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## **RECOVERY OUTLINE**

**for**

### ***Yermo xanthocephalus***

**(desert yellowhead)**

February 2010

#### **I. INTRODUCTION**

This document lays out a preliminary course of action for the recovery of *Yermo xanthocephalus* (desert yellowhead). It serves to guide recovery efforts and inform consultation and permitting activities until a comprehensive recovery plan for this species is developed and approved. This species is currently known from a single population of plants widely scattered over an area of 20 hectares (ha) (50 acres (ac)). The population is located entirely on Bureau of Land Management (Bureau) lands. The species is vulnerable to extinction from even small-scale habitat degradation due to its small population size and limited geographic range. At the time of listing, *Yermo xanthocephalus* was threatened by surface disturbances associated with recreation, oil and gas development, mineral extraction, trampling by livestock, soil compaction by vehicles, and invasive plant species (Fertig 1995; Heidel 2002; Heidel et al. 2008). Since that time, the Bureau has initiated a number of protective measures for *Yermo xanthocephalus*. In addition, we are working with the Bureau's Wyoming State Office to develop measures to further ensure the conservation of *Yermo xanthocephalus* on Bureau lands.

#### Listing and Contact Information:

Scientific Name:	<i>Yermo xanthocephalus</i>
Common Name:	Desert Yellowhead
Listing Classification:	Threatened
Listing:	67 FR 11442, March 14, 2002 (effective April 15, 2002)
Lead Agency, Region:	U.S. Fish and Wildlife Service, Region 6
Lead Field Office:	Wyoming Field Office
Contact Biologist:	Jan McKee, (307) 772-2374, ext 242, <a href="mailto:jan_mckee@fws.gov">jan_mckee@fws.gov</a>

## II. RECOVERY STATUS ASSESSMENT

### A. BIOLOGICAL ASSESSMENT

**Taxonomy:** *Yermo xanthocephalus* was discovered by Wyoming botanist Robert Dorn while conducting field work in the Beaver Rim area of central Wyoming in 1990. Dorn observed approximately 500 plants in sparsely vegetated, sandy hollows among sandstone outcrops. He revisited the area during the summer to find a striking plant with all the characteristics of the Aster family (*Asteraceae*). Upon closer examination and research, Dorn realized that the species had not been previously described and represented a new genus. Dorn (1991) described and named his discovery *Yermo xanthocephalus*, or literally “desert yellowhead.”

Since the original species description, more recent taxonomic work has indicated that not only is *Yermo xanthocephalus* a monotypic genus, but it is the only Wyoming species in a new subtribe Tussilaginatae (Cass.) (Dumort) (Dorn 2006). An ancient evolutionary origin of the species is suggested since it is a monotypic genus and also a highly isolated western member of the Tussilaginatae subtribe, as opposed to the more recent patterns of endemism characterized in Stebbins and Major (1965). This apparent ancient origin suggests an even greater phylogenetic distance between the genus *Yermo xanthocephalus* and all other Wyoming species in the Senecioneae Tribe than was identified in the original monograph (Dorn 1991; further discussed in Heidel 2002).

**Description, Habitat, & Life History:** *Yermo xanthocephalus* is a tap-rooted, glabrous (hairless) perennial herb with leafy stems to 30 centimeters (cm) (12 inches (in.) high. The leathery leaves are alternate, lance-shaped to oval, 4 to 25 cm (1.5 to 10 in.) long and often folded along the midvein. Leaf edges are smooth or toothed. Flower heads are many (25 to 180) and crowded at the top of the stem. Each head contains four to six perfect yellow disk flowers (ray flowers are absent) surrounded by four to six yellow, keeled involucre bracts (modified leaves below flower head). The pappus (ring of hairs) on the achenes (seeds) consists of many white capillary bristles (Dorn 1991; Dorn 2001; Dorn 2006).

The species is restricted to shallow deflation hollows in outcrops of Miocene sandstones and limestones of the Split Rock Formation at its junction with the White River Formation (Van Houten 1964; Love 1961). These wind-excavated hollows accumulate drifting snow and may be more mesic (moist) than surrounding areas. The vegetation of these sites is typically sparse, consisting primarily of low cushion plants and scattered clumps of *Oryzopsis hymenoides* (Indian ricegrass) (Fertig 1995).

