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IV. Statutory and Executive Order Reviews

Under Executive Order 12866, entitled ''Regulatory Planning and Review'' (58 FR 51735, October 4, 1993), this action was submitted to the Office of Management and Budget (OMB) for review. Any changes made to this document in response to OMB comments received by EPA during that review have been documented in the docket as required by the Executive Order.

Since this document does not impose or propose any requirements, and instead seeks comments and suggestions for the Agency to consider in possibly developing a subsequent proposed rule, the various other review requirements that apply when an agency imposes requirements do not apply to this action. Nevertheless, as part of your comments on this ANPRM, you may include any comments or information that you have regarding this action.

In particular, any comments or information that would help the Agency to assess the potential impact of a rule on small entities pursuant to the Regulatory Flexibility Act (RFA) (5 U.S.C. 601 *et seq.*); to consider voluntary consensus standards pursuant to section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA) (15 U.S.C. 272 note); to consider environmental health or safety effects on children pursuant to Executive Order 13045, entitled ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997); or to consider human health or environmental effects on minority or low-income populations pursuant to Executive Order 12898, entitled ''Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations'' (59 FR 7629, February 16, 1994).

The Agency will consider such comments during the development of any subsequent proposed rule as it takes appropriate steps to address any applicable requirements.

List of Subjects in 40 CFR Part 799

Environmental protection, Bisphenol A, BPA, Chemicals, Hazardous substances, Reporting and recordkeeping requirements.

Dated: July 20, 2011.

Stephen. A. Owens,

Assistant Administrator, Office of Chemical Safety and Pollution Prevention.

[FR Doc. 2011–18842 Filed 7–25–11; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[Docket No. FWS–R1–ES–2010–0023; MO 92210–0–008–B2]

Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Giant Palouse Earthworm (Drilolerius americanus) as Threatened or Endangered

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of 12-month petition finding.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), announce a 12-month finding on a petition to list the giant Palouse earthworm (*Driloleirus americanus*) as threatened or endangered as petitioned, and to designate critical habitat under the Endangered Species Act of 1973, as amended (Act). After review of all available scientific and commercial information, we find that listing the giant Palouse earthworm is not warranted at this time. However, we ask the public to submit to us any new information that becomes available concerning the threats to the giant Palouse earthworm or its habitat at any time.

DATES: The finding announced in this document was made on July 26, 2011.

ADDRESSES: This finding is available on the Internet at *http://www.regulations.gov* at Docket Number FWS–R1–ES–2010–0023. Supporting documentation we used in preparing this finding is available for public inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Washington Fish and Wildlife Office, 510 Desmond Drive SE., Suite 102, Lacey, WA 98503–1263; telephone 360–753–9440; facsimile 360–753–9008. Please submit any new information, materials, comments, or questions concerning this finding to the above street address.

FOR FURTHER INFORMATION CONTACT: Ken Berg, Manager, Washington Fish and Wildlife Office (see **ADDRESSES**). If you use a telecommunications device for the deaf (TDD), please call the Federal

Information Relay Service (FIRS) at 800–877–8339.

SUPPLEMENTARY INFORMATION:

Background

Section 4(b)(3)(B) of the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 *et seq.*), requires that, for any petition to revise the Federal Lists of Endangered and Threatened Wildlife and Plants that contains substantial scientific or commercial information that listing the species may be warranted, we make a finding within 12 months of the date of receipt of the petition. In this finding, we will determine that the petitioned action is: (1) Not warranted, (2) warranted, or (3) warranted, but the immediate proposal of a regulation implementing the petitioned action is precluded by other pending proposals to determine whether species are endangered or threatened, and expeditious progress is being made to add or remove qualified species from the Federal Lists of Endangered and Threatened Wildlife and Plants. Section 4(b)(3)(C) of the Act requires that we treat a petition for which the requested action is found to be warranted but precluded as though resubmitted on the date of such finding, that is, requiring a subsequent finding to be made within 12 months. We must publish these 12-month findings in the **Federal Register**.

Previous Federal Actions

On August 30, 2006, we received a petition dated August 18, 2006, from three private citizens and three other parties (the Palouse Prairie Foundation, the Palouse Audubon Society, and Friends of the Clearwater) requesting that the giant Palouse earthworm (*Driloleirus americanus*) (GPE) be listed as an endangered or threatened species under the Act, and critical habitat be designated. The petition included supporting information regarding the species' taxonomy and ecology, distribution, present status, and causes of decline. On October 9, 2007, we published a 90-day finding stating that the August 30, 2006, petition did not provide substantial scientific or commercial information to indicate that listing the GPE may be warranted (72 FR 57273). On January 24, 2008, the petitioners filed a lawsuit in the U.S. District Court, Eastern District of Washington against the U.S. Department of the Interior and the Service challenging the ''not substantial'' decision (*Palouse Prairie Foundation et al.* v. *Dirk Kempthorne, et al.,* No. 2:08–cv–0032–FVS). On February 12, 2009, the District Court denied the Appellants' motion for summary judgment and granted summary judgment in favor of the Service, upholding the October 9, 2007, determination. The U.S. Court of Appeals for the Ninth Circuit affirmed the District Court ruling on June 14, 2010 (D.C. no. 2:08–cv–00032–FVS).

History of the Current Petition

On July 1, 2009, we received a new petition dated June 30, 2009, from Friends of the Clearwater, Center for Biological Diversity, Palouse Audubon, Palouse Prairie Foundation, and Palouse Group of the Sierra Club (petitioners) requesting that the GPE be listed as an endangered or threatened species either in the entirety of its range, or in the Palouse bioregion as a significant portion of its range, and that critical habitat be designated under the Act. The petition clearly identified itself as such and included the requisite identification information for the petitioners, as required by 50 CFR 424.14(a). The petition included information on the GPE's taxonomy, species description, distribution, habitat, status, and potential threats. The petition was accompanied by a letter from Samuel W. James, who stated that he is ''the only earthworm taxonomist operating in the U.S.A.'' and has ''extensive experience in biodiversity of earthworms'' (2009 *in litt.*), and included additional information about the GPE and potential threats to the species. In an August 5, 2009, letter to the petitioners, we acknowledged receipt of the petition and determined that issuing an emergency regulation temporarily listing the species under section 4(b)(7) of the Act was not warranted. We also stated that, due to funding constraints in fiscal year 2009, we would not be able to further address the petition at that time but that we would further evaluate the petition when funding became available in fiscal year 2010.

On July 20, 2010, the Service announced a 90-day finding on the 2009 petition to list the GPE as endangered or threatened under the Act, and to designate critical habitat (75 FR 42059). Based on our review, we found the petition presented substantial scientific or commercial information indicating that listing the GPE as endangered or threatened may be warranted. We initiated a review of the status of the species to determine whether listing the GPE was warranted, and requested scientific and commercial data, and other information, regarding the species. This notice constitutes the 12-month finding on the July 1, 2009, petition to list the GPE as endangered or threatened, as petitioned.

Species Information

The GPE is one of about 100 native and at least 45 nonnative earthworms described in the United States (Hendrix and Bohlen 2002, p. 802). However, very little is known about the species. The GPE was first described by Smith in 1897, based on a collection near Pullman, Washington. At the time of this collection, Smith stated: ''This species is very abundant in that region of the country and their burrows are sometimes seen extending to a depth of over 15 feet'' (Smith 1897, pp. 202–203). His writing is based on second-hand information provided by R.W. Doane of Washington State Agricultural School (now Washington State University) in Pullman, Washington, which does not offer numerical or geographical context for his use of the terms ''very abundant'' or ''that region of the country.'' This burrow depth characterization has not been confirmed or contradicted by any subsequent field work.

Early descriptions indicate the GPE can be as long as 3 feet (ft) (0.9 meters (m); Smith 1897, p. 203). Reports in the popular literature of GPEs up to 3.3 ft (1 m) in length (Science Daily 2006, p. 1; Science Daily 2008, p. 1) have not been confirmed, and collections suggest that specimens are more moderate in size (approximately 6 to 8 inches (in) (15.2 to 20.3 centimeters (cm)) in length) (Smith 1937, p. 161; Science Daily 2006, p. 1; Science Daily 2008, p. 1).

Taxonomy and Species Description

The Service accepts the current taxonomic classification of the GPE (Subclass—Lumbricina; Superfamily—Megascolecoidea; Family—Megascolecidae; Genus—*Driloleirus;* Species—*americanus*) (Smith 1897, p. 203; Fender and McKey-Fender 1990, p. 372; Fender 1995, pp. 53–54). While the naming conventions of the GPE have changed over time (*Megascolides americanus* in 1897 (Smith 1897, p. 203) changed to *Driloleirus americanus* by 1990 (Fender and McKey-Fender 1990, p. 372), there is no information provided in the petition or in our files that would indicate scientific disagreement about its taxonomic classification as a species. Adult specimens in the *Driloleirus* genus are generally distinctive, but identifying to the species level requires expert morphological analysis, including dissection or DNA evidence. Both methods take time, and there are few species experts. It is difficult to identify juvenile earthworm species, because they have no clitellum (a glandular section in the body wall, similar in shape to a saddle). The clitellum is a key morphological difference for determining many species, and juvenile earthworm coloration can also vary, depending on soil type. Newly hatched earthworms are even more difficult to identify, and until DNA analysis becomes a more available tool, earthworm identification requires the examination of sexually mature individuals. Depending on site conditions and growth, an earthworm would need to be 3 to 6 months of age before being recognizable as being in the genus *Driloleirus* (Johnson-Maynard 2011, pers. com.).

Distribution

Distribution of native earthworm species in the Pacific Northwest is limited by several factors. Pleistocene glaciation covered nearly the whole of Canada and the northern edge of the United States, eliminating earthworms from the area covered with ice (Fender 1995, p. 54). Since the retreat of the glaciers, earthworms in the Lumbricidae family have been able to colonize the ice-free areas in a few centuries, although earthworm distribution in the Megascolecidae family (to which the GPE belongs) stops near the terminal moraines (ridges of rock, gravel and soil across valleys at the end glaciers or ice fields) of the ice sheet. This may be because the megascolecids prefer fine-textured soils, which are largely absent at the edge of Pleistocene glaciation (Fender 1995, p. 55). Other barriers, including mountain ranges and arid areas (Bailey *et al.* 2002, p. 26), have slowed recolonization of the Columbia Basin.

At the time of the original description, in 1897, this taxon was known only from the area around Pullman, Washington (Smith 1937, p. 157). The GPE was originally considered to be an endemic species (a species native to a particular region), that uses grassland sites with deep soil and native vegetation of the Palouse bioregion (Wells 1983, p. 213; James 1995, p. 1; Niwa *et al.* 2001, p. 34). The Palouse bioregion is an area of rolling hills and deep soil in southeastern Washington and adjacent northwestern Idaho. More recently, this species has also been found in Douglas-fir forests in the Palouse region (Johnson-Maynard, September 21, 2010, *in litt.* p. 1; November 30, 2010, *in litt.* p. 1), and on the eastern slope of the North Cascades Mountains (Cascades) west of Ellensburg, Washington (Fender and McKey-Fender 1990, p. 358). In 2010, the GPE was also documented in dry pine forest habitat near Leavenworth, Washington (Johnson-Maynard 2010, p. 3, *in litt.*). This broader distribution, which is now known to include Latah County (Idaho), Whitman County (Washington), Kittitas County (Washington), and Chelan County (Washington), provides evidence that the species may not be endemic to Palouse grasslands.

Confirmed GPE locations, and other potential GPE locations (DNA is currently being analyzed for these specimens), are identified in Table 1. Two of the potential GPE collections are of particular interest: one in shrub/grassland habitat near Chelan, Washington, and one in second-growth forest habitat east of Moscow, Idaho (Johnson-Maynard 2010, pp. 1–2; November 30, 2010, *in litt.* p. 2). The DNA or morphology results for these specimens are not yet available to enable identification to the species level, but if these specimens are confirmed to be GPE, the currently known distribution and habitat types documented for the species will be expanded. One commenter provided a list of possible GPE locations in the Palouse region (Hall 2010, *in litt.* pp. 2–3), but acknowledged that the sites were not confirmed. Although these anecdotal locality reports may be helpful in identifying areas for future GPE surveys, they are not relevant to this finding.

