

**Desert Yellowhead**  
**(*Yermo xanthocephalus*)**

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

**U.S. Fish and Wildlife Service**  
**Wyoming Ecological Services Field Office**  
**Cheyenne, Wyoming**

## 5-YEAR REVIEW

Species reviewed: Desert yellowhead (*Yermo xanthocephalus*)

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## **5-YEAR REVIEW**

### **Desert yellowhead (*Yermo xanthocephalus*)**

#### **GENERAL INFORMATION**

**Species:** Desert yellowhead (*Yermo xanthocephalus*)

**Date listed:** March 14, 2002, effective April 15, 2002

**FR citation(s):** Listing rule: 67 FR 11442; 1<sup>st</sup> 5-year review: 76 FR 35906 (June 20, 2011)

**Classification:** Threatened

**Critical habitat/4(d) rule/Experimental population designation/Similarity of appearance listing:** Critical Habitat designation: 69 FR 12278 (March 16, 2004)

#### **Methodology used to complete the review:**

In accordance with section 4(c) (2) of the Endangered Species Act of 1973, as amended (Act), the purpose of a 5-year review is to assess each threatened species and endangered species to determine whether its status has changed and it should be classified differently or removed from the Lists of Threatened and Endangered Wildlife and Plants. The U.S. Fish and Wildlife Service (Service) evaluated the biology and status of the desert yellowhead as part of a Species Status Assessment (SSA) to inform this 5-year review.

The SSA report was developed by a core team comprised of Service biologists in the Wyoming Ecological Services Field Office and the Service's legacy Region 6 Regional Office as well as a technical team comprised of federal (Bureau of Land Management (BLM)) and state agency (Wyoming Natural Diversity Database (WYNDD) and Wyoming Department of Agriculture) partners familiar with the species, its habitat, and its management. The SSA report is a peer- and partner-reviewed evaluation of the conservation status of the desert yellowhead based on the best available scientific information, including the resource needs and the current and future condition of the species.

**FR Notice citation announcing the species is under active review: 83 FR 39771, August 10, 2018.**

#### **REVIEW ANALYSIS**

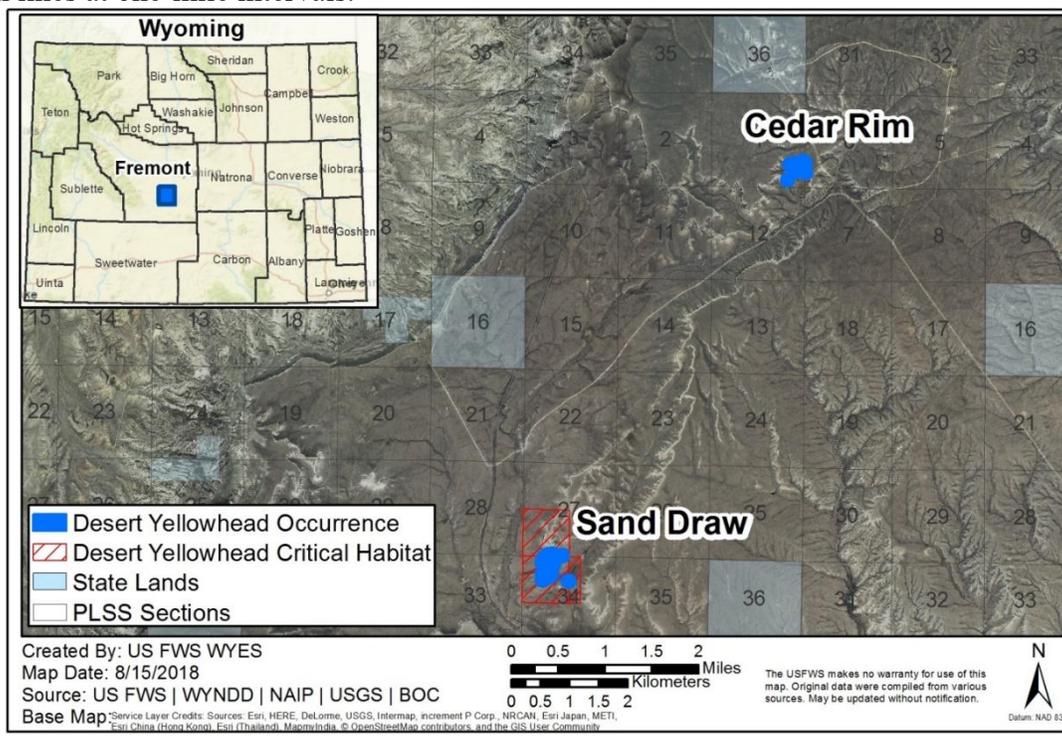
The SSA Report (USFWS 2019, entire) summarizes the best available scientific information on the current status and likely future viability of the species. The SSA report provided the scientific basis for the 5-year review. The SSA report describes the current and future viability of the desert yellowhead in terms of the conservation biology principles of resiliency, redundancy, and representation. Resiliency describes the ability of individuals and populations to withstand environmental or demographic stochasticity. Redundancy describes the ability of the species to withstand catastrophic events in a way that spreads risk and minimizes potential loss of the species, and is characterized as having multiple, resilient populations distributed across the range of the species. Representation describes the ability of a species to adapt to changing environmental conditions over time and is characterized by the breadth of genetic and environmental diversity within and among populations (Smith *et al.* 2018, pp. 7–8).

