# Kneeland Prairie penny-cress
*(Thlaspi californicum)*

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

**U.S. Fish and Wildlife Service**
**Arcata Fish and Wildlife Office**
**Arcata, California**

# 5-YEAR REVIEW

**Species reviewed:** Kneeland Prairie penny-cress/*Thlaspi californicum*

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# 5-YEAR REVIEW
# Kneeland Prairie pennycress/*Thlaspi californicum*

## I. GENERAL INFORMATION

**A. Methodology used to complete the review:** This review was conducted by David Imper, Ecologist, with the Arcata Field Office of the Fish and Wildlife Service, based on all information contained in files at that office and provided by the public in response to the Federal Notice.

**B. Reviewers**

**Lead Region** -- California/Nevada Operations Office; Diane Elam, (916) 414-6464

**Lead Field Office** -- Arcata Fish and Wildlife Office; Mike Long, David Imper (707) 822-7201

**C. Background**

1. **FR Notice citation announcing initiation of this review:**
   Federal Register 70(129): 39327-39329, July 7, 2005

2. **Species status:** Unknown (as of September 13, 2005 Data Call)

3. **Recovery achieved:** 1 (0-25%; as of September 13, 2005 Data Call)

4. **Listing history**

   Original Listing
   FR notice: Federal Register 65(27):6332-6338
   Date listed: February 9, 2000
   Entity listed: Species - Kneeland Prairie Penny-cress (*Thlaspi californicum*)
   Classification: Endangered

   Revised Listing, if applicable: NA

5. **Associated rulemakings**
   Critical Habitat Listed
   FR notice: Federal Register 67:62897-62910
   Date listed: October 9, 2002

6. **Review History:** No status reviews have been conducted since the listing in 2000.

7. **Species' Recovery Priority Number at start of review:**
   The recovery priority is 2C, reflecting conflict with construction or other development projects, a high degree of threat, a high potential for recovery, and a taxonomic rank of full species.

8. **Recovery Plan or Outline**

Recovery Plan for Kneeland Prairie Penny-cress (*Thlaspi californicum*)
Approved July 7, 2003;
No revisions.

## II. REVIEW ANALYSIS

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

**1. Is the species under review listed as a DPS?**

____ ***Yes***, *go to section II.A.2.*
__X__ ***No***, *go to section II.A.3.*

The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listings as distinct population segments (DPS) only to vertebrate species of fish and wildlife. Because the species under review is a plant and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

### B. Recovery Criteria

**1. Does the species have a final, approved recovery plan?**

__X__ ***Yes***, *continue to section II.B.2.*
____ ***No***, *go to section II.C.*

**2. Adequacy of recovery criteria.**

**a. Do the recovery criteria reflect the best available (i.e., most up-to-date) information on the biology of the species and its habitat?**

__X__ ***Yes,*** *go to section II.B.3.b.*
____ ***No***, *note why these criteria are not considered the best available information and go to section II.B.3.c. Consider developing recommendations for revising recovery criteria in section IV.*

**b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and there is no new information to consider regarding existing or new threats)?**

__X__ ***Yes***, *go to section II.B.4.*

In the recovery plan, we identify which of the 5 listing factors each recovery criterion addresses. However, the criteria are not strictly threats-based in that they are not specifically framed in terms of the 5 listing factors.

____ ***No**, please note below which, if any, factors do have corresponding criteria, and go to section II.B.3.c. Consider developing recommendations for revising recovery criteria in section IV.*

3. **List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors* are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here.**

Listing Factor B (overutilization for commercial, recreational, scientific, or educational purposes) is not relevant to this taxon. At the time of listing, no threats from disease (Listing Factor C) were known. Under Listing Factor C (disease or predation), grazing was noted, but levels at the time of listing were not thought to threaten the species. Monitoring since the time of listing suggests that grazing may affect reproductive output of the population (see 5-factor analysis below), but the extent of effects is unknown. Monitoring conducted in conjunction with Downlisting Criterion 1, and Delisting Criteria 1, 2 and 3 is needed to determine whether predation is a threat factor.

