

*Pseudobahia bahiifolia*  
(Hartweg's golden sunburst)

*Pseudobahia peirsonii*  
(San Joaquin adobe sunburst)

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



*Pseudobahia peirsonii*

*Pseudobahia bahiifolia*

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

**December 2007**

## 5-YEAR REVIEW

**Species reviewed:** *Pseudobahia bahiifolia* (Hartweg’s golden sunburst) and  
*Pseudobahia peirsonii* (San Joaquin adobe sunburst)

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**5-YEAR REVIEW**  
***Pseudobahia bahiifolia* (Hartweg's golden sunburst)**  
***Pseudobahia peirsonii* (San Joaquin adobe sunburst)**

**I. GENERAL INFORMATION**

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

This review was conducted by Sacramento Fish and Wildlife Office staff using information from published status surveys and technical reports, the 2007 California Natural Diversity Database (CNDDDB 2007), and personal communications with biologists having first-hand experience with *Pseudobahia bahiifolia* and *Pseudobahia peirsonii*. We interviewed recognized *P. bahiifolia* and *P. peirsonii* experts for their knowledge and suggestions for recommendations to assist in the recovery of the species.

**I.B. Contacts**

**Lead Regional or Headquarters Office** – Diane Elam, Deputy Division Chief for Listing, Recovery, and Habitat Conservation Planning, and Jenness McBride, Fish and Wildlife Biologist, Region 8 (California and Nevada), 916-414-6464

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**I.C. Background**

**I.C.1. FR Notice citation announcing initiation of this review:** On July 7, 2005, we, the U.S. Fish and Wildlife Service (Service), announced the initiation of the 5-year review for *Pseudobahia bahiifolia* and *Pseudobahia peirsonii* and asked for information from the public regarding the species' status (70 FR 39327-39329). We published a second notice announcing the 5-year review and extended the request for information until January 3, 2006, on November 3, 2005 (70 FR 66842). We received no response to the request for information.

**I.C.2. Listing history**

Original Listing

FR notice: 62 FR 5542

Date listed: February 6, 1997

Entity listed: Two species: *Pseudobahia bahiifolia* and *Pseudobahia peirsonii*

Classification: Endangered: *P. bahiifolia*. Threatened: *P. peirsonii*.

**I.C.3. Review History:**

We have not conducted any previous 5-year reviews of these species. A comprehensive survey and status report of both *Pseudobahia* species was funded under a Service contract and was completed in 1990 (Stebbins 1991).

#### **I.C.4. Species' Recovery Priority Number at start of review:**

*P. bahiifolia* – 2; *P. peirsonii* – 2 (USFWS 2006a). Both plant species were considered to have a high level of threat, primarily because the limited and specific habitat for each species is within an area that is under pressure of residential or agricultural development. Both species were also considered to have a high probability for recovery.

#### **I.C.5. Recovery Plan or Outline**

Draft Recovery Plan for Fifteen Plants from the Southern Sierra Foothills, California (in development).

## **II. REVIEW ANALYSIS**

### **Species Overview**

*Pseudobahia bahiifolia* and *Pseudobahia peirsonii* are members of the sunflower family (Asteraceae). The genus *Pseudobahia* has only three species, and all three species are small annual plants that are covered with woolly hairs and have alternate leaves. They have yellow, daisy-like flower heads that are borne singly at the tip of each branch. Each flower head is approximately 1 inch across. Both species are annuals with narrow distributions in the Central Valley of California (Stebbins 1991, Hickman 1993). There is no overlap in the distribution of *P. bahiifolia* and *P. peirsonii* (CNDDDB 2007) (see map at end of this document).

*Pseudobahia bahiifolia*. The known occurrences of *P. bahiifolia* are concentrated in the eastern San Joaquin Valley in Stanislaus, Madera, Merced, and Fresno Counties. The species has been reported from two locations in Tuolumne County in 1937 and 1963; however, no field work has been done at these sites to verify the presence or location of the species. The species has been apparently extirpated by levee construction and residential and industrial development from the type locality in Yuba County in the lower Sacramento Valley (CNDDDB 2007). *Pseudobahia bahiifolia* occurs almost entirely in non-native grasslands. The majority of the occurrences (regions of distribution) are associated with Mima mound topography. Mima mounds are small hillocks a few feet in height that have formed in dense concentrations. The plants are nearly always found on the north or northeast-facing slopes of the mounds with highest plant densities on the upper slopes where grass cover is minimal. The species was first collected in 1847 at the present-day site of Marysville in Yuba County (Stebbins 1991). *Pseudobahia bahiifolia* is now known from 19 extant occurrences. This total does not include the two unverified occurrences in Tuolumne County mentioned above, nor the extirpated type locality in Yuba County. The occurrences are found at an elevation of 15 to 140 meters (50 to 460 feet) on Amador soil series in Stanislaus County, Rocklin soil series in Fresno and Madera Counties, and Valley Springs soil formation in Merced County. In addition to the extirpation of the type locality in Yuba County, four other occurrences of *P. bahiifolia* have been or may have been extirpated by conversion to orchards or residential development (CNDDDB 2007).

*Pseudobahia peirsonii*. This species is very similar in outward appearance to *P. bahiifolia* with yellow, daisy-like flower heads and alternate leaves. However, *P. peirsonii* is much larger in stature (4 to 18 inches tall) and has larger flower heads than *P. bahiifolia*. In addition to size, these two congeners (species within the same genus) can be differentiated by the leaf appearance and phyllaries (bracts underneath the flower head). *Pseudobahia peirsonii* has bipinnately (twice divided into smaller divisions) lobed leaves and phyllaries that are joined only at their bases, and *P. bahiifolia* has entire or three-lobed leaves and phyllaries joined for approximately half their length. The plant is found at 32 extant occurrences distributed in Fresno, Tulare and Kern Counties.

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

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

Yes

No

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

## **II.B. Recovery Criteria**

### **II.B.1. Does the species have a final, approved recovery plan containing objective, measurable criteria?** The draft recovery plan is currently under development.

Yes

No

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

### **II. C.1. Biology and Habitat**

#### **II.C.1.a. Abundance, population trends (e.g., increasing, decreasing, stable), demographic features (e.g., age structure, sex ratio, family size, birth rate, age at mortality, mortality rate, etc.), or demographic trends:**

For *Pseudobahia bahiifolia*: Of the 24 originally recorded occurrences, two are extirpated, three are presumed to be extirpated, and 19 occurrences are listed as “presumed to be extant” (CNDDDB 2007).

For *Pseudobahia peirsonii*, Of the 44 originally recorded occurrences, seven occurrences are extirpated, two are possibly extirpated, three were removed from the record, and the remaining 32 occurrences are listed as “presumed extant” (CNDDDB 2007).

Quantitative and qualitative data for nearly all of the occurrences of both species of *Pseudobahia* are outdated and incomplete, with few sites having more than two population surveys ever taken. Most sites where “presumed extant” populations of either *Pseudobahia* are found have not been surveyed for more than 15 years and the population trends are listed as “unknown” (CNDDDB 2007). The location of many occurrences on private property makes site visits and surveys difficult because landowner permission is required.

Population numbers of both species can fluctuate widely from one year to another. This fluctuation is believed to depend on annual climatic conditions, specifically the amount of seasonal rainfall, and also on competition from non-native plants (Stebbins 1989, 1991; E. Cypher, CDFG, pers. comm. 2007). Because of these annual fluctuations, population trends for these species are difficult to deduce and can not be reliably completed in a few years of surveys (Stebbins 1989). Actual plant numbers are not as useful an index of population health as is the condition of occupied habitat and general population condition (62 FR 5542).

