models lack the geographic precision needed to predict the magnitude of effects at a scale small enough to discretely apply to the range of *Echinacea tennesseensis.* However, data on recent trends and predicted changes for the Southeast United States (Karl *et al.* 2009, pp. 111–116) provide some insight for evaluating the potential threat of climate change to *E. tennesseensis.* Since 1970, the average annual temperature of the region has increased by about 2 °F, with the greatest increases occurring during winter months. The geographic extent of areas in the Southeast region affected by moderate to severe spring and summer drought has increased over the past three decades by 12 and 14 percent, respectively (Karl *et al.* 2009, p. 111). These trends are expected to increase.

Rates of warming are predicted to more than double in comparison to what the Southeast has experienced since 1975, with the greatest increases projected for summer months. Depending on the emissions scenario used for modeling change, average temperatures are expected to increase by 4.5 °F to 9 °F by the 2080s (Karl *et al.* 2009, pp. 111). While there is considerable variability in rainfall predictions throughout the region, increases in evaporation of moisture from soils and loss of water by plants in response to warmer temperatures are expected to contribute to the effect of these droughts (Karl *et al.* 2009, pp. 112).

Despite the observations of Drew and Clebsch (1995, p. 66) that seedlings had an approximately 50-percent probability of dying during the drought conditions that occurred during their first year of study, we believe there is biological and historical evidence to suggest that *Echinacea tennesseensis* is well-adapted to endure predicted effects of climate change. First, Drew and Clebsch (1995, p. 66) found that stage-specific mortality rates during the drought conditions of their first year of study for non-reproductive *E. tennesseensis* plants with a cumulative leaf length greater than 30 cm (12 in) (*i.e.,* non-seedling, vegetative plants) and plants that were reproductively active ranged from 17 to 31 percent, considerably lower than rates observed in seedlings. Second, Hemmerly (1976, p. 12) found that mature plants possessed several roots

averaging 38.4 cm (15.1 in.) length and extending an average depth of 23.1 cm (9.1 in.) into the soil, often branching horizontally after reaching an impenetrable rock layer. These observations suggest that while seedlings face higher risks of mortality to drought conditions, this species possesses biological characteristics that increase drought resistance in later life-history stages. That non-seedling life stages of *E. tennesseensis* are more resilient to drought than seedlings is supported by Drew and Clebsch's (1995, p. 67) observation of demographic patterns in flowering individuals. During 1988, 41 percent of the plants that they observed flowering during 1987 failed to do so, presumably influenced by drought. However, 68 percent of those plants that failed to flower during 1988 produced flowers again during 1989, when annual rainfall levels increased. This ability to vary flower production in relation to annual rainfall levels, combined with its apparently long-lived habit (Baskauf 1993, p. 37), should enable *E. tennesseensis* to remain viable through periods of drought.

Studies examining the influence of genetic, ecological, and physiological factors on the distribution of *Echinacea tennesseensis* have not found sufficient differences between this species and more widespread congeners to explain its endemism in the cedar glades of middle Tennessee based on these factors alone (Baskin *et al.* 1997, p. 385; Baskauf and Eickmeier 1994, p. 963; Snyder *et al.* 1994, p. 64). Rather, it has been suggested that historical and ecological factors contributed to the evolution of this species and its subsequent restriction to cedar glade habitats in middle Tennessee (Baskin *et al.* 1997, p. 385). Baskin *et al.* (1997, pp. 390–391) suggested that an ancestral form of *E. tennesseensis* migrated to and became established in middle Tennessee during the Hypsithermal Interval (*i.e.,* the period of greatest post-glacial warming, ca. 8,000 to 5,000 years before present), and that as temperatures became cooler, the only members of this ancestral taxon that survived were those growing in the cedar glades of the region —*i.e.,* the plants that eventually gave rise to *E. tennesseensis*.

While predictions of increased drought frequency, intensity, and duration suggest that seedling survival could be a limiting factor for *Echinacea tennesseensis,* the species possesses other biological traits (*i.e.,* long life span, interannual reproductive variability) to provide resilience to this threat. In their analyses of life-history traits in relation to potential vulnerability to variability in demographic vital rates caused by increased variability in climatic patterns, Morris *et al.* (2008, p. 22) and Dalgleish *et al.* (2010, p. 216) concluded that longer-lived species should be less influenced by climate-driven increases in demographic variability. Further, predicted climate changes for the Southeast could, similar to what is believed to have taken place during the Hypsithermal Interval (Delcourt *et al.* 1986, p. 135), lead to an expansion of openings within forested areas of middle Tennessee, potentially increasing the area occupied by cedar glades communities. This presumably would increase the amount of suitable habitat available for *E. tennesseensis.* Based on these factors and the fact that we have no evidence that climate changes observed to date have had any adverse impact on *E. tennesseensis* or its habitat, we do not believe that climate change is a threat to *E. tennesseensis* now or within the foreseeable future.

