Willamette daisy
(*Erigeron decumbens* var. *decumbens)*

5-YEAR REVIEW
Short Form Summary

Photo by Jennifer Thompson, USFWS

U.S. Fish and Wildlife Service
Oregon Fish and Wildlife Office
2600 SE 98th Avenue, Ste. 100
Portland, Oregon 97266

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5-YEAR REVIEW

Short Form Summary

Species Reviewed: Willamette daisy (*Erigeron decumbens* var. *decumbens)*

Current Classification: Endangered

1. GENERAL INFORMATION

1.1 FR Notice announcing initiation of this review

U.S. Fish and Wildlife Service. 2005. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Reviews of the Mariana Fruit Bat (*Pteropus mariannus mariannus*), Mariana Crow (*Corvus hawaiiensis*), Laysan Duck (*Anas laysanensis*), Kauai Akialoa (*Honeycreeper*) (*Hemignathus procerus*), Large Kauai Thrush (*Myadestes myadestinus*), Kauai Oo (Honeyeater) (*Moho braccatus*), Ou (Honeycreeper) (*Psittirostra psittace*), Molokai Creeper (*Paroreomyza flammea*), Molokai Thrush (*Myadestes lanaiensis rutha*), Kauai Cave Wolf Spider (*Adelocosa anops*) Kauai Cave Amphipod (*Spelaeorchestia koloana*), *Alsinidendron obovatum* (No Common Name), *Amaranthus brownii* (No Common Name), *Chamaesyce celastroides* var. *kaenana* (Akoko), *Chamaesyce deppeana* (Akoko), *Chamaesyce herbstii* (Akoko), *Chamaesyce skottsbergii* var. *kalaeloana* (Ewa Plains Akoko), *Clermontia pyrularia* (Oha Wai), *Cyanea grimesiana* ssp. *obatae* (No Common Name), *Cyanea pinnatifida* (Haha), *Cyanea st.-johnii* (Haha), *Cyanea superba* (Haha), *Cyanea truncata* (Haha), *Cyrtandra dentate* (Haiwale), *Gouania vitifolia* (No Common Name), *Hedyotis degeneri* (No Common Name), *Hibiscadelphus woodii* (Hau Kuahiwi), *Castilleja levisecta* (Golden paintbrush), Fender's Blue Butterfly (*Icaricia icarioides fenderi*), ***Erigeron decumbens* var. *decumbens* (Willamette Daisy)**, *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's Lupine), *Lomatium bradshawii* (Bradshaw's Desert Parsley), and *Sidalcea nelsoniana* (Nelson's Checker-mallow). Federal Register 70:38972-38975. July 6, 2005.

1.2. Lead Region/Field Office

Region 1, Oregon Fish and Wildlife Office, Portland, Oregon

Name of Reviewer(s): Provide name(s) and phone number(s)
Jody Caicco, Non-Federal Lands Division Supervisor and
Jeff Dillon, Recovery Coordinator
U.S. Fish and Wildlife Service, Oregon Fish and Wildlife Office, (503) 231-6179

1.3 Background

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).

1.3 Methodology used to complete this 5-year review

The U.S. Fish and Wildlife Service (Service) initiated the 5-year review of *Erigeron decumbens* var. *decumbens* (Willamette daisy) on July 6, 2005 (70 FR 38972-38975). This 5-year review was conducted and reviewed by staff from the Oregon Fish and Wildlife Office (OFWO) and peer reviewed by Tom Kaye, Executive Director of the Institute for Applied Ecology. The review was based on the 2010 Recovery Plan for the Prairie Species of Western Oregon and Southwestern Washington (Recovery Plan) (USFWS 2010), the 2006 final rule designating critical habitat for Willamette daisy (USFWS 2006), and recent survey and site information available in our files. All pertinent literature and documents used in this review are on file at the OFWO.

2. REVIEW ANALYSIS

2.1 Analysis overview

There is no new information available to indicate that a change in the species current listing status is warranted. Threats identified and discussed in the listing rule, critical habitat designation and Recovery Plan generally remain the same. Overall, species status remains the same.

2.2 Five-factor analysis results summary

An analysis of threats is an essential component of our listing, delisting, and reclassification decisions. The five-factor analyses conducted by the Service that resulted in the listing of Willamette daisy assessed the threats to the species continued existence (USFWS 2000). The Recovery Team for the listed prairie species (including Willamette daisy) and other experts familiar with the species conducted a more recent five-factor analysis for the Recovery Plan by reviewing the threats associated with each of the known remaining occupied sites. Appendix 1 provides a listing of the currently known threats to Willamette daisy as identified in the Recovery Plan (USFWS 2010), along with a summarized comparison to threats identified in the final listing rule (USFWS 2000). Recovery actions outlined in the Recovery Plan are focused on controlling and reversing the currently known threats to the species and their prairie habitats (USFWS 2010).

Most of the threats to Willamette daisy identified in the Recovery Plan are the same as those in the final listing rule, although changes include threats that were added (i.e., hydrologic alterations, utilities installation and maintenance, field research activities and recreation), further described (i.e., improper prairie management associated with grazing, mowing and burning), not included (i.e., on-site agricultural activities) or shifted under a different factor in the five-factor analysis (i.e., invasive species and isolation/fragmentation was moved from Factor E to Factor A). Small population sizes threaten the species at many sites for a variety of reasons, including reproductive failure where populations are under 20 individuals (Kaye et al. 2006). These changes do not reflect significant new information since the time of listing.

One key change since the time of listing has been the designation of critical habitat. While additional regulatory protection is now in place for some activities with a Federal nexus, the listing rule noted that designating critical habitat could increase the threat of habitat vandalism. To date, we have not received reports of vandalism on sites that support Willamette daisy. Another change has been more recent efforts to collect seed for propagation and storage, and an increase in scientific study. These activities are conducted under Service permits for the purpose of species conservation and recovery, and have been designed to avoid and minimize potential adverse effects. The most significant threats continue to be invasive species encroachment and succession of native prairie habitats to woody vegetation, as well as the small number and fragmentation of extant populations, and small sizes of most of the remaining populations.