TABLE 1—LOCATIONS AND CHARACTERISTICS OF COLLECTIONS OF THE GPE OR *Driloleirus* GENUS

Site name/year	County/State	Positive ID as GPE	Vegetation and other site characteristics, if known	Collector (sources) comments	Survey methods, if known
Pullman, 1897?	Latah, ID	Yes		Collected by Doane. (Smith 1897, Gates 1967).	
Pullman, 1931	Whitman, WA	Yes		Collected by Svilha. (Smith 1937).	
Pullman, 1978	Whitman WA?	Yes	Beneath hawthorn thicket	Collected by Fender. (Wells *et al.* 1983, p. 213, credited to Fender). One mile east of Pullman.	
Hwy 95/195, 1978.	Whitman, WA	Yes		Collected by Fender. (Wells *et al.* 1983, p. 213; credited to Fender). Follow-up visit by Johnson-Maynard and Fender in 2006 showed habitat significantly degraded (Johnson-Maynard November 20, 2010, *in litt,* p. 1).	
Moscow Mountain, 1988.	Latah, ID	Yes	Douglas fir forest; Under the moss and litter layer of a forested site.	Collected by Johnson and Johnson. (Palouse Prairie Foundation 2006; Johnson-Maynard, September 21, 2010, *in litt.* p. 1).	

TABLE 1—LOCATIONS AND CHARACTERISTICS OF COLLECTIONS OF THE GPE OR *Driloleirus* GENUS—Continued

Site name/ year	County/State	Positive ID as GPE	Vegetation and other site characteristics, if known	Collector (sources) comments	Survey methods, if known
Ellensburg, pre-1990.	Kittitas, WA	Yes **		Collected by Fender. (Fender 1995; James 2000). ** Specimen in poor shape, but reflects properties of GPE (Fender Sept. 14, 2010, *in litt.* p. 1; Fender, Sept. 30, 2010, *in litt.* p. 10; Johnson-Maynard 2011, Pers. Comm.).	
Smoot Hill, 2005.	Whitman, WA	Yes	Native Palouse prairie remnant, some shrubs; 25% slope, Northwest aspect, 2,723 feet elevation; Soil: silt loam, gravelly sandy.	Collected by Sánchez-de León. (Sánchez-de León and Johnson-Maynard 2009, p.1398; Johnson-Maynard November 30, 2010 *in litt.* p. 2–3). Found during 2-year survey that included remnant prairie and Conservation Reserve Program (CRP) grasslands in Palouse.	Characterized earthworm populations in two grassland types (native prairie and CRP) in Latah County, ID, and Whitman County, WA. Conducted surveys in May and June of 2003 through 2005. Methods: 5 measured pits randomly located and excavated at each site and earthworms were sampled by hand sorting, then classified to species.
Paradise Ridge, 2008.	Latah, ID	Yes	Palouse prairie, some shrubs; 30% slope; Southwest aspect; 3,527 feet elevation; blue bunch wheatgrass, Idaho fescue, snowberry, non-native grasses; Soil: Loam, high content of gravel.	Collected by Umiker and Robertson. (Science Daily 2008, Johnson-Maynard November 30, 2010, *in litt.* p. 2–3; Hill, 2010 *in litt.* pp. 2–3; Johnson-Maynard, September 21, 2010, *in litt.* p. 1; Johnson-Maynard 2010 p. 2–3). Determined to be GPE based on location and partial specimen.	
Paradise Ridge, 2010.	Latah, ID	Yes. Identified by James.	Palouse prairie, same as above.	Collected by Xu and Umiker. (Johnson-Maynard, November 30, 2010, *in litt.* p. 2). Adult GPE found at a privately owned prairie remnant near Moscow, Idaho, 2008 and 2010 Paradise Ridge sites less than 50 feet from each other. Nearby location surveyed in 2005 with no GPE found.	2010 GPE specimens were collected with electroshocker.* Handsorting conducted at the same time did not result in the collection of GPE (Johnson-Maynard December 21, 2010 *in litt.* p. 2). *Use of electrodes and a generator to direct electric current into the soil.
East of Moscow, ID, 2010.	Latah, ID	Pending	Secondary growth forest (Douglas fir).	Collected by: ? (Johnson-Maynard, November 30, 2010, *in litt.* p. 2). Sample too degraded for morphological description; currently analyzing DNA.	
Leavenworth, 2007.	Chelan, WA	Pending	Open forest, savanna; Relatively open Ponderosa pine forest. Compacted area covered with gravel soil.	Collected by resident, initially. (Science Daily 2008, Johnson-Maynard 2010, pp. 3–4 Johnson-Maynard November 30, 2010, *in litt.* p. 2.) *Driloleirus* genus; Currently analyzing DNA.	

TABLE 1—LOCATIONS AND CHARACTERISTICS OF COLLECTIONS OF THE GPE OR *Driloleirus* GENUS—Continued

Site name/ year	County/State	Positive ID as GPE	Vegetation and other site characteristics, if known	Collector (sources) comments	Survey methods, if known
Leavenworth, 2010.	Chelan, WA ...	Yes. Adult examined by Fender.	Ponderosa pine, Arrowleaf baslamroot/mule's ear, annual grasses; South aspect, 27% slope; 1,846 feet elevation; Soil: sandy loam.	Collected by Xu and Umiker. (Johnson-Maynard 2010 p. 2–4). Multiple hatchling specimens—will analyze one injured hatchling for DNA.	Follow-up surveys specific to determining *Driloleirus* species and soil and site characteristics. Survey conducted in November, 2010. Soil was excavated from one large pit (approximately 60 cm by 60 cm) at each site. Soil was hand-sorted and all earthworms removed and counted. One sample was collected from each site for DNA analysis.
Near Camas Meadows (near Leavenworth), 2010.	Chelan, WA ...	Pending	Arrowleaf balsamroot, scattered ponderosa pine.	Collected by: Fleckenstein (Johnson-Maynard December 22, 2010 *in litt.* p. 2) Smaller adult, will analyze DNA.	
Chelan, 2010	Chelan, WA ...	Pending	Grasses, Arrowleaf balsamroot, sagebrush, sparse ponderosa pine nearby; ~38% slope, South aspect; 2,057 feet elevation; Soil: gravelly sandy loam.	Juvenile found—will analyze for DNA (Johnson-Maynard 2010, p. 2–4).	Follow-up surveys specific to determining *Driloleirus* species and soil and site characteristics. Survey conducted in November, 2010. Soil was excavated from one large pit (approximately 60 cm by 60 cm) at each site. Soil was hand-sorted and all earthworms removed and counted. One sample was collected from each site for DNA analysis.

Table 1 identifies confirmed GPE and potential GPE locations (at this time just identified to *Driloleirus* genus; DNA analysis is pending), and information on survey methods for each collection where available. While negative survey data are important to understand the distribution of any species, the Service found little information on surveys with negative results in the Palouse, and no information on negative surveys outside of the Palouse. The available information on negative survey results is presented in Table 1.

Earthworms are not randomly distributed in the soil (Guild 1952, as referenced in Edwards and Lofty 1977, p. 127), and some are difficult to detect. Factors that influence this non-random distribution could include: (1) Physical and chemical characteristics of the soil; (2) food availability; (3) the reproductive potential and dispersal capabilities of the species; or (4) interactions between these factors (Murchie 1958, as referenced in Edwards and Lofty 1977, p. 127). Earthworms also occur in patchy distributions, which make it difficult to determine population demographics (Whalen 2004, pp. 143, 148, Umicker 2009, p. 187). Edwards and Bohlen (1996, p. 90) stated that assessments of size, distribution, and structure of earthworm populations are difficult because numbers change with season, demography, and vertical distribution in the substrate.

In his letter submitted with the petition, James (2009 *in litt.* p. 2) states that a reasonable and sufficient effort has been made to find the GPE in a variety of habitats within its presumed range, and that these efforts have failed except in very rare instances in natural or little-disturbed vegetation. James also stated that the Washington State University team surveyed many locations (most importantly in agricultural lands), looking for large burrows that may indicate the presence of large earthworms, but only found *Lumbricus terrestris* (the common night crawler), an invasive species (James 2009, *in litt.* pp. 2–3). However, recently collected and confirmed specimens that have been documented in forested habitats and on the eastern slope of the Cascade Mountains in Washington (Table 1) indicate that survey efforts for the GPE to date have not been adequate to establish its distribution or the diversity of habitat types in which it occurs. Therefore, we believe the petitioners' assumptions regarding the presumed distribution of the GPE are likely erroneous.

Fauci and Bezdicek's study (2002, pp. 258–259) compared nonnative lumbricid earthworm distribution in the Palouse region of eastern Washington and northern Idaho. In the spring of 1999, they surveyed 46 sites in the Palouse, including sites in agricultural fields with a history of conservation tillage, areas next to waterways, and perennial vegetation areas along road rights-of-way or on old homesteads. Survey methods included digging six spades of soil in a 10-square-meter area, then hand-sorting and examining the soil. Additional samples were taken if immature worms were found to ensure adults for identification. Although the results for the GPE were negative, the Fauci and Bezdicek survey was not designed to specifically find this species. In addition, survey protocols have not yet been developed for the GPE; therefore, it is uncertain the protocol used in this study would have found GPE, if present. If reports that the GPE lives in burrows more than 15 feet deep are correct, the spade sampling method used by Fauci and Bezdicek would appear to be inadequate to confirm the species' absence.

Other negative earthworm surveys in the Palouse area were also not specifically designed to find the GPE. Umiker *et al.* (2009, pp. 184–185, 187) compared soil characteristics, cropping practices, and earthworm densities in 24 agricultural fields in the Palouse, but did not identify the earthworms to species level in that study (p. 187). However, adult *Driloleirus* earthworms are distinctive enough that they likely would have been documented, had they been collected. Juvenile *Driloleirus* earthworms, on the other hand, are not distinctive (Johnson-Maynard 2011, pers. com.), and hence could have been missed in this survey. Johnson-Maynard *et al.* (2007, p. 338) compared earthworm dynamics and soil properties in conventionally tilled and no-till agricultural fields on one research farm in the Palouse, and found only the nonnative southern worm (*Aporrectodea trapezoids*) (p. 340). Smetak *et al.* (2007, p. 161) investigated earthworm population density in urban settings in Moscow, Idaho; no native earthworm species were collected (p. 166). Nevertheless, while the negative survey data are interesting, in that the GPE has not been detected in agricultural fields or urban areas to date, coupled with information in Table 1, these data demonstrate how geographically limited the known survey efforts have been.

It is apparent that additional GPE surveys are needed to determine the range, habitat preference, and life history of this species, particularly in light of the recent confirmation of the species near Leavenworth, Washington, in forested habitat. James (2000, p. 5) acknowledges there have been a limited number of earthworms collected in the Columbia basin, which includes the eastern slope of the Cascade Mountains and the Palouse area, and only a small portion of potential habitat has been surveyed. In addition to limited survey efforts, this species is difficult to detect. Fender (September 14, 2010, *in litt.* p. 1) noted that *Driloleirus* species can at times be found near the surface during suitable survey conditions, but if conditions are dry they may be undetectable. Johnson-Maynard (September 21, 2010, *in litt.* p. 2) noted that one Palouse site had negative survey results for native earthworms in 2005, but later sampling in 2010 detected one adult GPE at the same site. The Xerces Society stated that due to the difficulty in detecting the Oregon giant earthworm (*Driloleirus macelfreshi*) (a similar species in the same genus), abundance estimates have not been made, and the species' status and threats cannot be determined until an effective survey protocol is developed and tested (Xerces Society 2009, p. 3).

Due to the difficulty in surveying for the GPE, the Idaho Department of Fish and Game, the Service, and others have contributed resources to the University of Idaho to develop appropriate survey protocols to address the scientific challenges associated with GPE surveys (Groen 2010, *in litt.* p. 2; Johnson-Maynard 2010, *in litt.* p. 2; Science Daily 2008, p. 2). Staff at the University of Idaho, including Johnson-Maynard and others, are currently working to develop and refine sampling methods and strategies, including a soil electroshocking technique that appears to be promising.

In summary, the level of survey effort for the GPE has been low, the species is difficult to detect, and effective survey methods are still being developed. There is a lack of survey data, and large geographic and taxonomic gaps in our knowledge (Fleckenstein 2011, *in litt.* p. 1). Researchers have only recently begun to look more broadly for the species including localities along the eastern slope of the Cascades. However, the GPE has now been documented in dry forest habitats, which provides further evidence that the complete range and distribution of the species is presently unknown, but are likely broader than the area identified by the petitioners.

