

Howell's spineflower
(Chorizanthe howellii)

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

**U.S. Fish and Wildlife Service
Arcata Field Office
Arcata, California**

September 2007

5-YEAR REVIEW

Species reviewed: Howell's spineflower/*Chorizanthe howellii*

TABLE OF CONTENTS

- I. General Information
 - A. Methodology
 - B. Reviewers
 - C. Background
- II. Review Analysis
 - A. Application of the 1996 Distinct Population Segment (DPS) Policy
 - B. Recovery Criteria
 - C. Updated Information and Current Species Status
 - 1. Biology and Habitat
 - 2. Five-Factor Analysis
 - D. Synthesis
- III. Results
- IV. Recommendations for Future Actions
- V. References

5-YEAR REVIEW
Howell's spineflower/*Chorizanthe howellii*

I. GENERAL INFORMATION

A. Methodology used to complete the review: This review was conducted by David Imper, Ecologist, with the Arcata Fish and Wildlife Office of the Fish and Wildlife Service, based on all information contained in files at that office and provided by the public and agencies in response to the Federal Notice.

B. Reviewers

Lead Region -- California/Nevada Operations Office; Diane Elam and Mary Grim, (916)414-6464

Lead Field Office -- Arcata Fish and Wildlife Office; Mike Long, Field Supervisor (707)822-7201

C. Background

1. FR Notice citation announcing initiation of this review:

On March 22, 2006, the U.S. Fish and Wildlife Service announced initiation of the five-year review for Howell's spineflower and asked for information from the public regarding the species' status (71 FR 14538). No information was received as a result of that announcement

2. Listing history

Original Listing

FR notice: Federal Register 50(17):27848-27859

Date listed: June 22, 1992

Entity listed: Howell's spineflower

Classification: Endangered

3. Review History: No status reviews have been conducted since the taxon was listed in 1992.

4. Species' Recovery Priority Number at start of review:

The recovery priority is 8, reflecting a moderate degree of threat, high recovery potential, and a taxonomic rank of full species.

5. Recovery Plan or Outline

Recovery Plan for Seven Coastal Plants and the Myrtle's Silverspot Butterfly
Approved September 29, 1998

No revisions.

II. REVIEW ANALYSIS

A. Application of the 1996 Distinct Population Segment (DPS) policy

1. Is the species under review listed as a DPS?

No. The Act defines species as including any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate wildlife. This definition limits listings as distinct population segments (DPS) only to vertebrate species of fish and wildlife. Because the species under review is a plant and the DPS policy is not applicable, the application of the DPS policy to the species listing is not addressed further in this review.

B. Recovery Criteria

1. Does the species have a final, approved recovery plan?

Yes
 No

2. Does the recovery plan contain recovery (i.e., downlisting or delisting) criteria?

Yes
 No

3. Adequacy of recovery criteria.

a. Do the recovery criteria reflect the best available (i.e., most up-to-date) information on the biology of the species and its habitat?

Yes
 No

b. Are all of the 5 listing factors that are relevant to the species addressed in the recovery criteria (and there is no new information to consider regarding existing or new threats)?

Yes
 No

In the recovery plan, we identify which of the 5 listing factors each recovery criterion addresses. However, the criteria are not strictly threats-based in that they are not specifically framed in terms of the 5 listing factors.

4. **List the recovery criteria as they appear in the recovery plan, and discuss how each criterion has or has not been met, citing information. For threats-related recovery criteria, please note which of the 5 listing factors* are addressed by that criterion. If any of the 5-listing factors are not relevant to this species, please note that here.**

Listing Factor B (overutilization for commercial, recreational, scientific, or educational purposes) is not relevant to this taxon. No evidence exists at this time to indicate Listing Factor C (disease or predation) is relevant.

Reclassification to threatened status will be evaluated when:

Downlisting Criterion 1 (Addresses Listing Factors A, D and E)

Habitat occupied by the species that is needed to allow delisting has been secured, with long-term commitments and, if possible, endowments to fund conservation of the native vegetation.

