U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Eriogonum codium*

COMMON NAME: Umtanum Desert Buckwheat

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: April 19, 2010

STATUS/ACTION

___ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status
___ New candidate
_X_ Continuing candidate
___ Non-petitioned
_X_ Petitioned - Date petition received: 5/11/2004
__ 90-day positive - FR date:
__ 12-month warranted but precluded - FR date:
Did the petition request a reclassification of a listed species? N0

FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)? YES
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? YES
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded. Higher priority listing actions, including court-approved settlements, court-ordered and statutory deadlines for petition findings and listing determinations, emergency listing determinations, and responses to litigation, continue to preclude the proposed and final listing rules for the species. We continue to monitor populations and will change its status or implement an emergency listing if necessary. The "Progress on Revising the Lists" section of the current CNOR (*http://endangered.fws.gov/*) provides information on listing actions taken during the last 12 months.

_N_ Listing priority change
Former LP: ___
New LP: ___
Date when the species first became a Candidate (as currently defined): 10/25/1999

___ Candidate removal: Former LPN: ___
___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a

proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.

___ F – Range is no longer a U.S. territory.
___ I – Insufficient information exists on biological vulnerability and threats to support listing.
___ M – Taxon mistakenly included in past notice of review.
___ N – Taxon does not meet the Act's definition of "species."
___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY**:**
Flowering plants; Polygonaceae (Buckwheat Family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE:
Washington State

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE:
Benton County, Washington

LAND OWNERSHIP
The entire known range of the species is on federally owned land in the Hanford National Monument (Monument). Ownership of the area where *Eriogonum codium* is located was transferred from Department of Energy (DOE) to the Service and is now part of the Monument. The entire Monument will eventually be managed by the Service, but the Service does not currently manage all parts of the Monument due to several unresolved management concerns (e.g., contaminants, unexploded ordinance) in some areas of the Monument, including the vicinity of the *E. codium* population. Until these issues are resolved, the Service has not taken on full responsibility for management of these areas, which continue to be overseen by the DOE (Heidi Newsome, Wildlife Biologist, U.S. Fish and Wildlife Service [USFWS], Hanford Reach National Monument, pers. comm. 2002). This species is in a discontinuous distribution along approximately 1 mile of bluffs, currently occupying about 5 acres.

LEAD REGION CONTACT Linda Belluomini (503) 231-6283; email: linda_belluomini@fws.gov

LEAD FIELD OFFICE CONTACT Tim McCracken, Central Washington Field Office, Wenatchee, Washington, (509) 665-3508 Ext. 17; email: timothy_mccracken@fws.gov.

BIOLOGICAL INFORMATION

Species Description
E. codium was discovered in 1995 during a botanical survey of the Hanford Nuclear Reservation (Reveal et al. 1996*). E. codium* is a long-lived, woody perennial plant that forms low mats. Individual plants may exceed 100 years of age, based on counts of annual growth rings on cross sections of recently dead plants (The Nature Conservancy (TNC) 1998; Dunwiddie et al. 2001). Growth rates are also extremely slow, with stem diameters increasing an average of only 0.17

millimeters (0.007 inch) per year (TNC 1998; Dunwiddie et al. 2001).

Taxonomy

E. codium is currently recognized as a distinct species, and there is no known controversy concerning its taxonomy.

Habitat/Life History

E. codium is found exclusively on exposed basalt from the Lolo Flow of the Wanapum Basalt Formation. The soils are classified as Lithosols and are composed of fine reddish to blackish basalt overlain with pumice (Reidel and Fecht 1981). It is unknown if the close association of *E. codium* with the Lolo Flow is related to the chemical composition or physical characteristics of the particular bedrock on which it is found, or possibly other factors.

Historical Range/Distribution

The only known population of *E. codium* occurs on a wide mountain ridge in Benton County, Washington. The population has a discontinuous distribution along a narrow, 1.6 kilometer (1 mile) long portion of the ridge (Dunwiddie et al. 2001). The species was discovered in 1995 (Reveal et al. 1996), and there are no records of any collections prior to 1995 from anywhere else in North America.

Current Range/Distribution

It is unknown if the pre-historical distribution of *E. codium* was different from the species' current distribution, but it is likely that the species has been confined to this location during the last 150 years.

