RECOVERY OUTLINE

Pagosa skyrocket
(*Ipomopsis polyantha*)

Western Colorado Ecological Services Field Office

January 2013

Photos by E. Mayo, U.S. Fish and Wildlife Service

I. INTRODUCTION

This document provides an overview of the known information for Pagosa skyrocket (*Ipomopsis polyantha*) and serves to guide recovery efforts and inform consultation and permitting activities until a comprehensive recovery plan for the species is approved.

LISTING AND CONTACT INFORMATION:

Scientific Name:	*Ipomopsis polyantha*
Common Name:	Pagosa skyrocket
Listing Classification:	Endangered rangewide
Effective Listing Date:	August 26, 2011 (76 FR 45054)
Proposed Designation of Critical Habitat:	July 27, 2011 (76 FR 45078)
Final Designation of Critical Habitat:	August 13, 2012 (77 FR 48368)
Lead Agency, Region:	U.S. Fish and Wildlife Service, Region 6
Lead Field Office:	Western Colorado Field Office
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II. RECOVERY STATUS ASSESSMENT

A. BIOLOGICAL ASSESSMENT

Taxonomy

Pagosa skyrocket (*Ipomopsis polyantha*) is a rare plant endemic to shale outcrops in and around the Town of Pagosa Springs in Archuleta County, Colorado. The species is in the Polemoniaceae (phlox) family and was originally described by Rydberg (1904, p. 634) as *Gilia polyantha.* Two varieties, *G. polyantha* var. *brachysiphon* and *G. polyantha* var. *whitingii*, were recognized by Kearney and Peebles (1943, p. 59). Grant (1956, p. 353) moved the species into the genus *Ipomopsis.* Currently available information indicates that *I. polyantha* is a distinct species (Porter and Johnson 2000, p. 76; Porter *et al.* 2010, pp. 195, 196, 199). It is treated as such in the PLANTS database (USDA, Natural Resource Conservation Service (NRCS) 2003), and in the Integrated Taxonomic Information System (2001). Reports of this species occurring in Arizona and New Mexico by the PLANTS National Database and State floras actually pertain to the two species that were formerly treated as varieties of *Ipomopsis polyantha* (Anderson 2004, pp. 11, 15).

Description, Habitat, and Life History

Pagosa skyrocket is an herbaceous biennial 12 to 24 inches (in) (30 to 60 centimeters (cm)) tall, branched from near the base above the basal rosette of leaves. Deeply divided leaves with linear segments are scattered up the stem. Stems and flower clusters are covered with glandular hairs. Flower clusters are along the stem in the axils of the leaves as well as at the top of the stem. The white flowers are 0.4 in (1 cm) long, with short corolla tubes 0.18 to 0.26 in (0.45 to 0.65 cm) long, and flaring corolla lobes flecked with purple dots (Anderson 1988, p. 3). These dots are often so dense that they give the flower a pinkish or purplish hue. The stamens extend noticeably beyond the flower tube, and the pollen is blue (Grant 1956, p. 353), changing to yellow as it matures (Collins 1995, p. 34). Seeds form a mucilaginous (secreting sticky mucous) coat after they are wet. Seeds germinate much faster in Mancos Shale soil than in potting soil (Collins 1995, p. 72). Mature seeds germinate to form rosettes that produce flowering stalks during the next growing season, or they may persist as rosettes for a year or more until conditions are right for flowering. Plants produce abundant fruits and seeds, but have no known mechanism for long-distance dispersal (Collins 1995, pp. 111–112). After seeds are mature, the plants dry up and die. We do not know how long the seeds remain viable.

Pollination by bees is the most common means of reproduction for Pagosa skyrocket, and the primary pollinators are the honey bee (*Apis mellifera*), metallic green bee (*Augochlorella* spp.), bumble bee (*Bombus* spp.), and digger bee (*Anthophora* spp.) (Collins 1995, pp. 71–72). Although *I. polyantha* is somewhat self-compatible, reproductive output is much greater when plants are outcrossed [by pollinators] (Collins 1995, pp. 45, 99).