Summary of Factor E: Because (1) management activities take place to prevent the loss of 19 secure *Echinacea tennesseensis* colonies, (2) 31 colonies are considered self-sustaining, as measured by persistence and demographic stability over time (despite low levels of genetic variation within the species), (3) there is biological and historical evidence to suggest that *E. tennesseensis* is well-adapted to endure predicted effects of climate change, and (4) we have no evidence that climate changes observed to date have had any adverse impact on *E. tennesseensis* or its habitat, we find that other natural or manmade factors considered here are no longer a threat to *E. tennesseensis.* Post delisting monitoring will also afford an opportunity to monitor the impacts of any natural events that occur, such as a drought similar to the one in 2007 and 2008, for five growing seasons to ensure that *E. tennesseensis* no longer requires protection as a listed species.

Conclusion of the 5-Factor Analysis

We have carefully assessed the best scientific and commercial information available regarding the threats faced by *Echinacea tennesseensis* in developing this rule. As identified above, site protection and habitat management efforts by TDEC, working cooperatively with TDF, TNC, COE, the Service, and private landowners, has reduced habitat loss from residential and recreational development so that it is no longer a threat. Potential effects of ORV use, illegal and otherwise, in habitats containing colonies of *E. tennesseensis* remain. While disturbance from ORV use has been observed in the past and remains unaddressed at four colonies (*i.e.,* colonies 2.4, 3.6, 3.8, and 4.3) on publicly and privately owned lands harboring *E. tennesseensis,* these four colonies accounted for only 2 percent of the species' total distribution in 2005. Most of the largest colonies are located in DSNAs and are protected from this threat by fences or other barriers that TDEC has constructed and maintained. At the time the 1989 recovery plan was written, there were five extant populations ranging in size from approximately 3,700 to 89,000 plants and consisting of one to three colonies each (Clebsch 1988, p. 14; Service 1989, p. 2). There was an estimated total of 146,000 individual plants in 1989 (Drew and Clebsch 1995, p. 62). Recovery efforts have secured habitat for 19 colonies that are self-sustaining and distributed among six geographically defined populations. These 19 secured colonies accounted for 88,773 flowering stems in 2005, or approximately 83 percent of the flowering stems observed; whereas, colonies that we do not consider secure accounted for 18,576 flowering stems, or approximately 17 percent of the flowering stems observed (TDEC 2006, pp. 4–5). The number of secured plants and colonies is adequate to ensure that Factor A is no longer a threat to the species overall. Thus, destruction and modification of habitat from ORV use is not a threat to the species throughout all its range now or into the foreseeable future.

The final rule that listed *Echinacea tennesseensis* as endangered (44 FR 32604) identified the overuse of this species for commercial or scientific (*i.e.,* medicinal) purposes as a potential threat to this species. This threat has not materialized, and we do not believe it will in the future due to the emphasis on use of three other species from the genus *Echinacea* for this purpose. Neither do livestock grazing, as identified in the listing rule, nor browse by herbivores threaten *E. tennesseensis.*

The State of Tennessee enacted the Rare Plant Protection Act of 1985, addressing the inadequacy of existing regulatory mechanisms for protecting this species at the time it was listed. Should the State of Tennessee remove *Echinacea tennesseensis* from its List of Endangered Plants, we believe that the protected status of the lands where the 19 secure colonies currently exist will continue to provide adequate regulatory protection for those colonies. Also, TDEC's program for managing vegetation succession and other threats to cedar glade habitats on DSNAs inhabited by *E. tennesseensis* and their cooperative efforts with TDF, Tennessee

State Parks, and COE to manage threats in habitats where colonies exist on properties under their jurisdictions have been effective in maintaining habitats in the absence of disturbances from ORV activity.

Baskauf *et al.* (1994, p. 186) documented low levels of genetic variability in *Echinacea tennesseensis,* but also observed that this species is not devoid of genetic variability and is evidently well adapted to its cedar glade habitat. They noted that given the relatively large sizes of many of the naturally occurring populations, random genetic drift should not erode genetic variability in *E. tennesseensis* very rapidly. We do not believe that low genetic variability threatens *E. tennesseensis* now or within the foreseeable future.