Habitat

Habitat requirements for the GPE are not well understood. The original descriptions by Smith (1897, 1937) do not present any descriptive information about the habitat where the specimens were initially collected. The GPE was originally thought to be a Palouse-region grassland species, and several specimens have been found in Palouse grassland remnants (Table 1; Sánchez-de León and Johnson-Maynard 2009, p. 1393; Science Daily 2008, p. 1; Johnson-Maynard September 21, 2010, *in litt.* pp. 1–2; Johnson-Maynard, November 30, 2010, *in litt.* p. 2–3; Jensen 2010, *in litt.* p. 6). Wells *et al.* (1983, p. 213) stated that Fender collected specimens under hawthorn thickets; Johnson-Maynard (September 21, 2010, *in litt.* p. 1) described the vegetation type at Johnson and Johnson's Moscow Mountain site as Douglas-fir forest.

There is limited specific information on the habitat type associated with the GPE collected near Ellensburg, Washington. Fender and McKey-Fender (1990) described the location as ''in the hills west of Ellensburg,'' and they described the GPE range at this locality as extending into ''treeless areas'' (pp. 358, 366). The GPE was not collected in recent surveys conducted in agricultural and urban locations in Latah County, Idaho (Johnson-Maynard *et al.* 2007, p. 340, Smetak *et al.* 2007, p. 166; Umiker *et al.* 2009, p. 187), and Whitman County, Washington (Fauci and Bezdicek, 2002 p. 257). Vegetation and soil characteristics of confirmed and potential GPE sites are described above in Table 1, where that information was available. Sánchez-de León and Johnson-Maynard (2009, p. 1394; Petition, p. 5) observed that remaining prairie remnants in the Palouse are often steep or rocky, or contain shallow soil, and, therefore, may be less suitable for earthworms (Sánchez-de León and Johnson-Maynard 2009, pp. 1394, 1398; Petition, p. 5). However, Johnson-Maynard (2010, pp. 2–3) noted that soils at the Paradise Ridge site near Latah, Idaho, had a high gravel content, suggesting that the GPE may be able to exist in soil types that would not be expected to be preferred habitat for most earthworms. She further noted that past *Driloleirus* samples provided by a landowner near Leavenworth, Washington, were obtained from a compacted area covered with gravel. Johnson-Maynard (2010, pp. 3–4) described the confirmed GPE collection site near Leavenworth, Washington, as Ponderosa pine forest with an understory of *Balsamorhiza sagittata* (arrowleaf balsamroot) and annual grasses. Although the GPE has also been documented in forests on the eastern slope of the Cascades and in Douglas-fir forests in the Palouse, significant uncertainties exist as to whether the species occurs in specific types or ages of forests, occurs in previously logged forests, or may be habitat-limited because of elevation or other site characteristics.

Biology

Earthworms are generally divided into three life-history strategies based on their habitat use: epigeic, endogeic, or anecic (Bouche 1977, as referenced in James 2000, p. 2; Edwards and Bohlen 1996, pp. 113–115). Epigeic worms live near the ground's surface and consume organic litter on and near the surface. Endogeic worms (which the petitioners currently believe the GPE to be (James 2009, *in litt.* p. 3)): (1) Live in the upper layers of mineral soil, (2) consume organic material in the mineral soil or at the soil-litter interface, and (3) are often pale in appearance (Edwards and Bohlen 1996, p. 114). Anecic worms, which the petitioners initially believed the GPE to be (James 2009, *in litt.* p. 3), and we believe the GPE to be based on the prevailing evidence, live in deep, semi-permanent burrows and move to the surface to feed on fresh plant litter. Anecic earthworms are the largest and longest lived of the three earthworm types (James 2000, p. 2; 1995, p. 6), and transport fresh plant material from the soil surface to subterranean levels. Deep-burrowing anecic earthworms usually produce castings on the surface near exits to their burrows (Edwards and Bohlen 1996, p. 198). GPE castings were observed at the Leavenworth, Washington, study area (Johnson-Maynard 2010, p. 2).

James (2009, *in litt.* p. 3) concluded that, based on the lack of pigmentation and information indicating that the species is not associated with surface castings, the GPE ''is probably an endogeic, meaning living entirely in the soil, on soil resources consisting of organic matter in varying stages of decomposition.'' He also states that deep burrow depths would be useful in avoiding dry soil conditions common in late summer within the range of the species (September 3, 2010, in litt. p. 1). Fender (September 14, 2010, *in litt.* p. 1) thinks deep soils would be helpful to survival and sees no reason to doubt the earlier descriptions of burrowing depths.

Characterizing earthworm life histories within one of three life-history strategies may not be entirely instructive, because some species may exhibit a combination of characteristics (Bouche 1977, as referenced in Edwards and Bohlen 1996, p. 113). However, understanding an earthworm species' life history is important for evaluating potential threats, the pathways that expose them to threats, and how they might respond.

As stated earlier, James (2009, *in litt.,* p. 3) initially speculated that the GPE was an anecic species, but now believes the species is probably an endogeic earthworm. He indicated that this conclusion is based on seeing a GPE specimen and learning more about the genus; if the GPE lacks pigmentation in the head and does not defecate at the surface (*i.e.,* leave castings), it is highly unlikely to have an anecic life-history strategy. We have no information indicating whether James has conducted field surveys for this particular earthworm species; however, his current opinion appears to be inconsistent with the existing literature, descriptions of GPE burrowing depths described in the literature, and field observations of castings by researchers at the Leavenworth, Washington, GPE location (Smith 1897, pp. 202–203; Fender and McKey-Fender 1990, p. 364; James 2000, p. 5; Johnson-Maynard 2010, p. 2).

In our 2010 90-day finding (75 FR 42059), we solicited scientific information on the GPE's endogeic or anecic life-history strategy to inform our status review. Johnson-Maynard (*in litt.* 2010, p. 2) stated that the GPE is likely anecic, based on her surveys at locations near Leavenworth, WA. In those studies, the GPE was associated with pores leading down into unconsolidated parent material, and surface castings were observed, which are indicative of a deep-burrowing species. Johnson-Maynard has conducted or been involved with a number of field surveys where GPE specimens were collected (see Table 1 above). Therefore, based on the best available scientific information, field observations, and the existing literature, we believe the prevailing evidence indicates the GPE is an anecic earthworm species, although we acknowledge that there are still significant uncertainties regarding its biological requirements.

In summary, the current understanding regarding the life cycles of even quite common earthworms is inadequate and requires more study (Edwards and Lofty 1977, p. 68), and there are many species about which little is known (Edwards and Bohlen 1996, p. 46). Accordingly, there are significant scientific uncertainties regarding the biology, distribution, habitat, and population trends of the GPE. The GPE's distribution has been documented to include areas within the Palouse bioregion, and areas within the eastern slope of the Cascade Mountains in Washington. We do not know whether there are other occupied sites between or outside of these locations, as few surveys have been conducted, the species is difficult to survey for, and survey methods are still being developed.

Documented habitat types used by the GPE in the Palouse bioregion include native grasslands and Douglas-fir forest. In addition, the GPE location near Leavenworth, Washington, is described as dry Ponderosa pine forest. There is very little specific information on habitat type at the GPE location west of Ellensburg, Washington. The *Driloleirus* earthworm species recently collected near Chelan, Washington, and east of Moscow, Idaho, are being identified (see Table 1 above). If these specimens are confirmed to be the GPE through DNA or other analysis, the species' range and diversity of habitat types used would be expanded.

Summary of Information Pertaining to the Five Factors

Section 4 of the Act (16 U.S.C. 1533) and implementing regulations (50 CFR part 424) set forth procedures for adding species to, removing species from, or reclassifying species on the Federal Lists of Endangered and Threatened Wildlife and Plants. Under section 4(a)(1) of the Act, a species may be determined to be endangered or threatened based on any of the following five factors:

(A) The present or threatened destruction, modification, or curtailment of its habitat or range;

(B) Overutilization for commercial, recreational, scientific, or educational purposes;

(C) Disease or predation;

(D) The inadequacy of existing regulatory mechanisms; or

(E) Other natural or manmade factors affecting its continued existence.

In making this finding, information pertaining to the GPE in relation to the five factors provided in section 4(a)(1) of the Act is discussed below. In addition, in making this 12-month finding on the petition we considered and evaluated the best available scientific and commercial information.

Given the paucity of information on GPE, surrogates may be useful. The petitioners claim that it is appropriate to use other earthworms as surrogates to determine effects to the GPE, provided they are biologically and ecologically similar (Sappington *et al.* 2001, p. 2869; Caro *et al.* 2005, p. 1821; Petition, p. 10). In some instances, the use of surrogate species (such as other earthworms) may be helpful in evaluating potential effects to the GPE, provided the appropriate scientific controls and precautions are taken. Caro *et al.* (2005, p. 1821) states ''for substitute species to be appropriate, they should share the same key ecological or behavioral traits that make the target species sensitive to environmental disturbance and the relationship between populations' vital rates and disturbance levels should match that of the target; these conditions are unlikely to pertain in most circumstances and the use of substitute species to predict endangered populations' responses to disturbance is questionable.'' The Oregon giant earthworm (*Driloleirus macelfreshi*) is in the same genus, and is believed to construct permanent, deep, subsurface burrows (a characteristic that indicates an anecic life-history strategy), and could potentially be an appropriate surrogate. However, the status and threats of this species cannot be determined until an effective survey protocol is developed and tested (Foltz 2009, pp. 2–3). Therefore, using it as a surrogate would provide little to no additional insight into potential threats to GPE. No other relevant surrogate species have been suggested or investigated.

Factor A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Habitat Loss and Fragmentation

Historical information regarding potential habitat loss is presented in the following discussion, for context. However, the focus for purposes of our analysis and response to the petition is on current and future habitat conditions, and whether the activities responsible for those conditions present a threat to the GPE such that listing under the Act is warranted.

As described in the 2010 90-day finding (75 FR 42061), the petitioners claim that the GPE is threatened by habitat conversion, loss, and fragmentation from agriculture and urban sprawl in the Palouse region (Petition, pp. 1, 7). The petitioners cite Sánchez-de León and Johnson-Maynard (2009, pp. 1393–1394, 1398), who state that combined effects of land-use change, habitat fragmentation, and competitive interactions have caused native earthworm declines. James (2009, p. 1) stated that indigenous earthworms are sensitive to habitat disturbance, and that to find indigenous earthworms one must work in undisturbed or mildly disturbed vegetation. Undisturbed vegetation is rare in the Palouse bioregion, as the native grassland habitat has been reduced to less than 1 percent of its pre-agricultural extent (Petition, p. 8; James 2009, p. 1; Noss *et al.* 1995, p. 74).

Estimates of native habitat conversion in the Palouse bioregion vary, but several studies indicate the conversion has been high: 99.9 percent of Palouse prairie habitats have been converted to agriculture (Noss 1995, p. 74); 94 percent of the grasslands and 97 percent of the wetlands in the Palouse bioregion have been converted to crop, hay, or pasture (Black *et al.* 1998, pp. 9–10); 21 percent of previously forested lands have been converted to agriculture or urban uses (Gilmore 2004, p. 3); and less than 1 percent of the original bunchgrass prairie habitat remains (Donovan *et al.* 2009, p. 1). However, comments on the 90-day finding noted that habitat loss in the Palouse due to agriculture happened historically and is not currently occurring. Much of the prairie was converted to farms by 1910, and much of the urban growth around the Pullman area occurred on farmland, not remaining prairie fragments (McGregor 2010, *in litt.,* p. 2; McGregor 1982, p. 109). However, habitat conversion in the Palouse may still occur, as neither Latah County, Idaho, nor Whitman County, Washington, have ordinances to prevent native habitat conversion (Latah County Board of Commissioners 2010, pp. 1–27; Whitman County 2010, pp. 1–76).

The petition identified several locations in the Palouse area that contain prairie remnants (Petition, p. 5). A study of four prairie remnants and adjacent Conservation Reserve Program (CRP) fields was carried out by Sánchez-de León and Johnson-Maynard (2009, pp. 1393, 1395; Petition, p. 4). In that study, the researchers collected one GPE, and commented that many remaining prairie remnants are not suitable for tillage because they are often steep or rocky, or contain shallow soil (2009, p. 6; Petition, p. 5). They also hypothesized that prairie remnants may not be the preferred habitat for the GPE due to shallow rocky soil. They described the GPE collection site at Paradise Ridge near Latah, Idaho, as having a high gravel content (Johnson-Maynard 2010, pp. 2–3). They acknowledged that sampling challenges could bias survey information on the GPE, and cautioned that hand-sampling methods may underestimate abundance of anecic species (Sánchez-de León and Johnson-Maynard 2009, p. 1399).