Pagosa skyrocket is limited to Pagosa-Winifred soils derived from Mancos Shale. The soil pH is nearly neutral to slightly alkaline (6.6 to 8.4). The elevation range is 6,400 to 8,100 feet (1,950 to 2,475 meters) (Service 2011c, p. 1). Plants occur in discontinuous colonies as a pioneer species on open shale or as a climax species along the edge of Ponderosa pine (*Pinus ponderosa*), mixed Ponderosa pine and Rocky mountain juniper (*Juniperus scopulorum*), or Utah juniper (*Juniperus. osteosperma*) and Gambel oak (*Quercus gambellii*) forested areas. In 1988, Anderson (p. 7) reported finding the highest densities under Ponderosa pine forests with montane grassland understory. Now the species is found mostly on sites that are infrequently disturbed by grazing, such as road right-of-ways that are fenced from grazing (as opposed to open range), lightly grazed pastures, and undeveloped lots (Anderson 2004, p. 20).

Distribution, Abundance, and Trends

The two known occurrences of Pagosa skyrocket are within about 13 miles (mi) (21 kilometers (km)) of each other, and collectively occupy about 388.4 acres (ac) (157.1 hectares (ha)) of habitat within a range that includes about 6.5 square mi (16.8 square km). The Pagosa Springs occurrence is southeast of the Town of Pagosa Springs along both sides of U.S. 84. Occupied habitat extends southward on the highway right-of-way for 3 mi (4.8 km) from the intersection with U.S. 160, and on private lands on both sides of the highway. The Dyke occurrence is about 10 mi (16 km) west of Pagosa Springs

along U.S. Highway 160. It includes 0.5 mi (0.8 km) of highway right-of-way on both sides of U.S. 160, adjacent private lands, and a BLM parcel. Species occurrences are further described in the June 23, 2010, proposed rule to list the species (75 FR 35721). Table 1 summarizes land ownership and results of the most recent plant counts reported within the two Pagosa skyrocket occurrences.

Table 1. Occupied habitat and estimated number of plants for Pagosa skyrocket by land ownership. (acres (ac) (hectares (ha)) (Lyon 2006; CNAP 2007; CNAP 2008, pp. 1-5; CNHP 2010a, pp. 1-8; CNHP 2010b, pp. 1-5; Service 2011a, p. 2; Service 2011b, p. 1; *Ecosphere 2012, p. 27)

Occurrence	Land Ownership	ac (ha)	Flowering	Rosettes
Pagosa Springs including Mill Creek	CDOT right-of-way	37 (15)	3,029	3,083
	Archuleta County *	66 (27)	2,014,667	1,582,953
	County right-of-way	5 (2)	469	403
	Town of Pagosa Springs	0.002 (.0008)	126	15
	Private	290 (117)	158,326	174,989
	Subtotals	**398 (161)**	**2,176,617**	**1,761,443**
Dyke	CDOT right-of-way	2.3 (1)	19	102
	BLM	9.8 (4)	88	164
	Private	34 (14)	163	275
	Subtotals	**46 (18)**	**270**	**541**
	Totals	**445 (180)**	**2,176,887**	**1,761,984**

In 2004, the total estimate of flowering plants throughout the entire range of the species was 2,246 to 10,526 (Anderson 2004, p. 40). Plant surveys from 2005 to 2007 increased the documented number of flowering individuals and rosettes within the Pagosa Springs occurrence at two sites on private land and on the U.S. 84 right-of-way (CNAP 2007, pp. 1–2). In 2011, a dense population was documented on previously unsurveyed county land. These occupied habitats include areas that have been grazed or bladed in the past, illustrating the species' ability to colonize barren Mancos Shale soil [where there is a seed source], and demonstrating the reproductive success of the species. Currently, the total estimate of flowering plants is 2,176,887 (see Table 1 above). The trend in the species' status since 1988 is one of fluctuating population size that is typical of biennial species. Several hundred plants have been lost due to development on private lands. Plants receive virtually no protections on the privately owned or local government lands, which contain about 89 percent of the occupied habitat for the skyrocket.