2.3 Recovery criteria

We delineated 10 recovery zones that cover the combined geographic range of the four listed plants addressed in the Recovery Plan. Eight of the recovery zones cover the historical range of the Willamette daisy. Specific recovery criteria address: 1) the number and size of Willamette daisy populations in six of the recovery zones; 2) additional populations that may occur anywhere within the historical range; 3) the distribution of subpopulations that make up the populations; 4) evidence of a stable or increasing population trend for at least 10 years (for downlisting to threatened status) or 15 years (for delisting); and 5) evidence of reproduction. The downlisting and delisting goals for Willamette daisy distribution and abundance, as outlined in the Recovery Plan, are shown in Appendix 2. The habitat that supports the populations to be counted toward recovery should be managed for high quality prairie habitat, and should be in secure, conservation-oriented ownership, with management and monitoring to control threats. An additional criterion to be considered for delisting is to have genetic material stored in a facility approved by the Center for Plant Conservation (USFWS 2010).

2.4 Population Status

At the time of listing, 28 occurrences of Willamette daisy were recognized with a total of 286 acres of occupied habitat (USFWS 2000). At the time the Recovery Plan was being developed, the total acreage considered to be occupied was 233 at 39 sites (USFWS 2010). Willamette daisy is likely to now be extirpated at some of the sites as smaller and unmanaged populations have succumbed to threats. However, there have been recent Willamette daisy introductions that may lead to populations that could count toward recovery in the future if proven successful, and many landowners and other partners are taking actions to help conserve and recover the species.

A listing of Willamette daisy sites and summary of the data used for this review that coincides with the narratives below can be found in Appendices 3 and 4. Appendix 3 provides a listing of sites and the number of Willamette daisy plants documented near the time of listing, with cross-references to the site names used in this review. Appendix 4 provides a summary of current information about known Willamette daisy sites, grouped by population. Site names often vary between data sources and documents that include Willamette daisy information because there are no standard naming conventions. In this review, “sites” are listed separately rather than aggregating those that make up a population or sub-population under one site name where there are differences in land ownership, conservation status, site activities or available data.

Current population estimates are based on available information from 2004 to the present. For most sites, long-term data needed to detect population trends is not available. In some cases, documentation of the number of plants at a site is not available, although there have been reliable reports of extant or potentially extirpated populations in recent years. Where sites are within 2 miles (3 kilometers) of each other, they are considered to be subpopulations that comprise a larger population (i.e., metapopulation) based on pollinator travel distance (USFWS 2010), with one exception noted in the Eugene West recovery zone. The past and current status of each Willamette daisy population is discussed below, organized by recovery zone and measured against the downlisting criteria presented in the Recovery Plan.

Corvallis East

No Willamette daisy populations were known to occur in this recovery zone at the time of listing (OFWO *in litt.,* 1999). Two are now known to occur, both of which are unprotected and located on private property. Approximately 30 reproductive plants occur at one site where seed was collected in 2008 (Tom Kaye, pers. comm. 2010; IAE 2009). A total of 551 plants were documented on the second site in 2006 (Kaye *et al.* 2006). Population trends at sites within in this recovery zone are unknown.

For downlisting the species to threatened status, the Recovery Plan calls for a minimum of one population and 5,000 plants in this recovery zone. Additional conditions include stable or increasing populations over a period of at least 10 years, site management to maintain suitable habitat, and long-term habitat protection. These goals have not been met.

Corvallis West

Two Willamette daisy populations were known to occur within this recovery zone at the time of listing, Bald Hill which supported 210 plants in several patches and a small population with approximately 20 individuals at Camas Prairie based on surveys in 1993 (Clark *et al.* 1993, OFWO *in litt.,* 1999). Five populations are now known to occur in this recovery zone. One is a more recently discovered unprotected natural population that occurs on private property, with a population size of approximately 300 plants. Seed was collected there in 2008 (IAE 2009). The second is comprised of two separate sites located within a mile of each other which are both on private properties. One is the Camas Prairie site, which supported 131 plants in 2005 and 135 plants in 2006 (Kaye *et al.* 2006). The other is a new site that is protected by a 30-year Natural Resources Conservation Service (NRCS) Wetland Reserve Program (WRP) conservation easement, and includes 1,000 plants that were introduced in 2010 (Andrea Thorpe, pers. comm. 2010). The third population was previously known, and consists of both private (Bald Hill Farm) and public lands (Bald Hill Park). This population includes a mix of naturally occurring plants (22 counted in 2005, 25 counted in 2006) (Kaye *et al.* 2006) and 1,100 plants that were introduced in 2007 and 2008 (IAE 2008 and 2009). Two additional populations were introduced, one at Finley National Wildlife Refuge where1,050 were planted in 2007 and 2008 (IAE 2008 and 2009) and another at the Beazell Memorial Forest where seeds were introduced in 2009, but plant establishment is unknown (Tom Kaye, pers. comm. 2010). Population trends at most wild sites within this recovery zone are unknown or not well documented, but the population at Bald Hill on City of Corvallis property has clearly declined.

For downlisting the species to threatened status, the Recovery Plan calls for a minimum of two populations and 10,000 plants in this recovery zone. Additional conditions include stable or increasing populations over a period of at least 10 years, site management to maintain suitable habitat, and long-term habitat protection. These goals have not been met.

Eugene East

Two populations were known to occur in this recovery zone at the time of listing, and continue to be the only known populations in this recovery zone. Both populations are unprotected and located on private property. The size of one population known as Belts Road is unknown and may be extirpated, as it was not found to be extant in 2008 (OFWO, *in litt.* 2010). In 1993, only 23 flowering clumps were counted (Clark *et al.* 1993, OFWO, *in litt.* 1999). The other is a small population at McKenzie View Drive that was still found to be extant in 2008 (OFWO, *in litt.* 2010) even though in 1992, only 2 large flowering clumps were found (Clark *et al.* 1993, OFWO, *in litt.* 1999). The current population size and trend data are not available for this site.

