

## RECOVERY PLAN AMENDMENTS FOR 20 SOUTHWEST SPECIES

The U.S. Fish and Wildlife Service has identified best available information that indicates the need to amend recovery criteria for the below species. Each amendment is recognized as an addendum that supplements the existing recovery plan.

<p><b>Brady Pincushion Cactus (<i>Pediocactus bradyi</i>) Recovery Plan</b> Original Recovery Plan Approved: March 28, 1985 Page(s) Superseded: 19-34</p>
<p><b>Endangered Karst Invertebrates (Travis and Williamson Counties, Texas) Recovery Plan</b> Original Recovery Plan Approved: August 25, 1994 Page(s) Superseded: 86-88 Species Included: Bee Creek Cave harvestman (<i>Texella reddelli</i>) Bone Cave harvestman (<i>Texella reyesi</i>) Coffin Cave mold beetle (<i>Batrisodes texanus</i>) Kretschmarr Cave mold beetle (<i>Texamaurops reddelli</i>) Tooth Cave spider (<i>Tayshaneta=Neoleptoneta myopica</i>) Tooth Cave ground beetle (<i>Rhadine persephone</i>) Tooth Cave pseudoscorpion (<i>Tartarocreagris texana</i>)</p>
<p><b>Holy Ghost Ipomopsis (<i>Ipomopsis sancti-spiritus</i>) Recovery Plan</b> Original Recovery Plan Approved: September 26, 2002 Page(s) Superseded: 18-21</p>
<p><b>Knowlton Cactus (<i>Pediocactus knowltonii</i>) Recovery Plan</b> Original Recovery Plan Approved: March 29, 1985 Page(s) Superseded: 16</p>
<p><b>Kuenzler Hedgehog Cactus (<i>Echinocerus fendleri</i> var. <i>kuenzleri</i>) Recovery Plan</b> Original Recovery Plan Approved: March 28, 1985 Page(s) Superseded: 13</p>
<p><b>Sacramento Prickly Poppy (<i>Argemone pleicantha</i> ssp. <i>pinnatisecta</i>) Recovery Plan</b> Original Recovery Plan Approved: August 31, 1994 Page(s) Superseded: 16-17</p>
<p><b>Siler Pincushion Cactus (<i>Pediocactus sileri</i>) Recovery Plan</b> Original Recovery Plan Approved: April 14, 1986 Page(s) Superseded: 19-41</p>
<p><b>Sneed and Lee Pincushion Cacti Recovery Plan</b> Original Recovery Plan Approved: March 21, 1986 Page(s) Superseded: 19 Species Included: Sneed pincushion cactus (<i>Coryphantha sneedii</i> var. <i>sneedii</i>) Lee pincushion cactus (<i>Coryphantha sneedii</i> var. <i>leei</i>)</p>
<p><b>Socorro Isopod (<i>Thermosphaeroma thermophilum</i>) Recovery Plan</b> Original Recovery Plan Approved: February 16, 1982 Page(s) Superseded: 6-7, 10-11, 13</p>

**Star Cactus (*Astrophytum asterias*) Recovery Plan**

Original Recovery Plan Approved: August 26, 2003

Page(s) Superseded: 11-14

**Tobusch Fishhook Cactus (*Ancistrocactus tobuschii*) Recovery Plan**

Original Recovery Plan Approved: March 18, 1987

Page(s) Superseded: iii, 14-15

**Zapata Bladderpod (*Lesquerella thamnophila*) Recovery Plan**

Original Recovery Plan Approved: July 14, 2004

Page(s) Superseded: 9-11

**Zuni Fleabane (*Erigeron rhizomatus*) Recovery Plan**

Original Recovery Plan Approved: September 30, 1988

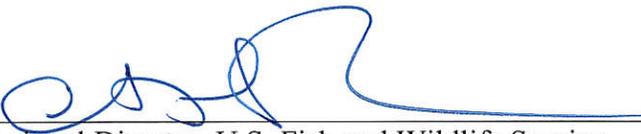
Page(s) Superseded: 14

**For**

**U.S. Fish and Wildlife Service  
Southwest Region  
Albuquerque, New Mexico**

**August 2019**

Approved:

  
\_\_\_\_\_  
Regional Director, U.S. Fish and Wildlife Service

Date:

\_\_\_\_\_  
8/28/19

## **Recovery Plan for *Ipomopsis sancti-spiritus* (Holy Ghost Ipomopsis)**

**Original Approved: 2002**

**Original Prepared by: Robert Sivinski (New Mexico Energy, Minerals, and Natural Resources Department, Forestry Division)**

### **DRAFT AMENDMENT 1**

We have identified best available information that indicates the need to amend the recovery criteria for this species. In this proposed modification, we synthesize the adequacy of the existing recovery criteria, show amended recovery criteria, and the rationale supporting the proposed recovery plan modification. The proposed modification is shown as an appendix that supplements the existing Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*) Recovery Plan (Recovery Plan, superseding only Part II, Objectives and Criteria (pages 18-21), of the recovery plan (USFWS 2002).

**For  
U.S. Fish and Wildlife Service  
Southwest Regional Office  
Albuquerque, NM 87103**

**August 2019**

### **BACKGROUND INFORMATION**

Recovery plans should be consulted frequently, used to initiate recovery activities, and updated as needed. A review of the recovery plan and its implementation may show that the plan is out of date or its usefulness is limited, and therefore warrants modification. Keeping recovery plans current ensures that the species benefits through timely, partner-coordinated implementation based on the best available information. The need for, and extent of, plan modifications will vary considerably among plans. Maintaining a useful and current recovery plan depends on the scope and complexity of the initial plan, the structure of the document, and the involvement of stakeholders.