Critical Habitat

Four units of critical habitat have been designated for Pagosa skyrocket (77 FR 48368 August 13, 2012). The Pagosa Springs unit includes the core population with the most habitat, plants, and threats. The Dyke population is a separate critical habitat unit. Two

units of suitable but unoccupied habitat on Forest Service lands are included to provide augmentation sites for introduced populations that would be under Federal protection. The total area of designated critical habitat for this species is 9,641 ac (3,902 ha).

B. VULNERABILITY AND THREATS ASSESSMENT

The present and threatened destruction, modification, and fragmentation of Pagosa skyrocket habitat from commercial, municipal, agricultural, and residential development is the primary threat to the species. This includes associated new utility installations, construction of new access roads and bike paths, competition from introduced roadside grasses, and other impacts on highway right-of-ways. These impacts pose significant and imminent threats to the species throughout its range (76 FR 45060).

Development

Archuleta County plans to build a sports/recreation complex on a 95 ac (38 ha) parcel that supports a high density of skyrocket plants (Ecosphere 2012, pp. 25-27). These plants represent about 90 percent of the total population, on about 10 percent of the total occupied habitat. The draft development plan to date shows that the most desirable sites for buildings, parking lots, and ball fields are the same sites that have the highest density of plants. The plan allows open space for the plants only in fragmented areas where there is less suitable habitat.

About 89 percent of the known occupied habitat is on non-federal lands, which support nearly 99 percent of the plants.

Ongoing impacts to the 10 percent of occupied habitat that occurs on the state and county highway right-of-ways include utilities installations and maintenance, road widening, and new intersections. Activities that sometimes occur on highway right-of-ways without Colorado Department of Transportation (CDOT) approval include weed control, mowing, and planting of smooth brome grass and other competitive species following ground disturbance. These activities may affect less than 1 percent of the total plant population.

Livestock

Destruction of flowering plants, rosettes, and seeds due to livestock use is a significant and ongoing impact on about 51 percent of the occupied habitat (76 FR 45060).

Regulatory mechanisms

Existing regulatory mechanisms do not adequately address the primary threats to the species (76 FR 45061). The town and county zoning regulations make no provisions that could serve to protect the species. Instead, development for municipal, residential and commercial use is encouraged as a boost for the local economy.

Other factors

The natural and human-caused factors of specific soil and germination requirements, fragmented habitat, effects of drought and climate change, and lack of proven methods for propagation and reintroduction present an imminent and moderate degree of threat to Pagosa skyrocket across the entire range of the species. These factors make the species highly vulnerable to the ongoing threats from development (76 FR 45062).

C. CONSERVATION ASSESSMENT

Denver Botanic Gardens (DBG) researchers collected 234 seeds from 4 locations in the Pagosa Springs population in 2012. Ten percent of the seeds will be germinated and transplanted at DBG, 90 percent will be deposited at the National Center for Genetic Resources Preservation for long term storage (Goshorn 2012, pers. comm.).

One landowner has installed a fence to protect plants from trespass cattle, with assistance from the Service's Partners for Fish and Wildlife Program. The protected area includes fewer than 35 acres with less than 1 percent of the total Pagosa Springs plant population.

Another private landowner is working with the Service to consider a conservation easement that would protect about 24 percent of the known occupied habitat in the Pagosa Springs population.

The Colorado Department of Transportation (CDOT) has an agreement with the Service to implement conservation measures for the skyrocket on the right-of-ways along highways 84 and 160, which support less than 1percent of the plants on 9 percent of the habitat (CDOT 2012, p. 1)). CDOT has refrained from mowing these right-of-ways for about seven years. In 2012, CDOT requested formal consultation with the Service on a Highway 160 widening project that resulted in purchase of a 7 ac (2.833 ha) conservation easement for occupied critical habitat on adjacent private land as mitigation for occupied habitat on the adjacent right-of-way. About 12 plants will be lost along the right-of-way; the new easement adjoins the BLM occupied habitat.