Population Estimates/Status

The only known population of *E. codium* was censused in 1997 and again in 2005. In 1997 there were 5,228 living individuals (Dunwiddie et al. 2001). In 2005 there were 4,418 living individuals (Caplow 2005). This represents a 15% decline in the population over 8 years. Demographic monitoring of the largest subpopulation within the population, begun in 1997, has shown an average 2 percent annual mortality of adult flowering plants, and in 9 years of monitoring, 4-5 seedlings have survived beyond the year of their germination. In short, both the monitoring and the census show population declines. The 2007 monitoring showed no change in numbers of plants, a slight reduction of vigor, and a single, new seedling counted in the study (J. Arnett, Botanist, Washington Department of Natural Resources (WDNR), Natural Heritage Division, pers. comm. 2008). In the summer of 2011, another full population census will likely be undertaken, providing a useful measure of change over the last 14 years.

A draft population viability analysis (PVA) was recently completed by Thomas Kaye (2007), based on 9 years of demographic data. This study determined that that there is little or no risk of a population decline greater than 90 percent within the next 100 years, but there is a 72 percent chance of a decline of 12.8 to 50 percent over the next 50 to 100 years, respectively. The PVA also concluded the decline is gradual, consistent with the decline noted by Caplow (2005) between 1997 and 2005, and will likely take several decades to accumulate significant impacts (Kaye 2007).

Other potential locations within the lower Columbia River Basin were intensively searched for additional populations of *E. codium* in 1996 and 1997, however no other populations were found.

THREATS

A. The present or threatened destruction, modification, or curtailment of its habitat or range. Wildfire is a major threat to *E. codium*. During the summer of 1996, a fire escaped from the Yakima Training Center (U.S. Department of Army) and traveled down the ridge occupied by *E. codium*. The fire was most severe where vegetative cover was dense and less severe on thinner soils with little or no vegetation. Shrub and grass fuels on parts of the ridge are sparse, and the fire was patchy in the area where *E. codium* is located (J. Soll, TNC, pers. comm. 1997). However, the fire killed an estimated 800 plants, or roughly 15 percent of the entire population (P. Dunwiddie, TNC, pers. comm. 2001). The plants appear to be quite sensitive to heat and were easily killed. Plants that were singed, but not visibly charred, appeared to be negatively affected and many died the year following the fire. The fire did not stimulate vigorous new growth on established *E. codium* plants, or sprouting from the plants' root crowns. In addition, there was no apparent flush of seedlings the following spring. This lack of regeneration indicates that the species is not fire-tolerant (Dunwiddie et al. 2001). The long-term impact of the fire to the population is unknown, but is likely to be significant given the low recruitment potential documented for this species.

Fire may be the primary threat to *E. codium* (Dunwiddie, pers. comm. 2001), and it could become an even greater threat if the frequency of fires increases (TNC 1998; Dunwiddie et al. 2001). Fires promote the invasion of some nonnative species, particularly cheatgrass (*Bromus tectorum*). In turn, the establishment and growth of highly flammable cheatgrass increases the likelihood of fire, potentially further impacting the *E. codium* population.

Fire fighting activities also pose a threat to the species. The location of the *E. codium* population is a natural fire break overlooking steep slopes, and fire lines and fire fighting equipment tend to be concentrated in such areas (H. Brunkal, pers. comm. 2001)

There have been incidences of trespassing by off-road vehicles (ORVs) and hikers in the vicinity of and within the *E. codium* population (F. Caplow, Rare Plant Botanist, WDNR, pers. comm. 2001). The open cliff edge where the plants grow is an attractive place for human traffic because of the compact substrate, sparse vegetative cover, and the view overlooking the Columbia River. The access road to the Bonneville Power Administration (BPA) power lines near the population is currently not fenced effectively, such that off-road and recreational vehicles may access the site. The entire known population exists within a narrow corridor where human traffic could be expected to concentrate. *E. codium* plants are easily damaged by trampling or crushing by ORVs, and appear to be extremely sensitive following such damage. Within 2 days of being run over by trespassing dirt bikes, portions of damaged plants showed signs of further decline. Some of the damaged plants have since died (TNC 1998).

There is a potential threat to *E. codium* from the movement (trailing) of livestock near the site by

a permitee as animals are moved seasonally between pastures (H. Newsome, pers. comm. 2006). An instance of trampling by livestock has not been observed to date, but remains a possibility as long as animals are being moved through the area.