An amendment involves a substantial rewrite of a portion of a recovery plan that changes any of the statutory elements. The need for an amendment may be triggered when, among other possibilities: (1) the current recovery plan is out of compliance with regard to statutory requirements; (2) new information has been identified, such as population-level threats to the species or previously unknown life history traits, that necessitates new or refined recovery actions and/or criteria; or (3) the current recovery plan is not achieving its objectives. The amendment replaces only that specific portion of the recovery plan, supplementing the existing recovery plan, but not completely replacing it. An amendment may be most appropriate if significant plan improvements are needed, but resources are too scarce to accomplish a full recovery plan revision in a short time.

Although it would be inappropriate for an amendment to include changes in the recovery program that contradict the approved recovery plan, it could incorporate study findings that enhance the scientific basis of the plan, or that reduce uncertainties as to the life history, threats, or species' response to management. An amendment could serve a critical function while awaiting a revised recovery plan by: (1) refining and/or prioritizing recovery actions that need to be emphasized, (2) refining recovery criteria, or (3) adding a species to a multispecies or ecosystem plan. An amendment can, therefore, efficiently balance resources spent on modifying a plan against those spent on managing implementation of ongoing recovery actions.

#### **METHODOLOGY USED TO COMPLETE THE RECOVERY PLAN AMENDMENT**

The recovery criteria were developed and reviewed by a group of individuals consisting of species experts, biologists, and botanists from New Mexico Energy, Minerals and Natural Resources Department, U.S. Forest Service, and the U.S. Fish and Wildlife Service (Service). The development process was informed by the best available science regarding species biology and current threats. The recovery criteria were designed to be objective and quantifiable, in order to meet the conditions needed to ensure species viability through sustainment of populations in the wild that demonstrate resiliency, redundancy, and representation.

#### **ADEQUACY OF RECOVERY CRITERIA**

Section 4(f)(1)(B)(ii) of the Endangered Species Act (Act) requires that each recovery plan shall incorporate, to the maximum extent practicable, "objective, measurable criteria which, when met, would result in a determination...that the species be removed from the list." Legal challenges to recovery plans (see *Fund for Animals v. Babbitt*, 903 F. Supp. 96 (D.D.C. 1995)) and a Government Accountability Audit (GAO 2006) also have affirmed the need to frame recovery criteria in terms of threats assessed under the five delisting factors.

#### **Recovery Criteria**

The following summarizes the current recovery criteria for the Holy Ghost Ipomopsis. For a detailed version of the criteria, please reference the 2002 Recovery Plan (USFWS 2002, pp. 18-22).

#### ***Downlisting Criteria***

The Holy Ghost Ipomopsis will be considered for downlisting when:

1. The Holy Ghost Canyon population has been maintained at an average of 2,000 plants per year.
2. Four additional populations in the upper Pecos Basin have been established.
3. A management plan to assure the continued survival of the species has been implemented.

#### ***Delisting Criteria***

Criteria for removing the Holy Ghost Ipomopsis from the Endangered Species list will be determined after further research provides more knowledge about long-term population viability.

#### **Synthesis**

Since the recovery plan was published in 2002, several studies and continual yearly monitoring have been conducted which have added greatly to our knowledge of this species (Sivinski and

Tonne 2005, 2006, 2007, 2008, 2009, 2010, 2011; Roth 2013, 2015a, 2015b, 2016). Field data from yearly monitoring have indicated that the method introduced in the 2002 Holy Ghost *Ipomopsis* Recovery Plan for estimating population numbers from transect survey data was inaccurate. The method suggested utilizing a standard multiplier based on an average ratio of rosettes to flowering plants to determine population numbers; however, recent data suggest that a multiplier based on the current year's ratio of rosettes to flowering plants would be more appropriate based on the large range of potential ratios (USFWS 2008). Therefore, the initial population value used to determine numbers needed for species recovery is most likely inaccurate.

In addition, the Holy Ghost Canyon population is increasingly confined to a narrow strip associated with Forest Road 122, leading to an even more limited distribution and increasing exposure to threats associated with road maintenance and recreation. Emerging threats since the time of listing include an increased forest canopy leading to high risk of catastrophic fire, the influx of invasive plants, and potential effects of climate change (e.g., increasing temperatures, increased periods of drought, habitat drying, etc.) (USFWS 2008). Therefore, the threats to this increasingly narrow endemic species have increased since time of listing and since the 2002 Holy Ghost *Ipomopsis* Recovery Plan was published.