For downlisting the species to threatened status, the Recovery Plan calls for a minimum of one population and 5,000 plants in this recovery zone. Additional conditions include stable or increasing populations over a period of at least 10 years, site management to maintain suitable habitat, and long-term habitat protection. These goals have not been met.

Eugene West

The greatest number of Willamette daisy populations occurs in the Eugene West recovery zone. There are currently four known populations, three of which are comprised of numerous occupied sites that comprise the larger populations. Two are known to be the largest Willamette daisy populations in existence, and include many sites that are protected and managed to sustain healthy native prairie habitats and listed species by various landowners including the U.S. Army Corps of Engineers (COE), Bureau of Land Management (BLM), The Nature Conservancy (TNC) and City of Eugene.

<u>Population 1</u>

This population includes subpopulations on 13 sites. Most of these sites were known at the time of listing, with the possible exception of Hynix, Speedway and Willow Creek Road. Over the years, different site names have been used for many of the sites and site lumping and splitting has varied between data sources due to the close proximity of many of the sites that make up this population. See Appendix 4 for site names used in this analysis, and Appendix 3 for a cross-reference to site names used in some of the primary data referenced at the time of listing.

One of the large subpopulations within this population is at a BLM site known as Oxbow West. Willamette daisy plants have numbered in the range of 1,079 to 3,948 based on total census counts between 1999 and 2009; the low of 1079 was found in 2001 and the high of 3948 plants was found in 2009 (BLM 2009). Data indicates this subpopulation has been stable or inreasing for over 10 years.

Data collected since 2002 at other BLM sites known as Speedway and Vinci indicates that these subpopulations are also stable, although 10 years of site-specific comparable data is not yet available. Subpopulation numbers for portions of the Vinci area considered at the time of listing

were 270, 75-100 and 50 clumps (Clark *et al.* 1993, OFWO, *in litt.* 1999); the exact locations where these counts were taken are unknown. In 2002, a total of 788 plants were found at Speedway and 271 at Vinci. Numbers in recent years are the highest on record. In 2008 and 2009, 1,925 and 2,685 plants, respectively, were counted at Speedway and 570 and 706, respectively, were counted at Vinci (BLM 2009).

Long-term data sets available for other BLM sites known as North Greenhill and Balboa and at TNC sites in the Willow Creek area indicate that these subpopulations may be declining, although they are still relatively large and are on protected lands that are actively managed with the aim of supporting the Willamette daisy and other native prairie species. The North Greenhill subpopulation supported 356 plants in 1999 and was augmented with 600 plants that year, but subpopulation numbers have declined such that between both the natural and introduced plants, only 147 were counted in 2009. BLM survey data for the Balboa site shows numbers ranging from 85 to 394 based on total census counts between 1999 and 2009; the high of 394 plants was found in 1999 and the low of 85 was found in 2008. The most recent data from the 2009 count documented 108 plants (BLM 2009). On TNC's Willow Creek Preserve sites, Willamette daisy surveys have been conducted annually in designated macroplots since 1986. The number of macroplots surveyed increased between 1986 and 1997, and has remained the same from 1997 through the present. Total counts just within the macroplots since 1997 have ranged from a high of 3,202 in 1997, to a low of 1,270 in 2009 (TNC 2009).

Augmentation of at least two Willamette daisy plants found on the Hynix site after the time of listing with approximately 480 introduced plants occurred between 2005 and 2007 (IAE 2007, IAE 2008 and OFWO, *in litt.* 2010). As of 2010, this subpopulation was still extant and while there was some loss, some recruitment was occurring (OFWO, *in litt.* 2010). Although Willamette daisy was introduced to a portion of the Hynix site that is within a wetland mitigation area to be conserved in perpetuity, the property is currently for sale and continued long-term management needed to sustain suitable habitat is uncertain.

The Speedway East and TNC's Cuddeback Unit sites are adjacent to each other. Data used at the time of listing indicated that 65 plants had been observed in this vicinity in 1993 (Clark *et al.* 1993, OFWO, *in litt.* 1999). The subpopulations are still extant here (OFWO, *in litt.* 2010, Kaye *et al.* 2006 and IAE 2009), although the number of plants and trends are not known.

A small subpopulation known at the time of listing at Wallis Street supported 13 plants in 1993 (Clark *et al.* 1993, OFWO, *in litt.* 1999). It was still extant in 2004, but was not seen in 2010 and may be extirpated (OFWO, *in litt.* 2010).

Past and present subpopulation numbers and trends at West 11th and Willow Creek Road are unknown. Both subpopulations were found to be extant in 2004 (OFWO, *in litt.* 2010), although they are both unprotected, privately-owned sites.

<u>Population 2</u>

The second large population in this recovery zone is comprised of subpopulations on 5 sites. The largest occupied areas are just over 2 miles from sites in the first population described above. One of the 5 sites, known as Lanel Substation, may serve as a "stepping stone" that

connects the two populations because it is within a distance of approximately 1.6 miles from the first population, but the foothills between the two provides a natural break where an area of separation occurs between the two site complexes, so although these may be somewhat connected they are discussed here as two populations. The Lanel substation site is the smallest and most vulnerable subpopulation within this area, with less than 200 plants on private property located within a railroad right-of-way (OFWO, *in litt.* 2010).

The COE manages the largest known subpopulation anywhere at the Fisher Butte site. Trends from various data collection efforts in this area since 1986 indicate that this has been a large and stable subpopulation for many years. Over 4,000 Willamette daisy plants were counted here in 2007 (Petersen 2008), and preliminary data from the 2010 field season suggests that previous counts may underestimate the subpopulation size and the site may support over 10,000 plants (W. Messinger, pers. comm. 2010). Seeds collected from Fisher Butte were propagated and 1,200 plants were introduced to a nearby COE site known as Fisher Butte West in 2009. These sites are located within a COE Research Natural Area, and are protected and managed to support listed and other native prairie species. The Oregon Department of Transportation (ODOT) owns Fisher Butte Dike, a contiguous property where 379 plants were counted in 2006 (Petersen 2008). Long-term plant data is not available for this site, but this area has been known to support Willamette daisy and has been managed jointly with the COE to sustain native prairie habitats for many years. Because the site is owned by ODOT and parallels State Highway 126, this subpopulation could be lost or impacted if future road expansion occurs.

