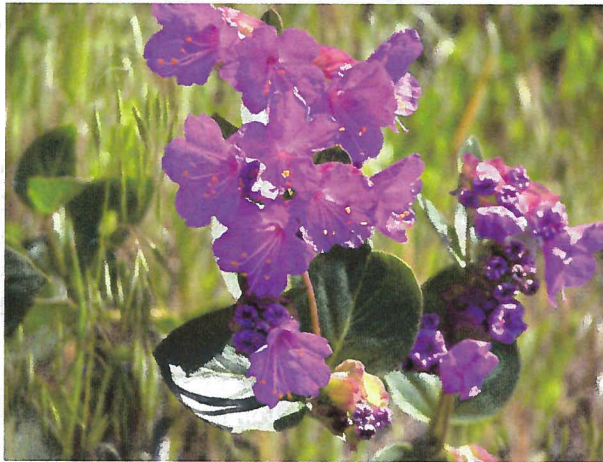


**5-YEAR REVIEW
Short Form Summary**

**MacFarlane's four-o'clock (*Mirabilis macfarlanei*)
Current Classification: Threatened**



**U.S. Fish and Wildlife Service
Idaho Fish and Wildlife Office
Boise, Idaho**

FR Notice citation announcing initiation of this review: 80 FR 8100

Lead Region/Field Office:

Region 1 / Idaho Fish and Wildlife Office, Boise, Idaho

Cooperating Field Office:

Oregon Fish and Wildlife Office, LaGrande Field Office, Oregon

Name of Reviewer(s):

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Methodology used to complete this 5-year review:

This review was conducted by staff of the Idaho Fish and Wildlife Office of the U.S. Fish and Wildlife Service (USFWS) beginning on February 13, 2015 (80 FR 8100). The review was based on current, available information since the last 5-year review for *Mirabilis macfarlanei* (USFWS 2009). We have considered information provided by individuals of an interagency *M. macfarlanei* technical team, which was established in

2009. This team includes botanists from the Cottonwood Field Office of the Bureau of Land Management (BLM), the Wallowa-Whitman National Forest in Oregon (Forest Service), the Oregon Fish and Wildlife Service (OFWO), and the Idaho Department of Fish and Game Natural Heritage Program (INHP). In addition, members of the technical team were provided an opportunity to review the draft 5-year review. Comments received from the technical team were incorporated into the status review document. The document was also reviewed by the Chief of Classification and Recovery before submission to the Field Supervisor for approval.

Review Analysis:

Please refer to the *Revised Recovery Plan for MacFarlane's Four-o'clock (Mirabilis macfarlanei)* finalized on June 30, 2000 (USFWS 2000) for a complete review of the species' status (including biology and habitat), threats, and management efforts. For information regarding the species' listing history and other facts, please refer to the Fish and Wildlife Service's Environmental Conservation On-line System (ECOS) database for threatened and endangered species (http://ecos.fws.gov/tess_public).

No new threats and no significant new information regarding the species' biological status have become available since the last 5-year review conducted in January 2009 (USFWS 2009). In addition, there is no new information regarding the species' biology and life history since 2000, when the revised recovery plan was finalized. Management actions are ongoing. New actions that have been implemented since 2009 are described below.

Survey, Inventory, and Assessment

Mirabilis macfarlanei occurs within the geographic area identified in the 2000 Recovery Plan: the Salmon, Snake, and Imnaha river canyons in Idaho and Oregon. The species occurs in 13 Element Occurrences (EOs), 9 in Idaho and 4 in Oregon. Land ownership is comprised of BLM, Forest Service, and private lands. Of the 13 EOs, 5 are located on BLM land, 1 is located on both BLM and private land, 4 are located on Forest Service land, 1 is located on both Forest Service and private land, and 2 are located solely on private land.

Both the BLM and the Forest Service continue to conduct surveys for *Mirabilis macfarlanei*. The Forest Service conducted surveys for *M. macfarlanei* in the Hells Canyon National Recreation Area, Wallowa-Whitman National Forest annually from 2007 through 2014. Approximately 4,700 acres of suitable habitat were surveyed for the presence of *M. macfarlanei* over the 8 year period, with an average of nearly 600 acres per year. The BLM surveyed an average of approximately 1,000 acres of suitable habitat on BLM lands annually from 2010 through 2015. Despite these survey efforts, no new *M. macfarlanei* populations have been discovered since the last 5-year review in 2009. The INHP has not surveyed for *M. macfarlanei* since 2008; however, as described in more detail in this Section below, the INHP conducted assessments of four of the known EOs. During these assessments no new *M. macfarlanei* subpopulations were documented.