#### **AMENDED RECOVERY CRITERIA**

Recovery criteria serve as objective, measurable guidelines to assist in determining when an endangered species has recovered to the point that it may be downlisted to threatened, or no longer meets the definition of an endangered or threatened species and may be delisted. Delisting is the removal of a species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Downlisting is the reclassification of a species from endangered to threatened. The term “endangered species” means any species (species, sub-species, or distinct population segment) which is in danger of extinction throughout all or a significant portion of its range. The term “threatened species” means any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

We provide both downlisting and delisting criteria for the Holy Ghost *Ipomopsis*, which will supersede those included in 2002 Holy Ghost *Ipomopsis* (*Ipomopsis sancti-spiritus*) Recovery Plan as follows:

#### **Downlisting Recovery Criteria**

The Holy Ghost *Ipomopsis* will be considered for downlisting when:

1. The Holy Ghost Canyon population is shown to be stable or improving over a 20-year period with at least 8,000 individuals (flowering adults) according to the following measures:
  - a) The Holy Ghost Canyon population has been designated as the core recovery population. The Holy Ghost Canyon population includes the natural population along Holy Ghost Canyon Road and any augmentation efforts within Holy Ghost Canyon which have resulted in successful reproductive exchange. This core population should be monitored yearly using annual demographic trend monitoring at representative sites to provide a population estimate based on methodology peer-

- reviewed by species experts and approved by the Service. The 20-year monitoring period will accommodate for periods of fluctuation in population size or years when monitoring may not be possible; this monitoring period may include any data that satisfies accepted monitoring techniques and analyses.
- b) Approximately every 5 years range wide and peripheral counts will be conducted using standardized methods peer-reviewed by species experts and approved by the Service.
  - c) Species presence and abundance is maintained with at least 8,000 individuals (flowering adults) within the core Holy Ghost Canyon population. The population shall be considered stable when a linear regression analysis (or other method which has been peer-reviewed by species experts and approved by the Service) of the population numbers estimated from the results of annual demographic monitoring reveals no significant decline in numbers.
  - d) A population viability analysis (PVA) (or other appropriate method which has been peer-reviewed by species experts and approved by the Service) will be conducted to determine the demographic parameters necessary to maintain a *resilient* population. A *resilient* population is one that is able to maintain approximately a 95% likelihood of persistence over a 100-year period (or other appropriate period of time which has been peer-reviewed by species experts and approved by the Service). Based on the PVA, the recovery criteria may be reassessed or adjusted to establish an accurate population number to achieve a resilient population, if necessary.

*Justification: These criteria establish a resilient core population which is able to withstand the threat of demographic and environmental stochasticity.*

- 2. At least four additional populations in the upper Pecos Basin, each with at least 800 individuals (flowering adults), have been established according to the following measures:
  - a) Maintain or increase suitable habitat within currently established population areas or identify additional suitable habitat in other areas.
  - b) Monitor these additional populations yearly for 20 years at representative sites to provide a population estimate based on methodology peer-reviewed by species experts and approved by the Service. The 20-year monitoring period will accommodate for periods of fluctuation in population size or years when monitoring may not be possible.
  - c) Species presence and abundance is maintained with at least 800 individuals within these additional populations. The populations shall be considered stable when a linear regression analysis (or other method which has been peer-reviewed by species experts and approved by the Service) of the population numbers estimated from the results of annual demographic trend monitoring reveals no significant decline in numbers.
  - d) A population viability analysis (PVA) (or other appropriate method which has been peer-reviewed by species experts and approved by the Service) will be conducted to

determine the demographic parameters necessary to maintain *resiliency* across these four populations. A *resilient* population is one that is able to maintain approximately a 95% likelihood of persistence over a 100-year period (or other appropriate period of time which has been peer-reviewed by species experts and approved by the Service). Based on the PVA, the recovery criteria may be reassessed or adjusted to establish an accurate population number to achieve a resilient population, if necessary.

*Justification: The criteria ensure redundancy through the establishment of at least four additional resilient populations of Holy Ghost Ipomopsis.*

3. Genetic diversity and structure will be maintained within the core Holy Ghost Canyon population of at least 8,000 individuals (flowering adults) and the additional populations within the upper Pecos Basin of at least 800 individuals (flowering adults) each, according to the following measures:
  - a) Any efforts undertaken to augment the Holy Ghost Canyon population will utilize standardized methods peer-reviewed by species experts and approved by the Service to maintain sufficient genetic diversity within the population to ensure population resiliency.
  - b) Any efforts undertaken to establish and/or augment the additional populations of Holy Ghost Ipomopsis outside of Holy Ghost Canyon will utilize standardized methods peer-reviewed by species experts and approved by the Service to maintain sufficient genetic diversity within and among those populations to ensure population resiliency.

*Justification: These criteria ensure genetic and ecological representation of Holy Ghost Ipomopsis across large portions of its range.*

4. The Holy Ghost Canyon and additional populations within the Upper Pecos Basin must be protected through the development and implementation of species-specific management recommendations that protect the species from identified threats.
  - a. These management recommendations should be developed in coordination with the Service and implemented by the appropriate land management entity.
  - b. These management recommendations should be periodically evaluated (i.e., at least every 2 years) to ensure effectiveness and success in protecting the species from identified threats.
  - c. In addition to this criterion, the designation of Holy Ghost Canyon as a Botanical Area, or other special management area, to highlight its unique botanical status should be considered as an added measure of protection for the habitat itself.