There is no baseline (*i.e.,* pre-agriculture) density and distribution information on the GPE, and there are significant challenges associated with surveying for this species. These challenges, coupled with the fact that earthworms have patchy distributions (Guild 1952, as referenced in Edwards and Lofty 1977, p. 127; Murchie 1958, as referenced in Edwards and Lofty 1977, p. 127; Whalen 2004, pp. 143, 148; Umicker 2009, p. 187), preclude our ability to correlate land use impacts with GPE abundance, based on the best available information. The GPE has been documented in both the Palouse bioregion and on the eastern slope of the Cascade Mountains, near Ellensburg and Leavenworth, in central Washington (see Table 1 above). There is little descriptive information about the habitat associated with the GPE that was collected near Ellensburg; it isn't clear whether the location is grassland or a different habitat type, and the specific location is uncertain. James (2009 *in litt.,* p. 2) speculated the Ellensburg site collection is a relict of a distribution that must have been more or less continuous at one time, but due to climate change and increased aridity has now become fragmented. Fender and McKey-Fender (1990) described the locality as being ''in the hills west of Ellensburg,'' and noted that the range of the GPE extends into ''treeless areas'' (pp. 358, 366). A report by Adolfson Associates (2005, p. 1) was presented as evidence of urban sprawl being a threat to GPE habitat. However, this report was limited to areas within the City of Ellensburg, Washington boundary, and is not particularly instructive in terms of correlating future urban development with loss of GPE habitat because pre-development density or distribution or both in that area are unknown. The petitioners also claim the grasslands around Ellensburg have been extensively modified by agriculture, similar to the Palouse bioregion (Adolfson Associates 2005, p. 2; Petition, p. 8; James 2009, *in litt.,* p. 2). However, the best available information is insufficient to determine or infer how or whether the GPE has been impacted by habitat loss and fragmentation in this area, because we have no baseline information with which to correlate land use modification with GPE abundance.

The best available scientific information is also inconclusive as to whether the GPE occurs in a certain forest type or age, or whether the species occurs in a broad variety of habitats. The GPE site near Moscow, Idaho, is in Douglas-fir forest habitat, and the Leavenworth, Washington, site is in dry ponderosa pine forest. Quigley *et al.* (1996, p. 54) stated that in the Columbia Basin, the total area in forest has remained relatively constant during the last two centuries, and broad indicators of sustainability indicate that Basin forest acreage and inventory volumes are relatively constant. If the GPE is a forested habitat generalist, it could be stable in forested locations; however, if it requires a forest of a specific type or age it may or may not be impacted by habitat loss, depending on the type of development activity involved. In either case, the available scientific evidence does not address that uncertainty.

In summary, the GPE's current and historical population size, distribution, and range of habitat types used are unknown. Based on recent collections, the GPE's range outside of the Palouse region has been expanded and now includes portions of the eastern slope of the Cascade Mountains. The GPE has also been documented in both grassland and forested habitats in the Palouse. However, survey efforts have been limited, and sampling protocols are still being developed to improve researchers' ability to detect the species during field investigations. While habitat conversion may occur and there may be local impacts, the GPE range is much wider than previously known and includes more diverse habitats than previously known. Because we cannot identify the full extent of the GPE's range or the varieties of habitat types it may use, we are unable to correlate habitat conversion with GPE abundance. Therefore, for the reasons stated above, the best available scientific information does not indicate current or future habitat loss or fragmentation represents a threat to the species.

General Impacts to Soil Characteristics

The petitioners present several claims in their petition, each of which has been evaluated and addressed below. They claim that earthworms or their grassland habitats are influenced by soil disturbance, tillage, traffic, food sources, chemical and pesticide residues, and soil microclimate (Jennings *et al.* 1990, p. 75; Edwards and Bohlen 1996, pp. 283–289; Edwards *et al.* 1995, pp. 200–201; USDA–NRCS 2001, p. 2; Petition, p. 10). Moisture, temperature, and food availability influence earthworm populations in general, and earthworms need the organic matter found in the topsoil that agriculture removes (James 2000, pp. 1–2; Petition, p. 11). Bare soil can increase the effects of flooding, drought, or other weather conditions due to the lack of vegetation that buffers soil from extreme moisture, dryness, and temperature fluctuations. These conditions can temporarily or permanently make soils unusable by earthworms (James 2000, pp. 1–2; Petition, p. 11). James (2009, *in litt.,* p. 1) stated that earthworms are highly sensitive to habitat disturbance, such as forest clear cutting or conversion of any habitat to agriculture, and the native earthworms are generally destroyed by any type of drastic and sudden habitat modification. One commenter stated there may have been long periods of bare soil historically in the Palouse region, but seeding and fertilizing technology improvements now enable farmers to prepare seedbeds with minimal disturbance (McGregor 2010, *in litt.,* p. 2). James also stated, ''when seeking the indigenous earthworms, it is almost always a complete waste of time to work in anything but undisturbed or mildly disturbed stands of vegetation'' (James 2009, *in litt.,* p. 1). GPE have been found in forested locations, but it is unknown whether these are previously disturbed habitats.

We acknowledge that soil disturbance has occurred and may still be occurring in GPE habitat. However, we currently have no information linking soil disturbance with GPE presence or absence. Survey efforts for GPE have been limited, and sampling protocols remain to be developed. Until we have a better understanding of the species' distribution and habitat information, we are unable to determine with reasonable confidence whether the GPE uses disturbed or undisturbed habitats, or both. Therefore, the best available scientific information does not indicate soil disturbance is a threat to the GPE.

Soil Compaction

The petitioners claim that soil compaction from farm machinery or other activities can affect earthworms by making burrowing and feeding more difficult (James 2000, p. 9), by decreasing soil pore size and thereby decreasing nutrient retention and changing the soil food web (Niwa *et al.* 2001, pp. 7, 13), or by favoring nonnative earthworms that prefer course soils rather than the fine soils apparently preferred by the GPE (Fender and McKey-Fender 1990, p. 364; Petition, p. 11). Johnson-Maynard (September 21, 2010, *in litt.,* pp. 2–3) noted that the effects of soil compaction on earthworm density can vary based on the species' ecological strategy (*i.e.,* anecic versus endogeic); larger species, such as anecic earthworms, have been found to be less sensitive to soil compaction than smaller species (Cluzeau *et al.* 1992, p. 1661) and may be more abundant in compacted areas compared to non-compacted areas (Cuendet 1992, p. 1467). Fender (1995, p. 57) has often found other Argilophilini worms (a tribe of native Pacific Northwest earthworms that includes the GPE) in compacted trails; Capowiez *et al.* (2009, p. 214) notes that our current knowledge of the sensitivity of earthworms to compaction is limited. In addition, the assumption that compaction would favor exotic species over native species due to their preference for finer-textures soils is invalid; while compaction does impact total porosity and pore size distribution, it does not alter soil texture (Johnson-Maynard, September 21, 2010, *in litt.,* p. 3). Johnson-Maynard states that generalizations such as those presented by the authors of the 2009 petition, suggesting that compaction favors nonnative species, should be interpreted with caution (Johnson-Maynard, September 21, 2010, *in litt.,* p. 3). In addition, survey efforts for the GPE have been limited, and sampling protocols remain to be developed. Until we have a better understanding of the species' distribution and habitat information, we are unable to determine with reasonable confidence whether soil compaction is occurring in GPE habitat, and if it is, whether it is resulting in a negative response in the species. Therefore, the best available scientific information does not indicate soil compaction is a threat to the species.

Soil Chemistry

The pH scale describes how acidic or basic a substance is, and ranges from 0 to 14, with 7 being neutral, below 7 being acidic, and greater than 7 being basic. The petitioners cite soil chemistry effects, notably a reduction in soil pH from nitrogenous fertilizer application, as having deleterious effects on earthworms (Ma *et al.* 1990, p. 76), and state that generally earthworms do not thrive in soils with a pH below 5 (Petition, p. 11; Edwards and Lofty 1977, p. 234). However, the best available scientific information related to the responses of earthworms to pH appears to both support and contradict the petitioners' claim with regard to the GPE. Soil pH is a factor that often greatly affects earthworm populations, both in numbers of individuals and numbers of species. According to the Natural Resources Conservation Service (USDA–NRCS 2001, p. 5), earthworms do not thrive in soils with a pH below 5 (USDA–NRCS 2001, p. 2; Edwards and Lofty 1977, p. 234; Edwards and Bohlen 1996, p. 276). However, one Australian study of tillage effects to one native anecic earthworm species (*Spencefiella hamiltoni*) described the surface soil in the study area as highly acidic (pH = 4.1), with the pH increasing (or acidity decreasing) with depth (pH = 5.0 at 0.8 meters) (Chan 2004, p. 90). Some earthworm species are intolerant of acid soil conditions, some are tolerant, and others can tolerate wide ranges of soil pH (Edwards and Bohlen 1996, p. 142). Because soil pH is related to other soil factors, such as clay content, or cation exchange capacity (the ability to hold plant nutrients), it is often difficult to establish a direct cause-and-effect relationship between soil pH and the size of earthworm populations (Edwards and Bohlen 1996, p. 144).

Fender (1995, p. 56) stated that Argilophilini worms appear to have higher tolerance than lumbricids (nonnative earthworms, such as the night crawler) for low pH (below 5, acidic) soils; high clay; and resinous, low-nitrogen, plant litter. Sánchez-de León and Johnson-Maynard (2009, pp. 1397, 1399) found a significant negative interaction between soil pH and mean earthworm density and mean earthworm fresh weight. The nonnative southern earthworm (*Aporectodea trapezoids*) was more abundant in CRP sites with lower pH values (pH 5.9 to 6.2) than prairie soils (pH 6.3 to 6.6) in a study of four paired CRP and prairie remnant sites. Their data did not support their hypothesis that native earthworms would be dominant in prairie remnants and exotic earthworms dominant in CRP set-aside lands (Sánchez-de León and Johnson-Maynard 2009, pp. 1398). In that study, one GPE was collected during sampling at the Smoot Hill prairie remnant study site. In the study, the prairie remnants' mean soil pH at depth was pH 6.3 (20–30 cm), pH 6.5 (10–20 cm), and pH 6.6 (0–10 cm), while in the CRP study sites the mean soil pH at depth was pH 6.2 (20–30 cm), pH 6.0 (10–20 cm), and pH 5.9 (0–10 cm) (Sánchez-de León and Johnson-Maynard 2009, p. 1397). The researchers stated they were unsure whether lower pH (more acid) in CRP sites correlated with some other non-measured soil parameter, such as previous fertilizer applications and resultant increased organic matter. They hypothesized the negative relationship between earthworm density and soil pH could be a reflection of a past land use rather than a direct effect of soil pH on earthworms (Sánchez-de León and Johnson-Maynard 2009, p. 1399). Other studies in the Palouse region demonstrated the mean soil pH in direct-seeded agricultural fields was pH 5.35, and in conventional tillage fields pH 5.61 (Umiker *et al.* 2009, p. 184). One commenter (McGregor 2010, *in litt.,* p. 4) stated less than 0.5 to 1 percent of the soils sampled in the Palouse have pH levels below 5.

In summary, studies investigating relationships between earthworms and soil pH indicate that earthworm response can vary with species, location, life-history strategy, or other attributes. The best available scientific information on this relationship for the GPE is limited (*e.g.,* to our knowledge, only the Smoot Hill study has investigated the potential soil pH relationship). There is significant uncertainty regarding the correlation between soil pH and GPE occurrence or persistence, and insufficient data to identify pH cause-and-effect relationships that might be limiting for the persistence of this species. However, in the Palouse region, soil pH levels do not appear to be so acidic (below pH 5) that they negatively affect earthworms generally. Also, the GPE may be more tolerant to acidity than some species of earthworms. In addition, the range of the GPE is wider than previously known, and includes pine forests on the eastern slope of the Cascades, although the full extent and type of forested habitats occupied by the GPE are not yet known. Detailed soil characteristics are not known for the GPE location near Leavenworth, Washington. Accordingly, the best available information does not indicate that changes in soil chemistry represent a threat to the GPE.