Population 3

The third population in this recovery zone is comprised of 6 sites, all of which are on unprotected private properties. It appears that only one of the sites, Sanford Road, was considered at the time of listing. This site supported a small subpopulation with 2 flowering clumps in 1993 (Clark *et al.* 1993, OFWO, *in litt.* 1999). Part of the area was surveyed in 2008, but no plants were found (OFWO, *in litt.* 2010). This subpopulation is likely to be very small if it is still extant, or extirpated.

The status of Willamette daisy on two properties known as Fox Hollow and Hazel Dell Prairie 3 is unknown, as the most recent confirmation that extant populations occur was in 2002. At that time, over 100 clumps were found at Fox Hollow and a sizable patch of approximately 100 plants was found at Hazel Dell Prairie 3 (Boyer 2002).

Three other sites, Spencer Creek, Spencer Creek Northwest and Spencer Creek West together supported several patches and over 100 clumps in 2002 (Boyer 2002). Subpopulations were still found to be extant in 2008, and over 200 plants were counted at the Spencer Creek site that year (OFWO *in litt.* 2010). Precise current plant counts and population trends are unknown.

Population 4

The fourth population in this recovery zone is based on a record of Willamette daisy on an isolated site known as Goshen. Willamette daisy plants numbered 70 in 1987 (Kagan & Yamamoto 1987), and 14 flowering clumps were observed in 1993 (Clark *et al.* 1993). A portion of the area on record is within a designated ODOT Special Management Area. ODOT

staff visited the site during the survey period in 2010, but were unable to find any plants (N. Testa, pers. comm. 2010). It is likely that it this subpopulation is now extirpated.

For downlisting the species to threatened status, the Recovery Plan calls for a minimum of three populations and 15,000 plants in this recovery zone. Additional conditions include stable or increasing populations over a period of at least 10 years, site management to maintain suitable habitat, and long-term habitat protection. The first two populations discussed meet the requirements of having at least 5,000 plants each and include protected and well-managed sites. However, more data is needed to document that population trends at the Speedway, Vinci, East Coyote and Fisher Butte West sites have been stable or increasing for at least 10 years, or that other significant populations in this recovery zone are protected and stable or increasing to meet the recovery goals. For instance, additional years of data on the TNC sites in the Willow Creek area may show that recent low counts are within the natural range of variation and do not indicate that those populations are on a downward trend. However, at this time, while the most significant sites occur within this recovery zone and great strides have been made to protect and manage many of them, the criteria for downlisting have only been partially met.

Salem East

Five populations occur in this recovery zone, four that were known at the time of listing and one that was introduced in 2004. Two have likely been extirpated, as no plants were found at the Starlight Road site during a visit in 2004, and no plants were found at the Shelburne Drive site in 2010 (OFWO, *in litt.* 2010). These sites only supported 1 and 2 flowering clumps in 1993 (Clark *et al.* 1993, OFWO, *in litt.* 1999).

A relatively large population of 200 plants was documented at Kingston-Lyons in 1993 (Clark *et al.* 1993), but no plants were found here in 2010 (OFWO, *in litt.* 2010). This site is near the Kingston Meadows Preserve site, with the two areas making up a population. The Kingston Meadows Preserve site, which is owned and managed by TNC, supports an extant population. A total of 52 Willamette daisy plants were counted in 2005 and 100 in 2006 (Kaye *et al.* 2006).

In 2004 or 2005, 1,100 plants were introduced to the Heritage site to begin to establish a new population. The plants were reportedly still doing well as of 2007 (TNC 2007). The Lone Fir Cemetery and Sublimity Grasslands sites make up another population in this recovery zone. The Lone Fir Cemetery site supported 70 flowering clumps in 1992 (Clark *et al.* 1993) but is now nearly extirpated, as only 17 plants were counted in 2010 (OFWO, *in litt.* 2010). Only 55 plants were counted in the Sublimity Grasslands population in 2006 (Kaye *et al.* 2006).

Willamette daisy may be extirpated from 3 of the 7 sites that make up the 5 populations in this recovery zone, and is nearly extirpated at a fourth. Only one population occurs on protected land at the Kingston Meadows Preserve; as noted above, the size of this population is about 100 plants. Population trends at extant sites within this recovery zone are unknown. For downlisting the species to threatened status, the Recovery Plan calls for a minimum of one population and 5,000 plants in this recovery zone. Additional conditions include stable or increasing populations over a period of at least 10 years, site management to maintain suitable habitat, and long-term habitat protection. These goals have not been met.

Salem West
Four populations are known to occur in this recovery zone. Only two, the Baskett Butte and Grand Ronde populations, were known and considered at the time of listing. In 1993, 45 flowering clumps were counted at Baskett Butte North and 370 at Basket Butte South. This population is still extant and fairly large, although it has declined to less than 200 plants at last count in 2006 (Kaye *et al.* 2006). Long-term trend data for this site is not available. A large population occurred at Grand Ronde, with 520 plants counted in 1993 (Clark *et al.* 1993). However, no plants were found in 2004 and this once significant population may now be extirpated (OFWO, *in litt.* 2010).

Two populations were discovered after the species was listed. One occurs on private property protected by an NRCS WRP easement where seed was collected in 2008 (Kaye *et al.* 2006); fewer than 20 plants were present at the site (Tom Kaye, pers. comm. 2010). The other is on a protected site within the Mill Creek ODOT Special Management Area, but it is nearly extirpated as only 7-14 flowering plants were found in 2005 and 2006 (Kaye *et al.* 2006) and only 1 or 2 plants were found in 2009 (N. Testa, pers. comm. 2010).