## Updated Information and Current Species Status

### Biology and Habitat

Desert yellowhead is an endemic herbaceous perennial plant that occupies two areas in Fremont County, Wyoming (see Figure 1). The two populations are located approximately 8 kilometers (km; 5 miles (mi)) apart and are on public lands administered by the BLM. Desert yellowhead is typically conspicuous compared to surrounding cushion plants and grasses, with its leathery leaves growing up to 30 centimeters (cm) (11.8 inches (in.)) tall, and 25 to 180 flower heads crowding the top of the stem of reproductive plants. Dispersal appears to be short-distance, with plants growing in clumps. In addition to normal sexual reproduction, plants also produce vegetative ramets that may separate from the parent plant, resulting in new plants that are genetically identical to the parent plant. Plants occupy a narrow range of habitat conditions defined by suitable soil characteristics, suitable amounts of precipitation, sufficient pollination, and mild temperatures. The seedling stage appears to have the highest level of mortality, and established plants can survive for many years. Desert yellowhead is considered an S-R strategist, meaning that it is stress-tolerant (S) and capable of surviving in disturbed habitats, and is ruderal (R), or an early colonizer and adapted to habitats that are severe to extreme (Scott and Scott 2009, p. 58).

Figure 1. Known range of desert yellowhead in Wyoming. Both populations occur on and are surrounded by BLM-managed lands and are approximately 8 km (5 mi) apart. The Sand Draw population is contained within designated critical habitat, and a mineral withdrawal follows the critical habitat designation boundaries. The Public Land Survey System (PLSS) delineates section lines at one-mile intervals.



Using what we understand regarding the species’ demographic and habitat requirements, we calculated each population’s resiliency by combining the score for each of the following factors: suitable soil conditions, low competition, sunlight for photosynthesis, pollinators, adequate spring precipitation, mild summer temperatures, seedling survival, established plant survival, and seed production (USFWS 2019, pp. 32–38). Because seedling survival appears to be the greatest indicator of population resiliency, that score is counted twice in determining overall population resiliency. In combining the current resiliency score for each population with the species’ overall redundancy and representation, we determined the overall current condition for the species (presented in Table 1).

Table 1. Current condition for Sand Draw and Cedar Rim, including resiliency, redundancy, and representation. Colors match the condition category labels from Table 3 for high (green), moderate (yellow), and low (orange) from the SSA report (USFWS 2019, p. 34). Values indicate the score for each factor contributing to resiliency, and totals indicate overall resiliency: low condition is 10–16, moderate is 17–23, and high is 24–30.