Tillage and Agriculture

The petition states that tillage removes the original topsoil, which may reduce earthworm burrow densities, soil aeration, soil infiltration rates, and the amount of organic matter available to the GPE for forage (Petition, pp. 10–11). Literature cited by the petitioners stated the original topsoil has been lost from 10 percent of Palouse cropland, and 60 percent of cropland has lost 25 to 75 percent of its topsoil (Veseth 1986b, p. 2). The petition did not present detailed information on agriculture activities in the Ellensburg area, although the Adolphson Associates report (2005, pp. 14–22) presented with the petition includes maps and photographs depicting areas converted to agriculture within the Ellensburg, Washington, city boundaries.

The potential threats to the GPE from tillage and cultivation are reduced food sources and burrow compaction, but would likely vary depending on its life-history strategy. Annual crops put a small fraction of their production into root mass (James 2009, *in litt.*, pp. 3–4), whereas perennial prairie grasses put approximately 50 percent of their annual production into roots, which provide resources for soil invertebrates (including endogeic earthworms). Endogeic earthworms, which the petitioners assert the GPE to be (James 2009, *in litt.*, pp. 3–4), would probably be more susceptible to agricultural activities that reduce soil organic matter, based on their need for organic matter as a food source. However, anecic earthworms use surface litter as a food source, and the best available scientific information supports the GPE being an anecic earthworm species. In either case, surveys to date in the Palouse have not documented the GPE in either agricultural fields or CRP lands (Fauci and Bezdicek, 2002, p. 254; Sánchez-de León and Johnson-Maynard 2009, p. 1393; Johnson-Maynard *et al.* 2007, p. 340). Therefore, we have no information indicating that the GPE would be exposed to reduced soil organic matter or reduced surface litter caused by ongoing cultivation in the Palouse region.

One Australian study demonstrated that 3 years of tillage reduced earthworm burrow density by nearly 90 percent (Chan 2004, p. 89; Petition, p. 10), which reduced the maximum infiltration rate of the soil and significantly increased the likelihood of runoff and erosion. Chan's study (2004, p. 90) compared tillage effects to soil infiltration by monitoring burrow density for the North Auckland worm (*Spenceriella hamiltoni*), an anecic member of the Megascolecidae (in the same family as the GPE), under three conditions: no-till (crops drilled directly into ground with a special slit drill), conventional one-pass, and conventional two-pass tilled agriculture (Chan 2004, p. 94). The effect of tillage on earthworm abundance is usually negative because tilling causes physical damage and burial of residues, although tillage could also increase the abundance of some earthworm species due to increases in food supply by incorporation of residues into the soil (Chan 2004, p. 90). In this study, tillage was found to decrease burrow density and water infiltration into the soil (Chan 2004, pp. 89, 94). The author concluded that under cropping, preservation of earthworm burrows can be achieved by adopting conservation tillage techniques (Chan 2004, p. 96). Conservation tillage techniques generally involve establishing crops in a previous crop's residues, which conserves water and minimizes soil disturbance and erosion.

Johnson-Maynard (September 21, 2010, *in litt.*, p. 2) discusses studies in which tillage effects on earthworm density were found to be dependent on the ecological grouping of earthworms in an area (*i.e.*, anecic or endogeic). Chan (2001, pp. 179, 185–187) found in a 3-year study that tillage had a strong negative impact on anecic species due to a combination of direct damage, burial of residue (food source), and destruction of earthworm burrows, while endogeic species were positively affected in the short term due to their smaller size (less physical damage) and increased availability of organic matter. In the Palouse bioregion, tillage removes the original topsoil, which may reduce earthworm burrow densities, soil aeration, soil infiltration rates, and the amount of organic matter available to the giant Palouse earthworm for forage (Veseth 1986b, p. 2; Petition, pp. 10–11). Edwards and Bohlen (1996, p. 215) stated that earthworm populations were much larger in soil that was manipulated using no-till methods. No-till agriculture accounted for 14,563 acres (5,893 hectares), or roughly 5 percent of the total surveyed acreage in the Palouse in 1989, up from the previous 5-year average (1984–1988) of 3 percent (Hall 1999, p. 15).

The GPE has been documented in the Palouse in remnant native grassland and in Douglas-fir forests, and in ponderosa pine forest at the Leavenworth site near Chelan, Washington. The GPE distribution is wider than previously known, but its total distribution remains uncertain because the species is very difficult to detect, survey protocols are still being developed, and the level of survey efforts within and outside of the Palouse area has been very low. While there may have been historical impacts to the GPE from agriculture in the Palouse, the magnitude of threats from those activities is difficult to determine because we have no baseline population or distribution information with which to make a comparison, other than the anecdotal statement in Smith (1897, pp. 202–203). In addition, to date the GPE has not been found in agriculture fields in the Palouse, and we have no information that indicates the GPE is or will be exposed to tillage and agriculture. Accordingly, the best available information does not indicate that tilling and agriculture represent a threat to the GPE.

Grazing

James stated that grazing degrades earthworm habitats, potentially to the point of causing extirpation, and that soil compaction from livestock grazing can affect earthworms by making burrowing and feeding more difficult (James 2000, pp. 9–10). The petition also claims that livestock grazing changes the quality and accessibility of detrital material, decreasing organic matter available to earthworms through conversion of herbage to partly digested clumps of organic matter (James 2000, p. 9; Petition, p. 14).

The petitioners describe livestock grazing as a pervasive land use in the range of the GPE. James (2000, p. 9) stated: (1) Livestock grazing can cause soil compaction, thereby making burrowing and feeding more difficult for earthworms; (2) effects are variable by earthworm species or habitat type (or both); (3) large earthworm species are less heavily impacted by grazing; and (4) ‘‘without further knowledge about native earthworms and the presence or absence of earthworms in lands subject to grazing in the Columbia River basin assessment area, it is of little use to speculate further.’’ Cluzeau *et al.* (1992, pp. 1661, 1663) demonstrated intensive trampling by cattle can reduce earthworm densities, particularly for smaller species and those living near the surface. No specific information was provided by the petitioners regarding the extent of livestock grazing impacts in the Palouse or Ellensburg areas. However, several individuals (Field 2010, *in litt.*, p. 2; Jensen 2010, *in litt.*, p. 6) commented that grazing can benefit some earthworms through increasing organic matter and plant species diversity (Dorsey *et al.* 1998, p. 2; Taylor and Neary 2008, p. 2). We cannot assess the distribution of the GPE in relation to grazing activities or grazing intensity because the species' range is unknown, but is wider than previously documented, there have been very few surveys, and the habitats used by the species are more variable than previously known. However, the best available information indicates grazing can sometimes benefit earthworms and larger species like the GPE may be less impacted by grazing than smaller species. Accordingly, based on the best available information, grazing has not been demonstrated to be a threat to the species.

Chemical Applications

Earthworms have been shown to be sensitive to some pesticides (Edwards and Bohlen 1996, pp. 283–285), and the toxicity varies depending on the type of pesticide used. Generally, carbamates (organic compounds derived from carbamic acid and frequently used in insecticides) are the most toxic (Edwards and Bohlen 1996, pp. 283–285). In addition, although chemicals may not result in direct toxicity, they may have indirect effects such as reduction in organic matter, which is a food source for earthworms. Contaminant exposure and toxicity depends on a wide range of chemical, physical, and biological factors, and the rate of application. Specific knowledge of the fate and transport of the chemical within the environment, physicochemical attributes of the exposure media, and biological characteristics of the organism are required to determine if a species may be impacted by environmental contaminants. Although pesticide application is widespread within the Palouse, information on GPE distribution, biology, and life history is limited. There is significant uncertainty with regard to determining the potential impact pesticides might present to this species, and what application rate(s) would be required for those impacts to rise to a level of being a threat to the species. Exposure could also vary, depending on the GPE's life-history strategy. Anecic species (which we believe the GPE to be based on the best available scientific information) may have less exposure than other forms. For example, the black-headed worm (*Aporrectodea longa*), an anecic species, was determined to be less susceptible to pesticides because of its ability to burrow deep into the soil. This species also undergoes an obligatory diapause in the summer months, which may limit pesticide exposure (Wheatley and Hardman 1968, as referenced in Edwards and Bohlen 1996, p. 280; Gerard 1967, as referenced in Edwards and Bohlen 1996, p. 280). It is unknown whether the GPE undergoes a diapause. In addition, in a midwestern United States study on agriculture and earthworms, Simonson *et al.* (2010, p. 147) found the most commonly applied pesticides and increased crop diversity did not have a significant effect on either the endogeic or anecic earthworm groups.

From 1992 through 1995, pesticides were assessed as part of the National Water-Quality Assessment (NAWQA) Program, and at least one pesticide was detected within 97 percent of surface water samples collected within the Palouse bioregion. No pesticides were found in groundwater (the only source of drinking water in the area) at concentrations that exceeded drinking water standards or guidelines (Roberts and Wagner 1996, p. 15). Although some data are available for pesticide presence in surface and groundwater, there is little information on pesticide presence or concentrations in soils within documented GPE habitat. Many currently used pesticides are water soluble and are much less persistent in soils than the organochlorine pesticides used in the past.

Approximately 700,000 pounds of commonly used pesticides are applied in the Palouse bioregion annually (Roberts and Wagner 1996, p. 2), and agricultural interests in the Palouse region apply many herbicides to control invasive and noxious plants (Hall *et al.* 1999, p. 12, Table 3.08; Kellogg *et al.* 2000, p. 2). Wagner *et al.* (1995, pp. 21–22) identified several pesticides used in an area within the Palouse bioregion, several of which were detected in water samples, including Triazine (Atrazine) (pp. 15–16, Table 4), although several comments (*e.g.*, McGregor *in litt.*, p. 4) stated that Triazine family herbicides are not used commercially for agriculture in the Palouse. The petition claims no-till farming uses herbicides rather than tilling for weed control, resulting in higher herbicide use in no-till fields than in tilled fields (Veseth 1986a, p. 1; Petition, p. 12); however, no-till farming was estimated in 1989 to be used on only 5 percent of the fields in the Palouse region (Hall 1999, p. 15). Several individuals from the Palouse bioregion commented that no-till farming uses glyphosate herbicides (Jensen 2010, *in litt.*, p. 5; McGregor 2010, *in litt.*, p. 2; Mick 2010, *in litt.*, p. 2), which studies show have no toxicity for earthworms when properly applied (Edwards and Bohlen 1996, p. 304). Individuals also commented that agricultural users apply fertilizers and pesticides sparingly and with precision because of the costs involved (Barstow

2010 *in litt.,* p. 2; Jensen 2010 *in litt.*, p. 5).

There is limited information available on pesticide use outside of the Palouse bioregion in the vicinity of documented GPE locations. One study detected such chemicals in irrigation canal monitoring sites in the Yakima watershed (Johnson 2007, p. 1). However, the monitoring sites used for the Johnson (2007) study appear to be lower in the watershed than the Ellensburg GPE location (Fender and McKey-Fender 1990, pp. 358, 366). Although groundwater and surface water pesticide monitoring studies provide an indication of pesticide use in the general area, the data are not informative on whether pesticides are present in GPE-documented habitats. We are also unaware of any pesticide monitoring studies in the vicinity of the GPE location near Leavenworth, Washington.

In summary, agricultural lands have been the primary focus areas for pesticide and herbicide monitoring studies; however, the GPE has not been documented to date in these types of areas. Although we have some information on pesticide applications in the Palouse area, and some generalized information regarding pesticide toxicity to earthworms, the available information is inadequate to determine how and whether those pesticides impact soils or habitats occupied by the GPE. We have some limited pesticide application information for the Ellensburg, Washington, vicinity, although the data are not particularly enlightening with regard to proximity to the GPE location, and we have no pesticide information related to the GPE location documented near Leavenworth, Washington. However, information on another anecic species (Wheatley and Hardman 1968, as referenced in Edwards and Bohlen 1996, p. 280; Gerard 1967, as referenced in Edwards and Bohlen 1996, p. 280) indicates deep-burrowing anecic species are less susceptible to pesticides. In addition, the prevailing information indicates the GPE is an anecic species, and anecic species have less exposure to pesticides than other earthworm life-history forms. We do not have information on GPE pesticide exposure in areas outside of the Palouse region, and the exposure will vary with the distribution, habitat types, and pesticide uses in those areas. The GPE has a wider range and occurs in more diverse habitats than previously known, and we have little information on pesticide applications occurring in those areas. Accordingly, the best available scientific information does not indicate the application of pesticides or herbicides is a threat to the GPE.

