

REVISED RECOVERY OUTLINE
for the
Kodachrome bladderpod
(Lesquerella tumulosa)



Utah Ecological Services Field Office
August 2009

I. INTRODUCTION

This document describes the known information on Kodachrome bladderpod (*Lesquerella tumulosa*) and provides a strategy for the species' conservation in the interim between listing and approval of a formal recovery plan. It serves to guide recovery efforts and inform consultation and permitting activities until a comprehensive recovery plan for the species has been finalized and approved. This document supersedes all prior recovery planning documents ¹.

- Listing and Contact Information:

Scientific Name:	<i>Lesquerella tumulosa</i>
Common Name:	Kodachrome bladderpod
Listing Classification:	Endangered rangewide
Effective Listing Date:	November 5, 1993 (58 FR 52027, October 6, 1993)
Lead Agency, Region:	U.S. Fish and Wildlife Service, Region 6
Lead Field Office:	Utah Field Office
Contact Biologist:	Daniela Roth, 801-975-3330, Daniela_Roth@fws.gov

II. RECOVERY STATUS ASSESSMENT

A. BIOLOGICAL ASSESSMENT

Taxonomy: Kodachrome bladderpod (*Lesquerella tumulosa*) is in the Mustard family (Cruciferae or Brassicaceae). Rupert Barneby discovered the Kodachrome bladderpod in 1966 from a site in the Kodachrome Basin of the Paria River drainage in northern Kane County, Utah. The type location, near Kodachrome Basin State Park, is approximately 8 kilometers (km) (5 miles (mi)) south-east of Cannonville, Utah. Barneby (1966) described the plant as *Lesquerella hitchcockii* ssp. *tumulosa*, comparing the taxon with *Lesquerella hitchcockii* ssp. *rubicundula* (now *Lesquerella rubicundula*) from the nearby Paunsaquint Plateau. James Reveal, in his taxonomic treatment of the *Lesquerella*

¹ A recovery outline was prepared at the time of listing. A draft recovery plan was under development between the years of 1995 and 1999, but never finalized. Neither are considered sufficient or up-to-date enough to direct the current and future recovery of Kodachrome bladderpod.

hitchcockii complex of species, elevated Barneby's *L. hitchcockii* spp. *tumulosa* to species rank as *L. tumulosa* (Reveal 1970). Rollins and Shaw (1973) submerged *L. tumulosa* in *L. rubicundula*.

Welsh and Reveal (1977) re-established *Lesquerella tumulosa* based on: (1) its distinctive gross vegetative morphology (leaves and branching pattern); (2) its ecological setting (restricted to very xeric shale outcrops); and (3) its spatial separation from *L. rubicundula*. The Missouri Botanical Garden is preparing the 7th Volume of the Flora of North America. This latest volume will provide taxonomic treatment of *Lesquerella*.

Description, Habitat, and Life History: Kodachrome bladderpod is a perennial herbaceous plant. The branched caudex (root crown) produces a dense mound of cushion-like growth. The caudex branches are clothed with numerous marcescent (withering but not falling off) leaves and leaf bases. The stems are 1 to 4 centimeters (cm) (0.4 to 1.6 inches (in.)) tall with mainly basal leaves. The leaves are narrowly linear 2 to 10 millimeters (mm) (0.1 to 0.4 in.) long and about 1 mm (0.05 in.) wide, with pubescent (fine soft short hairs) stellate (arranged in star pattern) hairs. The leaves are not differentiated into a blade and petiole (leaf stalk). The flowers of Kodachrome bladderpod have spatulate, yellow petals 5 to 7 mm (0.2 to 0.3 in.) long. The fruit is an ovoid (resembles an egg) silicle (a fused 2-chambered seed capsule that separates when ripe leaving a persistent center). The length of the fruit is about 3 mm (0.1 in.) long containing 2 to 4 seeds (Barneby 1966; Reveal 1970; Welsh and Reveal 1977; Welsh et al. 2003).