Prospecting by rock collectors may also threaten *E. codium.* Holes up to 1.5 meters (m) (5 feet (ft)) in diameter and 1.2 m (4 ft) deep dug with a pick-axe and shovel are found throughout the area occupied by the species (Ted Thomas, Fish and Wildlife Biologist, USFWS, pers. obs. 1996). The age of these excavations is unclear. Some may remain from before 1943, when the DOE acquired the land as part of the Hanford Nuclear Reservation, now the Hanford Reach National Monument (Monument). However, others may be the result of more recent, illegal collecting. Continued rock collecting on the Monument could threaten a large portion of the *E. codium* population.

In 2004 to2005, the BPA re-opened and improved a steep road on the top of the ridge from the substation on China Bar. The road is now passable to 2-wheel-drive vehicles, and as of the summer of 2005, was inadequately fenced and gated to prevent trespass (F. Caplow, pers. com. 2005). This increases the potential for the threats described above.

B. Overutilization for commercial, recreational, scientific, or educational purposes.
There is no evidence of commercial, recreational, scientific, or educational use of this species, other than occasional collection of relatively few specimens (e.g., dead plants) for study. Collection of significant numbers of seed for banking has not been attempted to date.

C. Disease or predation.
Researchers from TNC observed western harvester ants (*Pogonomyrmex occidentalis*), a common native species, gathering mature achenes (seeds) of *E. codium*, and transporting them to their underground colonies (P. Dunwiddie, pers. comm. 2001). Ants brought up and discarded the inedible remains of the achene above ground near the colony. The percentage of achenes consumed by ants and other insects, and thus the degree of impact insects are having on the available seed bank, is unknown. No seedlings have been seen near the ant colonies. Ant predation of seeds has been shown to be a significant factor in the viability of at least one other rare *Eriogonum* taxon (*Eriogonum umbellatum* var. *torreyanum*) (TNC 1998; P. Dunwiddie, pers. comm. 2001). Other disease and predation interactions potentially effecting *E. codium* are unknown.

D. The inadequacy of existing regulatory mechanisms.
E. codium is currently a federal candidate species, and State-listed as endangered (WDNR 2007). At this time, there are no existing regulatory mechanisms that provide protection for State listed plants in Washington. The DOE has no rare plant policy that provides specific protection for the species. The Service does not currently manage DOE lands where *E. codium* is found as a part of the Hanford National Monument. The Service has completed a comprehensive conservation plan (CCP) for the monument that is expected to provide some future conservation measures for rare plants in general that may benefit *E.codium.* However, the conservation of the plant is only addressed by stating that the protection of this population, and thus the species, requires that these issues be addressed in any management action (Service 2008). The Hanford Reach National Monument/Saddle Mountain National Wildlife Refuge Fire Management Plan

addresses *E.codium* briefly with guidance for fire suppression activities with the statement that "except on existing roads, the use of any equipment (including light engines) within 1/4 mile of the escarpment edge of the Umtanum Ridge is prohibited because of surface instability and potential for sloughing at the escarpment." It also states that protection of sensitive resources is an objective unless achieving this objective jeopardizes either firefighter or public safety (Service 2001).

E. Other natural or manmade factors affecting its continued existence.
The plant community and the habitat in which *E. codium* is found was significantly altered by fire in 1996 (Dunwiddie et al. 2001). One potential consequence of fire, or any disturbance that removes native plants from the shrub-steppe communities of eastern Washington, is the displacement of native vegetation by nonnative weedy species, particularly cheatgrass. As a result of the 1996 fire, a higher percent cover of weedy plant species, including cheatgrass, now grows within and around the *E. codium* population.

The typical size distribution of perennial plants consists of more individuals in smaller and therefore presumably younger, size-classes than in larger, or older, ones. *E. codium*, however, has fewer plants in smaller size-classes than in larger ones. This species is dominated by mature plants with little successful establishment of seedlings and has a strong tendency to remain in the same size class from one year to the next (Kaye 2007). During the period from 1997 to 2006, only five to six seedlings in monitoring plots were observed to survive longer than one year, and adult mortality averages two-percent annually. In 2005, preceded by a dry winter, no germination was observed at all (Caplow 2005). This indicates a problem with the establishment and survival of seedlings. The factor(s) responsible for the lower-than-expected number of seedlings is not known. Possible factors include low seed production, low seed or pollen viability, low seedling vigor and survival, impacts to plant pollinators or dispersal mechanisms, and insect predation of seeds. Long-term monitoring and research may determine the cause of the species' skewed size distribution. A seed bank study has shown that seed viability of buried seed decreases dramatically after the first year, suggesting a very small and short-lived seed bank for the species (Caplow 2005).