Based on biological evidence and historical factors discussed above in relation to the potential threat of climate change, and the fact that we have no evidence that climate changes observed to date have had any adverse impact on *Echinacea tennesseensis* or its habitat, we do not believe that climate change is a threat to *E. tennesseensis* now or within the foreseeable future.

With respect to *Echinacea tennesseensis,* we have sufficient evidence (see Summary of Factors Affecting the Species section above) to show that all of the threats identified at or since the time of listing are no longer significant threats to the species, and are not likely to become threats in the foreseeable future. We believe that the 19 secure, self-sustaining colonies distributed among six populations are secure for the foreseeable future from the threats currently affecting the species and those identified at the time of listing. These 19 colonies are located on protected conservation lands, the long-term management of which we believe precludes threats due to residential or recreational development and succession of cedar glade communities for the foreseeable future. Based on the analysis above and given the reduction in threats, *Echinacea tennesseensis* does not currently meet the Act's definition of endangered in that it is not in danger of extinction throughout all of its range, nor the definition of threatened in that it is not likely to become endangered in the foreseeable future throughout all its range.

Significant Portion of the Range Analysis

Having determined that *Echinacea tennesseensis* does not meet the definition of endangered or threatened throughout its range, we must next consider whether there are any significant portions of its range that are in danger of extinction or likely to become endangered. A portion of a species' range is significant if it is part of the current range of the species and is important to the conservation of the species as evaluated based upon its representation, resiliency, or redundancy.

If we identify any portions of a species' range that warrant further consideration, we then determine whether in fact the species is endangered or threatened in any significant portion of its range. Depending on the biology of the species, its range, and the threats it faces, it may be more efficient for the Service to address the significance question first and in others the status question first. Thus, if the Service determines that a portion of the range is not significant, the Service need not determine whether the species is endangered or threatened there. If the Service determines that the species is not endangered or threatened in a portion of its range, the Service need not determine if that portion is significant.

For *Echinacea tennesseensis,* we applied the process described above to determine whether any portions of the range warranted further consideration. The potential threats identified above are fairly uniform throughout the range of the species; however, they are more pronounced on privately owned lands where the species occurs. As discussed above, a portion of a species' range is significant if it is part of the current range of the species and is important to the conservation of the species because it contributes meaningfully to the representation, resiliency, or redundancy of the species. The contribution must be at a level such that its loss would result in a decrease in the ability to conserve the species. While there is some variability in the habitats occupied by *E. tennesseensis* across its range, the basic ecological components required for the species to complete its life cycle are present throughout the habitats occupied by the six populations. No specific location within the current range of the species provides a unique or biologically significant function that is not found in other portions of the range. The currently occupied range of *E. tennesseensis* encompasses approximately 400 km^2 (154 mi^2) in Davidson, Rutherford, and Wilson Counties, Tennessee. We have determined that 19 secure and self-sustaining colonies presently are distributed among the six populations of *E. tennesseensis,* which accounted for approximately 83 percent of the total individuals estimated to exist in 2005. Sixteen additional colonies account for the remaining 17 percent of the total individuals estimated to exist in 2005 and are not considered secure. However, we do not consider these unsecured colonies to be a significant portion of the range of this species because these colonies provide no unique or biologically significant function that is not provided by the 19 secured and self-sustaining colonies.

In conclusion, major threats to *Echinacea tennesseensis* have been reduced, managed, or eliminated. Although the impacts to *E. tennesseensis* habitat are fairly uniform throughout the range of the species, they are more pronounced on privately owned lands where the species occurs. However, we do not consider these unsecured colonies to be a significant portion of the range of this species. Therefore, we have determined that *E. tennesseensis* is not in danger of becoming extinct throughout all or a significant portion of its range nor is it likely to become endangered now or within the foreseeable future throughout all or any significant portion of its range. On the basis of this evaluation, we believe *E. tennesseensis* no longer requires the protection of the Act, and we remove *E. tennesseensis* from the Federal List of Endangered and Threatened Plants (50 CFR 17.12(h)).

Effect of This Rule

This rule will revise 50 CFR 17.12(h) to remove *Echinacea tennesseensis* from the List of Endangered and Threatened Plants. Because no critical habitat was ever designated for this species, this rule will not affect 50 CFR 17.96.

