

Introduced Population of *Orconectes (Procericambarus) neglectus neglectus* (Faxon, 1885) in the Columbia Basin

Jeff Adams, The Xerces Society for Invertebrate Conservation
jadams@xerces.org 503-232-6639
12/9/2005

Stover, A., D. C. Rogers, & J. Adams. **In prep.** New records of invasive Crustacea (Decapoda) in the western US.

Orconectes (Procericambarus) neglectus neglectus (Faxon 1885), also known as the ringed crayfish, is native to the Mississippi River drainage in Arkansas, Oklahoma, Missouri, and Kansas. However, the species has been introduced in several other locations. The species first became established west of the Rocky Mountains in the Rogue River Basin of southwest Oregon (Bouchard 1977). The Rogue River flows directly into the Pacific Ocean and has limited connection to other watersheds. However, a population of *O. neglectus* in the John Day River (Grant County, Oregon) has now been confirmed. The John Day River is part of the Columbia River Basin, giving the species a direct pathway to rivers from seven western states and British Columbia.

Methods

In the summer of 2005, staff of the Xerces Society for Invertebrate Conservation and the Confederated Tribes of Warm Springs Reservation of Oregon collaborated to collect macroinvertebrate samples from numerous Grant County locations on the John Day River and its tributaries. On July 19th 2005, abundant crayfish were observed at a sampling location between the communities of Mount Vernon and Dayville. A D-frame kicknet was used to collect several male specimens that were then preserved in 95% ethanol and sent to D. Christopher Rogers of EcoAnalysts Inc. for verification.

Xerces Society staff returned to the area on August 19th to estimate the extent of the population. Fifteen sites on an 90 km segment of the John Day River were assessed for presence of *O. neglectus* using a D-frame kicknet and visual survey. The survey ranged from approximately 2 km east (upstream) of Prairie City to 20 km downstream of Dayville (Fig. 1). In addition, two sites on each of Beech Creek, South Fork John Day River, and Rock Creek were surveyed.

Results

Specimens collected on July 19th were confirmed as *O. neglectus*, prompting the broader survey of the area the following month. At the most upstream sites examined, from Prairie City west to the community of John Day, no *O. neglectus* were observed. However, a very dense population was found at the Clyde Holliday State Park (Fig. 2), between John Day and Mt. Vernon. Densities were not quantified, but several individuals of different sizes (mostly small) would scatter with each footfall in the river. Such populations have also been noted in Rogue River tributaries.

Beech Creek is a small tributary that flows into the John Day River at Mt. Vernon. *Orconectes neglectus* were collected approximately 3 km north of Mt. Vernon, but were certainly less abundant than in the John Day River.

Dense populations were observed in the John Day River at each site surveyed between Mt. Vernon and Dayville (Fig. 3). Sparse *O. neglectus* individuals were observed in the South Fork of the John Day River in Dayville, near its confluence with the John Day River, but only native *Pacifastacus* individuals were collected approximately 8 km upstream of Dayville.

Downstream of Dayville only sparse individuals of *O. neglectus* were observed. Individuals were collected at two sites within the John Day Fossil Beds National Monument, and a claw was collected at the most downstream sample site. None were observed in the tributary Rock Creek.

Where *O. neglectus* were collected, no evidence of the native *Pacifastacus* was found. The only exception was the most downstream site where a *Pacifastacus* individual and an *O. neglectus* claw were collected

At locations with high densities, numerous crayfish could be seen moving on the substrate. Piles of clean sand at the edge of most cobbles served as additional evidence of a large crayfish population. *Orconectes* were observed from several bridges simply by looking for exposed crayfish and clean sand, then later confirmed by collecting and examining specimens.

Discussion

Research on introductions of the *O. neglectus* in the Spring River of Missouri and Arkansas suggest that both the introduced and native species rely on the same food sources (particularly other invertebrates), and that direct competition is occurring between the two species (Magoulick and DiStefano 2001). The very high densities of *O. neglectus* observed in both the Rogue River Basin and in the John Day River suggest disproportionate utilization of the aquatic fauna and flora by the introduced species. Native fish also use the invertebrate fauna as a food source, though direct competition between the dense crayfish populations and salmonids, sculpin, or other native fish has not yet been studied.

The discovery of a dense, well-established population of *Orconectes neglectus* in the Columbia Basin is certainly of concern for native crayfish populations, and should be considered a conservation issue for aquatic life throughout the Pacific Northwest.

***Orconectes* Identification**

In the field, a dense population size can be a red flag for ringed crayfish (Figs. 2 and 3), but some relatively simple characteristics can help separate *Orconectes* from native *Pacifastacus*.