The potential for expansion of the species' current distribution may be limited by conversion of surrounding shrub steppe habitats for a variety of human uses (e.g., agriculture, military training, transportation, and power corridors).

Regional models of climate change in the Columba Basin predict increased summer and winter temperatures and decreased precipitation from current global models for the Northwest U.S. between now and 2040 (Littell, *et al*. 2009). This scenario could impact survival and reproduction of *E. codium* and become a clear threat over time by shortening the growing season. Increased average temperatures and reduced average rainfall are likely causal to the current decline of the species and result in loss of habitat. Hotter and drier conditions may also increase the frequency and intensity of fires in the area, as cheatgrass would become a better competitor than it already is.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

A Draft Hanford Reach National Monument Comprehensive Conservation Plan and Environmental Impact Statement (CCP/EIS) has been developed (Service 2006) but does not specifically address the conservation needs of *E. codium*. The Central Washington Fish and Wildlife Office (Ecological Services) has initiated dialog with the Service's Monument staff to discuss potential, conservation measures for *E. codium* and a preliminary site visit was completed in July, 2004. Follow up site reviews by the Service's Regional recovery staff were undertaken in the summer of 2008.

SUMMARY OF THREATS (including reasons for addition or removal from candidacy, if appropriate)

Wildfire is a threat to *E. codium*. The plants appear to be sensitive to heat and are easily killed by fire. An observed lack of regeneration after fire indicates that the species is not fire-tolerant. Fires also promote the invasion of some nonnative species, particularly cheatgrass. In turn, the establishment and growth of highly flammable cheatgrass increases the likelihood of fire. As a result of a fire in 1996, a higher percent cover of weedy plant species, including cheatgrass, now grows within and near the population. Fire fighting activities, including the construction of fire lines and movement of equipment, pose a threat to the species.

Trespassing by off-road vehicles (ORVs) and hikers near and within the *E. codium* population is another potential threat to the species because plants are easily damaged by trampling or crushing. The only known population exists within a narrow corridor where human traffic would be expected to concentrate. Additionally, continued rock collecting or prospecting on the Monument could threaten a large portion of the *E. codium* population.

Ant predation of *E. codium* seeds is suspected to be an important factor in the viability of the species. Western harvester ants (*Pogonomyrmex occidentalis*) gather mature seeds and transport them into their underground colonies. To date, seedlings have not been observed near the ant colonies.

Increasing summer and winter temperatures and decreasing precipitation regionally greater than current global models, indicate increased effects to survival and reproduction of *E. codium* from physiological stress and habitat loss may occur in the future as a result of climate change. In addition, hotter and drier conditions may also increase the frequency and intensity of fires in the area, allowing cheatgrass to better compete on site.

E. codium is currently State-listed as endangered, but this classification confers no formal protection to the species.

There appears to be an insufficient level of establishment and survival of seedlings. The factor(s) responsible for this is not known. Possible factors include low seed production, low seed or pollen viability, low seedling vigor and survival, impacts to plant pollinators or dispersal mechanisms, and insect predation of seeds.

We find that this species is warranted for listing throughout all its range, and, therefore, find that it is unnecessary to analyze whether it is threatened or endangered in a significant portion of its range.

For species that are being removed from candidate status:

___Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES

At a meeting of species experts in 2006, several recommendations were developed to address some of the known threats to *E. codium*. These are:

1. Pursue grants and partnerships for research and monitoring *E. codium*.

2. Collect seed to establish seed bank collections.

3. Develop fire management plans to include provisions to protect *E. codium* with the Monument, Department of Defense, BPA, and DOE as potential cooperators.