*Downlisting Criterion 1 (Addresses Listing Factors A, C, D and E)*
*Reclassification to threatened status will be evaluated when:*
*The population as a whole, and all presently extant colonies, are protected and stable. Protected sites are defined as either 1) sites owned and/or managed by a government agency or private conservation organization that identifies maintenance of the species as the primary management objective for the site, or 2) sites protected by a permanent conservation easement or covenant that commits present and future landowners to the conservation of the species. To be deemed stable, the present largest population must maintain a running average population size (mean of annual mean population estimates) of at least 7,000 individuals, and the 2 other presently extant colonies must maintain a running average population size of at least 500 individuals each. Running averages will be determined over the most recent 10 years, or an appropriate period justified on the basis of population research.*

There has been no change in the protection status of the three colonies since the recovery plan was completed, and with one exception, since the taxon was listed. The largest colony, containing roughly 96 percent of the species, and a second colony remain unprotected on private property. Because the landowner has denied access to the largest colony since 2003, the last monitoring was done in 2002. A third colony is located on California Department of Forestry and Fire Protection (CDFFP) property. Following listing of the species, the CDFPP prepared a draft policy 2001 that outlines various measures to protect *Thlaspi*

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A)Present or threatened destruction, modification or curtailment of its habitat or range;
B) Overutilization for commercial, recreational, scientific, or educational purposes;
C) Disease or predation;
D) Inadequacy of existing regulatory mechanisms;
E) Other natural or manmade factors affecting its continued existence.

*californicum* on its property **(CDFPP 2001).** That policy is yet to be finalized. The number of individuals present in the two smaller colonies has increased (see Section C below), but has not reached the numerical abundance threshold necessary to consider downlisting.

*Downlisting Criterion 2 (In part, addresses Listing Factors A, C and E)*
*Reliable seed germination and propagation techniques for the species are understood and demonstrated.*

An investigation of the germination requirements of this species is ongoing. Those results may be available in May 2006.

*Downlisting Criterion 3 (In part, addresses Listing Factors A, C, and E)*
*Genetic material, in the form of seeds adequately representing the genetic diversity within the species, is stored in a facility approved by the Center for Plant Conservation.*

Due to the inability to access the primary population, and therefore collect samples representing the genetic diversity within the species, no progress has been made on this criterion.

*Delisting Criterion 1 (In part, addresses Listing Factors A, C and E)*
*Delisting will be considered when, in addition to the criteria for downlisting, all of the following conditions have been met:*

*The running average for the entire population is 10,000 or more individuals over a period of 10 years, or an appropriate period justified on the basis of population research.*

The landowner has denied access to the largest colony since 2003. Therefore, we cannot assess any progress made toward achievement of this goal.

*Delisting Criterion 2 (In part, addresses Listing Factors A, C, D and E)*
*At least five protected and stable colonies (populations on distinct serpentine outcrops) are distributed throughout the current and historic range of the species. For a site to be considered protected, it must be either owned by a government agency or private conservation organization that identifies maintenance of the species as the primary management objective for the site, or the site must be protected by a permanent conservation easement or covenant that commits present and future landowners to the conservation of the species. To be deemed stable, the largest presently extant colony must maintain a running average population size of at least 7,000 individuals, and colonies on 4 additional outcrops must be shown to be naturally reproducing and maintain a running average population size of at least 500 individuals each for a period of 10 years, or an appropriate period justified on the basis of population research.*

There has been no change in the protection status of the three extant colonies, or nearby suitable habitat since the recovery plan was completed. Two of the three

colonies, including the largest, are not protected. A third colony, on CDFFP property, is covered under a draft protective policy.

The landowner has denied access to the largest colony since 2003. Therefore, the information necessary to assess the stability of that colony is not being collected. The two smaller colonies (one on private land and one on CDFFP property) are naturally reproducing, and have increased in size since 2002 (see Section C below), but they do not yet meet the numerical abundance threshold established for delisting. No new colonies have become established at the Kneeland Airport site. The California Department of Fish and Game indicates that no new occurrences of Kneeland Prairie penny-cress have been discovered on timberlands in general, and the two major timberland companies in the area have not identified any new, significant ultramafic substrate in the Kneeland area **(Williams 2005)**.