Condition category	Resiliency									Overall Population Resiliency	Species Redundancy	Species Representation
	Habitat factors						Demographic factors					
	suitable soil conditions	low competition	sunlight for photosynthesis	pollinators	adequate spring precipitation	mild summer temperatures	seedling survival	established plant survival	seed production			
Sand Draw	3	3	3	3	2	3	1	3	2	24		
Cedar Rim	2	3	3	3	2	3	1	3	1	22		

Threats Analysis (threats, conservation measures, and regulatory mechanisms)

For a stressor to be considered in the current condition analysis, it must have a negative effect on desert yellowhead through both exposure and response. At the time of listing, threats from oil and gas development (Factor A) and the species’ limited habitat and population size (Factor E) were considered to be the greatest threats to desert yellowhead. Presently, the stressor of oil and gas development has been largely removed due to various conservation measures enacted by the BLM. Other threats identified at the time of listing included: mineral extraction (Factor A), motor vehicles and off-road vehicles (Factor A), invasive species (Factor E), overutilization (Factor B), predation (Factor C), and grazing and trampling (Factor C). Primarily through conservation measures implemented by the BLM, these threats have also largely been reduced. Climate change (Factors A and E) and wildfire (Factors A and E) are additional threats that were addressed in the SSA report (USFWS 2019, pp. 26–28). The primary stressor currently facing desert yellowhead is mineral extraction from opal mining (Factor A) within and around the habitat of the Cedar Rim population.

In addition to listing and critical habitat under the Act to protect the desert yellowhead, there are several conservation measures in place to protect the species. The BLM instituted a closure of designated critical habitat from motor vehicle use in 2005 (70 FR 40053; July 12, 2005), which remains in effect for the duration of the critical habitat designation. Public Land Order 7688 was issued in 2008, which withdrew critical habitat around Sand Draw from surface entry and mining for 20 years (expires January 10, 2028) (73 FR 5586; January 30, 2008). The BLM also included specific measures protecting both populations in the 2014 Lander BLM resource management plan (BLM 2014, pp. 44–48, 52–55, 62–69, 478–479, and 488–489), which remains in effect until the next RMP update (approximately 2030). These include applying a no surface occupancy (NSO) stipulation to both the 146 ha (360 ac) of designated critical habitat encompassing Sand Draw and the 34 ha (85 ac) area around Cedar Rim to oil and gas leasing, which prohibits oil and gas-related surface disturbing activities in accordance with Wyoming BLM Standard Mitigation Guidelines for Surface Disturbing Activities (BLM 2014, entire). The Lander RMP also limits livestock use of occupied habitat, such as prohibiting mineral or water supplements within 3.22 km (2 mi) of the sites supplemental feeding or herding within 0.8 km (0.5 mi) of the sites, and specifies monitoring and control of invasive weeds in and around occupied habitats (BLM 2014, pp. 488–489).

The Lander RMP maintains the existing locatable mineral withdrawal for desert yellowhead critical habitat surrounding the Sand Draw population and recommends a mineral withdrawal extension prior to its expiration. This management consists of the following: (a) being open to oil and gas, geothermal, and other fluid mineral leasing with an NSO stipulation; (b) closed to phosphate leasing; closed to mineral materials disposals; (c) excluded to major rights-of-way; (d) avoided for minor rights-of-way; and (e) closed to motorized and mechanized travel. Finally, it prohibits surface-disturbing activities and applies an NSO stipulation to mineral leasing activities within the Cedar Rim population of desert yellowhead (BLM 2014, 4000 Biological Resources 11.2, p. 66). These protections for desert yellowhead remain in effect, regardless of the species being listed under the Act, as they protect special status species or unique plant communities and aim to prevent future listings (Biological Resources 11.4) (BLM 2014, p. 54).

#### Summary of Current Condition

Both populations show some signs of human disturbance, with unused, old roadways to oil and gas or uranium sites within each population. We do not know if the current distribution of the two populations reflects the historical extent of the species. Stressors affecting the species have largely been ameliorated through management under the BLM, though the Cedar Rim population continues to be vulnerable to mineral exploration and development.

Regarding resiliency, desert yellowhead is currently characterized as having two populations: Sand Draw and Cedar Rim. Sand Draw has high resiliency due to high conditions of habitat factors and varied conditions of demographic factors. Cedar Rim has moderate resiliency due to the ongoing risk of mineral exploration and development potentially impacting the soil conditions, high conditions of other habitat factors, and low conditions of multiple demographic factors. Overall, desert yellowhead currently has low redundancy due to the limited number and distribution of populations. Regarding representation, we have no information on genetic diversity and found only minor differences across the species in terms of ecological setting, namely the slope, soil characteristics, density of surrounding vegetation,

and aspect of the two populations. Recent studies showing low or no recruitment into both populations suggests that population numbers are being maintained through production of ramets and not through outcrossing. Therefore, at present, we consider desert yellowhead to have low representation.