Long-term data to document population trends at sites within in this recovery zone are not available, although 2 of the 4 populations may now be extirpated. For downlisting the species to threatened status, the Recovery Plan calls for a minimum of two populations and 10,000 plants in this recovery zone. Additional conditions include stable or increasing populations over a period of at least 10 years, site management to maintain suitable habitat, and long-term habitat protection. These goals have not been met.

SW Washington and Portland
Although they are within the historical range of the species, neither the SW Washington nor Portland Recovery Zones has any known extant Willamette daisy populations. Therefore, there are no populations in this portion of the range that could contribute toward the recovery of the species at this time.

2.4. Genetic Material Storage

Efforts to store genetic material in a facility approved by the Center for Plant Conservation are well underway. Willamette daisy seed is currently being stored by the Berry Botanic Garden. Stored genetic material (i.e., seed) has been collected from 1 population in the Corvallis East recovery zone, 2 populations in Corvallis West, 2 populations in Eugene West, 2 populations in Salem East and 2 populations in Salem West. The only recovery zone not represented at this time is Eugene East (Guerrant, *in litt.* 2010). Seed storage efforts are likely to continue as additional seed is collected for preservation and propagation.

2.5 Conclusion

This review summarizes the history and status of Willamette daisy at 48 sites where the species has been documented. Of these, an estimated 29 sites representing 14 populations were known and considered when the species was listed. Five of the formerly known populations are now likely to be extirpated or their status is unknown. Willamette daisy is currently believed to be

extant at 37 sites that comprise 17 populations. Of these, 3 populations have been augmented and Willamette daisy has been introduced to 5 new sites since the time of listing. Three of the currently extant populations are the direct result of recent introductions, and 5 natural populations have been discovered since the time of listing. Willamette daisy is believed to be extirpated or the status is unknown at 11 sites. Of these sites, 8 were known at the time of listing, including 5 that represented individual populations and 3 that likely contributed to larger populations.

Of the 17 currently known populations, only 2 include protected sites that support relatively large subpopulations (i.e., with over 2,000 plants) known to have been stable for 8 years or more. Trend data is not available for most sites, and many sites are not formally protected (see Appendix 4). Recovery criteria outlined for downlisting have not been met in any of the recovery zones. Almost all previously identified threats to the species still remain. Significant progress has been made to store genetic material, and efforts to collect and store seed will likely continue.

Given the status of and threats to the species, and considering the extensive gap between the current status and the recovery criteria recommended for downlisting, we believe that Willamette daisy still warrants listing as endangered.

3. RECOMMENDATIONS FOR FUTURE ACTIONS

The Recovery Plan was released in June 2010. Needed recovery actions identified therein are current, address the known threats and are based on the best available information at this time. Priority tasks associated with actions identified in the Recovery Plan that are specific to Willamette daisy recovery are outlined below.

Action 1: Survey and Monitor

- Maintain information about what is currently known about the locations of extant and extirpated sites.
- Maintain map with historical and extant populations and potential introduction sites.
- Survey known and potential extant populations where status of populations or possible extirpation is unknown; identify and assess factors that appear to be driving population trends at occupied sites.
- Monitor key populations and identify factors that may be driving population trends at occupied sites.

Action 2: Habitat Protection, Management and Restoration

- Select populations and lands on which to focus protection, management and restoration recovery actions.
- Work with landowners to restore, manage and reduce threats to significant sites.
- Work with partners to explore and develop opportunities to protect key populations on private lands.
- Work to secure significant unprotected sites.

Action 3: Seed Collection, Propagation and Banking

- Continue on-going seed collection efforts for propagation and banking.
- Identify sites for additional seed collection.
- Increase seed availability through cultivation and propagation at facilities that can manage genetic diversity and any necessary isolation.

Action 4: Research

- Conduct demographic studies to determine how Willamette daisy responds to restoration and management treatments.
- Research genetic and reproductive biology questions related to progeny fitness, demographic trends and the breeding system for use in developing seed transfer and augmentation guidelines, and to evaluate inbreeding depression concerns.
- Research effects of climate change and voles on Willamette daisy populations and develop recommendations for responses to these threats.

Action 5: Augment Small Populations and Reintroduce Willamette Daisy to Suitable Habitats

- Identify protected populations that would be likely to benefit from augmentation and suitable habitats in strategic locations between secure populations that could be used as reintroduction sites.
- Implement augmentation projects; develop management plans with landowners, as needed.
- Implement (re)introduction projects; develop management plans with landowners, as needed.

4. REFERENCES

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4.2 Personal Communications

Brooke, Doug. Environmental Team Leader, Hynix Semiconductor Inc., Eugene, Oregon.

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Messinger, Wes. Botanist, Willamette Valley Projects, U.S. Army Corps of Engineers, Lowell, Oregon.

Testa, Nick. Region Biologist, Oregon Department of Transportation, Corvallis, Oregon.

Thorpe, Andrea. Program Director, Conservation Research, Institute for Applied Ecology, Corvallis, Oregon.

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U.S. FISH AND WILDLIFE SERVICE
SIGNATURE PAGE
for 5-YEAR REVIEW of
Erigeron decumbens var. *decumbens*

Pre-1996 DPS listing still considered a listable entity? n/a

Current Classification: Endangered

Recommendation resulting from the 5-year review:

_____ Delisting
_____ Reclassify from Endangered to Threatened status
_____ Reclassify from Threatened to Endangered status
__X__ No Change in listing status

Appropriate Listing/Reclassification Priority Number, if applicable: N/A

Review Conducted By: _____

Field Supervisor, Fish and Wildlife Service

Date 9/30/10

APPENDIX 1:
Five-factor Analysis Comparison between
the Recovery Plan (USFWS 2010) and Final Listing Rule (USFWS 2000)

The recovery team for the Recovery Plan conducted a five-factor analysis by identifying current threats to the covered listed prairie species, including Willamette daisy. A comparison between the threats identified for Willamette daisy in the Recovery Plan and those identified in the final listing rule, as associated with the five-factors analyzed, is summarized below.