It has been inferred that *Yermo xanthocephalus* is a long-lived perennial that produces sexually by seed and possibly asexually by vegetative buds. The species is likely pollinated by visually-oriented insects attracted to its bright disk flowers and bracts (Dorn 1991). The life history of *Yermo xanthocephalus* was initially characterized from qualitative field observations and later refined by germination studies that report three stages of seedling development (Scott and Hoster 2000; Scott, pers.comm. 2008a). There were preliminary inferences that flowering levels decline in drought years, and that its seeds have capacity for wind dispersal, while water

erosion also appears to influence distribution patterns (Heidel 2002). Fertig (1995) described the species as a “classic ‘K’ selected species characterized by a long-lived perennial growth form, adaptation to severe habitats, and low annual reproductive output.”

**Distribution, Abundance, Trends:** *Yermo xanthocephalus* is currently known from a single population of plants widely scattered over an area of 20 ha (50 ac). This population consists of one large subpopulation at the base of Cedar Rim and two smaller subpopulations about 0.4 kilometer (0.25 mile) away. Originally, Dorn (1991) estimated that there were approximately 500 plants within 1 ha (2.5 ac). However, this was a visual estimate (likely weighted toward flowering plants) and is not considered a rigorous estimate of the population size at the time. Therefore, this estimate should not be considered a reliable data point when assessing population trends over time.

Complete population censuses were initiated and conducted from 1995 to present. A permanent, survey grid is now in place and has facilitated an annual census of all known individuals. The total population size has varied from 9,293 to 13,244 individuals during the period 1995-2003. The results for more recent years are being compiled and will provide a basis for characterizing minimum-maximum population numbers and trends (Scott 2000). Despite extensive searches, no additional *Yermo xanthocephalus* populations have been located (Fertig 1995; Heidel 2002; Fertig and Thurston 2003).

**Critical Habitat:** On March 16, 2004 (69 FR 12278-12290), critical habitat was designated for *Yermo xanthocephalus* in Fremont County, Wyoming. Within critical habitat, three primary constituent elements necessary for the conservation of *Yermo xanthocephalus* have been identified including:

“(1) Recent soils derived from sandstones and limestones of the Split Rock Formation at its junction with the White River Formation. These are shallow, loamy soils of the Entisol order that can be classified as course-loamy over sandy-skeletal, mixed, Lithic Torriorthent. The surface stratum has little organic matter and subsurface layers show no accumulation of huymus, clay, gypsum, salts, or carbonates.

(2) Plant communities associated with *Yermo xanthocephalus* that include, but may not be limited to, sparsely-vegetated cushion plant communities with scattered clumps of *Oryzopsis hymenoides* (Indian rice grass) between 2043 and 2073 m (6,700 and 6,800 ft) in Fremont County Wyoming. Species common to these communities include *Arenaria hookeri* (Hooker’s sandwort), *Astragalus kentrophyta* (thistle milkvetch), *Hymenoxys acaulis* (stemless hymenoxys) and *Phlox muscooides* (squarestem phlox). These cushion-plant communities also contain natural openings.

(3) Topographic features/relief (outcroppings, cliffs, and hills) and physical processes, particularly hydrologic processes, that maintain the shape and orientation of the hollows characteristic of *Yermo xanthocephalus* habitat (through microscale dynamics of local winds and erosion) and maintain moisture below the surface of the ground (through sheet wash from the adjacent outcroppings, cliffs, and hills).”

The designated critical habitat is approximately 146 ha (360 ac) of Federal lands managed by BLM in the Beaver Rim area. Within the single critical habitat unit, *Yermo xanthocephalus* occurs in three subpopulations. Unoccupied habitat was not designated. In regard to this issue, the final critical habitat rule concluded “There is no evidence that the plant has ever occurred outside of the area currently occupied. While we agree that there could be additional security against extinction for the species if there were multiple populations, there appears to be no foundation upon which to make a determination that the conservation needs of *Y. xanthocephalus* require designation of critical habitat outside of the geographic area occupied by the species.”

Ground disturbing activities such as access roads, pipelines and seismic exploration, which have the potential to change the constituent elements, may have an adverse affect to designated critical habitat and may require section 7 consultation.

