

SPECIES FACT SHEET

Common Name: Oregon Giant Earthworm

Scientific Name: *Driloleirus macelfreshi* (Smith 1937) (formerly *Megascolides macelfreshi*)

Phylum: Annelida

Class: Oligochaeta

Order: Haplotaxida

Family: Megascolecidae

Conservation Status

Global Status (1989): G1 – critically imperiled

National Status (2006): N1 – critically imperiled

State Status (Oregon): S1 – critically imperiled

IUCN Red List Category: VU - Vulnerable

BLM Status: Bureau Sensitive Species

(NatureServe 2009)

Technical Description:

Adult: The Oregon giant earthworm is one of the largest North American earthworms (Wells *et al.* 1983). It is distinguished by its characteristic large size (up to 1.32 m in length and between .5 and 1 cm in diameter), pale whitish color, and distinctive, floral (lily-like) odor (Fender 2009, *pers. comm.*). The clitellum of this species (a swelling of the body towards the head of the worm where the gonads are located) extends from segments 13 to about 22, and there are numerous nephridia (networks of tubules that have an excretory function) on each body segment (Wells *et al.* 1983). Since immature specimens of this species are not as large, and since there are other large, white, fragrant earthworms in the Willamette Valley which could be mistaken for this taxon, specimen collection and expert identification based on internal anatomy is essential for this species. Fresh (refridgerated) specimens are best for identification (Fender 2009, *pers. comm.*). William Fender is the foremost authority on the Oregon giant earthworm, and should be consulted regarding any collected or reported specimens. The use of genetic work for identification of this species is a future possibility (Rosenberg 2009, *pers. comm.*). There are currently no keys to megascolecid worms in this region (Applegarth 1995), although a complete, technical description can be found in Smith (1937).

Immature Stages: The eggs and larvae of this species have not been described, but the eggs of other *Driloleirus* species are described as very irregularly fusiform, meaning they are rumped in appearance, very irregular, and not at all lemon-shaped (Fender 2009, *pers. comm.*). According to William Fender (2009, *pers. comm.*), “if you cut a leg off a pair of pants, stuffed it not quite full

of dough, tied off the ends, and then pushed in the sides at random places you would get something similar.”

Life History:

The life history of this species is not well understood and is based on a very limited number of specimens (Rosenberg 2009, *pers. comm*). Like other *Driloleirus*, it is believed to feed on organic matter, including mosses, decaying conifer needles, bits of wood, grass seeds and stems, and an occasional dead insect (Smith 1937). Wells *et al.* (1983) states that *D. macelfreshi* feeds on pure organic residues, with only a slight mixture of soil.

In response to disturbance, this worm produces a saliva with a flowery (lily-like) odor that is hypothesized to be a type of chemical defense (Fender 1995).

Although observed activity generally takes place near the surface, it is believed that *D. macelfreshi* constructs permanent subsurface burrows as deep as 4.6 m (15 ft.), a depth approximation based on one road cut where burrows were found (Wells *et al.* 1983, Fender 1995).

Range, Distribution, and Abundance:

This species has been found at 15 sites within the Willamette Valley and one site in the Oregon Coast Range. Known records are from Lincoln, Linn, Marion, Polk and Yamhill counties and, more recently, Benton County (Gervais 2008). It has not been found in Lane County, but is expected to occur there (Fender 2009, *pers. comm.*).

BLM/Forest Service Land: This species is suspected to occur on the Siuslaw National Forest and on BLM land in the Salem District and Eugene District of the Willamette Valley.

Due to the difficulty in detecting this species, abundance estimates have not been made.

Habitat Associations:

Like Oregon’s other indigenous worms, this species has a narrow range of tolerance for soil conditions, favoring fine textured soils rich in clay (Fender 1995). It has been suggested that it prefers well drained soils (fine-grained, clay to silt loams) that are near subsurface water, often where the water table is reachable but the soil is not waterlogged. This species is associated with deep, little disturbed soils in moist mixed forest of Douglas firs, grand firs, and bigleaf maples and is also known from pure Douglas-fir woodlots and occasionally from oak-ash woods (Wells *et al.* 1983). It is apparently tolerant of the acidic soil found under coniferous forests. The five historic sites re-sampled in 2000 by Bailey *et al.* (2002) were at approximately 70 m elevation, and were adjacent to farm-land, rivers, creeks, ponds, or sloughs. Presently, the dominant overstory at these historic sites consists of Douglas-fir, bigleaf maple,

Oregon white oak, red alder and Oregon ash and the understory consists of English ivy, Himalayan blackberry, dull Oregon grape, Pacific blackberry, snowberry, and western sword fern (Bailey *et al.* 2002). Despite the species' presumed requirement for little disturbed soil, the recent (2008) sighting occurred in a relatively disturbed urban park near the Willamette River, adjacent to a dense cover of Himalayan blackberry in an otherwise mixed hardwood riparian zone (Gervais 2008, Rosenberg 2009, *pers. comm.*).