Factor	Threats to Willamette daisy identified in the Recovery Plan	Comparison between threats identified for Willamette Daisy in the Recovery Plan vs. the final listing rule
A. The present or threatened destruction, modification, or curtailment of habitat or range	▪ Adjacent land use practices ▪ Housing/urban development ▪ Hydrologic alterations ▪ Improper prairie management ▪ *Invasive species ▪ Isolation/fragmentation ▪ Road development/maintenance ▪ Utilities installation and maintenance ▪ Timber harvest/silviculture/logging	▪ Agricultural activities was an identified threat in the final listing rule; on-site agriculture conversion and management practices was identified as a threat to some species in the Recovery Plan, but not for Willamette daisy. ▪ Hydrologic alterations was not an identified threat in the final listing rule. ▪ Threats associated with improper prairie management (e.g., mowing, grazing, and burning) are described in more detail in the Recovery Plan. ▪ Utilities installation and maintenance was not specifically identified as a threat in the final listing rule. ▪ Invasive species, isolation/fragmentation were identified as threats associated with Factor E in the final listing rule.
B. Overutilization for commercial, recreational, scientific, or educational purposes	▪ Field research activities ▪ Recreation	▪ Field research activities were not identified as a threat in the final listing rule; more field research has been occurring since the time of listing, although best management practices are followed to avoid and minimize potential adverse impacts. ▪ Recreation was not identified as a threat in the final listing rule, although the threat of recreational activities is not known to have changed significantly.

Factor	Threats to Willamette daisy identified in the Recovery Plan	Comparison between threats identified for Willamette Daisy in the Recovery Plan vs. the final listing rule
		▪ Collecting for personal herbarium specimens was listed as a threat in the final rule, but not in the Recovery Plan. "Overcollecting/poaching" was identified as a threat for some species in the Recovery Plan, but not for Willamette daisy; collection has not been reported for Willamette daisy and is not a likely threat (C. Brown, pers. comm. 2010).
C. Disease or predation	▪ Herbivores/predators ▪ Livestock grazing	▪ No changes.
D. Inadequacy of existing regulatory mechanisms	▪ Habitat vandalism	▪ Habitat vandalism was mentioned as a threat in the final listing rule, especially if critical habitat were to be designated, which did occur in 2006. ▪ Minimal protection of Willamette daisy on private lands through state (i.e., Oregon Wildflower Law and Endangered Species Act) or Federal (e.g., Clean Water Act, Endangered Species Act) laws was identified as a threat in the final listing rule but not the Recovery Plan; these threats have not changed except where reduced by Federal Endangered Species Act compliance that is now required due to listing and critical habitat designation.
E. Other natural or man-made factors affecting the continued existence of a species	▪ *Succession to native woody plants ▪ Impaired ecological functions ▪ Small population size/low genetic viability ▪ Pesticide use on-site	▪ No changes, except some of the threats discussed under Factor E in the listing rule are discussed under Factor A in the Recovery Plan.

**Most severe threats identified in the Recovery Plan (USFWS 2010)*

APPENDIX 2:
Distribution and Abundance Goals for
Erigeron decumbens* var. *decumbens
as outlined in the Recovery Plan

Recovery Zone	Downlisting Goals		Delisting Goals	
	Minimum # of Populations / Zone	**Target # of Plants / Zone**	**Minimum # of Populations / Zone**	**Target # of Plants / Zone**
SW Washington	0	0	0	0
Portland	0	0	0	0
Salem East	1	5,000	3	15,000
Salem West	2	10,000	3	15,000
Corvallis East	1	5,000	2	10,000
Corvallis West	2	10,000	2	10,000
Eugene East	1	5,000	2	10,000
Eugene West	3	15,000	3	15,000
+ additional populations (may occur in any zone within species' range)	2	10,000	5	25,000
Total	12	60,000	20	100,000

Source: USFWS 2010

APPENDIX 3:
Willamette daisy sites considered at time of listing,
organized by Recovery Zone

Site Name[1]	Ownership[1]	No. of Erigeron[1]	Cross-reference to site name in 5-year review[2]	Recovery Zone[3]
Bald Hill City Park	City of Corvallis	210	Bald Hill Park and Bald Hill Farm	Corvallis West
Muddy Creek/Allen and Allen Farm	Private	20 (<20)	Camas Prairie	Corvallis West
Belts Road	Private	23	Belts Road	Eugene East
Mckenzie View Drive	Private	2	Mckenzie View Drive	Eugene East
Danebo drag strip	BLM	20	Balboa	Eugene West
East Coyote	Army Corps of Engineers	75	East Coyote	Eugene West
Fisher Butte	Army Corps of Engineers	1500 (>1500)	Fisher Butte	Eugene West
Fisher Butte Dike	Army Corps of Engineers (assume ODOT, managed by the Corps)	1000 (about 1000)	Fisher Butte Dike	Eugene West
Goshen	Private/ODOT	14	Goshen	Eugene West
Neilson Road	Private	28	Lanel Substation	Eugene West
Green Hill Road North of RR Tracks	BLM	42	North Greenhill	Eugene West
Amazon Canal	Private	500 (>500)	Oxbow West	Eugene West
Green Hill Road and West 11 Ave. (JT note: "Northwest of Greenhill Road/West 11th intersection" in report	Private	270	Part of Vinci	Eugene West