## **B. ASSESSMENT OF VULNERABILITIES, THREATS, AND CONSERVATION ACTIONS**

A detailed evaluation of vulnerabilities and threats to *Yermo xanthocephalus* can be found in the original listing determination (67 FR 11442, March 14, 2002). As noted previously since listing, the Bureau has initiated a number of protective measures for *Yermo xanthocephalus*. In this outline, we provide an update concerning the vulnerabilities and threats as well as conservation actions to date. When we are able to do so, we also characterize the magnitude and immediacy of the threat. Our summary is ordered by our qualitative assessment of the severity of the issue.

**Small Population Size:** An inherent vulnerability for *Yermo xanthocephalus* is its small population size and restricted distribution. The entire known range of *Yermo xanthocephalus* occurs on 20 ha (50 ac) in southern Fremont County, Wyoming. This species physically occupies an area of 3.37 ha (8.33 ac). Population numbers have ranged from 9,293 to 13,244 individuals in recent years (Scott, pers. comm. 2008b).

Since *Yermo xanthocephalus* was discovered in 1990, numerous surveys of potential habitat in the area have not located new populations. There is no evidence of population expansion outside of the critical habitat area (Scott, pers. comm., 2008b). The establishment of this species is probably episodic and dependent on suitable spring and summer moisture conditions (Fertig 1995).

Species with small population size and restricted distribution are vulnerable to extinction by natural processes and human disturbance (Levin et al. 1996). For example, random events causing population fluctuations or population extirpations become a serious concern when the number of individuals or the geographic distribution of the species is very limited. Similarly, a single human-caused or natural environmental disturbance (fire, extreme weather event) could destroy the entire population of *Yermo xanthocephalus*. The species’ low reproductive output also increases the risk of effects of stochastic events as it is unlikely that the species will be able to rebound quickly (e.g., exhibit a high rate of population growth), even if environmental conditions improved after such an event. Other issues related to this factor include loss of genetic variability which may reduce a species ability to respond to changing environmental conditions (Godt et al. 1996) and inbreeding depression which can decrease fertility and survival rates (Levin et al. 1996).

While small population size remains a substantial issue of concern, there is no evidence that the plant has occurred outside of the area currently occupied or in substantially larger numbers any time in the recent past. More information on this issue is required. Specifically, we need to improve our understanding of the species demographics and genetics to assess the risk associated with the species' limited distribution and small population size.

### **Destruction or Modification of Habitat:**

Oil and Gas Development: At the time of listing, oil and gas development was the most severe and immediate threat to *Yermo xanthocephalus* populations through habitat destruction. In 1997, the Bureau granted a lease for oil and gas development on a 470 ha (1,160 ac) tract (designated WYW140702) that encompasses the *Yermo xanthocephalus* population. In May 1996, the same operator purchased a lease on an adjacent tract of 840 ha (2,080 ac) (WYW138846). Applications for four permits to drill also were filed, and two were permitted in 1998 on pre-existing wellpads. These leases were for a 10-year period and were allowed to expire in 2006 and 2007 without being developed or disturbed.

Since listing, the Service and the Bureau have worked to address this issue. Based on conservation actions by the Bureau, oil and gas development and surface mining are now considered to be moderate in severity and magnitude and not an immediate threat to *Yermo xanthocephalus*. Specific threats related to this issue include surface disturbances, soil compaction by vehicles, and the potential for introduction of invasive species (Fertig 1995, Bureau 2005a, Bureau 2005b).

The Bureau has committed to implement several conservation measures for the protection of *Yermo xanthocephalus*, and these measures are committed to in the U.S. Fish and Wildlife Service's (Service) Biological Opinion on the Bureau's Lander Resource Management Plan (Service 2005). In terms of oil and gas development, the Bureau committed to apply Conditions of Approval on all Applications for Permit to Drill within the desert yellowhead site and designated critical habitat, prohibiting all surface-disturbing activities (Service 2005).

The Bureau is in the process of updating the Land Use Plan for the Lander Resource Management Plan, and a decision of "No Leasing" for the 146 ha (360 ac) critical habitat unit is likely to be considered in the proposed alternatives (Keefe, pers. comm., 2008a). This designation would prohibit all surface disturbance activities (Keefe, pers. comm., 2008b) and would substantially minimize this threat.

In-field development in surrounding areas is also a concern. Such development could involve up to eight wells per section, depending on the characteristics of the producing formations. This intensified drilling activity would result in a new network of additional roads and well pads, and more human intrusion into what is now a remote area. In addition to ground disturbance, these activities also have the potential to introduce invasive plant species to an area that presently has no invasive plants. The Bureau maintains the authority and discretion to offer or defer leasing depending on an appropriate National Environmental Policy Act analysis of the potential affects to the species and its designated critical habitat.