Urbanization and Rural Development

The petitioners claim that urban sprawl and rural development negatively impact GPE habitat in the Palouse and Ellensburg areas. The Ellensburg, Washington; Pullman, Washington; and Moscow, Idaho human populations increased by approximately 76, 88, and 73 percent, respectively since 1980 (Petition, p. 12; *http://www.census.gov*, figure 4). The petition states that urban development compacts soil, removes topsoil, and favors nonnative, invasive earthworms (Petition, pp. 12–13), and road construction affects remaining prairie remnants (Petition, p. 13). If urban or rural development were to occur on remnant prairie habitats in the Palouse, there may potentially be an impact to the GPE. However, the Palouse prairie is not the only habitat type used by the GPE, as the species has also been located in Douglas-fir forest in the Palouse and in ponderosa pine forest near Leavenworth, Washington (see Table 1 above).

The petitioners (Petition p. 13) expressed concern about a potential rerouting of U.S. 95 through a large prairie remnant in the Palouse bioregion south of Moscow, Idaho. The planning for this project is ongoing (Idaho Department of Transportation (IDOT) 2011a, p. 1). There were three action alternatives under consideration (IDOT 2011c, p. 1), one of which (the eastern alternative) would impact Paradise Ridge, an area where the GPE has been documented. However, the IDOT forwarded only alternatives that would have no direct impact on rare plant communities (including remnant prairie habitat) for further analysis (IDOT 2011b, p. 21, 25), and as a result, the Paradise Ridge GPE site will not be affected by the IDOT project. Urban and rural development in prairie remnants is still possible, given that Latah County, Idaho, and Whitman County, Washington, do not prohibit this type of development (Latah County Board of Commissioners 2010; Whitman County 2010); however, there are significant scientific uncertainties regarding the full extent of habitat types used by the GPE, as well as the species' distribution, range, and population trends. In summary, the best available scientific information does not indicate that urbanization and rural development are threats to the GPE.

Forest Management

The impact of forest management actions on soils varies, and uneven-aged management (*i.e.*, selective harvest) can result in machinery-induced soil compaction over a larger area than even-aged management (*i.e.*, clearcut harvest) (Harvey *et al.* 1994, p. 44). However, while selective timber harvest practices may result in soil disturbance or compaction from heavy equipment, there will be less loss of surface or soil organic matter than when clearcut timber harvest methods are used (James 2000, p. 10). Forest management operations can alter the cycling of above-ground organic materials and their incorporation into soil (Harvey *et al.* 1994, p. 11), which may result in not only impacts to soil nutrients, but also changes to soil characteristics such as water-holding capacity, aeration, drainage, and cation exchange.

The GPE has been documented in Douglas-fir forest at Moscow Mountain in the Palouse, and recently confirmed in dry ponderosa pine forest near Leavenworth, Washington (see Table 1 above), although information regarding details on the forest stand at the GPE locations, and the extent of habitats the GPE occupies in forested environments, is incomplete. Forest types have changed in the Columbia Basin since historical times, although the numbers of forested acres are not substantially different (Quigley *et al.* 1996, p. 54). The potential impacts to the GPE from forest management activities would likely depend on whether the species requires certain forest types or ages, and if so, the specific nature of the management prescription being applied in those areas. There are uncertainties with regard to whether the GPE is restricted to certain types of forests, certain ages of forest, or certain elevations or other site characteristics, or whether surface vegetation is relevant to the species. If the GPE occurs in multiple types and ages of forest, the availability of a particular forested habitat type may not be a limiting factor, and forest management may have little impact.

James stated in 1995, that he can ''confidently state that nothing is known of the impact of any management practice on any Columbia River Basin native earthworm species'' (James 1995, p. 12). However, in 2000, James stated that logging: (1) Degrades earthworm habitat, potentially to the point of causing extirpation and changes in plant communities, and (2) may degrade habitat through changing soil type, soil temperature, moisture regime, or food resources (James 2000, p. 10). In his 2000 study, James also related the primary effect of tree removal on endogeic earthworms to soil climate and the availability of surface and soil organic matter sufficient to support earthworms until second-growth plants become established. James also stated that epigeic species would be expected to suffer most from the loss of tree cover because the preferred microhabitat would be less hospitable and ultimately less abundant, with the loss of annual leaf input, and indicated that disturbance caused from heavy equipment use may be the most deleterious to earthworms (Shaefer and others 1990, in James 2000, p. 10). However, James did not discuss how these types of activities would affect an earthworm species with a deep-burrowing, anecic, life-history strategy (James 2000, p. 10), such as the GPE. The Service recognizes that forest management activities can affect soils, temperatures, and vegetation, and the impacts would vary with types of forest management, types of forest, and habitat needs of the GPE. However, we were unable to determine how much forested habitat the GPE occupies or where it occurs in forested habitat (other than the above confirmed localities). Additional surveys will be needed to determine the extent of forested habitat occupied by the species. In addition, we have no information to indicate how GPE would respond to different types of forest management activities. Therefore, the best available information does not indicate that forest management activities represent a threat to the GPE.

Summary of Factor A

The GPE is known to occur in both grassland habitats and forested habitats in the Palouse. Native grassland habitats in the Palouse have declined to very low levels; information on changes to forested habitats in the Palouse is less well understood. The species' range outside of the Palouse region is substantially greater than was previously known, and includes portions of the eastern slope of the Cascade Mountains. Survey efforts have been limited, it is difficult to survey for the species, and effective survey methods remain to be developed. In addition, there are significant scientific uncertainties regarding the GPE's distribution, habitat diversity, biology, and population trends, which need to be resolved to be able to conduct a credible scientific assessment of potential threats to the species. The best available information is inconclusive with regard to whether soil pH is a limiting factor, or whether there are certain types of management activities that affect soil pH in a manner that presents a threat to the GPE. The literature suggests that compacting soils may result in impacts to earthworms, depending on their life-history strategy. However, there is no information with which to determine with reasonable confidence whether soil compaction is occurring in GPE habitat, and if so, whether it would result in a negative response in the species.

While there may have been historical impacts to the GPE from agricultural conversion in the Palouse, most agriculture conversion activities were completed by 1910 (McGregor, 1982, p. 109). The extent to which agricultural activities currently present a threat to the GPE is undeterminable, given the limited information available on the species' life history, its range, and the diversity of habitat types where it occurs. However, the species has not been collected in agricultural areas to date. The extent of the GPE's range and habitat types used beyond the Palouse is also unknown. While there may potentially be impacts from grazing activities, we have an incomplete understanding of the species' occupied habitat, whether grazing occurs therein, the magnitude and intensity of grazing activities in those areas, and the GPE's exposure to grazing impacts. We have some information on pesticides used in the Palouse area, and we have generalized information on pesticide toxicity to earthworms. However, we are unable to correlate that information to soils or habitats used by the GPE in the Palouse or elsewhere, and whether the GPE is exposed to those chemicals. The limited information on pesticide applications in the Ellensburg, Washington, vicinity is not instructive with regard to whether or not those activities might threaten the GPE, and there is no information related to pesticide application in the Leavenworth, Washington, GPE locality. Because of our limited knowledge of the species' range and occupied habitat, we cannot credibly evaluate the threat of urban or rural development to the species. We recognize that forest management activities can affect soils, temperatures, and vegetation, but there is no information correlating these activities to a possible negative response by the GPE. In summary, there is very little information available, and the best available scientific information does not indicate the present or threatened destruction, modification, or curtailment of the GPE's habitat or range from any of the above activities constitutes a threat to the species such that listing under the Act is warranted.

Factor B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

The petition did not identify overutilization for commercial, recreational, scientific, or educational purposes as a potential threat to the GPE. Unlike butterflies, for example, earthworms are not likely targets for collection by hobbyists. Recent records of the GPE are based on the few individuals that were killed during or after their collection (fewer than 10). While we anticipate some additional GPE mortality due to scientific collection as we learn more about the species, we have no reason to believe the loss of a few individuals for scientific purposes would present a threat to the continued existence of the species. Therefore, we conclude that overutilization for commercial, recreational, scientific, or educational purposes is not a threat to the species such that listing under the Act is warranted.

Factor C. Disease or Predation

The petition did not identify any threats to the GPE related to disease or predation. Hendrix and Bohlen (2002, p. 802) stated that imported nonnative earthworms may be vectors for plant or animal pathogens or viruses, but the authors do not correlate this potential threat to the GPE. Although James (1995, p. 11) stated that predation on earthworms can be accentuated by tilling the soil and exposing earthworms to bird predators, the correlation to the GPE is uncertain as the GPE is believed to be an anecic species and therefore may be less likely to be exposed by tilling. Also, surveys to date have not found the GPE in agricultural fields, although we acknowledge the extent of those surveys has been limited. However, the species would not be exposed to increased predation caused by ongoing tillage if it does not occupy agricultural areas. In summary, we do not have any evidence indicating that disease or predation is a threat to the GPE such that listing under the Act is warranted.

Factor D. The Inadequacy of Existing Regulatory Mechanisms

In our 2010 90-day finding (75 FR 42064; July 20, 2010), we determined the existing regulatory mechanisms may be inadequate to address potential threats to the GPE. The petitioners claim Federal, State, or local regulations do not specifically protect the GPE or its habitat. The Washington Department of Fish and Wildlife identifies the GPE as a species of concern (WDFW 2009, p. 1), although this status does not provide regulatory protection for the species. The petition states the Palouse Subbasin Management Plan (Gilmore 2004) includes objectives to protect and restore native grassland habitat within the Palouse subbasin, and increase wildlife habitat value on agricultural land, but is voluntary in nature and does not provide regulatory mechanisms that protect the GPE or its habitat. Habitat conversion in the Palouse may still occur, as neither Latah County, Idaho, nor Whitman County, Washington, have ordinances or regulations to prevent native habitat conversion (Latah County Board of Commissioners 2010, pp. 1–27; Whitman County 2010, pp. 1–76). However, we do not have evidence that habitat loss is a threat (see Factor A discussion). The petition also acknowledges the existence of the U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service, Environmental Protection Agency, and National Oceanic and Atmospheric Administration (NOAA) Fisheries Memorandum of Understanding (MOU, USDA Forest Service *et al.* 2003), in which the agencies agreed to voluntarily utilize the scientific findings of the Interior Columbia Basin Strategy (CBS) to guide project implementation and to revise resource management plans. The petitioners state the MOU and CBS do not address the GPE or provide regulatory mechanisms for its protection (Petition, p. 15), and claim existing regulations are ineffective in reducing the importation of nonnative earthworm species, which present a threat to the GPE. However, the best available information does not indicate that exotic earthworms represent a threat to the GPE (see Factor E discussion).

The U.S. Environmental Protection Agency (EPA) Office of Pesticide Programs evaluates which ingredients and which pesticide products can be used (registered) in the United States. The EPA evaluates the potential effects of pesticides on human health and the environment, conducts risk assessments, and works with companies to develop label instructions that ensure safety (see the National Pesticide Information Center at *http://www.npic.orst.edu/reg.htm*). One study found the use of pesticides at recommended rates had no detectable negative effects on earthworms in anecic or endogeic species (Simonsen *et al.,* 2010, cited in Johnson-Maynard, 2010, *in litt.,* p. 2). Therefore, the best available information indicates that the species is not threatened by the inadequacy of pesticide management.

Surveys for the GPE have been limited, and there are significant uncertainties regarding the species' distribution and life history, as well as the diversity of habitat types where it may be found. This type of information is essential to credibly assess whether or not existing regulatory mechanisms are adequate to address potential threats to the species. While we acknowledge the regulations and plans described above do not provide specific protections for the GPE, we have no information to indicate this lack of specific protections is resulting in threats to the species. Therefore, we find that the available information does not support a conclusion that the inadequacy of existing regulatory mechanisms is a threat to the GPE.