D. SUMMARY STATEMENT OF RECOVERY NEEDS

Recovery needs for Pagosa skyrocket include: (1) surveys and monitoring to accurately document populations, suitable habitat, and impacts; (2) protection and restoration of habitat, including pollinator habitat and corridors to provide connectivity; (3) protection of individual plants and populations from direct and indirect threats; and (4) seed collection, propagation, and transplanting of new rosettes.

III. PRELIMINARY RECOVERY STRATEGY

A. RECOVERY PRIORITY NUMBER WITH RATIONALE

The Pagosa skyrocket is currently assigned a recovery priority of 8C. This ranking recognizes that:

(1) The Pagosa skyrocket is a distinct species;

(2) It faces a moderate degree of threat;
(3) It has a high potential for recovery; and
(4) It is in conflict with development activities or other forms of economic activities.

The moderate degree of threat is linked to the species' occurrence within a limited range, the threat of habitat destruction due to development, and inadequacy of existing regulatory mechanisms. Recovery potential is high because of the potential for protection of existing populations on private lands, discovering new populations, and introducing populations on Federal lands where they would have a higher level of protection. Further information from future studies of seed banks, reintroduction protocols, pollinator biology, rangewide surveys, and long-term demographic and monitoring studies, could influence the recovery priority number. Therefore, this recovery priority number will be reviewed during the upcoming recovery planning process by the Service and as new data are made available.

B. RECOVERY VISION

We envision recovery for the Pagosa skyrocket to include sizable, stable populations maintained on conserved suitable habitat, with acceptable levels of connectivity between subpopulations for pollinator movement, gene flow, and seed dispersal. Populations will be maintained to provide sufficient representation, resiliency, and redundancy to ensure a high probability of survival for the foreseeable future. Seeds will be collected for long term storage and for propagation. New populations will be introduced on Forest Service lands that have been designated as critical habitat for this purpose. Meeting these goals will require that threats be sufficiently understood and abated, propagation and transplant protocols developed, and range-wide monitoring established.

C. INITIAL ACTION PLAN

Surveys and Monitoring

- Complete a comprehensive plant survey throughout the species' range. Survey results should provide an accurate population estimate and allow us to identify core population areas so we can more effectively protect the species and locate possible population connectivity corridors. Surveys are ongoing on federal lands and highway right-of-ways, county and town lands, a few large private properties, and very few small private parcels.
- Continue ongoing monitoring efforts and expansion of monitoring to include a larger and more representative sample of occupied sites. These data should improve our understanding of population trends.
- Monitor the success of propagated, outplanted rosettes to determine the best methods for introducing plants into suitable habitat.

Protect, restore, and expand habitat for plants and pollinators

- Identify sites in urgent need of habitat protection, set protection priorities, and work with public and private landowners to develop and implement conservation measures to minimize impacts of development projects and land uses.

- Establish permanent conservation easements or acquire land to protect key occurrences of the species on private land.
- Develop guidelines for mitigation of plants and habitat loss due to development where impacts cannot be avoided or minimized.
- Coordinate with land management agencies, project proponents, and other partners early in the planning process to limit direct and indirect impacts of planned activities.
- Work with landowners to develop a conservation bank for mitigation of habitat loss due to development.
- Improve resiliency by collecting and storing seeds and increasing the number of populations using controlled propagation (65 FR 56916). Although transplanting of existing rosettes is discouraged because the success rate is low, propagation of seeds and introduction of rosettes into protected unoccupied critical habitat [such as the Forest Service land] can expand the extent of distribution for the species.
- Salvage seeds from plants and soil where destruction of habitat cannot be avoided; use them for propagation.
- Work with CDOT to implement best management practices for highway right-of-ways

Research

- Identify potential reintroduction sites in designated critical habitat areas on public and private lands.
- Develop and implement effective propagation methods and outplanting protocol.
- Manage and monitor introduced populations.
- Continue research into Pagosa skyrocket life history and ecology, including pollinators, seed bank, rosette persistence, and response to habitat disturbance.
- Study population dynamics and conduct a population viability analysis.
- Encourage investigations that project the species' vulnerability and response to climate change.
- Improve our understanding of livestock grazing impacts on Pagosa skyrocket.