The BLM has established a new population of *Mirabilis macfarlanei* at the Lower Otto Creek Conservation area located on BLM land. The BLM worked cooperatively with a local private landowner to transplant approximately 25 rhizomes from private property to the Lower Otto Creek Conservation area in April 2015 (in accord with the FWS Section 7 Biological Opinion (dated July 22, 2011) prepared for the Shroyer Trail and Lower Otto Creek Conservation Area project). The Lower Otto Creek Conservation area includes 75 acres that was withdrawn from a BLM grazing lease area and was mitigation for a trail on BLM lands that impacted ESA-listed *Silene spaldingii* (Spalding's catchfly). Future monitoring will document the success of this transplanting.

The INHP conducted assessments of four *Mirabilis macfarlanei* EOs from 2010 through 2015 to determine the extent of subpopulations within these EOs and to document habitat characteristics and disturbances. In 2010, EO 2 (Long Gulch/John Day Creek) was assessed on both BLM and private land. Approximately 95 percent of the EO was mapped. The INHP recommended organizing this EO into seven subpopulations (K. Pekas, pers. comm. 2015). In 2012, EO 6 (Pittsburg Landing) was assessed. All six subpopulations within this EO, which is located within the Hells Canyon National Recreation Area, Wallowa-Whitman National Forest, were mapped with more precise point locations of plants within the subpopulations (Pekas and Lichthardt 2015). In 2015, EO 3 (Horseshoe Bend) and EO 9 (Box Canyon) were assessed on BLM land, with one subpopulation documented and mapped in each EO. Invasion of nonnative plant species, mostly annual grasses, was documented as the primary threat to *M. macfarlanei* in these EOs.

Monitoring

Monitoring data show an overall stable population trend for *Mirabilis macfarlanei*. In 2000, one of the action items identified in the *M. macfarlanei* Recovery Plan was to monitor population trends (U.S. Fish and Wildlife Service 2000). In 2007, the Service funded a project to synthesize and analyze monitoring data collected by the BLM between 1981 and 2004, and the Wallowa-Whitman National Forest from 2001 to 2006, and to provide a general review of the respective monitoring programs (Mancuso and Shepherd 2008). Among its results, analysis found no significant change in *M. macfarlanei* ramet abundance over the years at most monitored EOs. *Mirabilis macfarlanei* forms colonies from an extensive lateral root system that can extend up to 10 meters (33 feet; Yates 2007, p.3). Clonal shoots emanating from the same root system are referred to as ramets. Collectively, these genetically identical ramets comprise a genet (or the individual plant).

While this review acknowledged the impressive monitoring datasets, which included over 20 years of data collection, it also included a set of recommendations to improve the efficiency and value of the BLM and Forest Service monitoring efforts. One of these recommendations was the development and implementation of a rangewide monitoring strategy (Mancuso and Shepherd 2008, p. 22; U.S. Fish and Wildlife Service 2009, p.18). In response, a collaborative effort to develop and implement a new, standardized, rangewide monitoring program for *M. macfarlanei* was initiated in 2010. Development

of the new monitoring program was guided by management objectives identified by the Service, the BLM, and the Forest Service. The overall purpose of the new monitoring plan is to provide more comprehensive documentation and a better understanding of the rangewide conservation status of *M. macfarlanei*. The monitoring program is designed to collect quantitative information on *M. macfarlanei* and its habitat. It depends on frequency sampling as the primary metric to monitor changes to *M. macfarlanei* abundance and its habitat over time. Frequency is the percentage of possible plots occupied by a target species in a defined sample area (Elzinga et. al. 1998). The nested frequency method collects frequency data by sampling nested plots of variable size along a transect (Bureau of Land Management 1996). A full description of the monitoring protocol is provided in Mancuso 2011.

Ten *Mirabilis macfarlanei* transects were sampled in 2010 to test the proposed new monitoring protocols. Transect locations represented eight suboccurrences within six *M. macfarlanei* EOs. Monitoring results comparing 2010 results to pre-2010 datasets indicated that overall, *M. macfarlanei* percent frequency values for 2010 were similar to pre-2010 mean values and analysis found no significant difference ($p < 0.05$) in 2010 frequency compared to pre-2010 mean values for any of the monitoring plots sampled in 2010 (Mancuso 2011, p. 13). These data support the 2008 findings by Mancuso and Shepard (2008) that suggest the *Mirabilis macfarlanei* “population size” is stable rangewide (Mancuso 2011, p. 13).

Monitoring data has not been reanalyzed since 2010 because the new monitoring protocol has not yet been established at all *Mirabilis macfarlanei* EOs. In addition, monitoring sites that have been established are monitored on a rotation. Annual monitoring is not conducted due to concerns regarding excessive researcher disturbance that can result from trampling of the fragile soils on steep slopes where these plants occur.