Factor E. Other Natural or Manmade Factors Affecting the Species' Continued Existence

The petitioners claim that the GPE is threatened by invasive, nonnative earthworms (Petition, p. 1). In a 3-year study of earthworms in the Palouse region of eastern Washington and Idaho, Sánchez-de León and Johnson-Maynard (2009, p. 1393) found a dominance of invasive, nonnative earthworms in both native and nonnative grasslands. Nonnative earthworms can invade new habitats, change the ecological soil functions, and displace native species (Hendrix and Bohlen 2002, p. 805; Petition, p. 16). Earthworm populations are dominated by nonnative earthworms in agricultural sites and native prairie remnants in the Palouse region (Fauci and Bezdicek 2002, p. 257; Sánchez-de León and Johnson-Maynard 2009, pp. 1396, 1399–1400; Petition, p. 16). Habitat conversion favors invasion of nonnative earthworm species that are better adapted to a disturbed or degraded environment (Petition, p. 16; James 1995, p. 5). James (1995, p. 5) stated that many exotic species occur in the Columbia Basin, possibly altering previously worm-free soils and nutrient cycling pathways, competing with native species, and generally modifying any processes linked to soil physical or chemical properties. He also stated that invasive earthworm species present a potential threat to the GPE, and described the loss of a deep-dwelling Illinois earthworm species as an example of this threat, although the particular study was not cited (James 2009, *in litt.,* p. 2). Based on the limited information that was provided, we were unable to locate the study. James stated that although invasive earthworms do not always reduce or eliminate populations of indigenous worms, the invasion cannot help, and some species may be highly competitive with, a deeper-dwelling species like the GPE, while others may not (James 2009, *in litt.,* p. 2). There are substantial weaknesses in extrapolating data from an Illinois earthworm species to the GPE, because we have no information that would indicate the responses would be similar. While the Service concludes that the GPE is anecic based on the best available information, there is some expert disagreement on the GPE's life-history strategy. However, it is unclear whether this matters in relation to invasion by nonnative earthworms, and James (2009 *in litt.* p. 2) did not present a scientific basis for using an Illinois species as a surrogate for the GPE.

We agree that a correlation of decline and extirpation of some native earthworm species with the arrival of introduced earthworm species is well documented (Hendrix and Bohlen 2002, pp. 805–806; Sánchez-de León and Johnson-Maynard 2009, pp. 1393–1394), although the cause may not always be direct. The causes of the declines of native species of earthworms are not documented, but theories center on ecosystem disturbance (Hendrix and Bohlen 2002, pp. 805–806) and competitive exclusion (James 2000, p. 8; Hendrix and Bohlen 2002, pp. 805–806). In addition, James (2009, *in litt.,* p. 2) noted that invasive earthworms do not always reduce or eliminate populations of indigenous earthworms. Depending on ecological requirements, some species may be highly competitive with a deeper-dwelling species like the GPE, and some not competitive, or there may be a combination of effects coupled with habitat modification. Co-occurrence of native and nonnative earthworm species is common both in disturbed and undisturbed ecosystems; however, it is not known if this is a transient or permanent state (Hendrix 2006, p. 1203). Ecosystem disturbance sufficient to degrade or destroy habitat for native species may be caused by the arrival of introduced worm species, or the arrival of introduced species may follow habitat degradation caused by other factors (Hendrix and Bohlen 2002, pp. 805–806). Nonnative earthworm invasions may depend on the degree of disturbance, competition with natives, and adaptability to site conditions (Hendrix and Bohlen 2002, p. 1203; Sánchez-de León and Johnson-Maynard 2009, p. 1394).

In a 2003–2005 research effort in the Palouse region of southeastern Washington and northern Idaho, Sánchez-de León and Johnson-Maynard (2009, pp. 1394–1395) compared four paired study sites representing native prairie remnants and CRP set-aside lands. The study objective was to characterize and compare native and nonnative earthworm populations in two important grassland ecosystems within the Palouse region. Their results found that one invasive earthworm species, the southern worm (*Aporrectodea trapezoides*) comprised

90 percent of the total earthworm density in their study areas (Sánchez-de León and Johnson-Maynard 2009, p. 1396). One GPE was collected at one of the four prairie remnant study sites. The authors suggested that because native earthworms are found in fragmented native habitats along with exotic earthworms, the GPE may be able to coexist with exotic species in Palouse prairie remnants. They indicated that further study would be required to determine whether the GPE is a resilient species based on its deep-burrowing behavior, or whether the results of their study demonstrate a species replacement process (Sánchez-de León and Johnson-Maynard 2009, pp. 1398).

The rarity of native earthworms in their native prairie remnant study areas lends support to the researchers' theory that native earthworms are being replaced by nonnative earthworms, even in visibly intact remnants of fragmented habitats (Sánchez-de León and Johnson-Maynard 2009, pp. 1398–1399). The researchers suggested *Apporectodea trapezoides* may compete with the GPE for food in upper layers of soil (Sánchez-de León and Johnson-Maynard 2009, pp. 1398–1399), but could not exclude the possibility that the GPE did not historically occur in high densities within these prairie remnants because of their steep slope or high rock content, the very factors that prevented these areas from being plowed and preserved them as remnant prairie (Sánchez-de León and Johnson-Maynard 2009, p. 1398). They acknowledged that these findings are inconsistent with other studies showing that native earthworms predominate in undisturbed or minimally disturbed grasslands (James 1991, pp. 2101–2109; Callaham *et al.* 2003, pp. 1079–1093; Winsome *et al.* 2006, pp. 38–53; *in* Sánchez-de León and Johnson-Maynard 2009, pp. 1397–1398).

The researchers suggested that a combination of extensive habitat fragmentation in the Palouse region, low habitat quality of remaining prairie remnants, and possible competitive interactions with nonnative earthworms could have decimated GPE populations at their study sites (Sánchez-de León and Johnson-Maynard 2009, p. 1398). They acknowledged that no information is available on GPE pre-agricultural density or distribution, but the description of the species as being abundant by Smith (1897) contrasts with the rarity of finding the earthworm today. They stated that this suggests a significant reduction in population size (Sánchez-de León and Johnson-Maynard 2009, pp. 1394, 1399), but acknowledge their sampling methodology could have influenced the results. The hand-sorting sampling method is regarded as the best method to estimate abundance of most earthworm species, but is also known to underestimate the abundance of deep-burrowing species. The researchers recommend the use of a combination of methods for future studies, including non-destructive alternatives such as electrical methods or extraction methods with chemicals of low toxicity that are more suited for deep-burrowing earthworm species (Sánchez-de León and Johnson-Maynard 2009, p. 1399).

The GPE's range is more extensive than previously known, survey efforts for this species have been limited, and effective survey protocols remain to be developed. We acknowledge conflicting opinions by earthworm researchers regarding the GPE's life-history strategy, which could influence how it interacts with exotic earthworms. However, we believe the prevailing evidence points to the GPE being a deep-burrowing anecic species, based on observations in the field by scientists who appear to be most familiar with this particular species, and the report by Smith (1897, pp. 202–203) describing burrows extending to a depth of over 15 feet in new road cuts. Endogeic worms (which the petitioners believe the GPE to be) live in the upper layers of mineral soil, whereas anecic earthworms live in deep, semi-permanent burrows. The researchers Sánchez-de León and Johnson-Maynard also acknowledge that the hand-sorting sampling method (which has apparently been applied in most earthworm surveys) underestimates the abundance of deep-burrowing species. In addition, the limited evidence available does not lead to a reasoned scientific conclusion regarding competitive interactions between exotic earthworms and the GPE. In summary, we do not have evidence to support a conclusion that competition with exotic earthworms is a threat to the GPE.

Nonnative Plants

The petitioners describe the existence of introduced annual grasses and noxious weeds in the Palouse region, including *Poa pratensis* (Kentucky bluegrass), crops, *Bromus tectorum* (cheatgrass), and *Centaurea solstitialis* (yellowstar-thistle) (Gilmore 2004, pp. 1–87), and state that it is likely these species do not provide the same quality and quantity of earthworm forage as native vegetation (Petition, p. 17). However, they did not provide any evidence to support this statement. There may be differences in nutritive value between weeds and native plants, and there may be differences in phenology (*e.g.,* nonnative plants emerging at a different time than native plants), but it is unknown if this is important to the GPE. Invasive weed control in the Palouse is difficult (Jensen, 2010, *in litt.,* p. 3; Nyamai 2009, pp. 6–7, 21–22). Native plant communities in the Palouse are susceptible to invasion by nonnative plants (Gilmore 2004, pp. 1–26; James 2000, p. 8); domination of deep-soil sites by Kentucky bluegrass is common, and in shallow soils cheatgrass and yellowstar-thistle weeds compete with native grasslands. McGregor (1982, pp. 124–125) commented that nonnative weeds, including cheatgrass, have been present in the Palouse region since the 1890s. The Draft Palouse Subbasin Management Plan (Gilmore 2004, pp. 1–86) states that exotic weed invasions are possibly the greatest threat facing the grasslands and shrublands of the arid and semiarid West today, and species-rich ecosystems are being converted to monotonous weedlands as aggressive weeds replace native plants and degrade habitat for wildlife.

There are significant scientific uncertainties regarding the distribution and life history of the GPE, and the range of habitat types it occupies is unknown. Although there have been some studies relevant to nonnative plant invasion and conversion of native habitats and ecosystems, we are unaware of any scientific studies or other data that would allow an extrapolation of these observations to the GPE. Accordingly, we have no information to indicate that the introduction of nonnative plants represents a threat to the species.

Climate Change

The petitioners noted that, because Fender and McKey-Fender (1990, p. 366) describe annual precipitation as a parameter of GPE habitat, it is likely that changing weather patterns caused by global warming will impact this species' habitat and distribution (Petition, p. 17). This citation in fact defines the lower limit of precipitation tolerated by argilophilini worm species to be about 15 in (38 cm) annually, which the authors characterize as being ''about the edge of moist forests in our area, although the range of *Driloleirus americanus* extends into treeless areas.'' Although the petition expresses a concern about future climate change and its effects on the GPE, it did not present information or data in this regard.

The Service evaluated information available in our files and queried other available information related to this potential threat. Lawler and Mathias

(2007, pp. 19–20) investigated possible climate change impacts to vascular plants, stating that plants may mature earlier, creating potential mismatches between pollinators and plants, parasites and hosts, and herbivores and food sources; increased summer temperatures and decreased summer precipitation may lead to changes in distribution of some plant species; sagebrush steppe and grasslands may contract, while dry forests and woodlands expand; and plant distribution changes will depend in part on plant water-use efficiencies. According to the United Nations Framework Convention on Climate Change (2010, p. 1), plant growth may benefit from fewer freezes and chills, but some crops may be damaged by higher temperatures, particularly if combined with water shortages. Certain weeds may expand their range into higher-latitude habitats. Higher levels of carbon dioxide should stimulate photosynthesis in certain plants, in principle. This is particularly true for C3 plants (named for their carbon fixation pathway) because increased carbon dioxide tends to suppress their photo-respiration. C3 plants make up the majority of species globally, especially in cooler and wetter habitats, and include most crop species, such as wheat, rice, barley, cassava, and potato.

It is difficult to predict how or if future changes in growth or distribution of vegetation resulting from climate change will affect local conditions for weeds, native vegetation, or both, or to predict how such changes would affect earthworms. Earthworm mortality can result from extreme temperatures, and the upper lethal temperature for different earthworm species is lower than for other invertebrates ((Edwards and Bohlen 1996, p. 146) (*e.g.,* 28 °C (82 °F) for *Lumbricus terrestris;* 37 to 37.75 °C (98.6 to 100 °F) for *Pheretima californica* (Schread 1952, as referenced in Edwards and Lofty 1977, pp. 156–157)). Earthworms tolerate higher temperatures by migrating, or burrowing deeper, but must still be able to feed on the surface or the top layers of the soil.

The petition did not present any specific information, and we are unaware of any studies, that would facilitate an evaluation of the extent to which the GPE may be affected by: (1) Increased air temperatures or soil changes; (2) earlier seasonality of plant production; or (3) changes in plant distribution. Climate change models used in the Intergovernmental Panel on Climate Change Fourth Assessment Report project increased air annual temperatures in the Pacific Northwest of, on average, 1.1 °C (2.0 °F) by the 2020s, 1.8 °C (3.2 °F) by the 2040s, and 2.9 °C (5.3 °F) by the 2080s, compared to 1970 and 1999 (averaged across all climate models); however, increased air temperature does not necessarily correlate with increased surface or soil temperatures. Projected changes in annual precipitation averaged over all models are small (+1 to +2 percent), but some models project an enhanced seasonal precipitation cycle with changes toward wetter autumns and winters, and drier summers (Littell *et al.,* 2009, p. 1). In the Pullman, Washington, area, baseline annual precipitation is estimated at 21.1 in (53.6 cm); models projecting to 2080 do not project annual precipitation below 15 in (38.1 cm) under any scenarios (Climate Impacts Group 2009, pp. 197–198). Fifteen inches (38.1 cm) of annual precipitation has been suggested as the lower limit of precipitation tolerated by argilophilini worm species, such as the GPE (Fender and McKey-Fender 1990, p. 366).