There has been some improvement in the long-term protection status of habitat occupied by *Chorizanthe howellii* since the species was listed. More than 95 percent of the distribution of *Chorizanthe howellii*, considered to comprise a single population, occurs within MacKerricher State Park (MSP)(Imper 2005), which is owned and managed by the California Department of Parks and Recreation (CDPR). The General Plan adopted for MSP in 1995 (CDPR 1995) designated the north portion as the Inglehook Fen – Tenmile Dunes Natural Preserve. A map of the species distribution developed in 2001 suggested that area may contain more than half of the habitat occupied by *Chorizanthe howellii* within MSP (Maslach 2001). Under CDPR policy (CDPR 2004a), management within Natural Preserves more specifically emphasizes conservation of sensitive species than within other lands designated as State Park, which applies to the remainder of MSP.

Downlisting Criterion 2 (In part, addresses Listing Factors A, D and E)

Management measures are being implemented to address the threats of invasive species, pedestrians, and off-road vehicles at some sites.

CDPR has implemented several management measures since the recovery plan was completed that have, at least temporarily, addressed many threats to *Chorizanthe howellii*. Recreational activities that historically impacted *Chorizanthe howellii* habitat primarily included off-road vehicle, pedestrian and equestrian uses.

No off-road vehicle use is currently allowed in MSP, and none of the private parcels on which the species is known to occur are subject to this type of use at this time (Imper 2005). At the time the recovery plan was completed, CDPR was

proposing to restore the old haul road and convert it into a pedestrian trail in the north portion of MSP, which would have directly eliminated some colonies of *Chorizanthe howellii*, potentially interfered with sand movement, and contributed to accelerated stabilization of habitat landward of the road (CDPR 1998; EDAW 2000). Those plans were eventually dropped. In 1996, MSP implemented a project to redirect recreational use away from *Chorizanthe howellii* habitat in the vicinity of Cleone Lake, combined with extensive removal of invasive plants and reseeded effort with *Chorizanthe howellii* (CDPR 1996). In 2002, MSP implemented limited monitoring designed to assess the relative impacts of trail use on *Chorizanthe howellii*.

Since 1997, MSP has also implemented various projects aimed at controlling the invasive European beachgrass (*Ammophila arenaria*). As of 2004, beachgrass had been removed from approximately 16 acres of dune habitat in the north end of MSP (Pasquinelli, pers. comm. 2006). Plans are underway now, under CDPR's Natural Heritage Stewardship Program, to continue the beachgrass removal over the next few years utilizing integrated pest management techniques (Pasquinelli, pers. comm. 2006). Efforts to control another invasive species, iceplant (*Carpobrotus edulis*), began with a removal project located near Cleone Lake, in the center of MSP (CDPR 1996).

In 2005, another project funded under a Section 6 ESA grant was implemented to determine the historical rate of iceplant encroachment within MSP and the response by *Chorizanthe howellii* to controlled removal of the iceplant under different conditions (Warner 2006). That study has indicated that, at least in the short-term, *Chorizanthe howellii* responded quite favorably in most cases to removal of iceplant, as did various other non-native species, such as sheeps sorrel (*Rumex acetosella*), ripgut brome (*Bromus diandrus*), and quaking grass (*Briza* spp.). Continued monitoring over a longer period is needed to determine the dynamics of reoccupancy following iceplant removal, and whether this type of restoration provides any lasting recovery for *Chorizanthe howellii*. Warner (2006) also recommended expanding the study to investigate the efficacy of other iceplant treatment methods, such as mechanical and chemical control, due to the high cost for manual labor.

Downlisting Criterion 3 (In part, addresses Listing Factor E)

Monitoring reveals that management actions are successful in reducing threats of invasive non-native species.

Some progress has been made with respect to this criterion since the recovery plan was completed. The extent of iceplant coverage within MSP was first mapped in 2005 (Warner 2006). European beachgrass was mapped for the first time in 1997, and the map has been updated as removal efforts continue for that species (Maslach, pers. comm. 2006). However, there has been no attempt to quantify reestablishment of *Chorizanthe howellii* within habitat in which these species have been removed (Pasquinelli, pers. comm. 2006), and there is yet no

valid baseline estimate of the overall population of *Chorizanthe howellii*, necessary to assess the overall response of *Chorizanthe howellii* to the various invasive species removal efforts.