Site Name[1]	Ownership[1]	No. of Erigeron[1]	Cross-reference to site name in 5-year review[2]	Recovery Zone[3]
Green Hill Road South of RR tracks	Private	100 (75-100)	Part of Vinci	Eugene West
ODOT right-of-way	BLM	50	Part of Vinci	Eugene West
Sanford road	Private	2	Sanford Road	Eugene West
West 18 Ave.	Private	65	Speedway East/Cuddeback Unit	Eugene West
Wallis Street	Private	13	Wallis Street	Eugene West
Crow Rd. & W. 11th	Private	230	West 11th (on n. side W. 11th, quite a distance east of Crow Rd.)	Eugene West
Willow Creek Preserve	Oregon TNC, Private/City of Eugene	2080 (approx. 2080)	Willow Creek Preserve and sites in the vicinity	Eugene West
Kingston-Lyons Rd	Note changed from private to TNC	200	Kingston-Lyons (not including Kingston Meadows Preserve)	Salem East
Anderson Road	Marion County	70	Lone Fir Cemetery	Salem East
Shelburne Drive	Linn County	2	Shelburne Drive	Salem East
Starlight Road	Private	1	Starlight Road	Salem East
Sublimity	Private	30	Sublimity	Salem East
North Boundary (Baskett NWR)	U.S. Fish and Wildlife Service	45	Baskett Butte North	Salem West
Baskett Butte (Summit)	U.S. Fish and Wildlife Service	370	Baskett Butte South	Salem West
Grand Ronde	Private	520	Grand Ronde	Salem West

1. Extracted from undated "Willamette Valley Prairie Sites" table available in OFWO file #8197.ERDE9 included in the listing administrative record. Plant counts appear to have been drawn from Clark et al. 2003, and typically refer to "flowering clumps." Additional qualifiers from Clark *et al.* 2003 are provided in parenthesis as applicable.
2. Best approximation based on site names, known synonyms, location information, ownership and/or current records.
3. Source: USFWS 2010.

APPENDIX 4:
Willamette daisy sites and population status

Subpopulations that make up a population[1] are indicated by a common population number, followed by a site letter in the left-hand column of the table. In this document, "sites" refer to properties where Willamette daisy have been documented to occur naturally or as a result of introduction efforts. "Sites" are listed separately rather than aggregating those that make up a population or sub-population under one site name where there are differences in land ownership, conservation status, site activities or available data. Site names may vary from those used in other documents. Population size categories correlate to recovery goals in the Recovery Plan.

Site Name	Ownership	Habitat management & protection?	Period of stable or increasing population	Population size: # plants documented Between 2004 – 2010				Plant data year(s)	Data Source	Willamette daisy data notes
				Unknown	<200	200-2000	>2000			
Corvallis East										
1. Private property	Private	No	Unknown		X			2008	IAE 2009	Seed collected 2008
2. Private property	Private	No	Unknown			X		2006	Kaye *et al.* 2006	551 plants counted in 2006
Corvallis West										
1. Private property	Private	No	Unknown			X		2007	IAE 2009	Seed collected 2008
2a. Camas Prairie	Private	No	Unknown		X			2005, 2006	Kaye *et al.* 2006	131 plants counted in 2005, 135 counted in 2006
2b. Private property	Private	Partial, 30-year WRP easement	Unknown			X		2010	A. Thorpe, pers. comm. 2010	1,000 plugs introduced 2010
3a. Bald Hill Farm	Private	No	Unknown		X			2005, 2006	Kaye *et al.* 2006	20 plants in area counted in 2005 and 2006

[1] Where sites are within 2 miles (3 km) of each other, they are generally considered to be subpopulations that comprise a larger population (i.e., metapopulation) based on pollinator travel distance (USFWS 2010).

Site Name	Ownership	Habitat management & protection?	Period of stable or increasing population	Population size: # plants documented Between 2004 – 2010				Plant data year(s)	Data Source	Willamette daisy data notes
				Unknown	<200	200-2000	>2000			
3b. Bald Hill Park	City of Corvallis	Yes	Unknown			X		2005 - 2008	IAE 2008; IAE 2009; and Kaye *et al.* 2006	Small natural population augmented with 1,100 plants introduced in 2007 and 2008
4. Finley NWR	USFWS	Yes	Unknown			X		2007, 2008	IAE 2008; IAE 2009	1,050 planted in 2007 and 2008
5. Beazell Memorial Forest	Benton County Parks	Yes	Unknown	X				2009	Kaye, T., pers. comm. 2010	Introduced in 2009
Eugene East										
1. Belts Road	Private	No	May be extirpated	X				2008	OFWO, *in litt.* 2010	May be extirpated
2. McKenzie View Drive	Private	No	Unknown		X			2008	OFWO, *in litt.* 2010	Extant population found in 2008
Eugene West										
1a. Balboa	BLM	Yes	Declining		X			1999-2009	BLM 2009	Numbers have ranged from a high of 394 (in 1999) to a low of 85 (in 2008); 108 plants were counted in 2009
1b. Cuddeback Unit	TNC	Yes	Unknown	X				2008	IAE 2009	Seed collected 2008
1c. Hynix	Private	No	Unknown		X			2005-2007, 2010	IAE 2007; IAE 2008; D. Brooks, pers. comm. 2005; OFWO, *in litt.* 2010	Natural population may be extirpated; approximately 300 plants were introduced between 2005-2007, still extant in 2010

Site Name	Ownership	Habitat management & protection?	Period of stable or increasing population	Population size: # plants documented Between 2004 – 2010				Plant data year(s)	Data Source	Willamette daisy data notes
				Unknown	<200	200-2000	>2000			
1d. North Greenhill	BLM	Yes	Declining		X			1997 through 2009	BLM 2009	Counts have ranged from 127 to 956 plants; 600 were introduced in 1999, both natural and introduced plant numbers have been declining; 147 total were counted in 2009
1e. Oxbow West	BLM	Yes	≥ 11 years				X	1999-2009	Kaye *et al.* 2006; BLM 2009	Counts have ranged from 1988 plants (in 1999) to 3948 (in 2009)
1f. Speedway	BLM	Yes	≥ 8 years			X	X	2002, 2008, 2009	BLM 2009	Counts have ranged from 788 plants (in 2002) to 2685 (in 2009)
1g. Speedway East	Private	No	Unknown		X			2004, 2006	OFWO, *in litt.* 2010; Kaye *et al.* 2006	Extant population as of 2006
1h. Vinci	BLM	Yes	≥ 8 years			X		2002, 2005, 2006, 2008	Kaye et al. 2006; BLM 2009	Counts have ranged from 271 plants (in 2002) to 706 (in 2009)
1i. Wallis Street	Private	No	May be extirpated	X				2004; 2010	OFWO, *in litt.* 2010	Not found 2010; may be extirpated
1j. West 11	Private	No	Unknown	X				2004	OFWO, *in litt.* 2010	Extant population found 2004
1k. Willow Creek Bailey Hill	TNC	Yes	Unknown		X			2006	Kaye et al. 2006	78 plants counted in 2006