*Justification: These criteria will help ameliorate threats to the Holy Ghost Ipomopsis via management actions.*

#### **Delisting Recovery Criteria**

The Holy Ghost Ipomopsis will be considered for delisting when:

1. The Holy Ghost Canyon population is shown to be stable or improving over a 20-year period with at least 10,000 individuals (flowering adults) according to the following measures:
  - a) The Holy Ghost Canyon population has been designated as the core recovery population. The Holy Ghost Canyon population includes the natural population along Holy Ghost Canyon Road and any augmentation efforts within Holy Ghost Canyon which have resulted in successful reproductive exchange. This core population should be monitored yearly using annual demographic trend monitoring at representative sites to provide a population estimate based on methodology peer-reviewed by species experts and approved by the Service. The 20-year monitoring period will accommodate for periods of fluctuation in population size or years when monitoring may not be possible; this monitoring period may include any data that satisfies accepted monitoring techniques and analyses.
  - b) Approximately every 5 years, range wide and peripheral counts will be conducted using standardized methods peer-reviewed by species experts and approved by the Service.
  - c) Species presence and abundance is maintained with at least 10,000 individuals (flowering adults) within the core Holy Ghost Canyon population. The population shall be considered stable when a linear regression analysis (or other method which has been peer-reviewed by species experts and approved by the Service) of the population numbers estimated from the results of annual demographic monitoring reveals no significant decline in numbers.
  - d) A population viability analysis (PVA) (or other appropriate method which has been peer-reviewed by species experts and approved by the Service) will be conducted to determine the demographic parameters necessary to maintain a *resilient* population. A *resilient* population is one that is able to maintain approximately a 95% likelihood of persistence over a 100-year period (or other appropriate period of time which has been peer-reviewed by species experts and approved by the Service). Based on the PVA, the recovery criteria may be reassessed or adjusted to establish an accurate population number to achieve a resilient population, if necessary.

*Justification: These criteria allow for the threat of demographic and environmental stochasticity to be mitigated through the establishment of a resilient core population which is protected from random population fluctuations.*

2. At least four additional populations in the upper Pecos Basin are shown to be stable or improving over a 20-year period with at least 1,000 individuals (flowering adults) each according to the following measures:
  - a) Maintain or increase suitable habitat within currently established population areas and/or identify additional suitable habitat in other areas.
  - b) Monitor these additional populations yearly for 20 years at representative sites to provide a population estimate based on methodology peer-reviewed by species experts and approved by the Service. The 20-year monitoring period will

accommodate for periods of fluctuation in population size or years when monitoring may not be possible.

- c) Species presence and abundance is maintained with at least 1,000 individuals within each of these additional populations. The populations shall be considered stable when a linear regression analysis (or other method which has been peer-reviewed by species experts and approved by the Service) of the population numbers estimated from the results of annual demographic trend monitoring reveals no significant decline in numbers.
- d) A population viability analysis (PVA) (or other appropriate method which has been peer-reviewed by species experts and approved by the Service) will be conducted to determine the demographic parameters necessary to maintain *resiliency* across these four populations. A *resilient* population is one that is able to maintain approximately a 95% likelihood of persistence over a 100-year period (or other appropriate period of time which has been peer-reviewed by species experts and approved by the Service). Based on the PVA, the recovery criteria would be reassessed or adjusted to establish an accurate population numbers to achieve a resilient population, if necessary.

*Justification: The criteria ensure redundancy through the establishment of at least four additional resilient populations of Holy Ghost Ipomopsis.*

- 3. Genetic diversity will be maintained within the core Holy Ghost Canyon population of at least 10,000 individuals (flowering adults) and the additional populations within the upper Pecos Basin of at least 1,000 individuals (flowering adults) each, according to the following measures:
  - a) Any efforts undertaken to augment the Holy Ghost Canyon population will utilize standardized methods approved by the Service and peer-reviewed to maintain sufficient genetic diversity within the population to ensure population resiliency.
  - b) Any efforts undertaken to establish and/or augment the additional populations of Holy Ghost Ipomopsis outside of Holy Ghost Canyon will utilize standardized methods approved by the Service and peer-reviewed to maintain sufficient genetic diversity within and among those populations to ensure population resiliency.

*Justification: These criteria ensure genetic and ecological representation of Holy Ghost Ipomopsis across large portions of its range.*

- 4. The existing species-specific management recommendations (developed in coordination with the Service and implemented by the appropriate land management entity) should be proven effective and successful in protecting the species over the 20-year period required to reach delisting criteria described above. In addition, all land managing agencies will have developed a Post-Delisting Monitoring Plan (which has been approved by the Service's Southwest Regional Director) to cover a minimum of 5 years post-delisting of the species and be prepared to implement this plan prior to delisting to ensure the ongoing conservation of the listed species and the continuing effectiveness of management actions.

- a) In addition to this criterion, monitoring and research have been completed to conclude with a high degree of certainty that population sizes, quality, configuration, and management are adequate to provide a high probability of species survival (greater than 90 percent over 100 years).

*Justification: These criteria will help ensure the continued amelioration of threats to the Holy Ghost Ipomopsis via management actions.*

All classification decisions consider the following five factors: (1) is there a present or threatened destruction, modification, or curtailment of the species' habitat or range; (2) is the species subject to overutilization for commercial, recreational scientific or educational purposes; (3) is disease or predation a factor; (4) are there inadequate existing regulatory mechanisms in place outside the Act (taking into account the efforts by states and other organizations to protect the species or habitat); and (5) are other natural or manmade factors affecting its continued existence. When delisting or downlisting a species, we first propose the action in the *Federal Register* and seek public comment and peer review. Our final decision is announced in the *Federal Register*.