No efforts have been made to map burclover (*Medicago polymorpha*), riggut brome, or other invasive species besides European beachgrass and iceplant, that may be competing with *Chorizanthe howellii*.

Downlisting Criterion 4 (In part, addresses Listing Factors A, D and E)
Additional restored habitat has been secured, with evidence of either natural or artificial long-term establishment of additional populations, and long-term commitments (and endowments where possible) to fund conservation of the native vegetation.

Significant progress in removal of two invasive species, particularly European beachgrass, from the north portion of MSP is expected to have a beneficial effect on *Chorizanthe howellii*, at least in the short-term. However, no follow-up monitoring has been conducted to date to determine if *Chorizanthe howellii* is reoccupying the restored habitat (Pasquinelli, pers. comm. 2006). Currently, there is no assurance that the recent control efforts and presumed gains in suitable *Chorizanthe howellii* habitat will not be lost as invasive species recolonize during future periods of budget and staffing shortfalls, or redirection of management emphasis and resources.

Delisting will be considered when, in addition to the criteria for downlisting, all of the following conditions have been met:

General Delisting Criterion (In part, addresses Listing Factors A, D and E)
Full recovery will be achieved when the dune system it inhabits is secure, with experience to demonstrate that exotic (invasive) plants and other threats (recreational use, off-road vehicles, etc.) are controlled and managers have demonstrated their ability to keep the threats under control. The taxon needs to be secure in the presently-occupied range, and opportunities should be taken to introduce these plants to restored habitat in or near its historic range. To be counted toward recovery, (re)introduced populations should be naturally reproducing in vegetation that also appears to be persisting without excessive maintenance. The determination that delisting is possible must be based on at least 15 years of monitoring, to include wet and drought years. Aspects of demography and population biology must be understood to be assured that populations are likely to persist. The species can be considered for delisting when sites are secure from habitat modification (development), occupied habitat is stable or improving, and free of weed invasion.

Note: the recovery narrative specifically identifies two occurrences on private property (“A” Springer-Sheppard and Ward Avenue) that must be protected.

In general, while some progress has been made in removing or minimizing recreational threats (off-road vehicles, equestrian impacts), and in restoring *Chorizanthe howellii* habitat (primarily European beachgrass), monitoring has not yet been implemented to document the reestablishment and persistence of *Chorizanthe howellii* in restored habitat, nor has the restored habitat been adequately protected by permanent management direction aimed at maintaining suitable habitat in perpetuity (Pasquinelli, pers. comm. 2006).

Various properties surrounding MSP, including those mentioned in the above criterion, either support *Chorizanthe howellii*, or are important to sustaining the ecological integrity of the dune ecosystem represented within MSP. At this time these parcels are not protected from development.

Specific Delisting Criterion (In part, addresses Listing Factors A, D and E)
Restoration of habitat at MacKerricher State Park and the vicinity (Ten Mile Dunes), including eradication of European beachgrass and expansion of populations into restored habitat, has been accomplished. Monitoring and history studies should, by then, demonstrate that the area occupied by the plant is increasing and that populations are not being lost to recreational activity.

Restoration of habitat within MSP is ongoing, but far from completed. Monitoring to date is inadequate to document *Chorizanthe howellii* population trends, population expansion into restored habitat, or population response to recreational disturbances. Demonstration that habitat restoration efforts and the current management of recreational use in MSP are consistent with a stable *Chorizanthe howellii* population will necessarily depend on broad scale population and habitat monitoring over sufficient time to indicate trends. That monitoring largely remains to be implemented.

Adequacy of Criteria

Currently, all downlisting and delisting criteria are considered adequate and appropriate with respect to recovery of the species. The conservation strategy outlined by these criteria addresses all the currently known threats to *Chorizanthe howellii*. Components of the conservation strategy and criteria include habitat protection and management secured by appropriate agreements (such as conservation easements, covenants) to address listing factors A (habitat loss or modification, etc.), D (inadequate regulatory mechanisms), and E (other natural or manmade factors – specifically manmade random events).