*Delisting Criterion 3 (In part, addresses Listing Factors A, C and E)*
*Monitoring of population size, trends, other pertinent characteristics, and habitat quality has begun and will continue for the post-delisting monitoring period.*

Population-based monitoring of the two smaller colonies has been conducted since 2001. However, the largest colony and its habitat have not been monitored since 2002 because the landowner has denied access to the property.

Currently, all downlisting and delisting criteria are considered adequate and appropriate with respect to recovery of the species. The conservation strategy outlined by these criteria addresses all the currently known threats to the species. Components of the conservation strategy and criteria include habitat protection and management secured by appropriate agreements (such as conservation easements, covenants) to address listing factors A (habitat loss or modification, etc.), C (possible threat of predation), D (inadequate regulatory mechanisms), and E (other natural or manmade factors – specifically manmade random events, such as contaminant spills associated with the airport, that can be prevented or contained by appropriate management). Population sizes and number of protected populations included in the criteria in part address threat of stochastic events under listing factor E. Seed banking also addresses the threat of stochastic events under listing factor E by ensuring that genetic material is available to reestablish any populations that become extirpated due to stochastic events.

## C. Updated Information and Current Species Status

**1. Biology and Habitat** – (Bold font indicates references that have become available since the time of listing.)

Currently, the known global distribution of *Thlaspi californicum* is restricted to seven semi-isolated (i.e., separated by 100 feet or more) concentrations of plants (compared to five in 2002) located on three small patches of serpentine outcrop (total 6 acres) in the immediate vicinity of the Kneeland Airport, Kneeland Prairie, Humboldt County, California **(Imper 2005).** All plants within an individual serpentine outcrop are

considered to be one colony, resulting in a total of three colonies. The population estimates provided below are subject to error due to the rhizomatous growth pattern of the species which limits our ability to distinguish one individual from another. For past sampling efforts, rosettes separated by less than about 4 inches were generally assumed to be the same individual. In the recovery plan, we identify the need for research on the rhizomatous growth pattern of the species. Clarification is needed on the degree of clonal growth with the colonies, and a standardized protocol for identifying individuals for the purpose of population estimation should be developed.

As of 2002, the largest colony occupied approximately 19,000 square feet of serpentine outcrop on the west side of Mountain View Road, and comprised approximately 96 percent of the species. This colony contained approximately 9,920 plants in 1997; approximately 5,140 plants in 2001 (95 percent confidence interval of 3,884-6,400) **(SHN Consulting Engineers & Geologists 2001**); and approximately 8,850 plants in 2002 (95 percent confidence interval of 6,823-10,880) **(Imper 2002).** The landowner has denied access to this colony since 2003.

A second colony, which currently includes four semi-isolated concentrations of plants, was discovered in 1990 on the east side of the Kneeland Airport runway. In 2001, this colony contained a total of 135 plants occupying approximately 4,600 square feet of habitat. A total of 180 plants was observed in 2002, and 373 plants were observed in 2003 (**Imper 2003**), the last year a full census was conducted of that colony. A count made in 2005, representing approximately half of the overall colony, indicated a 10 percent increase in number of plants between 2003 and 2005. If those data are representative of the overall colony, the colony increased in size by 205 percent from 2001 to 2005. During the same period, habitat occupied by the colony increased by 76 percent to 8,100 square feet **(Imper 2005**).

A third colony was discovered across Mountain View Road on California Department of Forestry and Fire Protection (CDFFP) property in 1999. Sixteen plants were scattered over 600 square feet of habitat at that site in 2001. A total of 23 plants were observed in 2002; 42 plants in 2003 **(Imper 2003);** and 32 plants in 2005 **(Imper 2005).** The 32 plants observed in 2005 were scattered over approximately 1200 square feet of habitat - a 100 percent increase in occupied habitat over 2001. In addition, a single plant was discovered in another part of this outcrop in 2005, isolated from the main concentration of that colony.