#### **Rationale for Recovery Criteria**

While some of the existing downlisting recovery criteria are objective and measurable, the targets set for recovery are inadequate based on recent trends and new information since the 5-year review in 2008, as well as imprecise population estimates used in the original recovery plan. Since that time, yearly monitoring and a 2015 census have been completed for the Holy Ghost Canyon population. From 2003-2008, an average of 703 total plants were counted per year. From 2008-2012, an average number of 484 total plants were counted per year, indicating a downward population trend. From 2013-2017, an average of 593 total plants were counted per year (Roth 2015a). While numbers since 2012 appear to be increasing, the population still remains below the average number of plants used for the most recent 5-year review (n=703) (USFWS 2008). The 2015 census documented 6,052 total plants in Holy Ghost Canyon, which is well above the estimate provided for the original downlisting criteria (Roth 2015b). However, with the evidence of a declining population trend based on yearly monitoring and the continued persistence of threats to the species, the original estimate provided for downlisting would not represent a viable population. In addition, the original delisting recovery criteria are not considered objective and measurable. These criteria refer to the need to conduct a population viability analysis to determine population numbers needed to achieve recovery. Thus, these criteria needed to be re-evaluated and amended accordingly based on the best available science.

In the development of these amended recovery criteria, we used the three conservation biology principles of resiliency, representation, and redundancy (Shaffer and Stein 2000, pp. 306-310). Briefly, resiliency supports the ability of the species to withstand environmental and demographic stochasticity; representation supports the ability of the species to adapt over time to long-term changes in the environment; and redundancy supports the ability of the species to withstand catastrophic events. The amended downlisting and delisting criteria number 1 are objective and measurable in relation to the concept of population resiliency. These criteria allow for the threat of demographic and environmental stochasticity to be mitigated through the establishment of a core population which is protected from random population fluctuations. The

population abundance values (8,000 for downlisting and 10,000 for delisting) indicated in the amended criteria reflect species experts' opinions on the number of individuals needed within the Holy Ghost Canyon population to establish population resiliency; these values are based on interpretations of data from the 2015 census and population trends observed from previous years of monitoring. Population persistence over time will be achieved via stable or increasing demographic trends. The amended downlisting and delisting criteria number 2 are objective and measurable in relation to the concept of population redundancy. The criteria ensure the establishment of at least four additional resilient populations of Holy Ghost Ipomopsis which will provide redundancy. Redundancy provides for security against extinction from catastrophic events that could impact a single population by ensuring that one or more additional resilient, representative populations persist. The population abundance values (800 for downlisting and 1,000 for delisting) indicated in the amended criteria reflect species experts' opinions on the number of individuals needed within each population to establish population resiliency; these values are based on interpretations of population trends observed from previous years of monitoring. The amended downlisting and delisting criteria number 3 are objective and measurable in relation to the concept of population representation. These criteria ensure that Holy Ghost Ipomopsis populations have genetic representation, while having Holy Ghost Ipomopsis across large portions of their range ensures ecological representation. Diversity within and among populations should confer populations, and the species, greater resistance to pathogens and parasites and greater adaptability to environmental stochasticity (random variations, such as annual rainfall and temperature patterns) and environmental changes. The amended downlisting and delisting criteria number 4 are objective and measurable in relation to the concept of threats management. These criteria will help ensure management actions which ameliorate recognized threats and help to sustain the Holy Ghost Ipomopsis in its natural habitat over a biologically meaningful timeframe within the conditions on the landscape and inherent biological limitations of the species.

Based on the best available information that includes the input and data from species experts during our recovery criteria review, these amended recovery criteria provide quantifiable measures for identifying and implementing recovery actions (developing the various methodologies stated in the amended recovery criteria), a means to measure progress towards recovery, and the ability to recognize when recovery will be achieved.

#### **ADDITIONAL SITE SPECIFIC RECOVERY ACTIONS**

Not applicable

#### **COSTS, TIMING, PRIORITY OF ADDITIONAL RECOVERY ACTIONS**

Not applicable

## LITERATURE CITED

- GAO (U. S. Government Accountability Office). 2006. Endangered Species: Time and Costs Required to Recovery Species are Largely Unknown. U. S. Government Accountability Office, Washington, District of Columbia.
- Shaffer M.L., and M.A. Stein. 2000. Safeguarding our precious heritage. In: Stein BA, Kutner LS, Adams JS, Editors. Precious heritage: the status of biodiversity in the United States. New York: Oxford University Press; 2000. pp. 301-321.
- Sivinski, R. and P. Tonne. 2005. 2004-2005 Progress Report (Section 6, Segment19) prepared by Robert Sivinski and Phil Tonne for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2005.
- Sivinski, R. and P. Tonne. 2006. 2005-2006 Progress Report (Section 6, Segment20) prepared by Robert Sivinski and Phil Tonne for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2006.
- Sivinski, R. and P. Tonne. 2007. 2006-2007 Progress Report (Section 6, Segment21) prepared by Robert Sivinski and Phil Tonne for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2007.
- Sivinski, R. and P. Tonne. 2008. 2006-2008 Progress Report (Section 6, Segment22) prepared by Robert Sivinski and Phil Tonne for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2008.
- Sivinski, R. and P. Tonne. 2009. 2006-2009 Progress Report (Section 6, Segment23) prepared by Robert Sivinski and Phil Tonne for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2009.
- Sivinski, R. and P. Tonne. 2010. 2009-2010 Progress Report (Section 6, Segment24) prepared by Robert Sivinski and Phil Tonne for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2010.
- Sivinski, R. and P. Tonne. 2011. 2010-2011 Progress Report (Section 6, Segment25) prepared by Robert Sivinski and Phil Tonne for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2011.
- Roth, D. 2013. 2012 Recovery Summary Report (Section 6, Segment 27) prepared by Daniela Roth for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2013.
- Roth, D. 2015a. 1996-2014 Recovery Summary Report (Section 6, Segment 28) prepared by Daniela Roth for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2015.