C. Updated Information and Current Species Status

1. Biology and Habitat

Currently, the known global distribution of *Chorizanthe howellii* extends from the Tenmile River, north of the City of Ft. Bragg, south approximately 5.4 miles to Virgin

Creek, Mendocino County, and as much as 0.5 mile inland from the Pacific Ocean. Nearly the entire distribution occurs within MSP. The remainder of the distribution is in private ownership (California Department of Fish and Game 2006; U.S. Fish and Wildlife Service 1998).

Within MSP, a survey conducted in 2001 mapped some 277 occupied habitat polygons ranging as large as 0.73 acres, and overall totaling 7.8 acres (Maslach 2001). No statistically valid estimate of the population has been made. Based on a small number of sample plots surveyed in 2002, the population that year may have exceeded 3 million (Maslach 2002). While that estimate appears relatively large, we have no information with which to put the population size in a meaningful context. As an annual species, *Chorizanthe howellii* completes its entire life cycle within a year, and therefore responds almost immediately to changes in its environment. A persistent seedbank in the soil can mitigate this dependence to some extent, but there is no information indicating whether *Chorizanthe howellii* forms such a seedbank. Although *Chorizanthe howellii* is capable of rapid exploitation of habitat in some cases, such as following removal of iceplant, very large declines in density of plants have also been observed following encroachment by invasive species or changes in recreational use, even within one season (Imper 2005). Therefore, more information is needed on natural population fluctuations, the impacts of recreational disturbance and how that is changing, the rate of encroachment by invasive species, and in particular, the overall population trend, in order to determine what a viable population is for this species.

Chorizanthe howellii occurs within both the Northern foredune community, on semi-stabilized, recent dune sand, and within coastal prairie, located on the more fertile, finer textured soils typical along some of the coastal bluffs in MSP (Imper 2005). The habitat can be generally characterized as early successional. Disturbance in the form of wind exposure and sand deposition, or limited foot traffic appears necessary to prevent encroachment by other species, which appears to cause a steep decline in *Chorizanthe howellii* (Imper 2005). By no coincidence, most of the occupied habitat occurs near, but not within the center of the pedestrian or horse trails. However, some of the largest stands are located within semi-stabilized dune swales, which appear to receive little foot traffic. *Chorizanthe howellii* in general does not tolerate a high level of competition for seedling establishment. In some cases, *Chorizanthe howellii* very effectively colonizes areas in which iceplant has died or been pulled, if the remaining mulch is not too deep (Warner, 2006; Imper 2005). In 2005 this observation led to a study funded under an ESA Section 6 grant, to study the conditions under which a routine program of iceplant removal might contribute to reliable periodic regeneration of suitable habitat, and thus recovery of the species (CDPR 2004).

Given the unrelenting encroachment of its coastal habitat by a variety of invasive species, and the observed positive response to some kinds of human disturbance (Warner pers. comm. 2006), it may be reasonable to assume complete absence of human-related disturbance in its habitat could lead to a significant decline in the species. Thus, the location of the majority of the rangewide distribution of *Chorizanthe howellii* within MSP, where agents of disturbance are many, if not always easily controlled, offers a

potential opportunity for permanent protection and management of the species, if managed wisely. Ultimately, the recovery of *Chorizanthe howellii* depends on compatible management of recreational activities, and a permanent control program for invasive species within MSP.

2. Five Factor Analysis (threats, conservation measures and regulatory mechanisms).

No new information is available regarding threats to the species where it occurs on private land. Therefore, the discussion below focuses on MSP, which contains more than 95% of the distribution of *C. howellii*.

a. Present or threatened destruction, modification or curtailment of its habitat or range: At the time of listing, principle human threats to habitat for *Chorizanthe howellii* included pedestrian, equestrian, and off-road vehicle use. The CDPR, as owner of the majority of the distribution of the species, had not developed a specific preservation or management strategy for *Chorizanthe howellii*. Therefore, habitat within MSP was subject to recreational pressure from these sources.

