

FIRST RECORD OF *ORCONECTES RUSTICUS* (GIRARD, 1852)  
(DECAPODA, CAMBARIDAE) WEST OF THE GREAT CONTINENTAL  
DIVIDE IN NORTH AMERICA

BY

JULIAN D. OLDEN<sup>1,3</sup>), JEFFREY W. ADAMS<sup>2</sup>) and ERIC R. LARSON<sup>1</sup>)

<sup>1</sup>) School of Aquatic and Fishery Sciences, Box 355020, University of Washington Seattle,  
Washington 98195, U.S.A.

<sup>2</sup>) Washington Sea Grant, Box 355060, University of Washington Seattle,  
Washington 98105, U.S.A.

*Orconectes rusticus* (Girard, 1852), known as the rusty crayfish, have spread over the last 50 years from their historical range in the Ohio River drainage, United States, to waters throughout much of 18 additional eastern and central states, provinces of Ontario and Québec in Canada, and the Laurentian Great Lakes (Hobbs et al., 1989; Olden et al., 2006; Taylor et al., 2007). *O. rusticus* are omnivores and aggressive, resulting in numerous ecological and evolutionary impacts manifested across entire food webs. The invasion of this species has been associated with negative effects on aquatic plants, invertebrates, snails, and fishes (e.g., Olsen et al., 1991; Lodge et al., 1994; McCarthy et al., 2006), in addition to displacing and hybridizing with native crayfish (e.g., Perry et al., 2001). The most westward reported occurrences of *O. rusticus* are the North Platte River near Douglas, Wyoming (where the population is believed to have been successfully eradicated) and Conchas Lake in north-east New Mexico (Bouchard, 1977). Preventing the westward spread of aquatic nuisance species from eastern North America is a primary goal of the 100<sup>th</sup> Meridian Initiative (<http://www.100thmeridian.org>).

Here we are the first to document the presence of *O. rusticus* west of the Continental Divide in North America, separating watersheds that drain into the Pacific Ocean from those river systems that drain into the Atlantic Ocean. On 19 July 2005, a field survey conducted by the Xerces Society for Invertebrate Conservation and the Confederated Tribes of Warm Springs Reservation of Oregon revealed the occurrence of a non-native *Orconectes* sp. crayfish in the upper

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<sup>3</sup>) e-mail: olden@u.washington.edu

mainstem of John Day River, Oregon ( $44^{\circ}26'N$   $119^{\circ}16'W$ ); a sub-basin of the Columbia River. Xerces Society staff returned to the area on 19 August 2005, to estimate the extent of the invasion by sampling 15 sites using a D-frame kicknet (and visual surveys) on a 90-km segment of the John Day River (fig. 1). In addition, two sites on each of Beech Creek, South Fork John Day River, and Rock Creek were surveyed. Specimens collected during the surveys were originally believed to be *Orconectes neglectus neglectus* (Faxon, 1885), partially due to this invasive species' presence in Oregon's Rogue River drainage (Bouchard, 1977), but re-examination by the authors identified these crayfish as *O. rusticus*. This identification was verified by Dr. Christopher Taylor (University of Illinois) on 10