Mineral Extraction: The area also has locatable mineral resources such as gold and uranium. Private parties can stake a mining claim, explore for, and extract locatable minerals in accordance with the 1872 General Mining Law. Such activity could jeopardize the known population of *Yermo xanthocephalus*. Uranium and zeolites (a locatable mineral with properties useful in water softening, manufacturing of catalysts, and pollution control including the removal of radioactive products from wastes (Bureau 1986)) are found in the Beaver Rim area.

Activities associated with mining in the area could include surface disturbance (excavation and soil removal), as well as road construction and maintenance. The Bureau's authority to regulate mineral claims under the 1872 General Mining Law is limited. However, mining activities in areas with five or more acres of surface disturbance of unpatented Bureau land are required to have an approved operating plan under 43 CFR 3809.

In terms of mineral extraction, in the 2005 Biological Opinion, the Bureau agreed to withdraw the designated 146 ha (360 ac) critical habitat area from mineral location and entry under the General Mining Law of 1972 and to prohibit the disposal of salable minerals in designated desert yellowhead habitat (Service 2005).

In January 30, 2008, the Bureau provided a 20-year protective withdrawal of the 146 ha (360 ac) *Yermo xanthocephalus* critical habitat area from settlement, sale, location, or entry under the general land laws, including mining laws, subject to valid existing rights (73 FR 5586). The withdrawal does not include leasing under the mineral leasing laws. At present, there are no existing mining claims in the area. The withdrawal was necessary to provide protection for *Yermo xanthocephalus*. This action is the most appropriate and effective conservation measure to reduce the threat of impacts related to exploration and development of the locatable minerals or land disposals (73 FR 5586, January 30, 2008).

Invasive Species: *Yermo xanthocephalus* occurs on relatively barren sites with less than 25 percent total vegetative cover and may be intolerant of competition (Fertig 1995). Competition from plants not native to the area would pose a greater threat than competition from species with which *Yermo xanthocephalus* has evolved. To date, no nonnative plants have been identified in the area where *Yermo xanthocephalus* occurs.

Invasive species could be introduced to *Yermo xanthocephalus* habitat by domestic livestock, native ungulates, on the tires of vehicles during illegal use of the area, or on footwear or clothing of humans visiting the area. This threat will likely be ongoing. However, the Bureau's conservation actions involving closure of the area to foot and off-road vehicle traffic have reduced the level of this threat to moderate to low levels.

Many of the conservation efforts undertaken to date to address other threats serve to minimize this potential issue. However, the 2005 Biological Opinion (Service 2005) also addressed this issue. Specifically, the Bureau agreed to work with all of the interested parties in the development and implementation of a monitoring plan for the desert yellowhead and its designated critical habitat. The plan will include regular patrol of the site for unlawful uses of

the land, and the monitoring of invasive weed populations. This plan also would include, but is not limited to, the inventory and monitoring of all vehicle access to the area for the purpose of restricting access of vehicles that pose a threat to the desert yellowhead population.

Additionally, the Bureau agreed to prohibit biological control of weeds in desert yellowhead habitat until the impacts of the control agent has been fully evaluated and determined not to adversely affect the plant population. If ever allowed, the Bureau also committed to monitoring such biological control vectors.

Livestock and Wild Ungulate Grazing: Livestock and wild ungulate grazing may present a threat to *Yermo xanthocephalus* individuals and habitat quality. The critical habitat area is within an existing grazing allotment. Domestic and wild ungulate herbivory exerts considerable impact on structure and composition of native plant communities. Livestock, in particular, have been recognized as agents of detrimental change in the composition, structure, and development of plant communities. In the past, herbivory by wild ungulates was considered to have little or no impact to plant community composition and structure, but now is recognized as an ecological force in ecosystems. As noted by Vavra (2007) “intensive herbivory by ungulates can enhance exotic plant invasion, establishment, and spread for three reasons: (1) many exotic plants are adapted to ground disturbances such as those caused by ungulate feeding, trampling, and movements; (2) many exotic plants are adapted for easy transport from one area to another by ungulates via endozoochory and epizoochory; and (3) many exotic plants are not palatable or are of low palatability to ungulates, and consequently, their survival is favored as ungulates reduce or eliminate palatable, native plants.”