At the time the recovery plan was completed, CDPR was considering replacing eroded sections of the old haul road (currently a pedestrian trail) adjacent to Cleone Lake and in the north portion of MSP. Those improvements would have directly eliminated at least some colonies of *Chorizanthe howellii*, and could have interfered with sand movement and contributed to accelerated stabilization of habitat landward of the road, both detrimental to *Chorizanthe howellii* (CDPR 1998; EDAW 2000). The plans to replace the eroded sections of the haul road trail were eventually dropped. However, given the expected growth in recreational pressure on MSP, and the attractiveness of a trail spanning the length of the park, efforts to complete the trail could be reinitiated in the future (Pasquinelli, pers. comm. 2006).

Equestrian and pedestrian trails within MSP continue to affect a large portion of the occupied habitat. Residential development around the park combined with pending completion of the pedestrian trail between downtown Ft. Bragg and MSP is expected to lead to a significant increase in recreational pressure in the future (Pasquinelli, pers. comm. 2006).

Equestrian use of MSP is managed by a concessionaire, currently permitted on a monthly basis. MSP plans to implement a more comprehensive, permanent plan consistent with the resource opportunities and constraints within the park (Pasquinelli, pers. comm. 2006). In general, both equestrian and recreational trails facilitate public access to the dunes, and increase the risk of trampling in the more remote populations of *Chorizanthe howellii*. Moderate to heavy pedestrian and horse traffic preclude establishment of *Chorizanthe howellii* within the well-used center of pathways. In addition, the trails facilitate invasion by invasive

species, such as iceplant, burclover and European beachgrass, identified in the recovery plan as primary threats to *Chorizanthe howellii*, as well as ripgut brome, which often invades following removal of iceplant (Pasquinelli pers. comm. 2006). At the same time, anecdotal evidence and preliminary monitoring data (Maslach 2002) indicate that limited foot traffic helps maintain and perhaps create new *Chorizanthe howellii* habitat along the edges of the trails. The result, in terms of the overall impact on *Chorizanthe howellii* distribution and its abundance within MSP, has not been determined, but is the subject of disturbance-related monitoring initiated in 2002. That monitoring has not yet been fully implemented, and at least 5 to 10 years of data may be necessary to adequately assess disturbance-related impacts.

Limited monitoring designed to assess the relative impacts of trail use on *Chorizanthe howellii* was implemented in 2002. That effort needs to be expanded and continued in order to assess the compatibility between various levels of recreational use and *Chorizanthe howellii*, and enable extrapolation of those results in planning new or expanded recreational activities within MSP.

b. Overutilization for commercial, recreational, scientific, or educational purposes: Overutilization has not been, and currently is not known to be a threat for this plant.

c. Disease or predation:

We know of no current threats to *Chorizanthe howellii* from disease or predation.

d. Inadequacy of existing regulatory mechanisms:

With the exception of designation of the Inglenook Fen – Tenmile Dunes Natural Preserve in 1995, which preliminary estimates indicate contains a substantial portion of the distribution of the species within MSP, there has been no change in the imminence of this threat factor, since there has been no change in local, state, or federal regulations adding to the protection of this species. Successful mitigation of threats described under Listing factors A and E are intended to mitigate the importance of Listing factor D. The California Environmental Quality Act (CEQA) (chapter 2, section 21050 *et seq.* of the California Public Resources Code) affords the only protection for the species under state law. Virtually the entire distribution of *Chorizanthe howellii* is located on state park land, where many projects are subject to review under CEQA. However, protection of Federally listed species under CEQA is dependent upon the discretion of the agency involved.

In 1995, CDPR designated the north portion of MSP as the Inglenook Fen – Tenmile Dunes Natural Preserve (CDPR 1995). The mapping effort conducted in 2001 suggests the Natural Preserve may include half or more of the *Chorizanthe howellii* distribution within MSP. The change added management emphasis to conserving *Chorizanthe howellii*, but falls short of permanent protection.