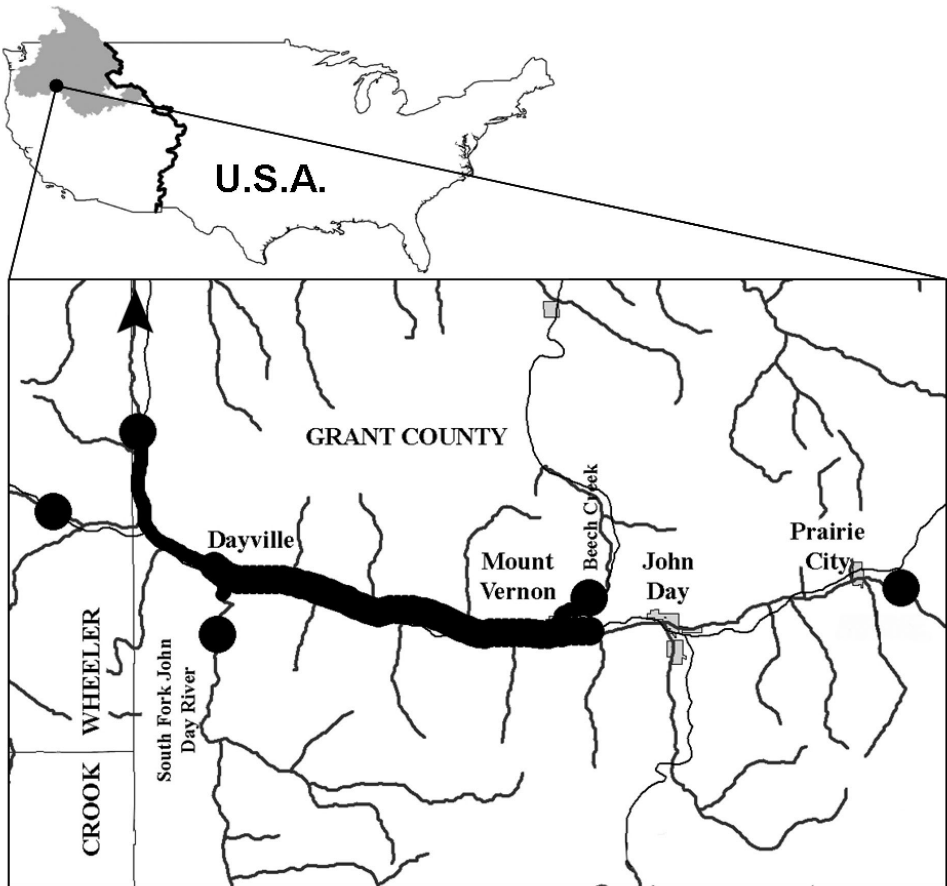


Fig. 1. Known *Orconectes rusticus* (Girard, 1852) distribution in the John Day River of Grant County, Oregon, U.S.A. (represented by the thick black line). Black dots delineate the survey area, and the arrow indicates the direction of river flow. Inset illustrates the Columbia River Basin (gray shading) and the Great Continental Divide (thick black line).

December 2008 and voucher specimens have been deposited at the Illinois Natural History Survey, Champaign, IL.

These surveys revealed a very dense population of *O. rusticus* at the Clyde Holliday State Park between the towns of John Day and Mt. Vernon. Densities were not quantified, but individuals of different sizes (mostly <30 mm carapace length) were found to be abundant on the streambed at many sampling sites. *O. rusticus* were more sparsely distributed in the South Fork of the John Day River (near its confluence with the John Day River), Beech Creek, and downstream of Dayville (fig. 1). Notably, individuals were also collected at two stream sites within the John Day Fossil Beds National Monument. Almost without exception, no evidence of the native crayfish, *Pacifastacus leniusculus* (Dana, 1852) was found where *O. rusticus* were collected.

Throughout much of their invaded range in the eastern United States, vectors of *O. rusticus* introduction include bait bucket discharge from recreational anglers (Ludwig & Leitch, 1996), intentional releases by lake-users for nuisance weed control (Magnuson et al., 1975) and commercial crayfish retailers (Gunderson, 1999), as well as natural dispersal through interconnected waterways. However, the introduction of this species in the John Day River Basin may be the result of the biological supply trade for science curricula in schools. Elementary and middle school science programs throughout the United States (including Washington and Oregon) use live invasive crayfish as laboratory organisms, and these crayfish are ordered from both local and national biological supply companies. We recently discovered that a number of science distribution centers contain *O. rusticus* (which are distributed to schools for classroom use) and a major supplier in the region provides these centers and individual schools with *O. rusticus* (cf. Larson & Olden, 2008; J. Adams, pers. obs.). Having said this, we cannot preclude the possibility that the introduction of *O. rusticus* is the result of bait bucket release because a significant smallmouth bass *Micropterus dolomieu* (Lacépède, 1802) fishery exists in the John Day River. However, this is unlikely given the very limited use of live crayfish for recreational fishing in western states compared to other regions in the United States. Finally, we can safely state that our discovery of *O. rusticus* is not a result of natural range expansion given that the closest known established population is over 1300 kilometers away.

The discovery of a dense, well-established population of *O. rusticus* in the John Day River is of significant concern. The John Day River Basin contains one of the healthiest runs of naturally reproducing spring Chinook salmon *Oncorhynchus tshawytscha* (Walbaum, 1792) compared to neighboring sub-basins of the Columbia River, but at the same time this population is highly depressed relative to historic levels and consequently even a minor disturbance could threaten

their continued existence (McClure et al., 2003). Invasive crayfish have been documented to prey on fish eggs (Dorn & Wojdak, 2004) and compete with juvenile salmon for habitat (Griffiths et al., 2004). Future research into the potential range expansion of *O. rusticus* in the Columbia River Basin is warranted.

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