4. Develop plans to control unauthorized access and trespass from BPA (fence). Increase law enforcement presence to discourage trespass

5. Implement weed management outside the *E. codium* population where it may provide a beneficial landscape effect.

6. Develop an agreement with the livestock permitee to ensure controlled movement of animals well away from the population of *E. codium*.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	**Imminent**	Monotypic genus	1
		Species	**2***
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	6
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Rationale for listing priority number:

Magnitude:
The only known population of *E. codium* is small and limited to a single site. As such, the species is uniformly vulnerable to the identified threats. In addition, due to the species' extremely slow growth rate and the very limited recruitment observed, the impacts from fire, trampling, and crushing may be severe. Based on the above, we currently consider the magnitude of threat to *E. codium* to be high.

Imminence:
All of the identified threats to *E. codium* are currently considered ongoing. Of primary concern is that negative impacts to the population from past fires have been significant, and future fires are likely to occur in or near the area occupied by the species. In addition, recreational activities and other human uses of the area may increase in the future. Based on the available information, we currently consider the threats to *E. codium* to be imminent.

Rationale for Change in Listing Priority Number (insert if appropriate)

___ Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed? YES

Is Emergency Listing Warranted? No.
While the identified threats to *E. codium* are considered both high and imminent, the species is

relatively long-lived, and preliminary protective measures are being implemented. Longer-term comprehensive conservation planning efforts for the species are currently being developed.

DESCRIPTION OF MONITORING

In 1997, a National Fish and Wildlife Foundation grant was awarded to the Service, in partnership with TNC, to inventory and study the *E. codium* population. Initial inventory work was accomplished in 1997. The population was mapped, and 24 permanent sample plots were established in the largest subpopulation. Growth-rate studies of this long-lived species were begun. Individual plants were tagged for a demographic study to observe the expansion of adult plants and the regeneration and establishment of seedlings. The permanent plots were monitored from 1997 through 2008 by TNC, WDNR, Calypso Consulting, and volunteers. A program of annual monitoring at the site is ongoing.

Because *E. codium* is such a long-lived, slow growing perennial plant, the compilation of useful demographic data will take time. The results of 9 years of demographic monitoring are currently available and the data has provided the important status and trend information found in the recent PVA (Kaye 2007). This monitoring is performed frequently enough to provide information about other potential threats such as incidents of trespass, ORV use, rock collection, and the status of invasive plant species. Observations of the species' responses to fire and localized weather patterns will provide additional background. Finally, the current monitoring program will help document the effects of conservation activities undertaken at the Monument.

COORDINATION WITH STATES

Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Washington

Numerous contributions to this assessment were provided either directly through personal communications, or through the dedicated work products of WDNR botanists. *E. codium* is listed as critically imperiled (S1) by the Washington Natural Heritage Program (WDNR), but receives little protection as such under State law. The shrub steppe habitat surrounding the species is considered a "Priority Habitat" under Washington's Comprehensive Wildlife Conservation Strategy (WDFW 2005). This strategy is a non-regulatory statewide approach to conservation and describes general and specific problems facing wildlife species, but does not include an assessment of plants.

Indicate which State(s) did not provide any information or comments: N/A

REFERENCES

<u>Personal Communications</u>

Arnett, Joseph, Botanist, Washington Department of Natural Resources (WDNR), Natural Heritage Division, Olympia, Washington, 2007-2010.

Caplow, F., Rare Plant Botanist, Washington Department of Natural Resources (WDNR), Natural Heritage Division, Olympia, Washington.

Dunwiddie, P., Botanist, The Nature Conservancy, Washington.

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U.S. Fish and Wildlife Service. 2008. Final Hanford Reach National Monument Comprehensive Conservation Plan and Environmental Impact Statement. On file and obtainable online at: http://www.fws.gov/hanfordreach/planning.html

WDNR. 2007. Natural Heritage Program Website, www.dnr.wa.gov/nhp/.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve:

Acting Carolyn A. Bohan
Regional Director, Region 1, Fish and Wildlife Service

5/18/10
Date

Rowan W. Gould
ACTING
Director, Fish and Wildlife Service

October 22, 2010

Concur:

Do not concur: _____
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review: April 17, 2010
Conducted by: Tim McCracken, Eastern Washington SubOffice

Reviewed by: Jodi Bush Date: April 30 , 2010
Division Manager, Listing and Recovery, WWFWO

Ken Berg Date: May 3, 2010
Manager, WWFWO