Fertig (1995) indicated livestock appear to use *Yermo xanthocephalus* habitat as a travel corridor between adjacent sagebrush-grassland pastures to some extent. This use can result in trampling. Scott (2000) noted signs of moderate horse traffic adjacent to the site. Cattle graze in the immediate vicinity, but observations at the site indicate that the plant is not palatable to grazers. The primary threat of grazing in the area appears to be trampling. Because *Yermo xanthocephalus* is unpalatable, the plant may benefit from some level of grazing through reduced competition with other more palatable species.

There are no existing barriers to prevent livestock access to the habitat. Fencing of the area would protect the plants from trampling threats, but also would likely result in a change in the associated plant community in the habitat. This change could result in unanticipated adverse impacts to the survival of *Yermo xanthocephalus*. We do not anticipate a need to modify current grazing practices given our current understanding of this activity’s impacts and benefits. At this point, the threat of grazing by wild ungulates or cattle appears to be low in severity and magnitude and not immediate.

The 2005 Biological Opinion (Service 2005) addressed this issue by committing the Bureau to: (1) not increase current permitted livestock levels; (2) not approve location of mineral supplements or additional water sources for livestock, wild horses, or wildlife on public lands within 2 miles of the site; preventing the intentionally herding of livestock within 0.8 kilometer (0.5 mile) of the desert yellowhead site, or in designated critical habitat, by prohibiting

supplemental feeding or straw placement without proper authorization (43 CFR 4140 (a)(3)); and, (3) not conducting wild horse management actions (e.g., temporary gathering/holding facilities) within designated critical habitat.

Off-road Vehicle Use: Recreational off-road vehicle use presents a threat to *Yermo xanthocephalus* through the crushing of plants, destruction of seeds, and compaction or erosion of soil. This threat is greatest in the spring and summer when plants are in flower or heavy with fruit. The known population is less than 1 air mile from Wyoming State Highway 135 and is visible from the Highway. A two-track, four-wheel drive trail connects to a major Bureau road, leading to an abandoned oil well. The two-track road bisects the population (see introduction photograph). This road was open to hunters and other recreationists using trucks and all-terrain vehicles until 2005.

Effective March 16, 2005, the Bureau issued an emergency closure of the 146 ha (360 ac) critical habitat area to all types of motor vehicle use to protect the *Yermo xanthocephalus*. Public access leading to, and within, the *Y. xanthocephalus* occurrences and its critical habitat by non-motorized means, such as by foot or horseback, is permitted. This closure will remain in effect until the threat to this species population and its critical habitat by motorized vehicles is no longer applicable (Bureau 2005).

The most common activities that attract users to the area are hunting and rock collecting. The population is a few miles north of the Sweetwater Crossing on the Oregon-California Trail, which is a popular tourist attraction. There was no significant surface disturbance caused by vehicles during the early years of population monitoring). However, Scott has noted light vehicular traffic on the site (Scott 2000). The Bureau's Resource Management Plan limits vehicle use to existing roads (including established two-tracks).

Since 2005, when the road was closed to all traffic, the primary habitat destruction threat of vehicles is illegal use of all-terrain vehicles on the road or areas occupied by *Yermo xanthocephalus*. This threat is considered low in severity and magnitude and not an immediate threat.

Climate Change: According to the Intergovernmental Panel on Climate Change (IPCC) (2007) "warming of the climate system is unequivocal, as it is now evident from observations of increases in global air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level." In general, a trend of warming in the mountains of western North America is expected to decrease snowpack, hasten spring runoff, and reduce summer flows (IPCC 2007). While this change could affect the *Yermo xanthocephalus* or its habitat, to date, a negative impact has not been documented. A significant degree of uncertainty exists as to how projected climate changes, alone and in concert with other threats, will affect the *Yermo xanthocephalus* or its habitat in the future. While fewer cold days and nights could result in increased vegetative yield in colder environments, increased summer heat and areas affected by drought may increase (IPCC 2007). Overall, it appears possible that the *Yermo xanthocephalus* or its habitat may be affected negatively by climate change.



### III. PRELIMINARY RECOVERY STRATEGY

#### A. RECOVERY PRIORITY NUMBER

The Endangered Species Act (section 4(f)(1)(A)) specifies that the Service shall, to the maximum extent practicable, give priority to completing recovery plans to those species that are most likely to benefit from such plans. In order to meet this requirement, the Service assigns a recovery priority number to each listed species, based on a matrix that includes the degree of threat, recovery potential, taxonomy, and the potential for the species to be in conflict with development or other economic activities (48 FR 43098, September 21, 1983).