The rapid increase in the size and extent of the two smallest colonies in only 4 years indicates that in some cases the species is capable of high expansion rates once a site is colonized. In particular, relatively large increases in the two colonies were observed from 2002 to 2003 (**Imper 2002, 2003**). The nearest location where climate data are recorded is Eureka, some 15 miles to the west. Climate data for Eureka (National Weather Service 2006) revealed no obvious explanation for the apparent high rate of expansion of the penny-cress occurring between 2002 and 2003. It is not known if this rate of expansion represents a short-term response to favorable environmental conditions, which may be countered in the long-term by periodic declines. The monitoring record for this species is too short to allow a meaningful assessment of trends or relationships between population fluctuations and climate conditions.

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

**a. Present or threatened destruction, modification or curtailment of its habitat or range:** There has been no significant change in the imminence of this threat factor. As noted in the final rule listing the species as endangered, the habitat occupied by *Thlaspi californicum* was reduced by 50 percent or more since the mid-1960's, through relocation of a county road, and construction of an airport and helitack port (U.S. Fish and Wildlife Service. 2002). Future losses are still possible because most of the area occupied by *T. californicum* is not protected and there remain threats from habitat destruction. At the time of listing, two colonies were located on private land and one on CDFFP land. The two colonies on private land are not protected; CDFFP has developed a draft protective policy concerning the colony on their land.

The final listing rule discussed upgrading of Kneeland Prairie Airport and associated slope stabilization. The west side of the runway (within *Thlaspi californicum* unoccupied, potential habitat) and the east side of the runway (adjacent to the occupied habitat) were considered as possible locations for the parking area. Due to site conditions, the runway can only be extended to the south, which would potentially affect unoccupied, presumed suitable serpentine habitat. No formal proposal has been submitted to the Service for the airport upgrade. Hank Seeman, Environmental Services Manager for the Humboldt County Department of Public Works, indicated that any proposed modifications to the airport will be included in the County Airport Master Plan, currently in preparation. That plan is expected to be completed by this fall (personal communication, Hank Seeman, 2006).

The final listing rule also discussed the potential for realignment of Mountain View Road, which could be conducted concurrently with, or independent of, the runway expansion. This realignment has not yet occurred, and we have no information to suggest that the project has been abandoned. Thus, until the County Airport Master Plan, which will outline the proposed improvements to the airport (personal communication, Hank Seeman, 2006), is completed, relocation of the road continues to be a potential threat to the serpentine habitat and to *Thlaspi californicum*.

**b. Overutilization for commercial, recreational, scientific, or educational purposes:** Overutilization has not been, and currently is not known to be a threat for this plant.

**c. Disease or predation:** We know of no current threats to *Thlaspi californicum* from disease. Cattle grazing occurs throughout the prairie and with the exception of the colony located on CDFFP property, affects the entire habitat occupied by *Thlaspi californicum*. At the time of listing there was no evidence that grazing was impacting the population. However, monitoring data collected since 2001 for a portion of the population suggest that even the current low intensity cattle grazing, or perhaps wildlife herbivory, may be depressing the reproductive output of the population through ingestion of inflorescences prior to seed dispersal, and perhaps through foliar ingestion. In 2005, as much as 41 percent of the flowering plants within the areas monitored were affected by grazing. Plants located closer to cattle trails, the serpentine/pasture interface, or on more moderate slopes were more likely to be grazed **(Imper 2005)**. Although these

impacts may be important, we do not know at this time if the impacts of grazing are affecting the rate of population mortality or recruitment, or limiting recovery of the population in any way.

**d. Inadequacy of existing regulatory mechanisms:** There has been no change in the imminence of this threat factor. The California Environmental Quality Act (CEQA) (chapter 2, section 21050 *et seq.* of the California Public Resources Code) affords the only protection for the species under state law. Virtually the entire distribution of *T. californicum* is located on privately owned grazing land, and CEQA does not regulate many activities on private land which might negatively affect the species, such as grazing. Moreover, protection of even listed species under CEQA is dependent upon the discretion of the agency involved.