Kodachrome bladderpod grows on white, bare shale knolls derived from the Winsor member of the Carmel geologic formation (Welsh and Reveal 1977; Welsh et al. 2003). Kodachrome bladderpod is restricted to very xeric shale outcrops at about 1,740 meters (5,700 feet). Visually, occupied habitats contain harder, rockier soils than unoccupied habitats (A. Hughes, pers. comm., 2009).

Kodachrome bladderpod occupies sites with very little vegetative cover. Two commonly associated plants with Kodachrome bladderpod are bitterbrush (*Purshia tridentate*) and yellow cryptantha (*Cryptantha flava*) (Van Buren and Harper 2001). Other species in the community include: pinyon pine (*Pinus edulis*), Utah juniper (*Juniperus osteosperma*), Indian ricegrass (*Stipa hymenoides*), wild buckwheat (*Eriogonum fasciculatum*) and hyaline herb (*Hymenopappus filifolius*) (58 FR 52027, October 6, 1993; Van Buren and Harper 2002).

Little is known regarding the specific biology of the Kodachrome bladderpod. The species' reproduction is sexual. Asexual reproduction is unknown. The species' pollinators are unknown. In most years, the plants begin flowering in late April and continue through May with seed dispersal occurring in June (Franklin 1990). Field observations in 2009 documented good flowering, presence of potential pollinators, and seed set (A. Hughes, pers. comm., 2009).

Distribution, Abundance, and Trends: Kodachrome bladderpod is an endemic found only in Kane County, Utah. The species is restricted to one population of scattered occurrences in the Kodachrome Flats area of the Paria River Drainage. The species is found in an area about 4 km (2.5 mi) long and 1.2 km (0.75 mi) wide. The Utah Natural Heritage Program (Heritage Program) conducted the only large scale survey effort for *Lesquerella tumulosa* in 1989 in the Kodachrome Basin, Little Dry Valley, and Rock Springs Creek areas. The survey documented 20,000 individuals covering approximately 300 hectares (ha) (700 acres (ac)) (Franklin 1990).

At the time of listing, approximately 90 percent of the plants were located on State land (58 FR 52027, October 6, 1993). In 1996, the Grand Staircase-Escalante National Monument (GSENM) was designated. Subsequently, State owned in-holdings were transferred to the Bureau of Land Management (BLM) and incorporated into the National Monument. Thus, more than 90 percent of the species' known range now occurs on the GSENM, which is managed by the BLM (A. Hughes, pers. comm., 2009). Private landowners and the Kodachrome Basin State park comprise the rest of the range.

Trend information for this species is limited. From 1997 to 2001, mortality at two study sites was 75.6 percent and survivorship was 17.6 percent (the remainder of individuals lost tags and were not included in final numbers). The population structure of these two study sites declined during this 4-year period as mortality exceeded recruitment. Mortalities were primarily associated with drought and off-highway vehicle (OHV) use (Van Buren and Harper 2002).

In 2007, 24 new plots were established for *Lesquerella tumulosa* on GSENM. Ten of these plots were monitored in 2008 and 2009 (the other plots were lost, vandalized, or time did not permit relocating). To date, observations have identified the numbers of adult, juvenile, and dead plants. Trend information is not available due to the short length of monitoring period to date (A. Hughes, pers. comm., 2009).

B. THREATS ASSESSMENT

At the time of listing, ongoing and foreseeable threats included: an active gravel quarry; leasing for oil and gas development; new road construction; OHV use; lack of adequate regulatory protection; cattle grazing; and its occurrence as a single population (58 FR 52027, October 6, 1993).

In 1972, the type location for Kodachrome bladderpod was largely destroyed by clay and gravel mining (Reveal 1972 in Meiji Resource Consultants 1982). However, mineral development activities ceased in known habitat due to the 1996 creation of the GSENM (A. Hughes, pers. comm., 2008). Specifically, the proclamation establishing the monument withdrew all Federal and interest in lands within the monument from mineral leasing and mining laws. Thus, no new Federal leases or prospecting permits may be issued and no new mining claims can be located within the monument. The Utah Schools and Lands Exchange Act of 1998 (Public law 105-335) transferred all in-holdings within the GSENM to BLM, along with the mineral interest on an additional 9,700 ha

(24,000 ac) (BLM 1999). Although valid existing rights for energy and mineral activities are recognized with the creation of GSENM, holding a lease or permit does not guarantee that a renewal will occur (BLM 1999). Thus, mineral development activities, such as gravel quarry and leasing for oil and gas, are not occurring and are not expected to occur within the range of the species. Such extraction activities are no longer considered a threat.