The impact of climate change on selected but economically significant crops in eastern Washington was predicted to be generally mild in the short term (*i.e.,* the next two decades), but increasingly detrimental with time (potential yield losses reaching 25 percent for some crops by the end of the century). The projected elevated carbon dioxide (CO_2) was expected to provide significant mitigation of climate change and its effects, and in fact result in important yield gains for some crops (Littell *et al.* 2009, p. 212), and it is likely that some native or nonnative plants would be similarly increased, potentially increasing the forage base for GPE.

Existing climate change projections are inadequate to allow a prediction regarding whether or how future climate change will impact the GPE or its habitat. This is further complicated by the significant uncertainties that exist regarding the species' distribution, biology, and habitat needs. However, given that the prevailing evidence indicates the species is anecic based on the results of survey efforts and the description of deep burrows associated with the species (Smith 1897, pp. 202–203), it is reasonable to conclude the species' deep-burrowing behavior will limit its exposure and increase its adaptability to increased soil temperatures. It is unclear how or whether drier summers would impact the GPE, or whether vegetation changes would impact the GPE. Therefore, based on the best available information, we conclude that climate change does not constitute a threat to the species.

Summary of Factor E

Although the decline and extirpation of some native earthworm species with the arrival of introduced earthworm species has been well documented, survey efforts for this species have been limited and effective survey protocols remain to be developed. In addition, there are conflicting opinions by earthworm researchers regarding the GPE's life history strategy, which could influence how it interacts with exotic earthworm species. Native plant communities in the Palouse bioregion are susceptible to invasion by nonnative plants, although we are unaware of any studies that correlate nonnative plant invasion and conversion of GPE habitat. The petition stated that future climate change could affect the GPE, although no supporting information or data was presented. Our examination of this concern has determined that existing climate change projections are inadequate to predict how future climate change may impact the GPE, which is further complicated because of the significant uncertainties regarding the species' distribution, life history, and the range of habitat types it occupies. In summary, there is no scientific evidence to support a conclusion that the GPE is threatened by competitive interactions with exotic earthworms, the conversion of habitat by nonnative plants, or future climate change.

Summary of Factors

A summary of our conclusions for each of the five factors is found in Table 2. More specific information for each threat considered under the five factors is available in the *Summary of Information Pertaining to the Five Factors* section above.

TABLE 2—SECTION 4(A)(1) LISTING FACTORS SUMMARY OF POTENTIAL THREATS CONSIDERED

Factor A	Habitat loss and fragmentation: The current or historical population, distribution, and range of the GPE is unknown; the habitats used by the GPE are more diverse than suggested by petitioners; survey efforts have been limited and sampling protocols remain to be developed to improve detection capabilities; there is no evidence with which to correlate current or future habitat loss with GPE abundance or status.

TABLE 2—SECTION 4(A)(1) LISTING FACTORS SUMMARY OF POTENTIAL THREATS CONSIDERED—Continued

	Soil characteristics: There is no information with which to link soil disturbance with GPE presence or absence. Soil compaction: There is no evidence that compaction is occurring in GPE habitat or that compaction would trigger a negative response. Soil chemistry: Earthworm responses to soil pH vary depending on the species, location, and life history strategy; there is insufficient information with which to establish cause-effect relationship that might be limiting to GPE; and there is no information that Palouse region soils are acidic enough to negatively affect earthworms. Tillage and agriculture: There is no information indicating the GPE is exposed to these activities, and no GPEs have been documented in agricultural areas. Grazing: There is no information with which to correlate GPE distribution and grazing areas; the species' range is unknown and surveys have been limited; grazing can sometimes benefit earthworms; and larger species like the GPE may be less impacted than smaller species. Chemical applications: Chemicals are applied in agricultural areas—the GPE has not been documented in agricultural areas; the available information is inadequate to determine how and whether pesticides impact soils occupied by the GPE; some studies indicate anecic species are less susceptible to pesticides; the GPE has wider range and occurs in more diverse habitats than previously known; and there is limited information on pesticide applications in known GPE areas. Urbanization and rural development: There are significant uncertainties regarding GPE distribution, range, population trends and extent of habitat types used; and there is no evidence that correlates urbanization and rural development with threats to the GPE. Forest management: Information is insufficient to determine the extent of forested habitat occupied by the GPE or where it occurs in forested habitat; and there is no information available regarding how the GPE would respond to differing types of forest management activities.
Factor B	Mortality resulting from scientific collections: Earthworms are not targets for collection by hobbyists; some mortality is expected from scientific collection, but we have no basis to conclude that removal of a few individuals for this purpose would have population-level impacts.
Factor C	Disease: We do not have any evidence indicating disease is a threat to the GPE. Predation resulting from exposure during tilling operations: GPEs have not been observed in agricultural areas; the GPE is believed to be an anecic species, which would be less likely to be exposed by tilling, even if it were to occupy agricultural areas.
Factor D	Non-regulatory programs and measures: Although the WDFW considers the GPE to be a species of concern and the USFS, FWS, NOAA, BLM, EPA developed a MOU agreeing to use scientific findings of the CBS to guide management plans, these are voluntary measures and have no regulatory affect; EPA pesticide regulations: The EPA regulates use of pesticide in the U.S.; one study found the use of pesticides at recommended rates had no detectable negative effects on anecic or endogeic earthworms; and having a better understanding of GPE distribution, life history, and diversity of habitat used is essential to credibly assess whether existing regulatory mechanisms are inadequate.
Factor E	Nonnative invasive earthworms: The co-occurrence of native and nonnative earthworms is common in both disturbed and undisturbed ecosystems, and the limited evidence available does not lead to a reasoned scientific conclusion regarding competitive interactions between the GPE and exotic earthworms; Nonnative plants: Significant scientific uncertainties exist regarding GPE distribution, life history, and range; the best available information does not allow an extrapolation of nonnative plant invasion to GPE threats. Climate change: The best available information is insufficient to determine the extent to which the GPE might be affected by increased air temperatures or soil changes, earlier seasonality of plant production, or changes in plant distribution; fifteen inches of annual precipitation was suggested as lower limit of precipitation tolerated by species such as the GPE, although models projecting out to 2080 do not show annual precipitation in the Pullman, WA vicinity falling below 15 inches under any scenarios; and significant uncertainties regarding the GPE's distribution, biology, and habitat needs frustrate efforts to draw parallels between climate change and the species' response.

A: Present or threatened destruction, modification, or curtailment of habitat or range;
B: Overutilization for commercial, recreational, scientific, or educational purposes;
C: Disease or predation;
D: Inadequacy of existing regulatory mechanisms;
E: Other natural or manmade factors.

Finding

As required by the Act, we considered the five factors in assessing whether the GPE is endangered or threatened throughout all or a significant portion of its range. We examined the best scientific and commercial information available regarding the past, present, and future threats faced by the GPE. We reviewed the petition, information available in our files, and other available published and unpublished information, and we consulted with the most qualified GPE experts and queried universities, State agencies, conservation districts, and other entities. In considering what factors might constitute threats, we must look beyond the mere exposure of the species to the factor to determine whether the species responds to the factor in a way that causes actual impacts to the species. If there is exposure to a factor, but no response, or only a positive response, that factor is not a threat. If there is exposure and the species responds negatively, the factor may be a threat and we then attempt to determine how significant a threat it is. If the threat is significant, it may drive or contribute to the risk of extinction of the species such that the species warrants listing as endangered or threatened as those terms are defined by the Act. This does not necessarily require empirical proof of a threat. The combination of exposure and some corroborating evidence of how the species is likely impacted could suffice. The mere identification of factors that could impact a species negatively is not sufficient to compel a finding that listing is appropriate; we require evidence that these factors are operative threats that act on the species to the point that the species meets the definition of endangered or threatened under the Act.

The analysis of threats (the five factors) to determine if the status of GPE meets the definition of endangered or threatened was particularly challenging, because the range of the species appears to be greater than it was originally thought to be. In addition to the Palouse area prairie, the species has been documented in dry forest habitat on the east slope of the Cascades. Survey effort for this species has been low, especially outside of the Palouse grasslands, and appropriate survey methods remain to be developed. In addition, the life history of the GPE is not completely understood. There is still some scientific debate regarding whether the GPE is an anecic or endogeic species, although the most recent field observations and prevailing scientific evidence indicates it is a deep-burrowing anecic species (Johnson-Maynard 2010, p. 2), which would result in a different exposure to threats than if it were an endogeic species. There is no scientific basis to conclude that any of the activities identified as threats by the petitioners are, in fact, threats to the GPE.

Based on our review of the best available scientific and commercial information pertaining to the five factors, we find that the threats are not of sufficient imminence, intensity, or magnitude to indicate that the GPE is in danger of extinction (endangered), or likely to become endangered within the foreseeable future (threatened), throughout all of its range. Therefore, we find that the GPE does not meet the definition of an endangered or threatened species throughout its range.

Distinct Vertebrate Population Segment and Significant Portion of the Range Analysis

After assessing whether the species is endangered or threatened throughout its range, we next consider whether a distinct vertebrate population segment (DPS) or whether any significant portion of the GPE range meets the definition of endangered or is likely to become endangered in the foreseeable future (threatened), in accordance with the Service's Policy Regarding the Recognition of Distinct Vertebrate Population Segments under the Endangered Species Act (61 FR 4722, February 7, 1996). Because the GPE is not a vertebrate species, the Distinct Vertebrate Population Segment policy is not applicable to this finding.

Significant Portion of the Range

Having determined that the GPE does not meet the definition of an endangered or threatened species, we must next consider whether there are any significant portions of the range where the GPE is in danger of extinction or is likely to become endangered in the foreseeable future. Because of significant uncertainties regarding the range of the GPE, the limited survey efforts, and the paucity of information regarding its life history, there is nothing to suggest that threats are disproportionately acting on any portion of the species' range, such that the species is at risk of extinction now or in the foreseeable future. Therefore, we find that listing the GPE as an endangered or threatened species is not warranted throughout all or a significant portion of its range. The designation of critical habitat for this species as requested by the petitioner is not appropriate, based on our determination that the species does not warrant listing under the Act.

The Service continues to be interested in the status of this unique species. We request that you submit any new information concerning the status of, or threats to, the GPE to our Washington Fish and Wildlife Office (see **ADDRESSES**) whenever it becomes available. New information will help us monitor the GPE and encourage its conservation.

References Cited

A complete list of references cited is available on the Internet at *http://www.regulations.gov* and upon request from the Washington Fish and Wildlife Office (see **ADDRESSES**).

Author(s)

The primary authors of this notice are the staff members of the Washington Fish and Wildlife Office.

Authority

The authority for this section is section 4 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*).

Dated: July 12, 2011.

David Cottingham,

Acting Director, U.S. Fish and Wildlife Service.

[FR Doc. 2011–18645 Filed 7–25–11; 8:45 am]

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

[FWS–R3–ES–2011–N107; 30120–1113–0000–C4]

Endangered and Threatened Wildlife and Plants; 5-Year Status Reviews of Seven Listed Species

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Notice of initiation of reviews; request for information.

SUMMARY: We, the U.S. Fish and Wildlife Service, are initiating 5-year status reviews under the Endangered Species Act of 1973, as amended (Act), of seven animal and plant species. We conduct these reviews to ensure that our classification of each species on the Lists of Endangered and Threatened Wildlife and Plants as threatened or endangered is accurate. A 5-year review assesses the best scientific and commercial data available at the time of the review. We are requesting the public to send us any information that has become available since the most recent status reviews on each of these species. Based on review results, we will determine whether we should change the listing status of any of these species.

DATES: To ensure consideration, please send your written information by September 26, 2011. However, we will continue to accept new information about any listed species at any time.

ADDRESSES: For how and where to send comments or information, see ''VIII. Contacts'' under **SUPPLEMENTARY INFORMATION**.

FOR FURTHER INFORMATION CONTACT: To request information, see ''VIII. Contacts'' under **SUPPLEMENTARY INFORMATION**. Individuals who are hearing impaired or speech impaired may call the Federal Relay Service at 800–877–8337 for TTY (telephone typewriter or teletypewriter) assistance.

SUPPLEMENTARY INFORMATION:

I. Why do we conduct a 5-year review?

Under the Act (16 U.S.C. 1531 *et seq.*), we maintain Lists of Endangered and Threatened Wildlife and Plants (which we collectively refer to as the List) in the Code of Federal Regulations (CFR) at 50 CFR 17.11 (for animals) and 17.12 (for plants). Section 4(c)(2)(A) of the Act requires us to review each listed species' status at least once every 5 years. Then, under section 4(c)(2)(B), we determine whether to remove any species from the List (delist), to