#### Future Species Condition

The SSA report evaluates the future condition of the species in the years 2040 and 2060, which are meaningful timeframes considering the timelines of management activities and current protective measures in place. To incorporate uncertainty about predictions of future conditions, the SSA report describes four plausible future scenarios, which capture the range of risk to the species in both of these timeframes. Stressors of mineral development, nonnative invasive plants, the effects of climate change, wildfire, and a combination of these factors were considered to be risk factors with the potential to affect desert yellowhead into the future. The SSA report also analyzed the level of impact resulting from changes in impacts from the stressors relative to the expected duration of conservation measures presently in place or the initiation of additional conservation measures in the future. A summary of the resulting resiliency in each of the four future scenarios and two timelines is provided in Table 2.

It is possible that current management by the BLM will not continue if the species is delisted in the future (*i.e.*, losing listed species status under the Act, but maintaining rare or unique special status in the BLM's 6840 Special Status Species Management Manual (BLM 2008, entire)). However, changes in management that jeopardize the existence of the species will likely result in the need to immediately list the desert yellowhead under the Act again. Management was determined to be the single most important indicator of population resiliency, and therefore management ultimately determined the trajectory of the four scenarios considered for this species: continuation, improvement, worst case, and mixed:

- 1) Continuation Scenario: The purpose of the continuation scenario is to assess the conservation status of the species if present management actions and the current trajectory of climate change continued into the future with no additional actions taken to further ameliorate stressors impacting current condition. The continuation scenario assumes current BLM management of the species continues into the future, particularly maintenance of a mineral withdrawal for the Sand Draw population, and the continued development, but not implementation, of a mineral withdrawal for the Cedar Rim population. We expect to see lower precipitation in the summer and more precipitation as snow in the winter and spring. Other stressors will continue to affect the species in the future at the same level as in current conditions.
- 2) Improvement Scenario: The purpose of the improvement scenario is to assess the conservation status of the species if management actions were implemented to improve the Cedar Rim population and if climate change effects were reduced species-wide. The improvement scenario is based on continued management of the habitat of both populations, with mineral withdrawals either developed or renewed for each population, as well as a slowing of the effects of climate change. Similar to the continuation scenario, we expect to see lower precipitation in the summer and more precipitation as snow in the

winter and spring. Other stressors potentially affecting the species in the future are minimized or do not affect the species.

Table 2. Summary of future resilience condition predictions for each population based on predictions of the habitat and demographic factors for desert yellowhead in 2040 and 2060. Note overall population resiliency is based on the sum of all habitat and demographic factors, with seedling survival counted twice. Low condition (orange) is a total between 10–16, moderate condition (yellow) is a total between 17–23, and high condition (green) is a total between 24–30. Exceptions where suitable soil condition drives resiliency are indicated with an asterisk (\*).

	Population	Habitat factors						Demographic factors			Overall population resiliency
		suitable soil conditions	low competition	sunlight for photosynthesis	pollinators	adequate spring precipitation	mild summer temperatures	seedling survival	established plant survival	seed production	
<b>2040</b>											
<u>Continuation scenario</u>	Sand Draw	3	3	3	3	2	2	1	3	2	23
	Cedar Rim	2	3	3	3	2	2	1	3	1	21
<u>Improvement scenario</u>	Sand Draw	3	3	3	3	3	3	2	3	3	28
	Cedar Rim	3	3	3	3	3	3	2	3	2	27
<u>Worst scenario</u>	Sand Draw	2	2	2	3	2	2	1	3	2	20
	Cedar Rim	1	2	2	3	2	2	1	3	1	18*
<u>Mixed scenario</u>	Sand Draw	2	2	2	3	3	3	2	3	3	25*
	Cedar Rim	1	2	2	3	3	3	2	3	2	23*
<b>2060</b>											
<u>Continuation scenario</u>	Sand Draw	3	3	3	3	2	2	1	3	2	23
	Cedar Rim	1	3	3	3	2	2	1	3	1	20*
<u>Improvement scenario</u>	Sand Draw	3	3	3	3	3	3	2	3	3	28
	Cedar Rim	3	3	3	3	3	3	2	3	2	27
<u>Worst scenario</u>	Sand Draw	1	2	2	3	1	1	1	2	1	15
	Cedar Rim	1	2	2	3	1	1	1	2	1	15
<u>Mixed scenario</u>	Sand Draw	1	2	2	3	3	3	2	3	3	24*
	Cedar Rim	1	2	2	3	3	3	2	3	2	23*