The following information outlines why the status of the various occurrences of the two *Pseudobahia* species is difficult to define (CNDDDB 2007):

*Pseudobahia bahiifolia*:

1. Surveys are not consistently performed and are outdated. Of the 19 occurrences listed as presumed extant, 15 occurrences have two or fewer total surveys performed. The most recent site visits for ten of these occurrences were over 15 years ago.
2. Some occurrences are doubtful. Two of the presumed extant occurrences are single sightings of unknown numbers of plants that have not been verified since 1937 and 1939, respectively.

*Pseudobahia peirsonii*:

1. Surveys are not consistently performed and are outdated. Ten occurrences have population sizes based only on a single site visit. These site visits were done an average of 16 years ago.
2. Some occurrences are poorly described. Four occurrences list that an “unknown” number of plants were counted when the only site visit was completed in 1974 (one site visit) and 1992 (three site visits). Seven other occurrences appeared to have declining populations; however, this trend is based on only two recorded surveys.
3. Presumed extant populations have no follow-up surveys. Four occurrences have had two surveys with the most recent survey revealing that no plants were found. However, the locales of these occurrences have favorable habitat conditions and the surveyors presumed that the plants would still be found there if land management practices do not change. Seven occurrences appeared to have stable or increasing populations. For all but two occurrences

these population trends are based on only two recorded surveys. One of these populations was very small (3 plants in 1988 increasing to 12 plants in 1990) and was considered marginal in viability by Stebbins (1991).

4. Populations vary greatly year to year and may appear extirpated. John Stebbins completed independent surveys of Fresno County *P. peirsonii* populations at Quail Lake (CNDDDB occurrence number 31) and Highway 180 near the Friant Canal (CNDDDB occurrence number 14) in 2003. He could not find any plants during these surveys, although numbers of both species may fluctuate widely from year to year. Stebbins' overall impression of the *P. peirsonii* habitat is that it was notably degraded since his surveys in the 1990s (J. Stebbins *in litt.* 2007). Stebbins also evaluated the overall status of both *Pseudobahia* species as declining compared to 1990s data (J. Stebbins *in litt.* 2007).

Surveys of *P. peirsonii* have been performed for seven flowering seasons by the Fresno Flood Control District biologist since 1998 (for CNDDDB occurrence number 30), and the surveys show that this is a population that fluctuates greatly from year to year (P. Bryan *in litt.* 2007). The average density calculated per hectare for this occurrence has annually fluctuated from as many as 546.6 individuals per hectare (1998) to as few as 23.5 individuals per hectare (2002, 2007) (P. Bryan *in litt.* 2007). Fluctuation in annual populations of the two listed *Pseudobahia* species is common and is believed to be associated closely with climatic cues; thus, only long-term surveys may accurately reflect the true overall trend of these population (J. Stebbins 1991, E. Cypher pers. comm. 2007).

#### **II.C.1.b. Genetics, genetic variation, or trends in genetic variation (e.g., loss of genetic variation, genetic drift, inbreeding, etc.):**

No new genetic information is available for either *Pseudobahia* species. Habitat for both *Pseudobahia* species is highly fragmented throughout their ranges due to conversion of natural habitat for urban and agricultural uses. This fragmentation has resulted in small isolated populations of these species (CNDDDB 2007). Such populations may be highly susceptible to extirpation due to inbreeding depression (Gilpin and Soule 1988; Goodman 1987); also see section II.C.1.e.

#### **II.C.1.c. Taxonomic classification or changes in nomenclature:**

*Pseudobahia bahiifolia* has had no changes in its scientific name or to its taxonomic classification since the genus *Pseudobahia* was split from the genus *Eriophyllum* in 1915 by Rydberg, based on his observations of leaf and floral morphology. *Pseudobahia bahiifolia* is commonly called "Hartweg's golden sunburst", a name commemorating German botanist Karl Hartweg who first collected this plant for scientific description in 1847 (Stebbins 1991). The common name also describes the bright yellow flowers.

*Pseudobahia peirsonii* has had no changes in its scientific name or to its taxonomic classification since it was first described in 1949 by the California botanist Phillip A. Munz. Common names used for *P. peirsonii* include San Joaquin adobe sunburst, Tulare pseudobahia, and San Joaquin

adobe sunflower (Stebbins 1991). The San Joaquin adobe sunburst is the preferred common name since it was used in the original listing notice (62 FR 5542).

#### **II.C.1.d. Habitat or ecosystem conditions (e.g., amount, distribution, and suitability of the habitat or ecosystem):**

Suitable habitat for both *Pseudobahia* species is now almost entirely on private lands in eastern Merced, Madera, Fresno, Tulare, and Kern Counties, while the extant populations are small, fragmented, and isolated (Stebbins 1989, CNDDDB 2007).

*Pseudobahia bahiifolia*. The historical distribution of *Pseudobahia bahiifolia* is not known specifically but is thought to have spread approximately 200 miles along the eastern San Joaquin valley and foothills from Stanislaus County in the south to Yuba County in the Sacramento Valley to the north (Stebbins 1991). The distribution once extended north to Yuba County in the Sacramento Valley, based on the 1847 type collections of Karl Hartweg; however, these occurrences are now extirpated (Stebbins 1991). The current distribution of the majority of *P. bahiifolia* occurs in two isolated clusters, including six extant occurrences near Friant along both sides of the San Joaquin River in high pumice content soils (Fresno and Madera Counties) and six occurrences near Cooperstown in Stanislaus County. *Pseudobahia bahiifolia* grows in loam or sandy loam soil associated with Amador and Pentz series (Stanislaus County), Rocklin series (Fresno and Madera County), Amador and Hornitos soils (Merced County) (Stebbins 1991).

*Pseudobahia bahiifolia* primarily grows in grasslands in the southern part of its range and within the transition zone between grasslands and blue oak woodland in the northern part of its range (Stebbins 1991, CNDDDB 2007). The optimum habitat for *P. bahiifolia* is the north to northeast-facing small hills or Mima mounds associated with the upland portion of the vernal pool habitat (E. Cypher pers.comm. 2007). Species commonly associated with extant occurrences of *P. bahiifolia* include non-native grasses and forbs such as *Bromus madritensis* ssp. *rubens* (foxtail chess), *Erodium botrys* (broad-leaved filaree), and *E. circuitarium* (red-stemmed filaree); and native grasses and forbs such as *Lasthenia fremontii* (Fremont's goldfields), *Lepidium nitidum* (shining peppergrass), *Lupinus bicolor* (miniature lupine), and *Bromus hordeaceus* (soft brome) (Stebbins 1991, CNDDDB 2007).

*Pseudobahia peirsonii*. The historical distribution of *Pseudobahia peirsonii* is not known because when the species was first described in 1949, extensive areas with suitable habitat for this species in the lower San Joaquin Valley were already converted to agriculture. This extensive land conversion precluded establishing a meaningful baseline survey of *P. peirsonii* (Stebbins 1991). Three major population concentrations of *P. peirsonii* now include: east of Fresno in Fresno County, west of Lake Success in Tulare County, and northeast of Bakersfield in Kern County (CNDDDB 2007).