Invasive nonnative plant species and noxious weed control

The primary threat to *Mirabilis macfarlanei* continues to be the invasion of nonnative plant species into its habitat. Invasive nonnative plant species, such as cheatgrass (*Bromus tectorum*), yellow starthistle (*Centaurea solstitialis*), dalmation toadflax (*Linaria dalmatica*), and rush skeletonweed (*Chondrilla juncea*), occur at most EOs (Colket et al. 2006, pp 3-23; Mancuso and Shepard 2008, p. 20) and compete with native plants for space, light, water, and nutrients. The presence of *B. tectorum* in particular can increase the risk of wildfire, as it provides increased fine fuel levels that can lead to more frequent and intense wildfires that can not only directly impact *M. macfarlanei* plants, but result in indirect impacts from habitat alteration.

We are unaware of any new wildfires occurring in *M. macfarlanei* since the last 5-year review in 2009. However, the BLM and the Forest Service have been treating some EOs for invasive nonnative plants and noxious weeds. In 2010 and 2014, the BLM treated the noxious weeds *Linaria dalmatica*, *Centaurea solstitialis*, and *Chondrilla juncea* at 2 EOs, the McKinzie Creek/Horseshoe Bend (4-5 acres) and Skookumchuck EOs (1 acre). In 2012, the BLM treated the Long Gulch (45 acres) and Rhett Creek (2-3 acres) EOs. The

Long Gulch EO is scheduled to be re-treated in 2016. Invasive nonnative plant control within *Mirabilis macfarlanei* plant populations is difficult because of the rugged terrain and the need for backpack spraying and pulling weeds adjacent to plants. Past and current efforts have resulted in an overall slight improvement and/or maintenance of ecological conditions (e.g., preventing additional weed spread). However, it appears that back-to-back years of treatment may be required for some populations and additional coordination with private landowners, in addition to the continued use of biological control methods.

The Forest Service has been using biological controls to treat EOs on the Wallowa-Whitman National Forest. In 2006, the Forest Service released the biological control agent, *Mecinus janthinus* (the 3-toed stem boring weevil which attacks *Linaria dalmatica*), at the Pleasant Valley and Tryon Creek *Mirabilis macfarlanei* sites. The following year (2007) both sites were burned during the Battle Creek wildfire. The fire did not appear to impact *M. macfarlanei* since it had already senesced and was dormant at the time of the wildfire, which occurred in mid-summer (although it is unknown if the seed crop may have been burned). However, monitoring data indicated that supplemental control agents were needed at the Pleasant Valley site, so in 2010 an additional 200 weevils were released. As of May 2011, monitoring demonstrated that the biological agents were established on the *L. dalmatica* plants. Results indicated an approximately 70 percent reduction of *L. dalmatica* at the Tryon site and a 60 percent reduction at the Pleasant Valley site. In addition, a small volunteer group from the Hells Canyon Preservation Council manually removes bull thistle (*Cirsium vulgare*) and other non-native forbs annually each spring from the Imnaha populations on Forest Service lands.

Despite these control efforts, the threat of invasive nonnative plant species continues to adversely impact *Mirabilis macfarlanei* and its recovery. A mix of native and introduced plant species characterized vegetation at the 10 monitored transects in 2010, with native flora comprising 64 percent and introduced weed species comprising 36 percent of the species recorded. Nonnative species included eight species on the noxious weed lists of Idaho and/or Oregon (Mancuso 2011, p. 10-11). Rhett Creek was the only transect sampled in 2010 with previous frequency data for plant species other than *M. macfarlanei*. Analysis found a significant increase in the frequency of two noxious weed species in 2010 compared to 2007 values at this site (Mancuso 2011, p. 18). Future monitoring will further document changes in invasive nonnative plants species in *M. macfarlanei* habitat and will help prioritize conservation and restoration for *M. macfarlanei*.

Private land conservation

Informational brochures and posters for distribution to private landowners were developed in 2010. These outreach materials were developed to encourage collaboration with private landowners and to provide information on potential conservation opportunities for *Mirabilis macfarlanei*, including surveys to help locate additional potential populations on private land. Currently, there are four EOs known to occur on privately-owned lands; two located solely on private land, one located on both private

and adjacent BLM land, and one located on both private and adjacent Forest Service land. With the exception of coordination with private landowners for acquiring rhizomes from their lands for establishment of the new population of *M. macfarlanei* at the Lower Otto Creek Conservation area (discussed above in the **Survey, Inventory, and Assessment** Section), we have not had the opportunity to work with any new private landowners towards conservation of this species since the last 5-year review. The BLM has had informal discussions with two private landowners in 2015 regarding conservation for *M. macfarlanei*. Both landowners were made aware of the occurrence of the species on their private lands and conservation opportunities were discussed. While both parties have shown interest in keeping a viable population of this species on their lands, no formal agreements have been developed.