The largest threat to the Kodachrome bladderpod is illegal OHV use. The habitat of the species is characterized by low rolling hills with little native vegetation, providing easy access and preferred terrain for OHV users. Impacts from OHV users likely increased mortality rates at established monitoring sites (Van Buren 1999, 1999; Van Buren and Harper 2001, 2002).

For areas of known habitat or locations of sensitive plant species, the GSENM Resource Management Plan closed cross-country travel; committed to continued monitoring and potential restoration; disallowed trails, parking areas, or other recreational facilities; and banned camping, overnight stays, and campfires (BLM 1999). No new roads are expected to be developed in Kodachrome bladderpod habitat (A. Hughes, pers. comm., 2008). However, many official dirt county roads exist within the species' habitat and it is unknown if these roads will be upgraded (A. Hughes, pers. comm., 2008).

In 1999, GSENM issued a 1,270 ha (3,140 ac) emergency OHV closure to protect a portion of sites for the Kodachrome bladderpod. In 2000, a 1.2-km (0.75-mi) straight fence was erected around a ridgeline on the west side of Rock Springs Bench Road. This deterred OHV use along the ridgeline in occupied Kodachrome habitat previously damaged by OHVs. The results of the fencing were positive (Van Buren and Harper 2001). However, most occupied sites are unfenced and can be accessed by OHV users.

The adjacent Kodachrome State Park does not allow OHV use within its park boundaries, but will direct the public to county roads within the GSENM's Kodachrome Basin where OHV is legal. The degree to which individuals stay on designated roads is unknown. Observational reports have documented off-road use and corresponding soil degradation and erosion impacts at known bladderpod sites on Federal and private lands (Van Buren 1998, 1999; Van Buren and Harper 2001, 2002; M. Ulloa, pers.comm., 2007, A. Hughes, pers. comm., 2007, 2008, 2009).

The BLM Dry Valley grazing allotment completely overlaps the range of the Kodachrome bladderpod. Grazing leases or permits existing at the creation of GSENM continue today and are subject to BLM's grazing regulations and other laws and regulations governing grazing on public lands (BLM 1999). While this allotment permits 699 Animal Unit Months or 166 cows, since 1999 it has run at about 75 percent of permitted levels. However, cattle grazing occurs outside of the flowering and seed setting period for Kodachrome bladderpod. Thus, we believe impacts to reproduction are likely minimal. Cattle are not known to feed on Kodachrome bladderpod; however, cattle may be a low threat to the species with occasional trampling, soil compaction, and erosion (Meiji 1982, A. Hughes, M. Ulloa, pers. comm., 2007).

The original listing (58 FR 52027, October 6, 1993) concluded that the species' existence in a single known population makes the species vulnerable to extinction due to a catastrophic event. Drought conditions likely resulted in high mortality (76 percent) and lower flower and fruit production at two Kodachrome bladderpod monitoring sites (Van Buren and Harper 2001, 2002). Although plants still occur at these monitoring sites, it is possible that extended and severe drought could cause the species to be lost in some areas.

Climate change was not discussed in the original rule to list the species. Over the past 50 years, the frequency of cold days, cold nights, and frosts have decreased over most land areas, and hot days and hot nights have become more frequent (Intergovernmental Panel on Climate Change (IPCC) 2007). Changes in the global climate system during the 21st century are hypothesized to be larger than those observed during the 20th century (IPCC 2007). The average temperature in the Southwest has already increased roughly 0.8°C (1.5°F) compared to a 1960-1979 baseline period (Karl et al. 2009). By the end of the century, average annual temperature is projected to rise approximately 2.2 to 5.6°C (4 to 10°F) above the historical baseline, averaged over the Southwest region (Karl et al. 2009). Hot extremes, heat waves, and heavy precipitation are expected to increase in frequency (IPCC 2007). According to 18 of 19 regional climate models, the levels of aridity of recent drought conditions and perhaps those of the 1950s drought years will become the new climatology for the southwestern United States and annual mean precipitation levels will continue to decrease over the next century (Seager et al. 2007). However, model projections for precipitation are less reliable than model projections for temperature.