**e. Other natural or manmade factors affecting its continued existence:** There has been no significant change in the imminence of this threat factor. *Thlaspi californicum* continues to occupy only a small portion of the available serpentine prairie habitat within Kneeland Prairie. As discussed in the final listing rule, because it is highly restricted, *Thlaspi californicum* is vulnerable to destruction of all or a significant portion of its range as a result of random events (Shaffer 1981 and 1987, Primack 1993, Meffe and Carroll 1994) such as contaminant, herbicide, or pesticide spills emanating from the airport, helitack base, and Mountain View Road; soil erosion; drought; fire; and exotic species encroachment.

Habitat for *Thlaspi californicum* has become progressively fragmented since construction of the original Mountain View Road and the airport. As a result, what probably was one large population spread across Ashfield Ridge is now fragmented into three relatively small and disjunct colonies, which probably function largely independently. In general, smaller serpentine outcrops support a higher number of alien species (Harrison 1999). Smaller outcrops may also be more vulnerable to recreational impacts, trampling, and modification of the unique serpentine soil chemistry as a result of enrichment from cattle grazing or the surrounding meadow system (SHN Consulting Engineers & Geologists 2001). Increased cattle grazing could increase impacts from erosion and soil compaction. In general, habitat fragmentation increases external threats by bringing sources of disturbance closer to plants, and increasing the amount of habitat near edges. Conserving several small, disjunct habitat fragments presents greater biological and operational difficulties than a single large habitat area (Ehrlich and Murphy 1987).

## D. Synthesis -

We have no new information to suggest that threats to the species have substantially changed since the time of listing. The primary threats continue to be potential destruction and modification of habitat and the threat from catastrophic events. Lands have not been protected since the time of the listing, and currently none of the three extant colonies occur on lands managed strictly for the protection of *T. californicum*. No progress has been made with respect to establishment of new colonies to reduce the threat of random catastrophic events although investigation of germination requirements in support of controlled propagation has begun . While modest gains have been recorded in the number of individual plants and extent of occupied habitat associated with two of the three extant colonies of *Thlaspi californicum* over the past 4 years, we lack any monitoring data for the largest colony since 2002. This colony

included over 95 percent of the species at the time of the 2002 survey. The primary landowner has been unwilling to authorize access for monitoring, or negotiate any protective mechanism that ensures the future protection of the population and its habitat. Without access to the majority of the population, we have been unable to establish any population trends that could be considered representative of the entire species. Similarly, without access to this site, we have been unable to characterize thoroughly the degree of threats posed directly by cattle grazing or indirectly through nutrient enrichment of its habitat.

In summary, due to past and threatened destruction or modification of its habitat; the possible threat of predation; the inadequacy of existing regulatory mechanisms; and other natural or manmade factors affecting its continued existence, we conclude that *Thlaspi californicum* continues to meet the definition of endangered.

## III. RESULTS

**A. Recommended Classification**:

**____ Yes, downlist to Threatened**
**____ Yes, uplist to Endangered**
**____ Yes, delist**
**__X__ No, no change is needed**

**B. New Recovery Priority Number** __2C__ (no change)

**C. If applicable, indicate the Listing and Reclassification Priority Number (FWS only):**

**Reclassification (from Threatened to Endangered) Priority Number**: ____

**Reclassification (from Endangered to Threatened) Priority Number**: ____

**Delisting (Removal from list regardless of current classification) Priority Number**:____

## IV. RECOMMENDATIONS FOR FUTURE ACTIONS -

Recovery criteria for *Thlaspi californicum* contain specific goals with respect to the number of individuals. Therefore, research is needed to determine the degree of clonal growth within the population and to develop a method to standardize identification of individuals for the purpose of population estimation.

*Thlaspi californicum* occurs on CDFFP land and on private lands owned by a single landowner. Successful partnerships with both CDFFP and the private landowner are crucial to the successful implementation of the recovery plan and conserving the extant population. Therefore, efforts must continue with the primary landowner to secure access for monitoring and to negotiate a protective mechanism and appropriate management for the population and its habitat.

At the same time, establishment of new colonies is central to recovery, in order to compensate for the historical decline in the population, and provide additional protection from catastrophic factors. Initial repatriation/introduction efforts should focus on the existing exposed serpentine

habitat (for which access is available). If opportunities arise, restoration of serpentine habitat buried during past construction, or exposure of serpentine geology where it is (naturally) situated near the ground surface are also worth pursuing. The ongoing propagation study should prove helpful in pursuing introduction efforts.