Roth, D. 2015b. 2015 Holy Ghost Ipomopsis Survey Report- Phase I, Holy Ghost Canyon prepared by Daniela Roth for U.S. Forest Service R2- Regional Office. Albuquerque, New Mexico.

Roth, D. 2016. 1996-2015 Recovery Summary Report (Section 6, Segment 28) prepared by Daniela Roth for U.S. Fish and Wildlife Service, Region 2. Albuquerque, New Mexico. 30 September 2016.

U.S. Fish and Wildlife Service. 2002. Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*) Recovery Plan. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 51 pp.

U.S. Fish and Wildlife Service. 2008. Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*) 5-Year Review. U.S. Fish and Wildlife Service, Albuquerque, New Mexico. 15 pp.

## APPENDIX A – SUMMARY OF PUBLIC, PARTNER, AND PEER REVIEW COMMENTS RECEIVED

### Summary of Public Comments

The Service published a notice of availability in the *Federal Register* on January 31, 2019 (84 FR 790-795) to announce that the amendment for the Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*) Recovery Plan (Recovery Plan) was available for public review, and to solicit comments by the scientific community, State and Federal agencies, Tribal governments, and other interested parties on the general information base, assumptions, and conclusions presented in the draft amendment. An electronic version of the draft Recovery Plan amendment was also posted on the Service's Species Profile website (<https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=8231>).

We also developed and implemented an outreach plan that included (1) publishing a news release on our national webpage (<https://www.fws.gov/news/>) on January 30, 2019, (2) sending specific notifications to Congressional contacts in Districts (include appropriate Districts, consult the corresponding Outreach Plan or contact your Regional Public Affairs Officer for more information), and (3) sending specific notifications to key stakeholders in conservation and recovery efforts. These outreach efforts were conducted in advance of the *Federal Register* publication to ensure that we provided adequate notification to all potentially interested audiences of the opportunity to review and comment on the draft amendment.

The Service received six responses to the request for public comment. These included comments from interested citizens, State and Federal agencies, the Center for Biological Diversity, and the Energy and Wildlife Action Coalition.

Public comments ranged from providing minor editorial suggestions to specific recommendations on the amendment content. We have considered all substantive comments; we thank the reviewers for these comments and to the extent appropriate, we have incorporated the applicable information or suggested changes into the final Recovery Plan amendment. In general, these comments did not lead to significant changes in the draft amendment. Below, we provide a summary of public comments received; however, some of the comments that we incorporated as changes into the Recovery Plan amendment did not warrant an explicit response and, thus, are not presented here.

*Comment (1):* Concern that, “criteria are being added in the absence of any scientific peer review and that this will lead to a failure on the Service’s part to follow the best-available science.”

*Response:* Peer review was conducted following the publication of the Notice of Availability, and in accordance with the requirements of the Endangered Species Act (Act). Below we provide a detailed summary of peer review comments and our responses, where appropriate.

*Comment (2):* Concern that, “the decision to update recovery criteria for these 42 species as a group is indicative of the Service moving away from utilizing recovery teams and outside scientific expertise.”

*Response:* Section 4 of the Act provides the Service with the authority and discretion to appoint recovery teams for the purpose of developing and implementing recovery plans. The current effort to update recovery plans with quantitative recovery criteria for what constitutes a recovered species is not indicative of the future need for, and does not preclude the future utilization of, recovery teams to complete recovery planning needs for listed species.

*Comment (3):* New and significant information has been developed in the years since the existing Recovery Plan was adopted. Updating this plan can serve to better inform the Service, the regulated community, and Federal, State, and local resource agencies.

*Response:* A recovery plan should be a living document, reflecting meaningful change when new substantive information becomes available. Keeping a recovery plan current increases its usefulness in recovering a species by ensuring that the species benefits through timely, partner-coordinated implementation based on the best available information.

*Comment (4):* The Service should consider whether the updated recovery criteria would be less burdensome on Federal agencies and the regulated community than the existing criteria.

*Response:* Recovery plans are guidance documents that outline how best to help listed species achieve recovery, but they are not regulatory documents. Recovery plans are intended to establish goals for long-term conservation of listed species and define criteria that are designed to indicate when the threats facing a species have been removed or reduced to such an extent that the species may no longer need the protections of the Act.

Recovery criteria are achieved through the funding and implementation of recovery actions by both the Service and our partners. In addition to the existing recovery actions included in each of these recovery plans, the amendments address the need for any new, site-specific recovery actions triggered by the modification of recovery criteria, along with the costs, timing, and priority of any such additional actions. Because recovery plans are not regulatory documents, identification of an action to be implemented by any public or private party does not create a legal obligation beyond existing legal requirements. Nothing in a recovery plan should be construed as a commitment or requirement that any Federal agency obligate or provide funds.

*Comment (5):* The Service should consider whether the recovery criteria are achievable, because including unattainable recovery criteria could render such plans meaningless, or impede other processes under the Act.

*Response:* The National Marine Fisheries Service and U.S. Fish and Wildlife Service Interim Endangered and Threatened Species Recovery Plan Guidance (2010) emphasizes the development of recovery criteria that are specific, measurable, achievable, realistic, and time-referenced (SMART). The achievable component of SMART criteria implies that the authority, funding, and staffing needed to meet recovery criteria are feasible, even if not always likely. In developing recovery criteria specifically, we attempt to establish criteria that are both scientifically defensible and achievable to the greatest extent possible. At times, however, the feasibility of achieving certain criteria can be, or appear to be, constrained by the particular, difficult circumstances that face a species. Even in such cases, criteria serve to guide recovery

actions and priorities for the species. Furthermore, as recovery progresses, periodic reevaluation of the species status through the 5-year review process may reveal that the barriers to achieving certain criteria have been removed or that circumstances or our understanding of the species have evolved. In that event, the Service can revise recovery criteria to ensure that they reflect the strategy most likely to succeed in the goal of recovery.