*Yermo xanthocephalus* is assigned a recovery priority of “7.” This ranking indicates that: (1) the species faces a moderate degree of threats, (2) the species has a high potential for recovery, and (3) the species is a monotypic genus.

Although several of the threats for this species have been addressed through conservation actions, there remain moderate threats to *Yermo xanthocephalus*. The primary threat is linked to the biological constraint of a small population with the potential for a single catastrophic natural or human caused event that could lead to extinction.

*Yermo xanthocephalus* has a high recovery potential based on ability to remove most, if not all, of the threats to the species through conservation actions. In addition, *Yermo xanthocephalus* seeds are stored at the Center for Plant Conservation (2008) under appropriate storage conditions. Scott and Holster (2000) demonstrated the ability to germinate seeds. This study indicates that if there were a catastrophic event, there is some potential that the species could be re-established through propagation and transplanting. The use of artificial re-establishment of the population is appropriate in cases of such emergencies. Further evaluation of biological constraints (relation between climate and life history, reproductive biology, seed ecology, habitat specificity) is warranted to evaluate species’ vulnerability to extinction.

Considering conservation measures discussed above, the primary threats related to development activities and other forms of economic activities are moderate at this time. This recovery priority number will be reviewed during the recovery planning process.

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	<b>Monotypic Genus</b>	<b>7 *</b>	<b>7C</b>
		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

## B. RECOVERY VISION

Recovery of the *Yermo xanthocephalus* is currently envisioned as follows: stable *Yermo xanthocephalus* populations will persist on habitat across the species' historical range. Threats to the species, primarily natural constraints and human caused site degradation, will be sufficiently understood and sufficiently abated to ensure this species is not in danger of extinction within the foreseeable future. A monitoring and adaptive management approach will be in place to address unforeseen events and threats.

## C. INITIAL ACTION PLAN

The primary focus of the initial phase of recovery will be to maintain the known distribution of *Yermo xanthocephalus* through protection of all extant populations on Federal lands and their habitat and the surveying and protection of potential additional populations on Federal lands. Secondary actions include: (1) determining the ecological requirements of the species, including soil, water, and topography using potential distribution model revision and surveys; (2) determining the viability of the known populations using population viability theory and monitoring data; (3) understanding population demographics and dynamics as well as life history, including reproductive biology and seed ecology; (4) determining an annual inspection protocol to identify unforeseen disturbance and impacts or direct drop in numbers; and (5) continuing to investigate what is needed to fully protect its habitat.

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

### **Assessing Vulnerability and Addressing Threats:**

- **General:** The Service will continue to work with the Bureau's Wyoming State Office to determine appropriate methods for ensuring protection of *Yermo xanthocephalus* on Bureau lands.
- **Small Population Size and Restricted Distribution:** The Service intends to partner with the Bureau's state office to evaluate the species' population demographics and genetics to determine and evaluate this issue in terms of the species' status and conservation. In the short-term, additional security is provided through seeds stored at the Center for Plant Conservation (2008).
- **Oil and Gas Development:** The Bureau is considering revisions to the Land Use Plan for the Lander Resource Management Plan and a decision of "No Leasing" for the 146 ha (360 ac) of Critical Habitat is likely to be considered in the proposed alternatives. A protective management designation for the entire area of critical habitat that would prohibit all surface disturbance activities would remove this threat (Keefe, pers. comm., 2008c).
- **Mining:** The Bureau provided a 20-year protective withdrawal of *Yermo xanthocephalus* 146 ha (360 ac) critical habitat area from settlement, sale, location, or entry under the general land laws including mining laws. The Service will continue to work with the Bureau to pursue permanent protection of this area to the maximum extent possible.
- **Invasive Species and Trampling:** While much progress has been made on this issue, we recommend evaluating additional potential actions to further discourage or limit site access.

### **Surveys and Monitoring:**

- Monitor population abundance and distribution.
- Survey for new populations in areas identified as potential suitable habitat.
- Annually inspect for invasive species on the two-track entry road and in occupied habitat.