Site Name	Ownership	Habitat management & protection?	Period of stable or increasing population	Population size: # plants documented Between 2004 – 2010				Plant data year(s)	Data Source	Willamette daisy data notes
				Unknown	<200	200-2000	>2000			
1l. Willow Creek Preserve (includes Willow Creek North)	TNC	Yes	Declining			X	Possible (census data is only available for macroplots)	2005, 2006, 1986-2009	Kaye *et al.* 2006; TNC 2009	Overall, numbers have declined in macroplots from 1997-2009; plant counts have ranged from a high of 3202 (in 1997) to a low of 1270 (in 2009)
1m. Willow Creek Road	Private	No	Unknown	X				2004	OFWO, *in litt.* 2010	Extant population found in 2004
2a. East Coyote	COE	Yes	Unknown		X			2005, 2006	Kaye *et al.* 2006; Petersen, E.S., *in litt.* 2009	36 plants counted in 2006
2b. Fisher Butte	COE	Yes	$\geq$ 15 years				X	1986, 1993, 2004, 2005, 2006, 2007	Kagan and Yamamoto 1987; Clark *et al*. 1993; Kaye *et al*. 2006; IAE 2003; IAE 2007; IAE 2009; OFWO *in litt.* 2010; Petersen, E.S., *in litt.* 2009; W. Messinger, pers. comm. 2010	2,000 plants counted in 1986; over 1,500 flowering clumps counted in 1993; 4,007 plants counted in 2007; preliminary data for 2010 surveys suggests that over 10,000 plants may occur here
2c. Fisher Butte Dike	ODOT	Partial	Unknown			X		2006	Petersen, E.S., *in litt.* 2009	379 plants counted in 2006
2d. Fisher Butte West	COE	Yes	n/a			X		2009	Petersen, E.S., *in litt.* 2009	1,200 introduced in 2009
2e. Lanel Substation	Private	No	Unknown		X			2006, 2008	OFWO, *in litt.* 2010	Between 158 and 189 plants were counted in 2008
3a. Fox Hollow	Private	No	Unknown	X				2002	Boyer 2002	No data since 2002

Site Name	Ownership	Habitat management & protection?	Period of stable or increasing population	Population size: # plants documented Between 2004 – 2010				Plant data year(s)	Data Source	Willamette daisy data notes
				Unknown	<200	200-2000	>2000			
3b. Hazel Dell Prairie 3	Private	No	Unknown	X				2002	Boyer 2002	No data since 2002
3c. Sanford Road	Private	No	May be extirpated	X				2008	OFWO, *in litt.* 2010	Part of area was surveyed in 2008, not found; may be extirpated
3d. Spencer Creek	Private	No	Unknown	X				2008	OFWO, *in litt.* 2010	Extant population found in 2008
3e. Spencer Creek Northwest	Private	No	Unknown	X				2008	OFWO, *in litt.* 2010	Extant population found in 2008
3f. Spencer Creek West	Private	No	Unknown	X				2008	OFWO, *in litt.* 2010	Extant population found in 2008
4. Goshen	ODOT	Yes	May be extirpated	X				2010	N. Testa, pers. comm. 2010	Not found 2010, may be extirpated
Salem East										
1. Starlight Road	Private	No	May be extirpated	X				2004	OFWO, *in litt.* 2010	Not found in 2004, may be extirpated
2. Shelburne Drive	Private	No	May be extirpated	X				2010	OFWO, *in litt.* 2010	Not found in 2010, may be extirpated
3a. Kingston-Lyons	Private	No	May be extirpated	X				2010	OFWO, *in litt.* 2010	Not found in 2010, may be extirpated
3b. Kingston Meadows Preserve	TNC	Yes	Unknown		X			2005, 2006	Kaye et al. 2006	52 plants counted in 2005, 100 counted in 2006
4. Heritage	Private	No	Unknown			X		2007	TNC 2007	1,100 planted in 2004/05
5a. Lone Fir Cemetery	Private	No	Declining		X			2010	OFWO, *in litt.* 2010	Nearly extirpated; 17 plants found in 2010
5b. Sublimity Grasslands	Private	No	Unknown		X			2005, 2006	Kaye *et al.* 2006	58 plants counted in 2005, 55 counted in 2006

Site Name	Ownership	Habitat management & protection?	Period of stable or increasing population	Population size: # plants documented Between 2004 – 2010				Plant data year(s)	Data Source	Willamette daisy data notes
				Unknown	<200	200-2000	>2000			
Salem West										
1a. Baskett Butte North	USFWS	Yes	Unknown		X			2005, 2006	Kaye *et al.* 2006	27 plants counted in 2005, 46 counted in 2006
1b. Baskett Butte South	USFWS	Yes	Unknown		X	X		2005, 2006	Kaye *et al.* 2006	20-75 and 52-141 plants counted in 2005 and 2006 (Baskett Butte Areas 3 and 4)
2. Gooseneck Creek WRP	Private	Yes, permanent WRP easement	Unknown		X			2008	IAE 2009	Seed collected in 2008
3. Grand Ronde	Private	No	May be extirpated					2004	OFWO, *in litt.* 2010	Not found in 2004, may be extirpated
4. Mill Creek	ODOT	Yes, Special Management Area	Declining		X			2009	Kaye *et al.* 2006; NT, pers. comm. 2010	Nearly extirpated; 7-14 flowering plants counted in 2005 and 2006; only 1-2 plants found in 2009