*Pseudobahia peirsonii* received its common name "San Joaquin adobe sunburst" because early collectors found this plant exclusively in heavy clay or dark adobe soils of the San Joaquin Valley (Stebbins 1991). Soil type is the most important factor in determining suitable habitat for this plant species (Stebbins 1991). Although *P. peirsonii* was successfully grown on a variety of soil types in the greenhouse, all known wild occurrences are associated with the following soil



types: Cibo clay, Porterville clay, Centerville clay, and Mt. Olive clay (Stebbins 1991). The probable reason for the plant/soil association is the capability of these clay soils to retain moisture longer than most other soil textures (Stebbins 1991). These soil types also have neutral to slightly alkaline pH. Stebbins (1989) suggested that seed germination for this plant may require a high moisture threshold that can only be found in the clay soils in this relatively arid region. *Pseudobahia peirsonii* grows in grasslands and in the transition zone between grassland and blue oak woodland at elevations between 390 and 2,600 feet on level or gently sloping areas between low hills (Stebbins 1989). *Pseudobahia peirsonii* can grow in fairly dense grass cover, but optimal habitat appears to be a landscape sparsely vegetated with a mixture of grasses and forbs (Stebbins 1989). Associated grasses and forbs include such non-native species as *Avena* sp. (wild oats), *Bromus madritensis* ssp. *rubens* (foxtail chess), *Bromus hordeaceus* (soft brome), *Hordeum murinum* (foxtail barley), and *Erodium cicutarium* (red-stemmed filaree), and such native species as *Amsinckia menziesii* var. *intermedia* (fiddleneck) and *Achyrachaena mollis* (blow-wives) Stebbins 1991).

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

### **II.C.2.a. Present or threatened destruction, modification or curtailment of its habitat or range:**

#### ***Residential development***

At the time of listing in 1997, a primary threat to both *Pseudobahia* species was the conversion of natural habitat to residential development (62 FR 5542). Residential and agricultural development still remains a threat to both species of *Pseudobahia*. About 85 percent of extant *P. bahiifolia* occurrences and about 89 percent of extant *P. peirsonii* occurrences are located on private lands where they receive little protection. In addition, flooding from proposed flood control projects was a threat at the time of listing and still remains a threat to some occurrences of *P. peirsonii*.

*Pseudobahia bahiifolia*. Since listing, the following occurrences of this species have become at risk from development. Five of 19 occurrences plus suitable habitat around U.C. Merced are threatened.

1. The proposed Friant Ranch, a residential and commercial development in Fresno County, would cover about 1,093 acres near the San Joaquin River immediately downstream of Millerton Lake and will provide 2,511 homes serving the Fresno/Clovis metropolitan area. This property contains soils that are unsuitable for agriculture and has traditionally been used for cattle grazing (EDAW 2006b). *Pseudobahia bahiifolia* occurrence numbers 23 and 24 (CNDDDB 2007) occur on this site, with a combined population of about 600 individuals when observed in 1995. These occurrences would be significantly impacted and possibly destroyed by the proposed development. No agreement with the Service for compensation for these impacts has yet been made.

2. The French Bar Bluffs Habitat Restoration and Monitoring Plan was developed for the restoration of habitat that was affected by the illegal construction of eight stream impoundments, roads, and fences associated with the future development of a community of ranchette parcels called French Bar Bluffs. The habitat restoration and monitoring plan called for the removal of the earthen dams, deepening (sediment removal) of existing stream beds, and restoration of vegetation in the Upper Dominici Creek area west of the city of La Grange in Stanislaus County (Northwest Biological Consulting-URS 2006). This project adversely impacted 0.2 acre of the 4.85 acres of known *Pseudobahia bahiifolia* habitat containing occurrence numbers 6 and 7 (CNDDDB 2007). Further development plans for this property include subdivision to accommodate residential development, possibly multi-acre ranchettes (Northwest Biological Consulting-URS 2006). The compensation proposed for this impact is the protection in perpetuity of 1.74 acres of upland habitat, some of which is currently occupied by *P. bahiifolia* within the French Bar Bluffs project area as identified in a survey conducted in 2006 (Northwest Biological Consulting-URS 2006). However, this compensation has not yet been implemented and the two occurrences remain unprotected (K. Turner pers. comm. 2007).
3. The largest single population of *Pseudobahia bahiifolia* (CNDDDB occurrence number 26, 10,000 plants counted in the 2004 survey) is located on the proposed North Fork Village Project site near the west shore of Millerton Lake in Madera County. Of the 2,238 acres proposed for development (including almost 3,000 residential dwelling units and a 15-acre elementary school), 629 acres were proposed for open space use. The *P. bahiifolia* occurrence now occupies 11.7 acres on the proposed site (Michael Brandman Associates 2006). The environmental impact report for the project proposes that 28.7 acres will be preserved onsite as sanctuary for *P. bahiifolia* and that development would be uphill of the *P. bahiifolia* (Michael Brandman Associates 2006). However, the project would still destroy nearly 50 percent of the onsite area currently occupied by *P. bahiifolia*, which is estimated to contain 35 percent of the onsite population, and is a significant portion of the largest known extant occurrence of *P. bahiifolia* (Michael Brandman Associates 2006). Compensation for these impacts has not yet been resolved. *Pseudobahia bahiifolia* seed was collected from the North Fork Village site and sent to Rancho Santa Ana Botanic Garden (USFWS 2006b).
4. The construction and expansion of the new University of California (U.C.) at Merced near Yosemite Lake, Merced County, will threaten adjacent suitable habitat of *Pseudobahia bahiifolia* because of the rapid urbanization that is expected to take place around the new campus (Stebbins 1991, E. Cypher pers. comm. 2007). A cluster of five occurrences (CNDDDB occurrence numbers 29 – 33) approximately 14 miles north of the campus are the nearest recorded populations of *P. bahiifolia*; however, the campus and the surrounding lands are within the apparent range of suitable habitat for this species as determined by our GIS analysis of soil layers and altitude.
5. The population trends determined from the most recent surveys indicate that *Pseudobahia bahiifolia* populations appeared to be stable at only two of 24 recorded occurrences (CNDDDB 2007). These two occurrences, near the city of La Grange in Stanislaus County, are located on property that may eventually be developed into residential ranchettes (CNDDDB 2007).

*Pseudobahia peirsonii*. At the time of listing, the threat to *P. peirsonii* was primarily due to the planned 462-acre combined Quail Lakes housing development and recreational lake in Fresno County that would affect the large occurrence (CNDDDB occurrence number 31) of 5,000 plants surveyed in 1990. Completion of this project included compensation for environmental impacts which involved off-site wetland construction, transplantation of *P. peirsonii* and top soil translocation to a protected area within the development site, and preservation of two high density sub-populations of *P. peirsonii* within the protected site (EIP Associates 1994). During post-construction monitoring of these sub-populations, *P. peirsonii* at this location were not seen for four years; however, large numbers were observed in a single season during the fifth year of monitoring (Halstead *in litt.* 2007). In the 2003 season John Stebbins did not observe any plants at this location (J. Stebbins *in litt.* 2007). Residential development still remains a threat to *P. peirsonii* at the following locations (two occurrences):

1. A proposed parcel split of a privately owned 65-acre parcel in Fresno County near the city of Clovis, and the proposed residential development of these sub-parcels, is located within the area described to contain *Pseudobahia peirsonii* occurrence number 36 (Halstead and Associates 2006, CNDDDB 2007). Surveys for *P. peirsonii* were performed on this property in 2004 and 2005 and no plants were found (Halstead *in litt.* 2007). We lack adequate information on the reproductive ecology and seed bank dynamics of this species to determine whether or not it may reappear at this site in the future.
2. The proposed Round Mountain Estates project would develop a 600-acre parcel at Round Mountain in Fresno County, an area occupied by about 40 acres of *Pseudobahia peirsonii*. Surveys in 1993 and 1996 revealed the 40 acres support an apparently stable *P. peirsonii* population and that current land use continues to be moderate cattle grazing (J. Gurule, Live Oak Associates, pers. comm. 2007). Compensation recommended for this project by the consultant is to protect in perpetuity the 40 acres that contain the *P. peirsonii* occurrence (Hartesveldt Ecological Consulting Services [now Live Oak Associates] 1996).