### **Research:**

- Additional research is needed to understand why *Yermo xanthocephalus* occurs in some areas of apparently suitable habitat and not in others.
- Conducting modeling to clarify the factors affecting long-term population viability (population demographics and genetics).
- Evaluate all known habitat components through a Geographic Information System database and conduct surveys for additional populations in areas containing characteristics of high occupancy.
- Continue research into *Yermo xanthocephalus* life history and ecology (e.g., identify pollinators).
- Investigate and project *Yermo xanthocephalus* response to climate changes.
- Complete analysis of the species genetic diversity.

## **IV. PREPLANNING DECISIONS**

### **A. PLANNING APPROACH**

A recovery plan will be prepared for *Yermo xanthocephalus* pursuant to Section 4(f) of the Endangered Species Act. The recovery plan should include objective, measurable criteria which, when met, will result in a determination that the species can be removed from the Federal List of Endangered and Threatened Plants. Recovery criteria should address all threats meaningfully impacting the species. The recovery plan also should estimate the time required and the cost to carry out those measures needed to achieve the goal for recovery and delisting. The scope of the plan will be single species.

Plan preparation will be under the stewardship of the Wyoming Field Office - Ecological Services. Currently, Jan McKee, is lead botanist for *Yermo xanthocephalus*. Other Federal agency personnel involved with the species will be integrally involved in the planning effort, including the Bureau's State Office in Cheyenne, Wyoming, and their Field Office in Lander, Wyoming. Our 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, if deemed necessary. Periodically, meetings among these parties may be convened for the species with the purpose of sharing information and ideas about advancing *Yermo xanthocephalus* recovery.

## B. INFORMATION MANAGEMENT

**General:** All information relevant to recovery of the *Yermo xanthocephalus* will be housed in administrative files found at our Wyoming Field Office in Cheyenne, Wyoming. The lead botanist will be responsible for maintaining a full administrative record for the recovery planning and implementation process for the species. Copies of new study findings, survey results, records of meetings, comments received, etc., should be forwarded to the lead botanist in the Wyoming Field Office. Species occurrence boundaries and available trend data will continue to be maintained by the Wyoming Natural Diversity Database.

**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 *Yermo xanthocephalus* recovery effort to the lead botanist in the Wyoming Field Office. Copies of the completed reports can then be disseminated to all contributors upon request.

## C. RECOVERY PLAN PRODUCTION SCHEDULE

The following dates are dependent on personnel and funds available to complete the recovery plan process.

Internal review draft:	August 2012
Public review draft:	December 2012
Public comment period:	March 2013
Final plan:	August 2013

## D. STAKEHOLDER INVOLVEMENT

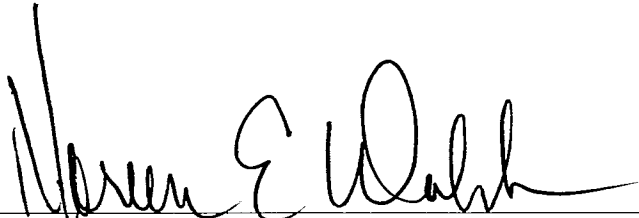
### Key stakeholders:

- (1) The Bureau (all populations occur on Bureau lands);
- (2) Conservation organizations such as The Nature Conservancy and the Center for Plant Conservation and cooperating institutions (i.e., local botanic gardens);
- (3) The University of Wyoming and other academic researchers including Wyoming Natural Diversity Database;
- (4) Mining or energy organizations; and
- (5) Grazing leaseholder and/or Stockgrowers Association representatives

**Stakeholder involvement strategy:** Early in the recovery planning process, a meeting of Federal and State endangered species experts and biologists working with *Yermo xanthocephalus* will be held to exchange status information and identify recovery issues. The information gathered from this discussion will provide the initial platform for proceeding with recovery planning. State and local officials also will be asked to participate on an ongoing basis in the recovery effort, particularly with regard to monitoring and regulatory protection of the species.

Additional meetings and conference calls will be held as needed to discuss particular issues. Stakeholders will be invited to participate as warranted depending upon the purpose of the meeting or call. Advantage will be taken of all opportunities to interact with stakeholders in a productive and meaningful way.

Stakeholders will be afforded an opportunity to review and comment on a draft of the recovery plan. Stakeholders also may be asked to contribute directly in developing implementation strategies for planned actions. Strong, one-on-one working relationships with both experts and stakeholders will be developed over time.

Approve:  . Date 2/25/10  
*Deputy* Regional Director, Mountain-Prairie Region (Region 6)

## Literature Cited:

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