Orconectes tend to have a stronger dark and light color pattern, with dark bands on their cephalothorax, and a black ring and orange tip on their claws (Fig. 4). With dead specimens or specimens with the strong color pattern described above and pictured below, crack open the back half of the carapace to confirm that it is not the native *Pacifastacus*. *Pacifastacus* will have a small gill at the base of the last pair of legs. *Orconectes* will not have any gill in that position (Fig. 5). For final confirmation, put a specimen in container of rubbing alcohol and send it to a specialist.

Acknowledgements

I would like to thank the Xerces Society for Invertebrate Conservation, the Oregon Watershed Enhancement Board, and John Day Basin Office of the Confederated Tribes of Warm Springs Reservation of Oregon for funding and assisting in the project that led to the discovery of the *O. neglectus* population. I would also like to thank D. Christopher Rogers of EcoAnalysts Inc. for confirming specimen identifications.

Citations

Bouchard, Raymond W. 1978. Distribution, Systematic Status and Ecological Notes on Five Poorly Known Species of Crayfishes in Western North America (Decapoda: Astacidae and Cambaridae). In Ossi V. Lindquist, editor, *Freshwater Crayfish 3*, pages 409-423, 2 figures. Kuopio, Finland: University of Kuopio.

Faxon, Walter. 1885. Preliminary Catalogue of the Crayfishes of Kansas. *Bulletin of the Washburn College Laboratory of Natural History*, 1(4): 140-142.

Magoulick, D.D. and R.J. DiStefano. 2001. Potential impact of the introduced crayfish *Orconectes neglectus* on native crayfish in the Spring River drainage. June 2001. Final Report prepared for the U.S. Fish and Wildlife Service, Columbia, Missouri.

USGS fact sheet on *Orconectes neglectus*.

