BRIEF NOTE

Distribution and Status of *Orconectes (Rhoadesius) sloanii* (Bundy) (Crustacea: Decapoda: Cambaridae)[1]

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ABSTRACT. **The distribution of the crayfish, *Orconectes sloanii* (Bundy), is revised from Rhoades' (1962) report. Five county records are added: Dubois, Lawrence, Perry, Rush and Spencer, Indiana; the species has been extirpated from three counties: Miami and Shelby, Ohio, and Shelby, Indiana. Where *O. sloanii* is sympatric with *Orconectes (Procericambarus) rusticus* (Girard), the number of *O. rusticus* collected usually exceeded the number of *O. sloanii*. The status of the species as a threatened Ohio crayfish is supported.**

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INTRODUCTION

The range of *O. sloanii* is limited to southern and southwestern Ohio (Hobbs 1972), and a further definition of its range is presented herein. Rhoades (1941) collected the first *O. sloanii* in Ohio from Shakers Creek, Warren County, in 1938. Additional Ohio specimens were collected from Butler, Darke, Hamilton, Montgomery and Preble counties (Rhoades 1941, 1944). Rhoades (1941:95) described the Indiana distribution of *O. sloanii* as the Whitewater, White, Muscatatuck and Blue rivers in "... southern and eastern Indiana." Rhoades (1962) further defined the range of *O. sloanii* by listing it as occurring in the following counties: Indiana — Bartholomew, Clark, Decatur, Fayette, Floyd, Franklin, Henry, Jackson, Jefferson, Jennings, Randolph, Ripley, Scott, Shelby, Union, Washington and Wayne; and Ohio — Butler, Darke, Hamilton, Miami, Montgomery, Preble, Shelby and Warren.

The purpose of this paper is to compare the present distribution of *O. sloanii* with that reported by Rhoades in 1962 and to evaluate the species' threatened status. Additionally, the implications of the sympatry of *O. sloanii* and *Orconectes rusticus* are discussed.

MATERIALS AND METHODS

Collecting trips were made to southwestern Ohio, southern Indiana, and much of north-central Kentucky in 1975, 1977, 1978, 1982, and 1985, resulting in 220 collections. Specimens were collected by hand, with a metal strainer, or with a minnow seine (1.2 × 1.8 m; 0.64-cm mesh). The crayfish were fixed and preserved in the field in a mixture of ethyl alcohol (70%), glycerine (2%), and water (28%). They are currently housed at The Ohio State University at Newark Crayfish Museum (OSUNCM), Newark, Ohio. Forty-five additional collecting sites were added to the study by examining catalogued and uncatalogued specimens in The Ohio State University Museum of Zoology (OSUMZ), Columbus, Ohio.

The nomenclature of Hobbs (1974) and Fitzpatrick (1987) is followed.

RESULTS AND DISCUSSION

The present distribution of *O. sloanii* is summarized in Figure 1. Considerable modification of the report of Rhoades (1962) is necessary. The species no longer occurs in Miami and Shelby counties in Ohio and in Shelby County, Indiana. New county records are Dubois, Lawrence, Perry, Rush and Spencer counties, Indiana.

The occurrence of *O. sloanii* in Rush County, Indiana, although a new county record, was not surprising since the location was within the previously recognized range of the species. The only specimens taken in Rush County were from the Little Flatrock River. *Orconectes sloanii* is typically found in small tributary streams. It was probably missed by Rhoades (1962) in Rush County and is, therefore, not a range expansion. In fact, the species may be in danger of extirpation in Rush County because of competition from *O. rusticus* which is found throughout the Flatrock River system.

Rhoades (1962) did not include Martin County, Indiana, in the range of *O. sloanii*. However, the OSUMZ contains specimens collected from this county in 1961 and 1964 near the village of Shoals on the East Fork of the White River. My recent collecting at this site failed