### ***Agricultural conversion***

When federally listed in 1997, conversion of habitat to agricultural use was considered a significant but secondary threat to *Pseudobahia peirsonii*. Eight of the original recorded occurrences of *P. peirsonii* had already been extirpated from their locale due to various agricultural conversions by the time Stebbins (1991) surveyed the sites. We do not believe that agricultural conversion presents a serious threat to *P. peirsonii* at this time since occurrences are now on either public land or private land used for cattle ranching (E. Cypher pers. comm. 2007). However, *P. bahiifolia* is still threatened by agricultural development, as it was at the time of listing, because of the pressure to convert ranch lands with occurrences of *P. bahiifolia* to orchards and vineyards (E. Cypher pers. comm. 2007).

### ***Flooding***

Inundation of *Pseudobahia peirsonii* plants caused by the creation of Lake Success in Tulare County extirpated two of the originally recorded occurrences of *P. peirsonii* before the species

was listed (Stebbins 1989, CNDDDB 2007). Three occurrences of *P. peirsonii* are now found at the Lake Success Recreation Area which is managed by the U.S. Army Corps of Engineers. Two of these occurrences are historically recorded and one occurrence is believed to be a relict of one of the original occurrences that were documented as extirpated when Lake Success was first filled (EDAW 2006a). Flooding at Lake Success continues to be a threat to the three local occurrences of *P. peirsonii* (E. Cypher *in litt.* 2007). Excessive rainfall during an exceptionally wet year could raise the level of Lake Success and cause inundation of at least one of the occurrences (E. Cypher *in litt.* 2007). In addition, two proposals for the improvement of the Lake Success dam could affect at least one other occurrence of *P. peirsonii*. The U.S. Army Corps of Engineers plans to move the dam 300 feet downstream of its current location and then increase the size of the new spillway (E. Cypher *in litt.* 2007). Compensation by transplanting was addressed, but is not considered a reliable option for saving the affected populations of *P. peirsonii* owing to the limited success of previous transplanting efforts (E. Cypher *in litt.* 2007). As a result of the creation of Lake Success, one population was subjected to the additional threat of adverse recreational activity, since that population was located on the highly impacted shoreline (Stebbins 1989, 62 FR 5542, CNDDDB 2007).

The Fancher Creek flood control project, completed in the mid-1990s, impacted about 40 percent of the second largest population of *Pseudobahia peirsonii* (CNDDDB occurrence number 30, 62 FR 5542). However, *P. peirsonii* are still found at the Fancher Creek site and surveys are conducted on a regular basis (P. Bryan *in litt.* 2007). The possible inundation of at least part of the existing local occurrence during an exceptionally heavy rainfall season remains a threat to this occurrence because no flood control system can protect against all conceivable flood events (Stebbins 1991, Fresno Metropolitan Flood Control District 2007).

### ***Protected occurrences***

Few occurrences of either *Pseudobahia* species are found on public land. Only one occurrence of *P. bahiifolia* is found on public land, while five occurrences of *P. peirsonii* are found on public land and two are on private lands managed as preserves (CNDDDB 2007). The remaining occurrences are all located on private land and are not afforded the same protections as those on public (Federal) lands.

*Pseudobahia bahiifolia*. The only occurrence of *Pseudobahia bahiifolia* that is on public land and is, therefore, offered some degree of protection is the CNDDDB occurrence number 21 in Fresno County near the city of Friant and the Friant canal. This occurrence is split between private property owned by The Nature Conservancy and public land managed by the U.S. Bureau of Reclamation (BOR), consisting of 52 acres (CNDDDB 2007). Formal surveys for *P. bahiifolia* are not conducted there annually; however, the occurrence appears to be stable based on the confirmation of a flowering population in 2004 by BOR personnel and the lack of conflicting land management practices (M. Kinsey, BOR, pers. comm. 2007).

*Pseudobahia peirsonii*. Two occurrences of *Pseudobahia peirsonii* are located on public, non-Federal land in Fresno County owned and managed by the Fresno Metropolitan Flood Control District (CNDDDB occurrence numbers 16 and 30). Although these occurrences are monitored by surveys and protected by fencing, flooding remains a possible threat to these occurrences.

Lake Success was created when the Tule River was dammed by the earthen Success Dam, which was constructed by the U.S. Army Corps of Engineers in 1961. The property around Lake Success, owned and managed by the U.S. Army Corps of Engineers, located just east of Porterville in Tulare County, contains three occurrences of *Pseudobahia peirsonii*. Two of these occurrences were previously recorded in the CNDDDB as occurrence numbers 10 and 19; however, a new occurrence was also discovered and may be the continuation of a population that was covered by the lake when the Success Dam was first built (EDAW 2006a). The sizes of these populations were recorded as 120 individuals for occurrence 10, 30 individuals for occurrence 19, and 45 individuals for the new occurrence (EDAW 2006a). The population numbers from this recent survey appear to indicate these occurrences are somewhat stable when compared with population numbers recorded in previous surveys (1985, 1986, 1988, 2003) (EDAW 2006a; T. Beyerl, EDAW, pers.comm. 2007). These occurrences receive a certain amount of protection because they are on federally operated public land; however, flooding from this dam remains a viable threat to the local occurrences.

Lewis Hill Preserve consists of 110 acres of grass-covered hills with rock outcrops located north of Porterville in Tulare County. This preserve, owned and managed by the Sequoia Riverlands Trust, contains *Pseudobahia peirsonii* occurrence number 28, as well as the rare wildflower, *Fritillaria striata* (striped adobe lily) (Sequoia Riverlands Trust 2007). This preserve is not open to the public. Although formal surveys for the listed plant species have not been conducted since 1990, the presence of *P. peirsonii* was confirmed by preserve personnel during the 2006 flowering season (H. Destin, Sequoia Riverlands Trust, pers. comm. 2007). Currently the Lewis Hill preserve is not actively managed, but future management activities such as prescribed burns and grazing are being planned to control invasive weedy plants (H. Destin pers. comm. 2007).

Before *Pseudobahia peirsonii* was listed in 1997, as compensation for impacts to the four sub-populations of occurrence number 31 by construction of the Quail Lake residential development in Fresno County (see above), two of the highest-density sub-populations were protected and a new sub-population was created by trans-locating soil from the two impacted sub-populations and seeding the soil with seeds collected earlier (completed in 1993) (62 FR 5542, EIP Associates 1994). This compensation was done in compliance with the California Endangered Species Act and California Environmental Quality Act. The area, south of Clovis in Fresno County, containing these sub-populations is protected as natural habitat in perpetuity (EIP Associates 1994). Subsequent monitoring revealed that individuals originating from seeds sewn into the trans-located soil, as well as the individual plants in the original two dense populations, were numerous, healthy, and reproducing in 1998 (J. Halstead *in litt.* 2007). However, *P. peirsonii* is not clearly present at Quail Lakes every year and the habitat in the area of the trans-located soil appeared to be significantly degraded in 2006 (J. Halstead *in litt.* 2007, J. Stebbins *in litt.* 2007).