<http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=2267>

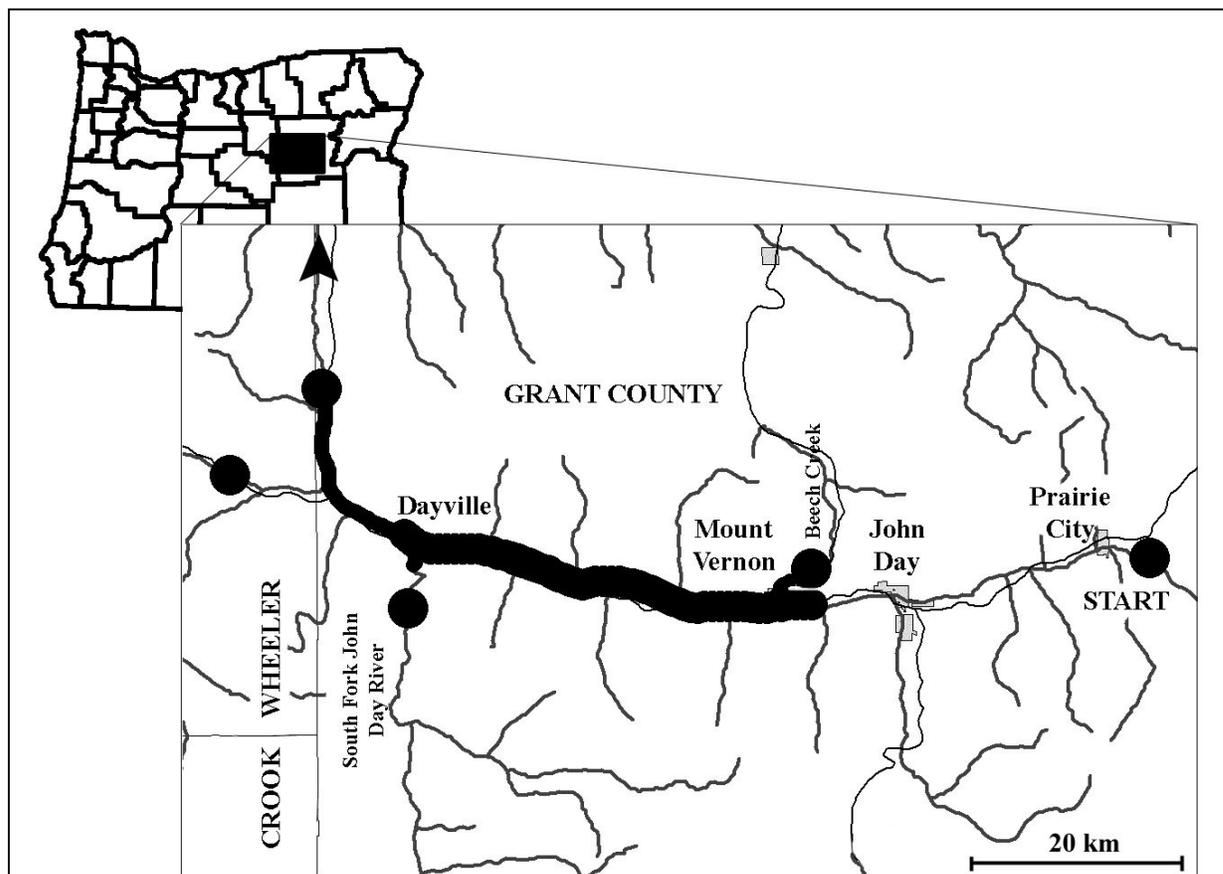


Figure 1: Known ringed crayfish (*Orconectes neglectus*) distribution in the John Day River of Grant County, Oregon. Black dots represent the survey boundaries, and the arrow indicates the direction of flow of the John Day River. The heavy black lines represent the section of river where *O. neglectus* was found, and the thickness of the line represents relative density.



Figure 2. *Orconectes neglectus* abound at the Clyde Holliday State Recreation Site near Mount Vernon, Oregon. No individuals were found several miles upstream at John Day, so the site is likely close to the current upstream limit of the population. The six visible individuals within this image reflect the high density found from this location, downstream to Dayville.

Figure 3. Numerous *O. neglectus* individuals under a bridge between Mount Vernon and Dayville. Also shown is an individual at the same site displaying the sometimes obvious orange-tipped claws.





Figure 4. A strong dark/light color pattern on the body and an orange tip followed by a black ring on the claws are good indications of *Orconectes*, but not definitive for identification.

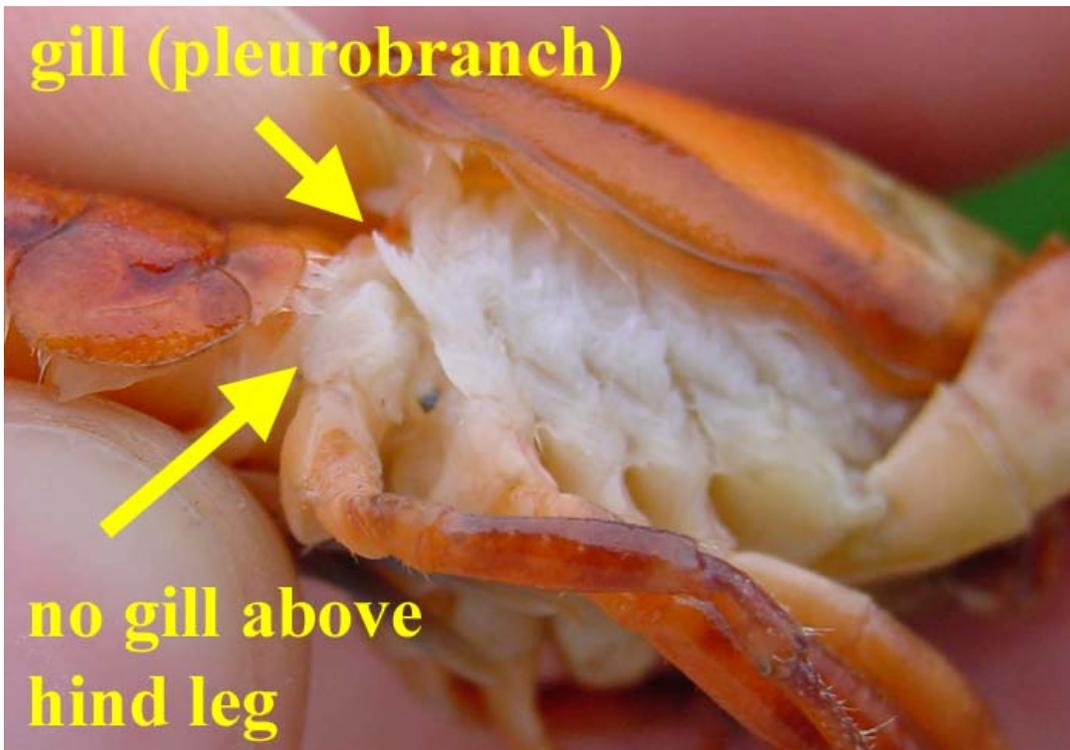


Figure 5. A definitive character to separate native Northwest crayfish from non-natives is the presence or absence of a gill at the base of the hindmost pair of large legs (pereiopod V). Native *Pacifasticus* will have a small gill at the base; introduced *Orconectes* will not as in the image above.