*Comment (6):* The Service should consider conservation efforts that have been put into place for the listed species since the previous iteration of the recovery plan, especially where the Service has supported conservation efforts, in formulating recovery criteria that will be established or amended by the revised draft plan.

*Response:* While section 4 of the Act directs the Service to specifically develop and implement recovery plans, several other sections of the Act and associated programs and activities also provide important opportunities to promote recovery. Information from these programs and activities about the biological needs of the species can inform recovery planning (including the formulation or revision of recovery criteria) and implementation. These conservation efforts have been considered during the development of this and other recovery plans.

*Comment (7):* The Service should determine whether ongoing species conservation efforts beneficially address one or more of the listing factors set forth in the Act implementing regulations addressing species listings and designation of critical habitat.

*Response:* All Service decisions that affect the listed status or critical habitat designation of a particular species, including our 5-year review of each listed species, are made by analyzing the five factors described in section 4 of the Act. Such an analysis necessarily includes an assessment of any conservation efforts or other actions that may mitigate or reduce impacts on the species. While our objective with this particular effort was to establish objective, measurable criteria for delisting, conservation actions play a crucial role in determining if and when those criteria have been satisfied.

*Comment (8):* The Service should be mindful of the impacts that recovery plan criteria can have on the section 7 process of the Act for the regulated community, because the Service and other Federal resource agencies sometimes request that recovery criteria be addressed in biological assessments and other planning processes under the Act addressing listed species.

*Response:* Recovery plans can both inform, and be informed by section 7 processes of the Act. When revising a recovery plan, existing section 7 consultations may provide helpful information on: recent threats and mechanisms to avoid, minimize, or compensate for impacts associated with those threats; a summarized status of the species; and indication of who important partners may be. Section 7 consultations can inform the need for revised recovery actions, recovery implementation schedule activities, recovery criteria, or species status assessments to provide more comprehensive recovery planning while the species remains listed.

*Comment (9):* The Service should include the full panoply of current information available for the species in all revised draft recovery plans.

*Response:* Our recovery planning guidance recommends that recovery planning be supported by compilation of available information that supports the best possible scientific understanding of the species. Although it is not necessary to exhaustively include all current information within the text of the recovery plan, to the extent that this information is specifically relevant and useful to recovery, the recovery plan may summarize such material or incorporate it by reference. Supporting biological information may also be included within a species status assessment or biological report separate from the recovery plan document itself.

*Comment (10):* The Service should consider whether the existing recovery plan should be revised or replaced in its entirety rather than amended in part.

*Response:* Under guidance established in 2010, partial revisions allow the Service to efficiently and effectively update recovery plans with the latest science and information when a recovery plan may not warrant the time or resources required to undertake a full revision of the plan. To further gauge whether we had assembled, considered, and incorporated the best available scientific and commercial information into this recovery plan revision, we solicited submission of any information, during the public comment period, that would enhance the necessary understanding of the species' biology and threats, and recovery needs and related implementation issues or concerns. We believe the recovery plan amendment, which targets updating recovery criteria, is appropriate for the species. However, we will also continue to evaluate the accuracy and usefulness of the existing recovery plan with respect to current information and status of conservation actions, and may pursue a full revision of the plan in the future, if appropriate.

*Comment (11):* Comment regarding the need to only include plants that have flowered as part of the abundance criteria for recovery. Comment also noted that much greater research and establishment of additional populations is needed in order to ensure protection and survival for the species.

*Response:* This comment is very well justified. In response, we changed the recovery criteria in order to define the term "individuals" to mean "flowering adults". We have also included recovery criteria which stress the need for additional research and establishment of additional populations. Further research is needed in order to determine the stage of the life cycle that is most affected by the current threats as well as which stage of the life cycle is most limiting in the growth and recovery of the species; the establishment of additional populations was not only included in the original recovery plan but it is required for the recovery of the species due to the assumed continuing presence of threats at the population's natural location and in order for a viable population to be obtained. While we are uncertain of the extent of the species' historic range, the establishment of additional populations outside of Holy Ghost canyon will serve to increase species resiliency and ensure we have adequate genetic representation for the species.

*Comment (12):* Comment regarding specifying the term "individuals" which is used throughout the recovery criteria. Comment also requested a justification for the number values in the recovery criteria.

*Response:* The comment regarding specifying the term “individuals” is well justified. As indicated above, we have changed the recovery criteria in order to define the term “individuals” to mean “flowering adults”. The justification for the number values chosen within the recovery criteria is provided within the “Rationale for Recovery Criteria” section of the amendment.

*Comment (13):* Comment regarding the need to specify that management recommendations should be in the form of a management plan. Comment also suggested that these management actions should be proven effective and successful in protecting the species.

*Response:* Comment regarding the effectiveness and success of these management recommendations is well justified. In response, we have added language to clarify who should develop and implement these management recommendations, as well as the need for evaluation of those recommendations to ensure effectiveness and success in protecting the species. Comment on the need to include a management plan is noted. While the sentiment of this comment is understood, the term “management recommendations” will remain and is intended to provide the flexibility to incorporate these recommended actions into a variety of different applicable documents which will guide the management and recovery of the species.