#### **II.C.2.b. Overutilization for commercial, recreational, scientific, or educational purposes:**

Overutilization for commercial purposes was not known to be a factor in the 1997 final rule and does not appear to be a threat at this time.

### **II.C.2.c. Disease or predation:**

The Service is not aware of any new information regarding disease or predation since the listing of *Pseudobahia bahiifolia* and *Pseudobahia peirsonii* in 1997. The 1997 listing rule states that disease was not considered a threat. Disease is still not considered a threat to either *Pseudobahia* species (E. Cypher pers. comm. 2007).

### ***Overgrazing and trampling***

Cattle ranching was recognized as a threat to the *Pseudobahia* species in the original listing rule (62 FR 5542) because of the possibility of excessive grazing and trampling by cattle, which could destroy many individuals of the two species (Stebbins 1989). In 1997, when first listed, about 50 percent of known occurrences of *P. peirsonii* were found on private property that was used primarily for cattle grazing. Moderate grazing regimes are not believed to seriously affect either of the plant species, and may actually enhance their growth due to the removal of non-native, aggressive, invasive grasses and forbs (Stebbins 1989, Marty 2005). Cattle do not preferentially target either of the *Pseudobahia* species while grazing (E. Cypher pers. comm. 2007). In addition, profitable cattle ranching may indirectly benefit the two *Pseudobahia* species by discouraging residential development of ranch land (E. Cypher pers. comm. 2007). Cattle grazing and trampling are no longer considered a serious threat to either species unless the grazing times are extended, leading to excessive trampling and consumption.

### **II.C.2.d. Inadequacy of existing regulatory mechanisms:**

When listed in 1997, we noted that most of the occurrences of both the *Pseudobahia* species were located on private land and, thus, State and Federal laws were limited in their ability to regulate potentially detrimental human activity at these locations (62 FR 5542). No significant changes to the Federal or State laws have provided increased protection for these species; however, current regulations that continue to assist in protecting the two *Pseudobahia* species include the following:

The Federal Endangered Species Act: The Endangered Species Act of 1973, as amended (Act), is the primary Federal law that provides protection for the federally endangered *Pseudobahia bahiifolia* and threatened *Pseudobahia peirsonii*. Section 7(a)(2) requires Federal agencies to consult with the Service to ensure any project they fund, authorize, or carry out does not jeopardize a listed species. Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the “take” of federally threatened and endangered wildlife; however, take of plants is not prohibited. Instead, plants are protected in two particular circumstances. Section 9 prohibits (1) the removal and reduction to possession (i.e., collection) of endangered plants from lands under Federal jurisdiction, and (2) the removal, cutting digging, damage, or destruction of endangered plants on any other area in knowing violation of a State law or regulation. Section 9 also makes illegal the international and interstate transport, import, export, and sale or offer for sale of endangered plants and animals. The protection of Section 9 afforded to endangered species is extended to threatened wildlife and plants by regulation.

Few occurrences of either *Pseudobahia* species are found on Federal public land. Only one occurrence of *P. bahiifolia* is found on public land, while five occurrences of *P. peirsonii* are found on public land. The remaining occurrences are all located on private land and are not afforded the same protections as those on public (Federal) lands as described in the preceding paragraphs. Occurrences of these species that are protected on public lands are described in section II.C.2.a. above.

Section 10(a)(1)(B) of the Act provides for non-Federal project proponents to apply for an incidental take permit where their actions will result in take of federally listed wildlife or take of State-listed wildlife and plants. The Service issues these permits if the applicants develop, fund, and implement an approved habitat conservation plan (HCP). Two HCPs apply to land within the range of the two *Pseudobahia* species. These are the proposed Kern Valley Floor HCP (in draft) and the Pacific Gas and Electric San Joaquin Valley Operation and Maintenance Program HCP (in effect). HCPs ultimately serve to protect both listed and unlisted species within a defined area by the active conservation efforts of the landowner, based on agreements between the landowner and government agencies. The Kern Valley Floor HCP provides protection for *P. peirsonii* and the San Joaquin HCP provides protection to both *Pseudobahia* species, allowing only minimal take from specific populations.

California State Laws: The State's authority to conserve plants is comprised of four pieces of legislation: The California Endangered Species Act (CESA), the Native Plant Protection Act (NPPA), the California Environmental Quality Act (CEQA), and the Natural Community Conservation Planning Act (NCCPA).

*Pseudobahia bahiifolia* was State-listed as endangered in 1981. *Pseudobahia peirsonii* was State-listed as endangered in 1987. CESA (California Fish and Game Code, section 2080 *et seq.*) and NPPA (Division 2, Chapter 10, section 1908) prohibit the unauthorized take of State-listed threatened or endangered plant species. Unlike the take prohibition in the Federal Act, the State prohibition includes plants; however, landowners are exempt from this prohibition for plants via habitat modification because a salvage option is provided. As noted in the 1997 Federal rule to list *P. bahiifolia* and *P. peirsonii*, the landowner is required to notify the California Department of Fish and Game 10 days in advance of changing land use in order to allow salvage of listed plants (NPPA Division 2, Chapter 10, section 1913). However, we consider salvaging is unlikely to be beneficial for the two listed *Pseudobahia* species, because they are both annual species, and no evidence exists that the species would survive transplantation without suitable protected habitat. A CDFG funded study also showed that only 20 percent of the rare, listed plants in the study survived relocation, transplantation or re-introduction (62 FR 5548).

The California Environmental Quality Act (CEQA) (chapter 2, section 21050 *et seq.* of the California Public Resources Code) requires government agencies to consider and disclose environmental impacts of projects and to avoid or mitigate them where possible. Under CEQA, public agencies must prepare environmental documents to disclose environmental impacts of a project and to identify conservation measures and project alternatives. Through this process, the public can review proposed project plans and influence the process through public comment. However, CEQA does not guarantee that such conservation measures will be implemented.

## **II.C.2.e. Other natural or manmade factors affecting its continued existence:**

### ***Non-native plants***

The final listing rule noted that the intrusive and aggressive characteristics of herbaceous weedy species appear to be detrimental to habitat quality of the two *Pseudobahia* species. Plants mentioned as being common non-native associates of *P. bahiifolia* include *Erodium cicutarium* (red-stem filaree), *E. botrys* (longbeak stork's bill), *Bromus mollis* (soft brome or soft chess), and *Bromus madritensis* ssp *rubens* (foxtail chess). Plants mentioned as being common non-native associates of *P. peirsonii* include *Avena fatua* (wild oats), *Brassica kaber* (wild mustard), *Bromus mollis* (soft brome or soft chess), *Bromus madritensis* ssp *rubens* (foxtail chess), and *Erodium cicutarium* (red-stem filaree) (62 FR 5542). Non-native grasses and forbs continue to proliferate throughout the range of the two *Pseudobahia* species and these non-native species continue to invade locations that the two species occupy. Thus, non-native plants remain a significant threat to the two *Pseudobahia* species (E. Cypher pers. comm. 2007).