Drought conditions led to a noticeable decline in survival, vigor and reproductive output of rare plants in the Southwest during the drought years of 2001 through 2004 (Clark and Clark 2007; Hughes 2005; Roth 2008 a, 2008 b; Van Buren and Harper 2002 and 2003). Effects related to climate change, such as persistent or prolonged drought conditions, are likely to reduce the frequency and duration of flowering and/or germination events, lower the recruitment of individuals, compromise the viability of the population, impact pollinator availability and, therefore, adversely affect the long-term persistence of Kodachrome bladderpod and lessen its recovery potential. Prolonged droughts combined with increases in the frequency of heavy rainfall events may increase erosion in Kodachrome bladderpod habitat.

While the potential impacts of climate change could be serious, improved projections are needed to better understand this potential threat.

III. PRELIMINARY RECOVERY STRATEGY

A. RECOVERY PRIORITY NUMBER WITH RATIONALE

Kodachrome bladderpod is currently assigned a recovery priority of 11. We recommend changing this ranking to an 8. This new ranking recognizes that: (1) Kodachrome bladderpod is a full species (*Lesquerella tumulosa*); (2) it faces a moderate degree of threat; and (3) it has a high potential for recovery. The change from an 11 to 8 reflects our belief that this species has a high recovery potential. Recovery potential is informed: by our understanding of biological and ecological limiting factors; our understanding and perceived ability to alleviate threats; and our belief that long-term management needs can be provided. Much of the improvement in recovery potential is

Degree of Threat	Recovery Potential	Taxonomy	Priority	Conflict
High	High	Monotypic Genus	1	1C
		Species	2	2C
		Subspecies/DPS	3	3C
	Low	Monotypic Genus	4	4C
		Species	5	5C
		Subspecies/DPS	6	6C
Moderate	High	Monotypic Genus	7	7C
		Species	8*	8C
		Subspecies/DPS	9	9C
	Low	Monotypic Genus	10	10C
		Species	11	11C
		Subspecies/DPS	12	12C
Low	High	Monotypic Genus	13	13C
		Species	14	14C
		Subspecies/DPS	15	15C
	Low	Monotypic Genus	16	16C
		Species	17	17C
		Subspecies/DPS	18	18C

related to the designation of the GSENM and recent management to respond to threats. The moderate degree of threat is linked to biological constraints, including its occurrence in only a single population, and human-influenced threats, including recreational vehicles and cattle-grazing. Climate change also may be an issue in species' recovery, but improved projections are needed to better understand this potential threat. Direct monitoring of Kodachrome bladderpod sites for threats and population information, such as longevity, fecundity, and annual numbers, is most likely to improve our ability to recover Kodachrome. Advancement in research and/or an increase in known occupied sites could favorably influence the recovery priority number. Therefore, this recovery priority number will be reviewed during the recovery planning process and annually by the Service as new data are made available.

B. RECOVERY VISION

Our vision of recovery for the Kodachrome bladderpod is that the population will remain stable and of a size to reduce the likelihood that catastrophic events will lead to extinction. Threats to the species will be sufficiently understood and if needed, sufficiently abated to ensure a high probability of survival for the foreseeable future.

C. INITIAL ACTION PLAN

Recovery needs for the Kodachrome bladderpod are: (1) completion of a full habitat survey to ensure habitats can be managed for protection and threat reduction; (2) protection of sites from illegal OHV use through signage, fencing, and public education; and (3) an evaluation of cattle use within Kodachrome bladderpod habitat.