Management of MSP is generally guided by the Department Operations Manual, or DOM (CDPR 2004a), and more specifically, the MSP General Plan (CDPR 1995). The DOM generally advances a holistic approach to natural resource management; e.g., “natural resources will be managed to preserve the composite whole of physical and biological processes, features, and native plant and animal communities except where the management purpose is otherwise established through unit classification or General Plan”, and “does not attempt to solely preserve individual species except threatened or endangered species in special situations.”

Under the DOM, CDPR lands important to preserving rare or endangered plant and animal species and their supporting ecosystems may be designated as Natural Preserves, as was the Inglenook Fen – Tenmile Dunes Natural Preserve. The emphasis of management in that management category is on conservation of natural values, as opposed to the State Park lands category, where the stated management emphasis is as “a composite whole, with all features and processes being considered, in order to restore, protect, and maintain its native environmental composition to the extent compatible with the primary purpose for which the park was established.” MSP appears to have been established primarily for recreational use, such that management emphasis is focused on recreational use, so long as the natural, scenic, cultural, and ecological values are preserved for present and future generations.

Ultimately, the DOM allows for waiver or modification of department policy on a case by case basis by the Director or their designee. The reality is that practical limitations of park management policy (variability in staffing levels, staff interest and management priorities) combined with the uncertainty in funding from year to year provide no guarantee that appropriate management will continue should the species be delisted.

e. Other natural or manmade factors affecting its continued existence:

Chorizanthe howellii was listed, in part, due to the past introduction and invasion of its habitat by a variety of invasive, non-native plant species. These species threaten virtually the entire distribution of *Chorizanthe howellii*, through direct competition for space, stabilization of the dunes, and in some cases, enrichment of the soils which then stimulates invasion by other aggressive species. Within *Chorizanthe howellii* habitat, European beachgrass, iceplant, burclover, ripgut brome and other annual grasses are principle threats (Pasquinelli, pers. comm. 2006). Evidence suggests these taxa will continue to invade *Chorizanthe howellii* habitat, necessitating routine and permanent management action. The majority of these species have not been, nor are they currently, mapped within MSP on a routine basis, so there is little to no documentation of encroachment rates.

MSP has implemented several projects aimed at controlling two of the competing invasive species, European beachgrass (*Ammophila arenaria*) and iceplant (*Carpobrotus edulis*). Efforts to remove European beachgrass began in 1997 (CDPR 1997) supported by private donations, and funding under ESA Section 6

grants to the States (CDPR 2002). As of 2004, European beachgrass had been removed from approximately 16 acres of dune habitat in the north end of MSP (Pasquinelli, pers. comm. 2006). Plans are underway now, under CDPR's Natural Heritage Stewardship Program, to continue the beachgrass removal over the next few years utilizing integrated pest management techniques (Pasquinelli, pers. comm. 2006).

Efforts to control iceplant began with an extensive removal project located near Cleone Lake, in the center of MSP (CDPR 1996). In 2005, another project funded under a Section 6 ESA grant was implemented to determine the historical rate of iceplant encroachment within MSP, and determine the response by *Chorizanthe howellii* to controlled removal of the iceplant under different conditions (Warner 2006). Recent field mapping and inspection of historical aerial photographs indicated that iceplant established a foothold within MSP sometime prior to 1978, and expanded an average of 300 percent between 1986 and 2005 (Warner 2006). Some areas of MSP exhibited as much as a 1000 percent increase during that period. The preliminary results from iceplant removal suggest that *Chorizanthe howellii* responds both predictably, and favorably, at least in the short term, to iceplant removal under certain conditions (Warner 2006), but past removal efforts have indicated the positive response may be short-lived. Maslach (pers. comm. 2006), reflecting on a small-scale iceplant removal study conducted in 2001, observed very rapid initial expansion by *Chorizanthe howellii* when seeded into habitat in which iceplant had been removed. However, within just a year or two the abundance of *Chorizanthe howellii* declined substantially. It is apparent that longer term monitoring data are needed in order to establish meaningful trends in this species. The ultimate objective of the Section 6 iceplant removal study is to determine whether a sustained program of removal could play an integral role in recovery of *Chorizanthe howellii* in MSP (CDPR 2004b).