New Land Management Plans

Management of BLM lands where 6 of the 13 *Mirabilis macfarlanei* EOs occur is currently covered under the Cottonwood Resource Management Plan (RMP), which was finalized on December 18, 2009 (BLM 2009). RMPs are the basic land use documents that guide land use decisions and management actions on BLM administered land through establishing goals and objectives and the measures needed for accomplishing these goals and objectives. The Cottonwood RMP directs the BLM to maintain or restore special status species (including *M. macfarlanei*) and their habitat to contribute to species recovery. Specifically, the RMP supports Recovery Plan actions for *M. macfarlanei* in an effort to contribute towards recovery and delisting, including such actions as implementing control measures for invasive nonnative plant species, developing management plans to provide for the implementation of the appropriate management and conservation of populations, establishing new populations, and considering cooperative management with adjacent landowners to support conservation and restoration efforts, among others. Currently, the BLM has prioritized various conservation actions that directly or indirectly support recovery for the species; current priority efforts that took place from 2010 to 2015 include: (1) control of invasive nonnative plant species; (2) establishment of a new transplant population; (3) ongoing surveys and monitoring; and (4) acquisition of canyon grasslands and development of conservation agreements within the Salmon River canyon (some of these lands contain suitable habitat for *M. macfarlanei* and are identified for future plant surveys).

Analysis Summary:

Numerous conservation actions have been implemented by the BLM and the Forest Service since *Mirabilis macfarlanei* was first listed in 1979, including focused surveys, population monitoring, fencing to exclude livestock grazing, and invasive nonnative plant species control measures. However, overall *M. macfarlanei* populations are not secure from threats, particularly the two primary threats of invasive nonnative plant species and wildfire. Invasive nonnative plant species are pervasive and difficult to alleviate and will require intensive long-term management. In addition, the potential for wildfire to impact both *M. macfarlanei* plants and its habitat continues.

The Revised Recovery Plan for *Mirabilis macfarlanei* (USFWS 2009) identified criteria to recover the species:

1. A minimum of 11 populations are secure from threats and naturally reproducing with stable or increasing population trends for at least 15 consecutive years.
2. Population sizes are above the minimum necessary to maintain the viability of the species.
3. Populations of this species occur throughout its current range in each of three geographic areas (i.e., Imnaha, Snake, and Salmon River areas).
4. Management practices reduce and control threats. On Federal land, habitat management plans are in place and monitoring is used to ensure implementation and effectiveness of conservation management practices. On non-Federal lands, *M. macfarlanei* populations are managed and conserved.
5. A post-delisting monitoring program for the species is developed and implemented. This program will be developed through coordination with the BLM, Forest Service, FWS, and other interested parties.

Similar to the 2009 5-year review, only two of the five criteria identified have been met: 1) there are a minimum of 11 populations of *Mirabilis macfarlanei* with the species occurring in 13 EOs (9 in Idaho and 4 in Oregon), and in general monitoring data indicate that overall population trends appear to be stable; and 2) the species occurs throughout its current range in each of the three geographic areas (Salmon, Snake, and Imnaha river canyons). For a complete discussion of these criteria please refer to the 2009 5-year review and the 2000 Revised Recovery Plan for this species.

Mirabilis macfarlanei is not in immediate threat of extinction; analysis of monitoring data suggest an overall stable population trend. However, because populations are still not secure from threats, primarily habitat degradation from invasive nonnative plant species, and the associated potential increase in wildfire (and cycle of ever-increasing weed establishment), *M. macfarlanei* continues to meet the definition of threatened as it remains likely to become endangered in the foreseeable future throughout its range.

Recommendations for Future Actions:

- Continue working as an interagency technical team to collaborate on recovery actions for this species.
- Continue control efforts of invasive nonnative plant species and noxious weeds. We suggest developing site-specific management plans and monitoring schedules for individual EOs.
- Develop and implement studies to assess general life history and ecological needs, including studies addressing soil chemistry and moisture regimes.
- Continue to pursue opportunities to work with landowners towards

- conservation of this species on private lands.
- Continue the rangewide monitoring program and conduct a 10-year analysis of the data set.
- Continue survey efforts to locate potential new populations.

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Personal Communications

Pekas, Kristen. 2015. Botanist, Idaho Natural Heritage Program. Email Fw: MIMA 5-year review. Subject: MacFarlane's four-o'clock EO Assessments. Dated August 12, 2015.

U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE for 5-YEAR REVIEW of
MacFarlane's four-o'clock (*Mirabilis macfarlanei*)

Recommendation resulting from this 5-year review:

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

New Recovery Priority Number: No change, remain as RPN of 2 (high degree of threat/high potential for recovery).

Field Supervisor, Idaho Fish and Wildlife Office

Michael Cassier

Date 9-18-15