*Comment (14):* Comment on the need for a more comprehensive review of the species prior to finalizing the proposed amendment.

*Response:* Comment is noted. We elicited species’ experts’ opinions during the development of these criteria, along with eliciting peer review of the proposed amendment. A comprehensive review of the species was beyond the scope of this particular action and will be completed in the future, most likely in conjunction with a five-year status review.

### **Summary of Peer and Partner Review Comments**

In accordance with the requirements of the Act, we solicited independent peer review of the draft amendment from the U.S. Forest Service and the New Mexico Energy, Minerals, and Natural Resources Department; academic and scientific groups and individuals; and any other party that may have possessed pertinent information. Peer review was conducted concurrent with the *Federal Register* publication. Criteria used for selecting peer reviewers included their demonstrated expertise and specialized knowledge related to the Holy Ghost Ipomopsis (*Ipomopsis sancti-spiritus*) and endemic botanicals. The qualifications of the peer reviewers are in the decision file and the administrative record for this Recovery Plan amendment.

In total, we solicited review and comment from 6 peer reviewers and 1 partner reviewers. We received comments from 2 peer reviewers and no partner reviewers. Peer reviewers that responded were from one Federal agency (U.S. Forest Service) and one State agency (New Mexico Energy, Minerals, and Natural Resources Department). In general, the draft amendment was well-received by the peer and partner reviewers and garnered positive comments. Several reviewers provided additional specific information, including documents or citations; we thank the reviewers for these data and we have added the information where appropriate.

We considered all substantive comments, and to the extent appropriate, we incorporated the applicable information or suggested changes into the final Recovery Plan amendment. Below,

we provide a summary of specific comments received from peer and partner reviewers with our responses; however, we addressed many of the reviewers' specific critiques and incorporated their suggestions as changes to the final amendment. Such comments did not warrant an explicit response, and as such, are not addressed here. We appreciate the input from all commenters, which helped us to consider and incorporate the best available scientific and commercial information during development and approval of the final Recovery Plan amendment.

*Peer Review Comment (1):* Comment regarding specifying the term “individuals” which is used throughout the recovery criteria. Comment suggested that “individuals” should be defined as “flowering adults” since many rosettes do not survive until adulthood in order to contribute to the population.

*Response:* As explained above, we have changed the recovery criteria in order to define the term individuals to mean “flowering adults”.

*Peer Review Comment (2):* Comment regarding specifying the term “range wide and peripheral” which is used within downlisting and delisting recovery criteria 1.

*Response:* While we understand the desire to have these terms defined within the recovery criteria, the intent of this criteria is to allow for the development of a survey/monitoring methodology in coordination with species experts. We intend for these terms to be defined during the development of this protocol; therefore, we are not defining those terms within the recovery criteria themselves.

*Peer Review Comment (3):* Comment regarding specifying who should create the management recommendations referenced within downlisting and delisting recovery criteria 4, in addition to a suggestion to elaborate on this particular criterion.

*Response:* We have added language to the recovery criteria to clarify how the development of these recommendations should be coordinated and the entity that should implement the management recommendations.

*Peer Review Comment (4):* Comment regarding specifying the term “individuals” which is used throughout the recovery criteria. Comment also requested a justification for the number values in the recovery criteria.

*Response:* As indicated in the response to peer review comment 1 above, we have changed the recovery criteria in order to define the term “individuals” to mean “flowering adults”. The justification for the number values chosen within the recovery criteria is provided within the “Rationale for Recovery Criteria” section of the amendment.

*Peer Review Comment (5):* Comment regarding the highly controversial nature of population viability analysis (PVA) and the inclusion of the completion of a PVA within downlisting and delisting recovery criteria 1.

*Response:* We understand that population viability analysis can be highly controversial and are highly dependent on the collection of appropriate data often over a long time frame. For this reason, we have included the option of using another appropriate methodology to assess population resiliency within the recovery criteria. This will allow the Service to coordinate with species experts to determine the most appropriate means to evaluate the status of the population and its future needs.

*Peer Review Comment (7):* Comment regarding the need to specify that management recommendations should be in the form of a management plan, preferably an integral part of the Forest Management Plan. Comment also suggested that these management actions should be proven effective and successful in protecting the species.

*Response:* We have added language to clarify who should develop and implement these management recommendations, as well as the need for evaluation of those recommendations to ensure effectiveness and success in protecting the species. While the sentiment of this comment is understood, the term “management recommendations” will remain and is intended to provide the flexibility to incorporate these recommended actions into a variety of different applicable documents which will guide the management and recovery of the species.

*Peer Review Comment (8):* Comment regarding the need to extend the length of time for the post-delisting monitoring plan from 5 years to at least 10 years.

*Response:* The Endangered Species Act requires a minimum timeframe of 5 years for post-delisting monitoring. We will consider a longer period if appropriate, at the time a post-delisting monitoring plan is developed.

*Peer Review Comment (9):* Comment on the need for a more comprehensive review of the species prior to finalizing the proposed amendment.

*Response:* A comprehensive review of the species was beyond the scope of this particular action and will be completed in the future, most likely in conjunction with a five-year status review.

*Peer Review Comment (10):* Comment regarding the unnecessary constraint that may be placed on recovery through the incorporation of management recommendations which are “consistent with land uses in the area”.

*Response:* We have removed this qualifier from the recovery criteria as it is not necessary for the intent of the recovery criteria to be met.