In summary, MSP has made substantial efforts to implement research and management aimed at controlling invasive species and restoring *Chorizanthe howellii* habitat, and learning more about the ecology and habitat requirements of *Chorizanthe howellii*. These efforts, particularly the monitoring, need to be both continued and expanded. While the threat posed by invasive species has been addressed to some extent, at least temporarily, no mechanism has been implemented which ensures continued funding and implementation of an invasive species control program, or the monitoring necessary to effectively implement such a program.

D. Synthesis.

The limited available data indicate the population of *Chorizanthe howellii* in 2002 was substantially larger than suggested at the time of listing, by an order of magnitude (Maslach 2001, 2002). Since the population information available at the time of listing (U.S. Fish and Wildlife Service 1992) does not appear to have been based on quantitative data, there is no

evidence to indicate the 2002 population estimate was due to an actual expansion of the population, or simply was a more accurate estimation. While the more recent population estimate suggests the taxon is not at as great a risk as originally thought, other factors indicate the threat remains significant.

As an annual species, *Chorizanthe howellii* responds almost immediately to changes in its environment. Encroachment by invasive plants into habitat occupied by *Chorizanthe howellii*, if unchecked, threatens to eliminate its habitat. At the same time, the recreational use of MSP, while likely beneficial to *Chorizanthe howellii*, also has the potential to severely degrade or eliminate its habitat. The recreational pressure is expected to increase substantially as the surrounding residential population grows and access to MSP is improved. Some progress has been made toward understanding the impacts of recreational use on the species, and how those impacts might be used to benefit the species. Efforts have also been taken to reverse the loss of habitat to invasive species. Further information is needed to best understand how to accommodate the current and expected increase in recreational use while maintaining a stable population of *Chorizanthe howellii*, and how to best restore *Chorizanthe howellii* habitat. In addition, given that the threat from invasive species is not likely to ever dissipate, the means for ensuring the future monitoring and responsive management necessary to maintain *Chorizanthe howellii* are needed.

We believe that *Chorizanthe howellii* continues to be at risk of extinction due to the threat of habitat loss from invasive plants and recreational use. Therefore, we recommend that *Chorizanthe howellii* remain endangered and no status change is recommended at this time.

III. RESULTS

A. Recommended Classification:

- Yes, downlist to Threatened
- Yes, uplist to Endangered
- Yes, delist
- No, no change is needed

B. New Recovery Priority Number 8 (no change)

C. If applicable, indicate the Listing and Reclassification Priority Number (FWS only):

Reclassification (from Threatened to Endangered) Priority Number: _____

Reclassification (from Endangered to Threatened) Priority Number: _____

Delisting (Removal from list regardless of current classification) Priority Number: _____

IV. RECOMMENDATIONS FOR FUTURE ACTIONS -

Partnership: Successful partnership with California Parks and Recreation Department on whose land the majority of the *Chorizanthe howellii* population and its habitat occur, is crucial to the successful implementation of this recovery plan and conserving the extant population. Therefore, continued collaboration between the Service and CDPR is critical.

Acquisition and/or Protection of Habitat: The CDPR and the Service should continue to pursue opportunities for acquisition or otherwise protection of important habitat adjacent to MSP, which either supports *Chorizanthe howellii*, or contributes to the integrity of the Tenmile Dunes ecosystem. In decreasing order of priority, these important lands include:

- inland dune habitat immediately south of Tenmile River;
- inland dune and prairie habitat northeast of Cleone Grange;
- dune habitat surrounding Virgin Creek and dunes habitat located east of Highway 101 south of Virgin Creek;
- dune habitat near the inland extent of the dune sheet north of Ward Avenue;
- dune habitat near the inland extent of the dune sheet north of Cleone Lake

Invasive Species Removal: Monitoring of plots as part of the ongoing ESA Section 6-funded study of iceplant removal should continue past the 3-year completion date for the Section 6 project, in order to assess the long-term response of *Chorizanthe howellii* to removal of iceplant. That study should help identify which invasive species (e.g., riggut brome) are most effective at competing with *Chorizanthe howellii* following iceplant removal efforts, and suggest further research on ways to discourage those species from competing with *Chorizanthe howellii*. Since the study has indicated that manual removal of iceplant may be cost-prohibitive, further research is also needed on alternative methods, such as herbicides, for its removal.