V. REFERENCES - (Bold font indicates references that have become available since the time of listing.)

**California Department of Forestry and Fire Protection 2001. Draft policy and procedures dealing with critical habitat area of Kneeland Prairie penny-cress. Fortuna, California.**

Ehrlich, P.R. and D.D. Murphy. 1987. Conservation lessons from long-term studies of checkerspot butterflies. Conservation Biology 1:122-131.

Harrison, S. 1999. Local and regional diversity in a patchy landscape: native, alien, and endemic herbs on serpentine. Ecology 80(1):70-80.

Hodges & Shutt. 1993. Kneeland Airport airport layout plan narrative report. Report prepared for the County of Humboldt. 28 pp.

**Imper, D.K. 2002. 2002 monitoring report - Kneeland Prairie pennycress. Unpublished monitoring report. U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Arcata, California.**

**Imper, D.K. 2003. U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Arcata, California. Unpublished population data, Kneeland Prairie penny-cress.**

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**National Weather Service 2006. Preliminary Climatological Data for Eureka, California (web application). Available online at http://www.weather.gov/climate/index.php?wfo=eka. Accessed 4 February 2006.**

Primack, R.B. 1993. Essentials of Conservation Biology. Sinauer Associates, Inc., Sunderland, Massachusetts.

Shaffer, M.L. 1981. Minimum population sizes for species conservation. Bioscience 31(2):131-134.

Shaffer, M.L. 1987. Minimum viable populations: coping with uncertainty. In Viable Populations for Conservation, M.E. Soule, ed., Cambridge University Press, England.

**SHN Consulting Engineers & Geologists. 2001. 2001 population monitoring report and**

**summary of critical habitat: Kneeland Prairie penny-cress, Kneeland Prairie, Humboldt County, CA. Unpublished report submitted to the U.S. Fish and Wildlife Service, Arcata, California. 14 pp.**

U.S. Fish and Wildlife Service. 2002. Endangered and threatened wildlife and plants: determination of endangered status for the plant *Thlaspi californicum* (Kneeland prairie penny-cress) from coastal Northern California. Federal Register 65(27):6332-6338. February 9, 2000.

B. Personal Communications

**Seeman, Hank. 2006. Environmental Resources Manager, Division of Natural Resources, Humboldt County Department of Public Works. Phone conversation with David Imper, U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Arcata, California, on May 15, 2006. Subject: proposed modifications to Kneeland Airport.**

**Williams, Bob. 2005. Environmental Scientist, California Department of Fish and Game, Redding, California. E-mail to David Imper, U.S. Fish and Wildlife Service, Arcata Fish and Wildlife Office, Arcata, California, dated December 15, 2005. Subject: 5-year status review for the Kneeland Prairie Penny-cress.**

U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Thlaspi californicum*

Current Classification __Endangered____
Recommendation resulting from the 5-Year Review

**____ Downlist to Threatened**
**____ Uplist to Endangered**
**____ Delist**
**__X__ No change is needed**

Appropriate Listing/Reclassification Priority Number __N/A__

Review Conducted By __David Imper, Ecologist_____

FIELD OFFICE APPROVAL:

Lead Field Supervisor, Fish and Wildlife Service

Approve _____ Date 6/12/06

*The lead Field Office must ensure that other offices within the range of the species have been provided adequate opportunity to review and comment prior to the review's completion. If a change in classification is recommended, written concurrence from other field offices is required.*

REGIONAL OFFICE APPROVAL:

*The Regional Director must sign all 5-year reviews, unless the authority has been delegated by the Regional Director to the Assistant Regional Director of Ecological Services.*

Acting
**Lead Regional Director, Fish and Wildlife Service**

Approve _____ Date 6/20/06

*The Lead Region must ensure that other regions within the range of the species have been provided adequate opportunity to review and comment prior to the review's completion. If a change in classification is recommended, written concurrence from other regions is required.*