The Act and its implementing regulations set forth a series of general prohibitions and exceptions that apply to all endangered plants. The prohibitions under section 9(a)(2) of the Act make it illegal for any person subject to the jurisdiction of the United States to import or export, transport in interstate or foreign commerce in the course of a commercial activity, sell or offer for sale in interstate or foreign commerce, remove and reduce *Echinacea tennesseensis* to possession from areas under Federal jurisdiction, or remove, cut, dig up, or damage or destroy *E. tennesseensis* on any other area in knowing violation of any State law or regulation such as a trespass law. Section 7 of the Act requires that Federal agencies consult with us to ensure that any action authorized, funded, or carried out by them is not likely to jeopardize the species' continued existence. This rule will revise 50 CFR 17.12(h) to remove

(delist) *E. tennesseensis* from the Federal List of Endangered and Threatened Plants and these prohibitions would no longer apply. Delisting *E. tennesseensis* is expected to have positive effects in terms of increasing management flexibility by State and Federal governments.

Post-Delisting Monitoring

Section 4(g)(1) of the Act requires us to monitor for at least 5 years species that are delisted due to recovery. Post-delisting monitoring refers to activities undertaken to verify that a species delisted due to recovery remains secure from the risk of extinction after the protections of the Act no longer apply. The primary goal of post-delisting monitoring is to monitor the species so that its status does not deteriorate, and if a decline is detected, to take measures to halt the decline so that proposing it as endangered or threatened is not again needed. If at any time during the monitoring period, data indicate that protective status under the Act should be reinstated, we can initiate listing procedures, including, if appropriate, emergency listing.

Section 4(g) of the Act explicitly requires cooperation with the States in development and implementation of post-delisting monitoring programs, but we remain responsible for compliance with section 4(g) and, therefore, must remain actively engaged in all phases of post-delisting monitoring. We also seek active participation of other entities that are expected to assume responsibilities for the species' conservation after delisting. In August 2008, TDEC agreed to be a cooperator in the post-delisting monitoring of *E. tennesseensis.*

We have finalized a Post-Delisting Monitoring Plan (Plan) for *Echinacea tennesseensis* (USFWS 2011, entire). The Plan: (1) Summarizes the species' status at the time of delisting; (2) defines thresholds or triggers for potential monitoring outcomes and conclusions; (3) lays out frequency and duration of monitoring; (4) articulates monitoring methods, including sampling considerations; (5) outlines data compilation and reporting procedures and responsibilities; and (6) depicts a post-delisting monitoring implementation schedule, including timing and responsible parties.

Required Determinations

Paperwork Reduction Act of 1995

OMB regulations at 5 CFR 1320, which implement provisions of the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*), require that Federal agencies obtain approval from OMB before collecting information from the public. The OMB regulations at 5 CFR 1320.3(c) define a collection of information as the obtaining of information by or for an agency by means of identical questions posed to, or identical reporting, recordkeeping, or disclosure requirements imposed on, 10 or more persons. Furthermore, 5 CFR 1320.3(c)(4) specifies that ''ten or more persons'' refers to the persons to whom a collection of information is addressed by the agency within any 12-month period. For purposes of this definition, employees of the Federal government are not included. This rule and our final Post-Delisting Monitoring Plan do not contain any new collections of information that require approval by OMB under the Paperwork Reduction Act. This rule will not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

We have determined that we do not need to prepare an environmental assessment or environmental impact statement, as defined in the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), in connection with regulations adopted pursuant to section 4(a) of the Endangered Species Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Government-to-Government Relationship With Tribes

In accordance with the President's memorandum of April 29, 1994, ''Government-to-Government Relations with Native American Tribal Governments'' (59 FR 22951), Executive Order 13175, and the Department of Interior's manual at 512 DM 2, we readily acknowledge our responsibility to communicate meaningfully with recognized Federal Tribes on a government-to-government basis. We have determined that there are no Tribal lands affected by this rule.

References Cited

A complete list of references cited is available on *http://www.regulations.gov* under docket number FWS–R4–ES–2010–0059.

Author

The primary author of this document is Geoff Call, Tennessee Ecological Services Field Office (see **FOR FURTHER INFORMATION CONTACT**).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we hereby amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

■ 1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500; unless otherwise noted.

§ 17.12 [Amended]

■ 2. Amend § 17.12(h) by removing the entry for ''*Echinacea tennesseensis''* under ''FLOWERING PLANTS'' from the List of Endangered and Threatened Plants.

Dated: July 21, 2011.

Gregory E. Siekaniec,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. 2011–19674 Filed 8–2–11; 8:45 am]

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