Efforts should continue with respect to removal of iceplant and European beachgrass, and exploring ways to implement a permanent invasive species monitoring and response program. Such a program could potentially be included within the Weed Inventory Monitoring System (WIMS) program recently initiated by CDPR.

Chorizanthe howellii Population Monitoring: The habitat occupied by *Chorizanthe howellii* was mapped in 2001, which provided an excellent baseline with respect to occupied habitat. This task should be repeated at periodic intervals (e.g., 5 years). Periodic remapping of occupied habitat is essential to detecting overall changes in the *Chorizanthe howellii* distribution, providing feedback on whether the current recreational management is consistent with maintaining *Chorizanthe howellii*. The occupied polygon map also facilitates development of a statistically valid estimate of the overall population (yet to be completed), necessary to determine population trends and provide feedback on management. However, a standard protocol is needed which ensures that the mapping is consistent from year to year. At a minimum, a baseline population estimate should be completed as soon as possible, and then repeated at periodic intervals. Monitoring should emphasize detection of *Chorizanthe howellii* within habitat recently treated for European beachgrass.

Chorizanthe howellii Disturbance Monitoring: Habitat disturbance is known to be a necessary element in the ecology of *Chorizanthe howellii*; however, too much or too little disturbance is detrimental. Therefore, in order to effectively tailor recreational use to the needs of *Chorizanthe howellii*, quantitative data are needed linking specific recreational use to response by *Chorizanthe howellii*. The disturbance monitoring study begun in 2002 was designed to measure the rate of establishment and mortality of *Chorizanthe howellii* along several pedestrian and equestrian trails. That monitoring needs to be continued in order to establish the recreational use/*Chorizanthe howellii* response relationship, and if possible, expanded to include quantitative measurement of actual pedestrian/equestrian use along these segments of trails, so that the impacts can be correlated directly with response by *Chorizanthe howellii*.

Permanent Funding: The CDPR and/or the Service should determine the amount of needed funds, and then pursue opportunities to secure permanent funding in the form of an endowment or trust fund, which ensures that periodic monitoring and habitat restoration are conducted in perpetuity. Such funding should not be subject to future CDPR staffing and budgetary limitations.

Specific Tasks Needed to Enable Review for Potential Downlisting, 2012 Status Review

The specific tasks needed to determine whether downlisting is appropriate for this taxon at the time of the next 5 year status review, include:

- 1) Using GPS, remap the distribution of *Chorizanthe howellii*-occupied polygons within MSP in 2008, and again in 2012. Using that map, derive a statistically valid estimate of population during both years. In particular, the inventory should emphasize habitat restored over the past decade.
- 2) Continue the monitoring begun as part of the Section 6 iceplant/spineflower study implemented in 2003, to better characterize the relationship between iceplant removal and recolonization by the *Chorizanthe howellii*. Plots should be monitored at no less than two year intervals, beginning spring 2008.
- 3) Fully implement the disturbance-related *Chorizanthe howellii* population monitoring initiated in 2003, and monitor those plots at not less than 2 year intervals.
- 4) Incorporate language in the forthcoming management plan developed for the Inglenook Fen Natural Preserve, which specifically commits to future conservation of *Chorizanthe howellii* within that area.

V. REFERENCES

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U.S. FISH AND WILDLIFE SERVICE
5-YEAR REVIEW of *Chorizanthe howellii*

Current Classification Endangered

Recommendation resulting from the 5-Year Review

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

Appropriate Listing/Reclassification Priority Number 8

Review Conducted By David Imper, Ecologist

FIELD OFFICE APPROVAL:
Lead Field Supervisor, Fish and Wildlife Service

Approve Michael M. Long Date 7/3/07

Acting REGIONAL OFFICE APPROVAL:
Lead Regional Director, Fish and Wildlife Service

Approve Carli Thoma Date 8/24/07