### ***Road maintenance and widening***

Stebbins (1991) lists several road maintenance projects that would affect populations of *Pseudobahia peirsonii*. The most extensive project was the proposed widening of State Route 180 in Fresno County that may destroy plants on both sides of the road. Six other occurrences were also determined to be threatened by road maintenance activities conducted by the California Department of Transportation (CALTRANS) which include spraying herbicides, grading, scraping, slope stabilization, road widening, and road alignment. The listing rule noted that road maintenance activities were a threat to *P. peirsonii* (62 FR 5542). However, subsequent CALTRANS maintenance activities and road alignment did not appear to directly affect the occurrences of *P. peirsonii*; rather, the disturbance created from the maintenance appears to indirectly and moderately threaten both species of *Pseudobahia* by encouraging the growth of non-native weedy vegetation which competes with the two listed species of *Pseudobahia* (J. Stebbins *in litt.* 2007).

### ***Transmission line maintenance***

Two occurrences of *Pseudobahia peirsonii* (CNDDDB occurrence numbers 23 and 24) inhabit areas beneath two transmission lines supported by Southern California Edison (SCE). The properties where the transmission lines are located are considered "rights of way", and are mostly within privately owned lands. Stebbins (1991) recognized that these populations would need to be protected from the machinery and traffic (human and vehicular) that would impact the area when maintenance actions were performed on the transmission lines, and this was considered a threat when the species was listed (62 FR 5542). Routine maintenance activities include patrol road maintenance, line maintenance, and overhead canopy maintenance. Routine maintenance actions are scheduled by SCE annually, avoid the active time periods for local listed plants, and require a minimum of off-road activities (Entrix, Inc. 1997). A more substantial threat to *P. peirsonii* is from emergency repairs to the power lines due to catastrophic failure, natural disasters, or vandalism where the need to conduct repairs expeditiously would increase the chances of incidental damage to the plants during the repair effort. Entrix, Inc. (1997)



conducted a survey for *P. peirsonii* and found only one occurrence along one of the two transmission lines where the species was thought to occur. SCE maintenance personnel are provided with environmental and endangered species training to ensure they avoid impacting listed species (Entrix, Inc. 1997).

### ***Drought***

At the time of listing drought was considered a threat to small and marginal populations of either *Pseudobahia* species (62 FR 5542). Natural cycles of drought are not likely to threaten the larger occurrences of either of the *Pseudobahia* species owing to the drought-adaptive nature of the plants (E. Cypher pers. comm. 2007). However, where populations persist on only marginal habitat, the addition of prolonged drought conditions is likely to result in higher rates of mortality in the short term, with the effects of low reproductive output and survivorship persisting after the drought has ceased (E. Cypher pers. comm. 2007). It is unknown how quickly the *Pseudobahia* populations may rebound after severe climatic conditions.

### ***Small population size***

The two species of *Pseudobahia* each require separate and specific soil conditions for successful germination and growth, so that the distribution of these plants is limited to the occurrences of these soil types (Stebbins 1991). The conversion to agricultural use of the geographic areas where these soil types are found began before a baseline survey of either plant could be performed, so the historic distribution can only be assumed based on a variety of factors, including soil type. The conversion to agriculture and to other land uses (discussed above) which are adverse to the proliferation of the two species have resulted in fragmented populations, many of which are of extremely limited population size (E. Cypher pers. comm. 2007). For example, about 67 percent of the *P. bahiifolia* and 62 percent of the *P. peirsonii* populations with known counts have less than 100 plants from the last surveys that were recorded (CNDDDB 2007). In addition, some of the sites are questionable as to whether they are still producing any plants at all; for example, two of the presumed extant occurrences of *P. bahiifolia* are single sightings of unknown numbers of plants that have not been verified since 1937 and 1939, respectively (CNDDDB 2007). At the time of listing it was recognized that such small populations may be highly susceptible to extirpation due to chance events, inbreeding depression, or additional environmental disturbance (Gilpin and Soule 1988; Goodman 1987, 62 FR 5542). The conservation biology literature commonly notes the vulnerability of species known from one or very few locations and/or from small populations (e.g., Shaffer 1981 and 1987, Primack 1998, Dunning et al. 2006). In particular, small population size makes it difficult for such species to persist while sustaining the impacts of habitat loss, competition with non-native plants, and other impacts such as prolonged drought. If an extirpation event occurs in a population that has been fragmented, the opportunities for re-colonization will be greatly reduced due to physical isolation from other source populations. The small size of populations, along with the geographic isolation of the separate populations of both *Pseudobahia* species remains a threat (E. Cypher pers. comm. 2007).

### II.C.2.f. Summary of Current Threats

Threats and Conservation Measures	<i>Pseudobahia bahiifolia</i>	<i>Pseudobahia peirsonii</i>
Factor A		
Residential Development	X	X
Agricultural Conversion	X	X
Flooding	X	X
Protected Occurrences	X	X
Factor B	N/A	N/A
Factor C		
Overgrazing and trampling	X	X
Factor D	X	X
Factor E		
Non-native plants	X	X
Road Maintenance and Widening	X	X
Transmission line maintenance		X
Drought	X	X
Small population size	X	X

### II.D. Synthesis

Both *Pseudobahia bahiifolia* and *Pseudobahia peirsonii* are faced with a variety of present-day threats. Only one occurrence of *P. bahiifolia* and five occurrences of *P. peirsonii* are on public (Federal) land, and two are on private preserves, and are guaranteed some degree of protection. On both public and private lands, properly managed cattle grazing can benefit these species when each species is co-occurring with dense non-native, invasive grasses and forbs; however, excessive grazing and trampling can be destructive to both species of *Pseudobahia*. Surveys for both species are not consistently performed throughout their ranges, and a majority of occurrences have not been surveyed for over 15 years. Thus, reliable values for population sizes and trends do not exist for the overall distribution of either species.

*Pseudobahia bahiifolia*. Plans for residential developments in the southern San Joaquin Valley are currently poised to destroy all or part of five occurrences including a significant portion of the two remaining and most densely populated occurrences of *P. bahiifolia*. All of the remaining occurrences are threatened by one or more of the following: by the vulnerability of the small and fragmented populations; by the conversion of habitat from cattle ranches to urban and residential development, vineyards, and orchards; and by competition from non-native invasive grasses and forbs. An undetermined acreage of suitable habitat for *P. bahiifolia* will be adversely affected by the surge in urban growth that will follow the construction of the U.C. Merced campus. Based on the continuing risk of these threats, we conclude that *Pseudobahia bahiifolia* still meets the Act's definition of endangered, and we recommend no change in status at this time.

*Pseudobahia peirsonii*. A portion of one of the largest *P. peirsonii* occurrences (Quail Lake) was destroyed by residential development and recent surveys show that the property acquired as compensation to support and protect the remnant of this occurrence has become seriously degraded (EIP Associates 1994, Stebbins *in litt.* 2007). Only during one year of five years of

observations were *P. peirsonii* seen at this location (Halstead *in litt.* 2007). Other extant occurrences of *P. peirsonii* are threatened primarily by competition with non-native invasive grasses and forbs, and by the vulnerability of the small and fragmented populations. Flooding has destroyed portions of two occurrences of *P. peirsonii* and still threatens those occurrences at Lake Success and on the Friant Flood Control property. Based on the continuing risk of these threats, we conclude that *Pseudobahia peirsonii* still meets the Act's definition of threatened, and we recommend no change in status at this time.