- 3) **Worst Scenario:** The purpose of the worst scenario is to assess the conservation status of the species would if beneficial management actions ceased and the effects of climate change increased. The worst scenario is based on BLM management that does not benefit desert yellowhead or allows adverse effects to the species, including allowing expiration of the Sand Draw mineral withdrawal and no development of the mineral withdrawal for Cedar Rim. Similar to the continuation and improvement scenarios, we expect to see lower precipitation in the summer and more precipitation as snow in the winter and spring. Other stressors increase and have an additional negative effect on the species in the future.
- 4) **Mixed Scenario:** The purpose of the mixed scenario is to assess the relative effect of management (e.g., habitat protections from stressors such as mineral extraction) versus climate (e.g., shifts in available moisture from changing temperature and precipitation regimes) on the future conservation status of the species. Specifically, it presents a case where climate improves, as discussed in the improvement scenario, but management protections are removed, as discussed in the worst scenario. If the mixed scenario results in a substantially more negative outcome than the improvement scenario as well as a more negative outcome than the continuation scenario, it suggests that management of on-the-ground stressors such as opal mining are likely to be a more important driver of future conditions for desert yellowhead than shifts in climate.

Regarding future redundancy and representation for desert yellowhead, none of the scenarios predict the discovery of any additional populations, new forms of connectivity between the two known populations, or increases in genetic or ecological diversity. In fact, if one or both population is lost due to opal mining or another stressor, we would anticipate that the redundancy and representation of the species would be even lower than the low condition assigned to the species in its current condition. Therefore, we predict that the species' redundancy and representation will continue to be low in 2040 and 2060 for all of the scenarios.

#### Summary of Future Condition

The SSA report evaluated the potential future condition of desert yellowhead by predicting the species' response to a range of scenarios involving changes in management, climate, competition with nonnative invasive species, and wildfires, which were deemed the most likely stressors to affect desert yellowhead into the future. The SSA report determined that the future condition of the species could be somewhat improved from the current levels of the 3Rs in the improvement scenario as the result of increases in habitat protections, but could also be diminished if stressors impact one or both of the populations through ineffective decisions in species management. The continuation scenario predicts some decreases in the 3Rs, specifically resulting from impacts to the resiliency of the Cedar Rim population related to opal mining. The worst scenario has low levels of the 3Rs due to lapses of protections that are currently in place to protect the Sand Draw population from opal exploration and mining and the failure of the BLM to provide adequate protection to the Cedar Rim population. The mixed scenario showed that improvements in the projected trajectory of climate change cannot provide enough benefit to the populations to compensate for the loss of habitat resulting from management that allows mineral exploration and extraction within and around occupied

habitats. In summary, we find that the viability of the species in the long-term is largely dependent upon the protections put in place by the BLM, where management of the lands occupied by and surrounding the two populations of desert yellowhead is the key driver to the species' continued viability.

### **Synthesis (Application of SSA Results to Act Classification)**

Under the Act, an endangered species is defined as any species that is “in danger of extinction throughout all or a significant part of its range.” Based on the current condition of desert yellowhead described in the SSA report and summarized above in terms of resiliency, redundancy, and representation, we conclude that the current risk of extinction is low, such that the species is not in danger of extinction throughout all or a significant portion of its range. Stressors affecting the species have largely been ameliorated through management under the BLM, though the Cedar Rim population continues to be vulnerable to mineral exploration and development. Representation and redundancy are low for this species, but likely were always low as a function of the species being a narrow endemic, monotypic genus. Therefore, we conclude that the desert yellowhead does not meet the definition of an endangered species.

Having determined that the desert yellowhead is not an endangered species, we next compared the status of the species to the definition of a threatened species under the Act, which states that a species is “likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.” The foreseeable future refers to the extent to which the Secretary of the Department of Interior can reasonably rely on predictions about the future in making determinations about the future conservation status of the species. The key statutory difference between a threatened species and an endangered species is the timing of when a species may be in danger of extinction, either now (endangered species) or in the foreseeable future (threatened species).