Recovery efforts should build on ongoing conservation efforts. Specific actions that will be undertaken early in the process include the following:

- Evaluate all known habitat components analyzing geospatial data and conduct range surveys including searches for additional occurrences in areas containing characteristics highly related to occupancy.
- Identify sites in urgent need of habitat conservation, such as fencing, and increased protective actions. Areas particularly impacted by OHV use will be targeted.
- Support research on Kodachrome bladderpod's life history and ecology, including soil needs and pollinators.
- Encourage investigations that project Kodachrome bladderpod's response to climate changes in its habitat.

IV. PREPLANNING DECISIONS

A. PLANNING APPROACH

A recovery plan will be prepared for Kodachrome bladderpod (*Lesquerella tumulosa*) pursuant to section 4(f) of the ESA. The recovery plan will include objective, measurable criteria which, when met, will result in a determination that the species be removed from the Federal List of Endangered and Threatened Plants. Recovery criteria will address all threats impacting the species. The recovery plan will estimate the time and costs required to complete actions necessary to achieve the goal of recovery and delisting. The scope of the plan will be a single species.

Plan preparation will occur under the stewardship of Utah Ecological Services Field Office. Daniela Roth, Region 6, is lead botanist for the Kodachrome bladderpod. Other Federal agency personnel involved with the species will be integrally involved in the planning effort. Utah field office biologists will coordinate with the Regional endangered species offices as planning proceeds. This species does not, at the present time, warrant the appointment of a recovery team. The Service will coordinate recovery efforts with an informal network of experts and involved parties; a recovery team may be formally appointed at a later date, if deemed necessary. Periodically, meetings among these parties may be convened for the species with the purpose of sharing information and ideas about advancing Kodachrome bladderpod recovery.

B. INFORMATION MANAGEMENT

- General:

All information relevant to recovery of the Kodachrome bladderpod will be housed in administrative files found at our Utah Ecological Services field office in West Valley City, Utah. The lead botanist will be responsible for maintaining the official record for the recovery planning and implementation process for the species, and copies of new study findings, survey results, records of meetings, comments received, and other relevant materials should be forwarded to her.

- Reporting Requirements:

Information needed for annual accomplishment reports, the Recovery Report to Congress, expenditures reports, and implementation tracking should be forwarded by all individuals and offices involved in the Kodachrome bladderpod recovery effort to Daniela Roth. Copies of the completed reports can then be disseminated to all contributors upon request.

C. RECOVERY PLAN PRODUCTION SCHEDULE

Internal review draft:	October 2010
Public review draft:	February 2011
Public comment period:	May 2011
Final plan:	October 2011

D. STAKEHOLDER INVOLVEMENT IN THE RECOVERY PROCESS

Possible Stakeholders:

- Public land managers with Kodachrome bladderpod on or adjacent to their lands including representatives from Grand Staircase-Escalante National Monument, and Kodachrome Basin State Park;
- Representatives of Utah State conservation programs;
- Private landowners, which may have or have potential for Kodachrome bladderpod on their lands;
- Town/county officials in Kane County, Utah;
- Federal researchers, such as, but not limited to U.S. Geological Survey, and the U.S. Department of Agriculture (Agriculture Research Station; Rocky Mountain Research Station);
- Plant conservation organizations and societies;
- Academic researchers;
- OHV groups and users; and
- Individuals with cattle grazing leases and/or affiliated cattle industry organizations.

Stakeholder Involvement Strategy:

Early in the recovery planning process, we will hold a meeting of individuals working with the Kodachrome bladderpod to exchange status information and identify recovery issues. The information emanating from this discussion will help shape the initial draft for the recovery plan. We will reach out to the above potential stakeholder groups to facilitate involvement of all interested parties. When needed, additional meetings and/or conference calls will be held to discuss particular issues. Targeted stakeholders will be invited to participate in these calls when relevant for the purposes of recovery planning. Advantage will be taken of all opportunities to interact with stakeholders in a productive and meaningful way. Stakeholders also may be asked to contribute directly in developing implementation strategies for planned actions.

Approved:

A handwritten signature in cursive script, reading "Steven E. Walsh". The signature is written in black ink and is positioned above a horizontal line.

USFWS Regional Director

Date: 10/27/09

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