Giant Palouse Earthworm

(Driloleirus americanus)

State Status: Candidate, 2007
Federal Status: None
Recovery Plans: None

Figure 1. Giant Palouse earthworm (*photo by Kelly Weaver, University of Idaho)*.

The giant Palouse earthworm (Figure 1) is a poorly known native species that has been found at scattered locations in eastern Washington and adjacent Idaho. The species was first described by Smith (1897, 1937) from specimens collected near Pullman, Whitman County. Smith (1897) noted that they were reportedly "very abundant" in the area and wrote that burrows placed in road cuts sometimes extended to depths of over 15 feet. Giant Palouse earthworms appear to be a type of 'anecic' worm, based on observations of castings by J. Johnson-Maynard at locations near Leavenworth, Chelan County (USFWS 2011). Anecic worms live in deep, semi-permanent burrows, move to the surface to feed on fresh plant litter, and are the largest and longest lived of the three general groups of earthworms (James 2000).

Despite Smith's (1897) early report of abundance, only a few records of the giant Palouse earthworm existed until the 1980s, these from near Pullman, and near Moscow, Idaho. The locations and rarity of specimens (none from 1931-1978, 1 in the 1978, and 2 in the 1980s) suggested the species was a nearly extinct Palouse endemic that required deep soil and undisturbed native grassland. A collection near Ellensburg, Kittitas County, in the 1980s was the first record outside the Palouse region. Interest in the worm resumed in 2005, when a specimen was collected in remnant Palouse prairie at Smoot Hill Ecological Preserve near Albion, Whitman County (Sanchez-de Leon and Johnson-Maynard 2009). Researchers began to look more broadly for the species including localities along the eastern slope of the Cascades. This has resulted in specimens being found in a wider range of locations and habitats, including at a number of sites in dry forest between Ellensburg and Lake Chelan in Washington (J. Fleckenstein, unpubl. data) and in Douglas-fir forests in Latah County, Idaho (USFWS 2011). Some specimens await DNA analysis to confirm their species identification. Although the species is cryptic in its habits, increased surveyor familiarity with burrows and castings has greatly aided survey efforts (J. Fleckenstein, pers. comm.). Recent records indicate that the species is found both in deep and shallow loam soils (J. Fleckenstein, unpubl. data).

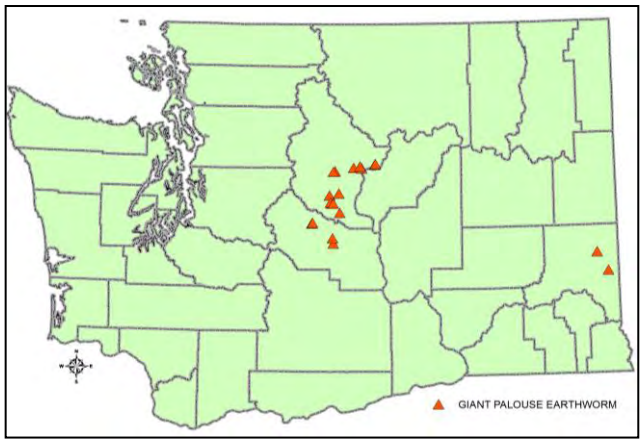

Figure 2. Giant Palouse earthworm records in Washington (Washington Natural Heritage Program).

Sanchez-de Leon and Johnson-Maynard (2009) proposed that a combination of extensive habitat loss and fragmentation in the Palouse region, low habitat quality of remaining prairie remnants, and possibly competitive interactions with exotic earthworms decimated giant Palouse earthworm populations. Agricultural conversion has resulted in a more than 99% reduction of the Palouse prairie ecosystem, and much of the Columbia Basin between the Whitman and Kittitas County sites is probably too dry for

earthworms (James 2000). Soil tillage, compaction, agricultural chemicals, and grazing probably degrade conditions for the species (USFWS 2011). Nonnative earthworms, which are commonly encountered throughout the Palouse region (Fauci and Bezdicek 2002), can invade new habitats, change the ecological soil functions, and displace native species (Hendrix and Bohlen 2002, Hendrix 2006). Native earthworms have an important role in soil formation.

Conservation actions. In response to a petition filed in 2009, the U.S. Fish and Wildlife Service conducted a 12-month status review and published a finding of 'not warranted' for listing under the Endangered Species Act (USFWS 2011). The finding cited the recent collections of giant Palouse earthworms over a broader geographical and ecological range and the lack of data about known direct threats to the species.

Survey efforts in Washington have been greatly expanded, with the Natural Heritage Program of the Washington Department of Natural Resources conducting surveys in the eastern Cascades and on the Palouse since 2010. Thes include visits to about 54 sites in 2011 when giant Palouse earthworms were found at 18 sites. In 2012, an additional 49 sites were survyed and the species was found at two new locations, bringing the total to about 22 sites in Washington.

Personnel from the University of Idaho are currently working to develop and refine sampling methods and strategies, including a soil electroshocking technique that appears promising.

The highest priorities for additional survey work for this species are to the north and south of the known range in the eastern Cascades. Additional species of native earthworm occur in Washington, and investigation of their ecology, distribution, and taxonomy is needed.

Partners and cooperators: Washington Department of Natural Resources, Natural Heritage Program, U.S. Fish and Wildlife Service, University of Idaho, Palouse Prairie Foundation, Palouse Audubon, Idaho Department of Fish and Game, Soil Biology Associates.

Literature Cited

Fauci, M. F. and D. F. Bezdicek. 2002. Lumbricid earthworms in the Palouse region. Northwest Science 76:257-260.

Hendrix P. F. 2006. Biological invasions belowground – earthworms as invasive species. Biological Invasions 8:1201–1204.

Hendrix, P. F., and P. J. Bohlen. 2002. Exotic earthworm invasions in North America: ecological and policy implications. BioScience 52(9):801-811.

James, S. 2000. Earthworms (Annelida: Oligochaeta) of the Columbia River Basin Assessment Area. Interior Columbia Basin Ecosystem Management Project: Scientific Assessment. GTR PNW-GTR-491. U.S. Forest Service, Pacific Northwest Research Station, Portland, Oregon. 13 pp.

Sanchez-de Leon, Y. L. and J. L. Johnson-Maynard. 2009. Dominance of an invasive earthworm in native and non-native grassland ecosystems. Biological Invasions 11:1393-1401.

Smith, F. 1897. Upon an undescribed species of *Megascolides* from the United States. American Naturalist 31:202-204.

Smith, F. 1937. New North American species of earthworms of the family Megacolidae. Proceeding of the U.S. National Museum 84:157-181.

USFWS (U.S. Fish and Wildlife Service). 2011. 12-month finding on a petition to List the giant Palouse earthworm (*Drilolerius americanus*) as threatened or endangered. Federal Register 76(143):44547-44564.