Threats:

Given how little is known about the life history of this species, assessment of threats is difficult (Rosenberg 2009, *pers. comm.*). Habitat loss and the establishment of introduced earthworms are currently identified as the two major threats to this species (Fender 2009, *pers. comm.*). In the Willamette Valley less than one percent of the original estimated acres of pre-European settlement grasslands remain (USFWS 2000), and conversion of land for agriculture, industry, or urban/suburban development has eliminated much of this species' suitable habitat (Wells *et al.* 1983). Such conversions result in drastically altered or lowered food resources for all worms, and favor the exotic Lumbricidae species (Wells *et al.* 1983). In places where habitat remains, heavy chemical treatment for agricultural or forest management purposes may pose threats to this species (Wells *et al.* 1983). Non-native earthworms of the Lumbricidae family not only compete for resources with native species, but also raise the pH of the soil, lessening its suitability for native species which tend to thrive in more acidic soils (Bailey *et al.* 2002). Please note, however, that the status and threats of this species cannot be fully assessed until an effective survey protocol is developed and tested (Rosenberg 2009, *pers. comm.*).

Conservation Considerations:

The following conservation needs have been identified by Daniel K. Rosenberg, Oregon State University (Rosenberg 2009):

1. Develop a fruitful survey protocol for this species, possibly by training dogs to sniff out dead or living specimens occurring on the surface after heavy rain. Working Dogs for Conservation (<http://www.workingdogsforconservation.org/>) is a non-profit organization actively employing canine-human teams for wildlife censusing, monitoring and research. The use of detector dogs is an effective method of detection for dozens of species, including the threatened Kincaid's lupine in Oregon, the Desert tortoise in Nevada, and the invasive rosy wolf snail in Hawaii (WDC 2009). Although no attempts have yet been made to investigate the feasibility of this survey method for the Oregon giant earthworm, steps are being taken to prepare for its future possibility. For example, upon collection of the most recently encountered specimen (December 2008), a 1 cm segment of tissue was removed before chemical preservation and frozen for potential use as training scent (Gervais 2008).

2. Once detection methods are improved, evaluate the status of and threats to the Oregon giant earthworm by assessing its current distribution and abundance in the Willamette Valley and Oregon Coast Range.

3. Develop protocols and train biologists, both students and professionals, for detecting and identifying this species. Educate land owners and managers about this species and its status and conservation needs on their lands.

Additionally, since there are over 56 unnamed megascolecid worms in this region and very little literature on how to distinguish even the named species, a taxonomic key for Oregon native earthworms is in serious need of development (Applegarth 1995, Fender 2009, *pers. comm*).

Version 2:

Prepared by: Sarah Foltz
Xerces Society for Invertebrate Conservation
Date: June 2009

Edited by: Dan Rosenberg (Oregon State University and Oregon Wildlife Institute) and William Fender
Date: August 2009

Version 1:

Prepared by: Scott Hoffman Black and Logan Lauvray
Xerces Society for Invertebrate Conservation
Date: September 2005

ATTACHMENTS:

- (1) **References**
- (2) **List of Pertinent or Knowledgeable Contacts**
- (3) **Map of Species Distribution**

ATTACHMENT 1: References:

Applegarth, J.S. 1995. Invertebrates of special status or special concern in the Eugene district. U.S. Department of the Interior, Bureau of Land Management. Eugene, OR. 126 pp.

Bailey, D.E., Rosenberg, D.K., Fender, W., McKey-Fender, D., and J. Jacobs. 2002. Patterns of abundance and habitat associations of earthworms in

remnant forests of the Willamette Valley, Oregon. Northwest Science 76(1): 26-34.

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Fender, W.M. and McKey-Fender, D. 1990. Oligochaeta: Megascolecidae and Other Earthworms from Western North America. p. 357-378. *In*: Dindal, Daniel L. (ed.) Soil Biology Guide. Wiley and Sons, New York, New York.

Gervais, J. 2008. Details of "Rediscovery" of Oregon Giant Earthworm in 2008. Unpublished report. [Further details can be obtained by contacting: Dr. Jennifer Gervais, Oregon Wildlife Institute.

NatureServe. 2008. "*Driloleirus macelfreshi*" NatureServe Explorer: An online encyclopedia of life [web application]. Feb. 2009. Version 7.0. NatureServe, Arlington, Virginia. 18 June 2009 <<http://www.natureserve.org/explorer/>>

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Rosenberg, Dan. 2009. Oregon State University and Oregon Wildlife Institute. Personal communication with Sarah Foltz.

Smith, F. 1937. New North American species of earthworms of the family Megascolecidae. United States National Museum, Proceedings, Volume 84, pages 157-181. [*Driloleirus macelfreshi*, as *Megascolides macelfreshi*, is named on pages 166-168. This publication is in the University of Oregon science library under Q11.U55.]