IV. PREPLANNING DECISIONS

A. PLANNING APPROACH

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

Plan preparation will be under the stewardship of the Western Colorado Ecological Services Field Office. At the present time, this species does not warrant the appointment of a recovery team. The Service will coordinate recovery efforts with an informal network of technical experts and involved parties (see Stakeholder Involvement below). A recovery team may be formally appointed if deemed necessary. Periodically, meetings among these parties may be convened for the purpose of sharing information and ideas about advancing Pagosa skyrocket recovery.

B. INFORMATION MANAGEMENT

General

All information relevant to recovery of Pagosa skyrocket will be housed in administrative files in our Western Colorado Ecological Services Field Office in Grand Junction, Colorado. Botanists at this office will be responsible for maintaining the official record for the recovery planning and implementation process. Copies of new study findings, survey results, records of meetings, comments received, and other relevant information should be forwarded to this office (see Listing and Contact Information section above).

Reporting Requirements

Information needed for annual accomplishment reports, the Recovery Report to Congress, expenditures reports, and implementation tracking should be forwarded to this office (see Listing and Contact Information section above). 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 funding being available to complete the recovery planning process:

Internal review draft:	June 2013
Public review draft:	October 2013
Public comment period ends:	January 2014
Final recovery plan:	April 2014

D. STAKEHOLDER INVOLVEMENT IN THE RECOVERY PROCESS

Stakeholders

- Public land managers with Pagosa skyrocket on their lands, including representatives of BLM and the Forest Service (San Juan Public Lands Offices), Archuleta County, and the Town of Pagosa Springs
- State agencies including the Colorado Natural Areas Program and the State Land Board
- The Colorado Natural Heritage Program

- Colorado Department of Transportation
- Private landowners with Pagosa skyrocket habitat on their lands
- Public utilities such as La Plata Electric
- Individuals with cattle grazing leases containing Pagosa skyrocket habitat
- Academic and Federal researchers and species experts, including Denver Botanic Gardens
- Southern Ute Tribal representatives
- Nongovernmental organizations including the Colorado Rare Plant Conservation Initiative, The Nature Conservancy, Rocky Mountain Wild, the Colorado Native Plant Society and Land Trusts (Neely 2011, pp. 1-24)
- Environmental consultants – Ecosphere, SME and others
- USDA Natural Resources Conservation Service
- USFWS Partners for Fish and Wildlife

Stakeholder Involvement Strategy

- Inform stakeholders of the critical habitat designation for Pagosa skyrocket.

- Inform landowners of potential habitat on their lands and request permission to conduct surveys for plants.

- Seek opportunities for conservation agreements, easements, and land acquisition.

- Develop conservation and mitigation measures for highway rights of way with CDOT.

- Work with Archuleta County and the Town of Pagosa Springs to develop and implement conservation measures on their lands.

- Convene meetings of individuals interested in Pagosa skyrocket to exchange status information and identify recovery issues. The information emanating from these discussions will help shape the initial draft recovery plan. We are reaching out to the above stakeholders to facilitate involvement of all interested parties. When needed, additional meetings and/or conference calls will be held to discuss particular issues.

- Targeted stakeholders and species experts will be invited to participate in these calls when relevant for the purposes of recovery planning. We will take advantage of all opportunities to interact with stakeholders in a productive and meaningful way. Stakeholders also may be asked to contribute directly in developing implementation strategies for planned recovery actions.

Pagosa skyrocket (*Ipomopsis polyantha*) Recovery Outline

Approve: _____ Date 1-11-13

Deputy Regional Director, Region 6

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