As determined in the SSA, the potential future condition of desert yellowhead appears dependent on the management practices in place to protect one or both populations. There is no certainty that the existing protections limiting mineral development at Sand Draw, which are set to expire in 2028, will be renewed in the foreseeable future or that the proposed mineral withdrawal to protect Cedar Rim will be approved and implemented. Given high mineral potential in the area, removal of such protections would pose imminent threat to species viability, as evidenced in the future condition scenarios described above. The species therefore has the potential to become endangered in the foreseeable future and meets the definition of a threatened species.

### **Recovery Criteria**

Recovery Plan or Outline: Recovery Outline for *Yermo xanthocephalus* (desert yellowhead), February 25, 2010.

There are no established Recovery Criteria for the desert yellowhead, because there is no Recovery Plan for the species. The Recovery Outline included a recovery vision for stable populations persisting on habitat across the species' historical range, with threats, primarily

natural constraints and human-caused site degradation, sufficiently understood and abated to ensure the species is not in danger of extinction within the foreseeable future. The initial action plan in the Recovery Outline was to maintain known distribution of the species through protection of all extant populations and their habitat, surveying for additional populations, determining ecological requirements of the species, determining viability of known populations, understanding population demographics and species biology, determining annual inspection protocol for identification of unforeseen disturbances, and continuing to investigate necessities for fully protected habitat. The Recovery Outline provided a generalized framework for the development of objective, measurable recovery criteria that should address all threats meaningfully impacting the species, and an estimation of time and cost to carry out those measures.

## RESULTS

**Recommended Classification:** *After assessing the best available information, we conclude that the desert yellowhead is not in danger of extinction throughout all or a significant portion of its range, but is likely to become so in the foreseeable future; that is, it is a threatened species throughout all of its range. We recommend that no change in classification is needed.*

**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**

**New Recovery Priority Number:** Maintain at 7

**Brief Rationale:** This species faces a moderate degree of threats, has a high potential for recovery, and is a monotypic genus.

## RECOMMENDATIONS FOR FUTURE ACTIONS

Proceed with the development of a Recovery Plan for the desert yellowhead that includes specific, objective, and quantifiable recovery criteria and actions, including:

- Collaborate with a team of experts to determine recovery requirements for the species.
- Develop an inter-agency conservation plan between the Service and the BLM that defines specific commitments to maintain conservation measures that ensure future long-term viability of the species.

## REFERENCES

- BLM. 2008. 6840 – Special Status Species Management Manual. Release 6-125. December 12, 2008. 48 pp.
- BLM. 2014. Record of Decision and Approved Resource Management Plan for the Lander Field Office Planning Area. June 2014. 490 pp.
- Doak, D., R. Dibner, A. Louthan, and M. Peterson. 2016. Final Report on Desert Yellowhead Conservation Status Project, *Yermo* Viability Analysis. 36 pp. + appendix.
- Scott, R.W. and B.J. Scott. 2009. *Yermo xanthocephalus* Dorn, a research report. Prepared by the Central Wyoming College Herbarium, Riverton, Wyoming, and Scott Environmental Resources, Inc., Riverton, Wyoming in cooperation with Wyoming Natural Diversity Database, Laramie, Wyoming. 68 pp. + appendices.
- Smith, D.R., N.L. Allan, C.P. McGowan, J.A. Szymanski, S.R. Oetker, and H.M. Bell. 2018. Development of a species status assessment process for decisions under the U.S. Endangered Species Act. *Journal of Fish and Wildlife Management* 9: 302–320.
- U.S. Fish and Wildlife Service. 2019. *Yermo xanthocephalus* (desert yellowhead) Species Status Assessment. U.S. Fish and Wildlife Service, Wyoming Ecological Services Field Office, Cheyenne, Wyoming. 59 pp.

**U.S. FISH AND WILDLIFE SERVICE  
5-YEAR REVIEW of desert yellowhead (*Yermo xanthocephalus*)**

**Current Classification:** Threatened

**Recommendation resulting from the 5-Year Review:**

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

**Appropriate Listing/Reclassification Priority Number, if applicable:** 7

**FIELD OFFICE APPROVAL:**

**Wyoming Ecological Services Field Office Supervisor, Fish and Wildlife Service**

Approve



Date

2-13-10