### III. RESULTS

#### III.A. Recommended Classification:

**Downlist to Threatened**

**Uplist to Endangered**

**Delist** (Indicate reasons for delisting per 50 CFR 424.11):

*Extinction*

*Recovery*

*Original data for classification in error*

**No change is needed** (*Pseudobahia bahiifolia* and *Pseudobahia peirsonii*)

#### III.B. New Recovery Priority Number:

*Pseudobahia bahiifolia*: **5C**. We recommend that the recovery priority number be changed from 2 to 5C because the species continues to have a high degree of threat from residential development and agricultural conversion, and its potential for recovery has declined. The species is vulnerable as it is found only in small populations, and the majority of populations are geographically isolated preventing genetic flow. In spite of seed banking and successful maintenance of the population managed by the Bureau of Reclamation (M. Kinsey, BOR, pers. comm. 2007), *P. bahiifolia* does not have a high potential for recovery. The "C" indicates that some degree of conflict exists with urban development, particularly the two planned residential developments that may impact the two largest occurrences of *P. bahiifolia* (see section II.C.2.a.).

*Pseudobahia peirsonii*: **2**. We recommend that the recovery priority number remain 2 because the species continues to experience a high degree of threat from invasive plants, flooding, and road and power-line maintenance activities. In addition, the species is vulnerable as small populations. The specific, clay soil type required for this species and the lack of public lands with suitable habitat reduce the recovery potential for this species; however, the recovery potential is still high for this species because of the successful management of occurrences on public lands and private preserves.

### IV. RECOMMENDATIONS FOR FUTURE ACTIONS

1. Protect lands with known occurrences of either species of *Pseudobahia*, particularly those occurrences with the largest and most dense populations, through conservation

easements, acquisition in title, or other methods. Manage these properties to protect and enhance growth of *P. bahiafolia* and *P. peirsonii*.

2. Work with landowners to gain access to their property for surveying and monitoring populations of both *Pseudobahia* species.
3. Conduct coordinated surveys of all recorded occurrences of both species of *Pseudobahia*. Establish systematic periodic surveys where possible of known occurrences. Begin surveys in potentially suitable habitat of both species of *Pseudobahia* based on soil type and habitat characteristics.
4. Complete and publish the draft recovery plan and ultimately finalize the recovery plan. Much of the information contained in Stebbins' two studies (1989, 1991) is still valid and is directly applicable to a recovery plan.
5. Maintain a viable, protected seed collection for both species of *Pseudobahia*. Ensure sufficient seeds (approximately 5,000 per site, USFWS 2006a) are taken from as many sites as possible to maintain genetic heterogeneity.

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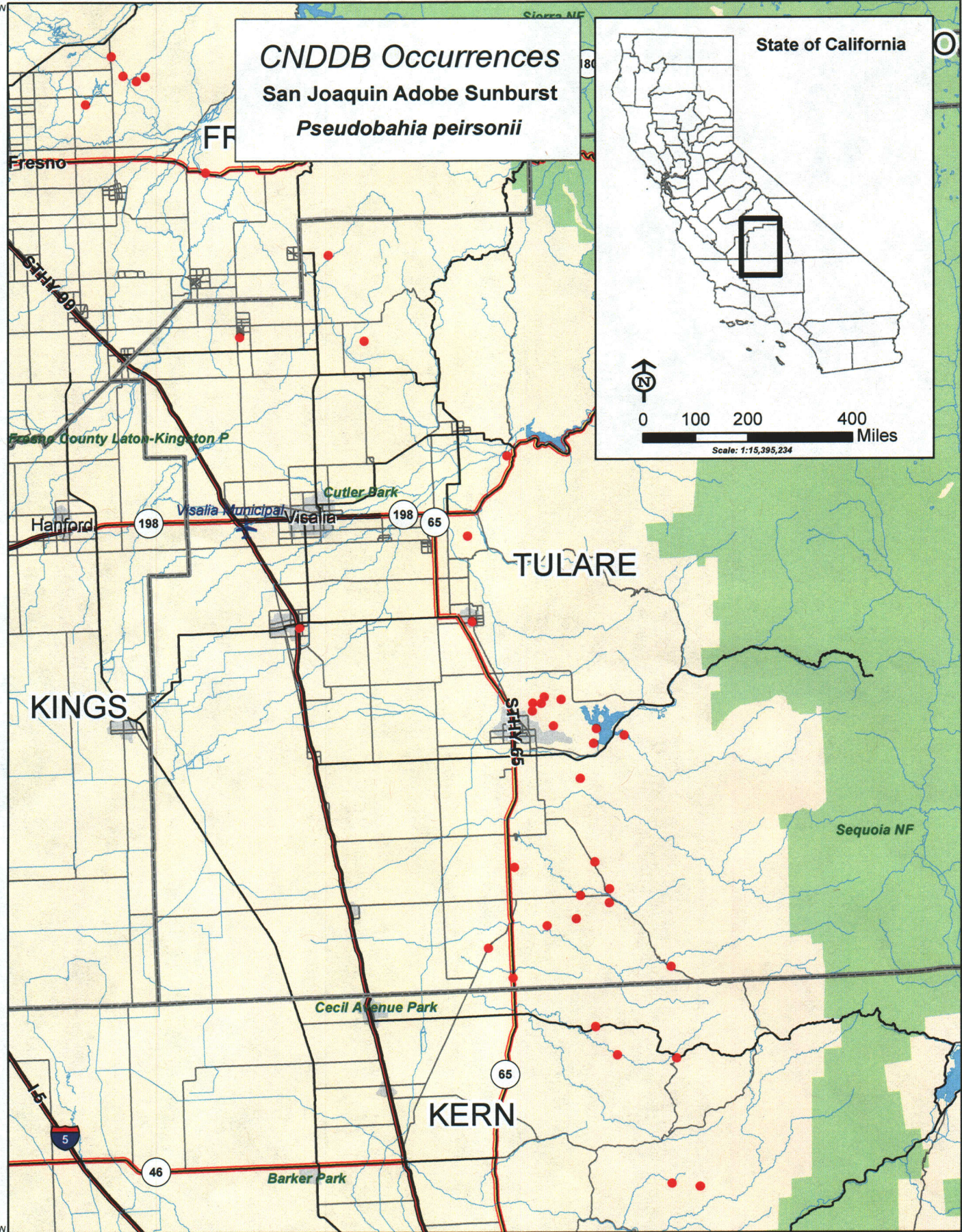
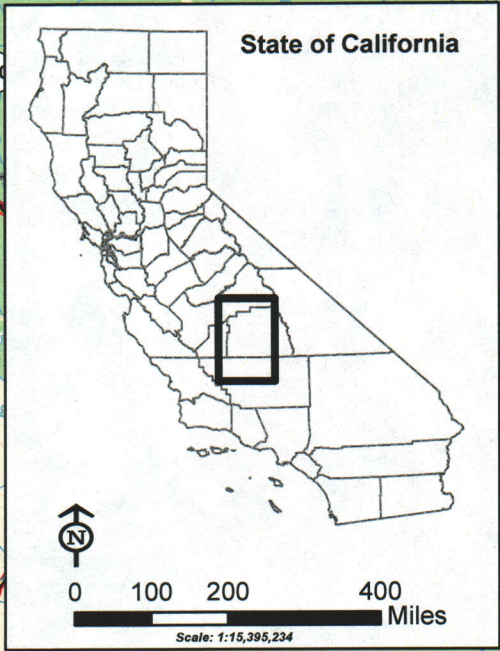
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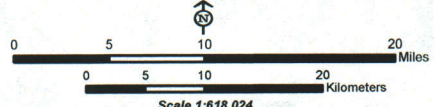
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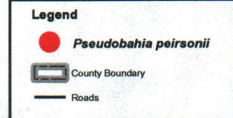
# CNDDDB Occurrences San Joaquin Adobe Sunburst *Pseudobahia peirsonii*