United States Fish and Wildlife Service. 2000. Endangered and threatened wildlife and plants; endangered status for *Erigeron decumbens* var. *decumbens* (Willamette daisy) and Fender's blue butterfly (*Icaricia icarioides fenderi*) and threatened status for *Lupinus sulphureus* ssp. *kincaidii* (Kincaid's lupine). 50 CFR Part 17. 65(16): 3875-3890.

Wells, S.M., Pyle, R.M. and Collins, N.M. 1983. The IUCN Invertebrate Red Data Book. IUCN, Gland, Switzerland. 632 pp.

Working Dogs for Conservation. 2009. Available at: <http://www.workingdogsforconservation.org/>. (Last accessed July 2009).

ATTACHMENT 2: List of pertinent or knowledgeable contacts:

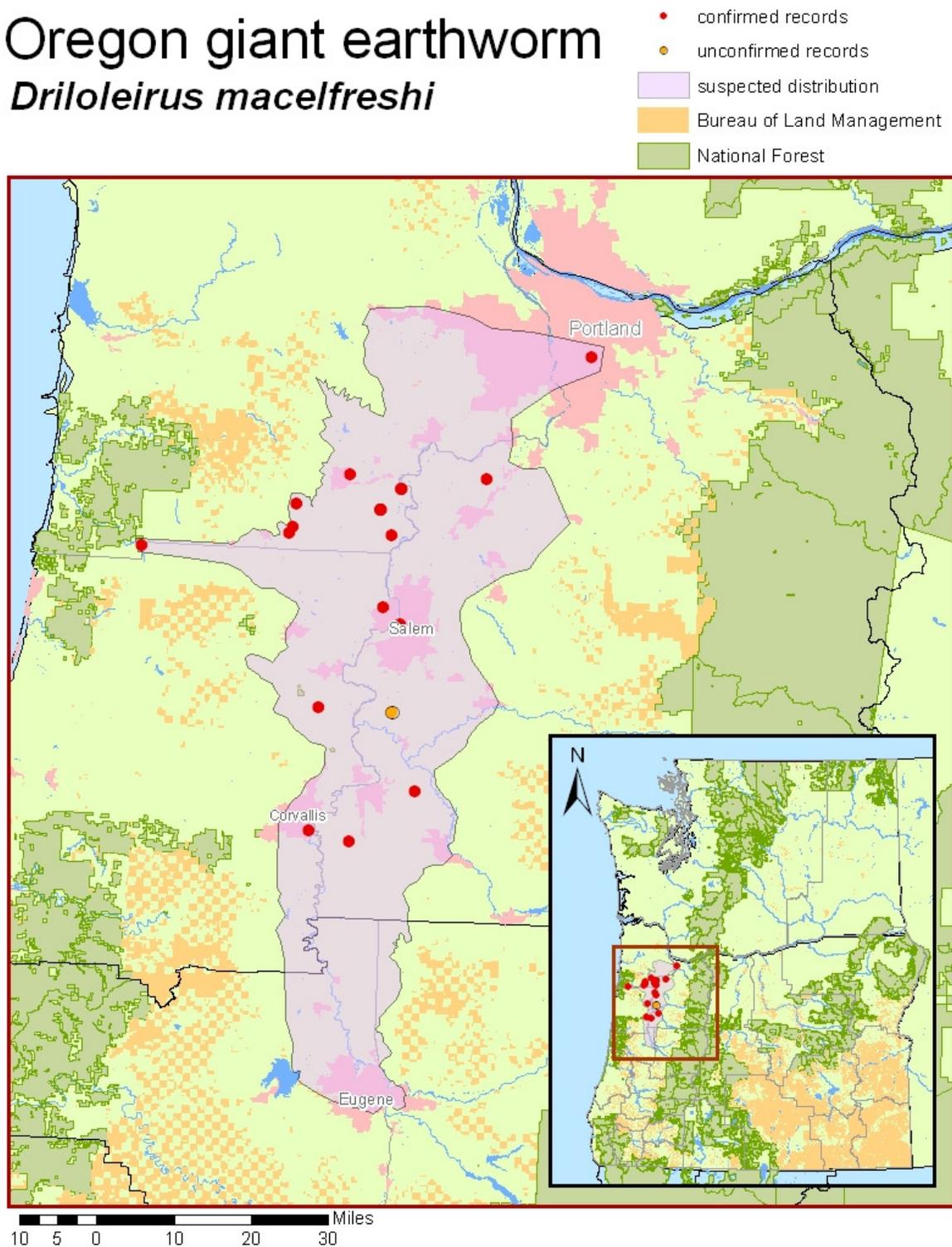
William Fender, Portland, Oregon.

Dan Rosenberg, Oregon State University, Corvallis, Oregon and Oregon Wildlife Institute, <http://oregonwildlife.org/people.html>

ATTACHMENT 3: Map of Species Distribution:

Oregon giant earthworm

Driloleirus macelfreshi



Records and suspected distribution of *Driloleirus macelfreshi* in Oregon, relative to Forest Service and BLM lands (Fender 2009, *pers. comm.*). BLM District boundaries are shown in black and Resource Area boundaries are shown in grey.