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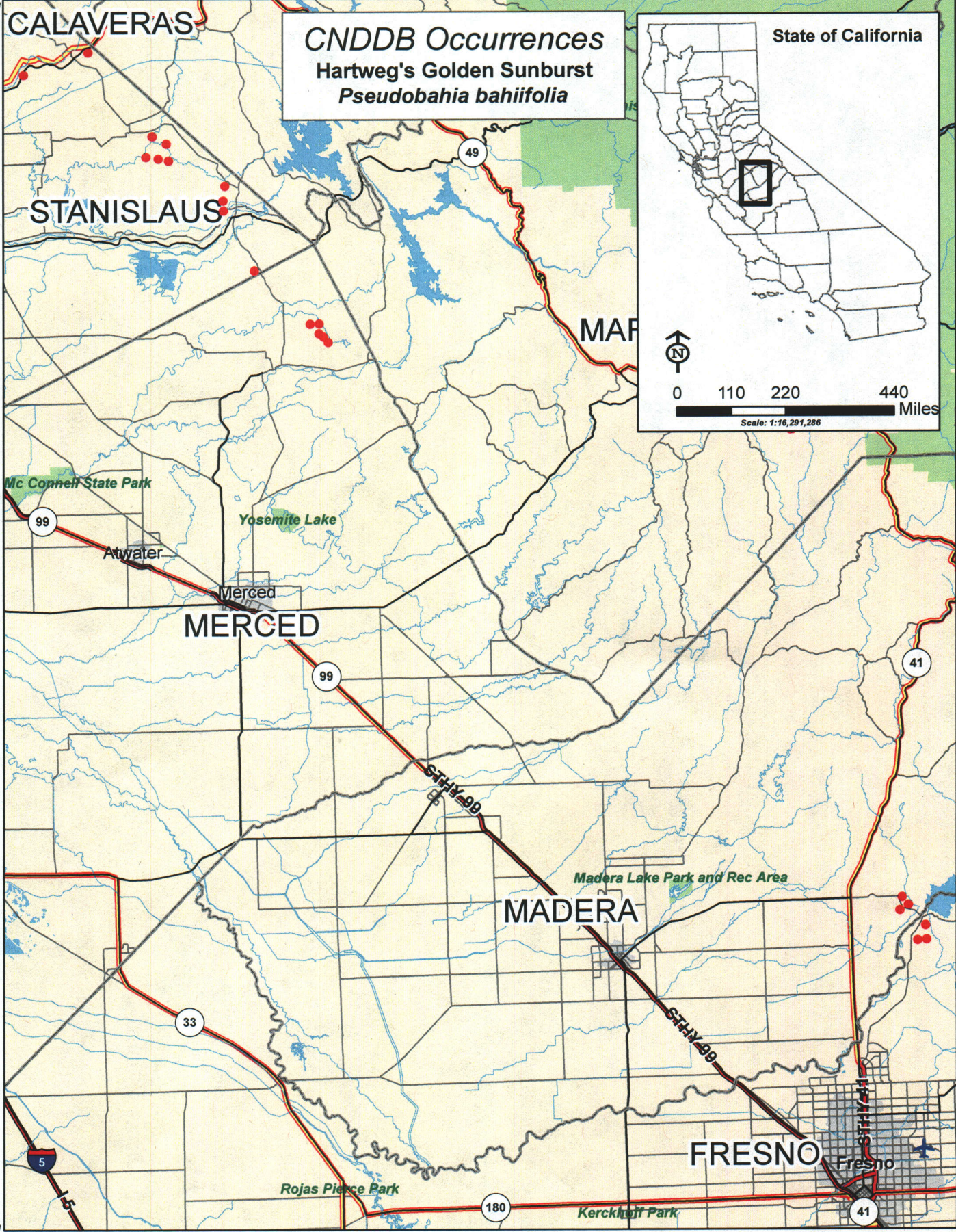
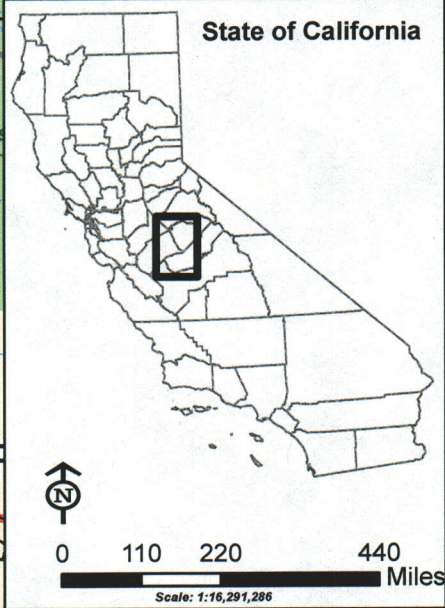


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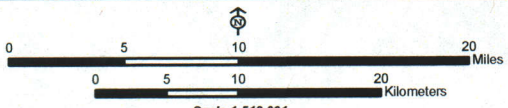




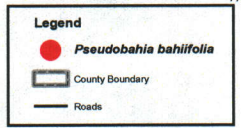
# CNDDDB Occurrences Hartweg's Golden Sunburst *Pseudobahia bahiifolia*



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Map Date: April 24, 2007  
Map Projection:  
UTM Zone 10N NAD 1983





**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW OF**  
***Pseudobahia bahiifolia* (Hartweg's golden sunburst)**

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

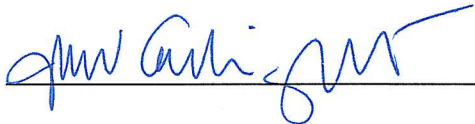
- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed

Appropriate Listing/Reclassification Priority Number, if applicable NA

Review Conducted By Sacramento Fish and Wildlife Office Staff

**FIELD OFFICE APPROVAL:**

Lead Field Supervisor, Fish and Wildlife Service

ACTING  
Approve  Date 1-8-08

**REGIONAL OFFICE APPROVAL:**

Regional Director, Fish and Wildlife Service

Approve  Date 1/10/08

**U.S. FISH AND WILDLIFE SERVICE**  
**5-YEAR REVIEW OF**  
***Pseudobahia peirsonii* (San Joaquin adobe sunburst)**

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

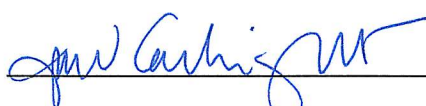
- Downlist to Threatened
- Uplist to Endangered
- Delist
- No change is needed

Appropriate Listing/Reclassification Priority Number, if applicable NA

Review Conducted By Sacramento Fish and Wildlife Office Staff

**FIELD OFFICE APPROVAL:**

Lead Field Supervisor, Fish and Wildlife Service

ACTING  
Approve  Date 1-8-08

**REGIONAL OFFICE APPROVAL:**

Regional Director, Fish and Wildlife Service

Approve  Date 1/10/08