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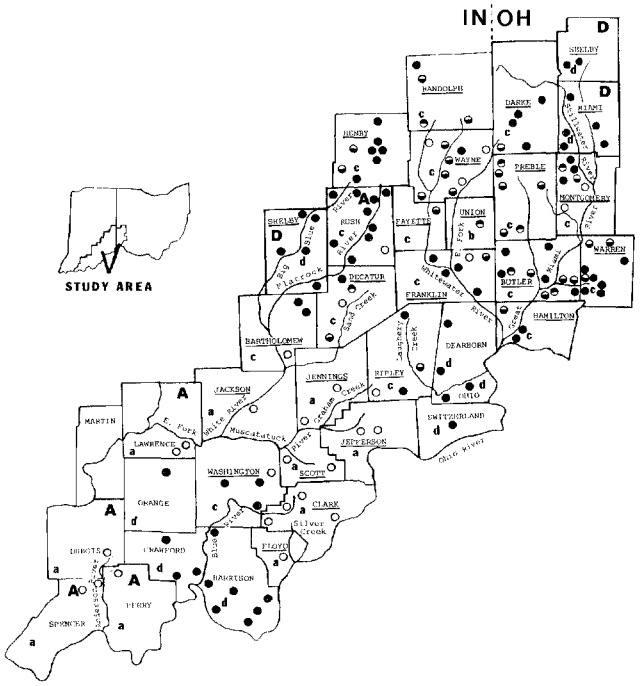

FIGURE 1. Distribution of *Orconectes sloanii* in Ohio and Indiana. A, additions to Rhoades' (1962) records; D, deletions from Rhoades' (1962) records; a, *O. sloanii* and not *O. rusticus* present in the county; b, *O. sloanii* > 50% and *O. rusticus* < 50% of the specimens in the county; c, *O. rusticus* > 50% and *O. sloanii* < 50%; d, *O. rusticus* and not *O. sloanii* present. Underlined counties are Rhoades' 1962 records. Circles represent one or more collections at a site and indicate: open circle - *O. sloanii* without *O. rusticus*; darkened upper half of circle - *O. sloanii* sympatric with *O. rusticus* (*O. sloanii* > 50% in collection); darkened lower half of circle - *O. sloanii* sympatric with *O. rusticus* (*O. rusticus* > 50%); and darkened circle - *O. rusticus* without *O. sloanii*.

to yield any *O. sloanii*. The species has probably been extirpated from Martin County since 1964.

Orconectes sloanii was not found in Miami and Shelby counties in Ohio, nor in Crawford, Dearborn, Harrison, Ohio, Orange, Shelby, and Switzerland counties in Indiana. Rhoades (1962) reported *O. sloanii* from the two Ohio counties and Shelby County, Indiana. The species appears to have been extirpated from these latter three counties. Inasmuch as the stream systems in Crawford, Harrison and Orange counties, Indiana, are confluent with stream systems in which *O. sloanii* was found (East Fork of the White River and Blue River), one might expect to find this species in these three counties. The previous existence of *O. sloanii* in Orange and Crawford counties was suggested by Faxon (1914) who described some second-form males (which may have been *O. sloanii*) as having been collected between Paoli and Wyandotte. This would be either in Orange or Crawford counties, as Eberly (1955) inferred. Recent collections by the author in these counties has not produced any *O. sloanii*.

Rhoades (1962) did not include Dearborn, Ohio or Switzerland counties, Indiana in his report of the distribution of *O. sloanii*. It is not clear, however, if he collected in these counties. Considering the present range of *O. sloanii* (Fig. 1), it would not be surprising to find the species in Dearborn and Ohio counties in Laughery Creek because *O. sloanii* was collected from an upstream tributary of this creek in Ripley County to the west. However, collections made in these three counties did not produce any *O. sloanii*.

Rhoades (1962) suggested that large streams (rivers) have acted as barriers to the dispersal of *O. sloanii*. He did not explain how a river would act as a barrier, but it is true that *O. sloanii* has not been found south of the Ohio River. Collections examined by the author from tributaries of the Ohio River from Cloverport, Kentucky, to east of Florence, Kentucky, have produced no *O. sloanii*. The original description of the species' range (Bundy 1876) was probably in error.

Throughout much of its present range *O. sloanii* is sympatric with *O. rusticus*. In 27 of the 35 sympatric collection sites, *O. rusticus* accounted for more than 50% of the specimens collected (Fig. 1). This information can prove useful in further evaluations of the impact of *O. rusticus* on *O. sloanii*.

The long-term survival of populations of *O. sloanii* in sympatry with *O. rusticus* is questionable. Jezerinac (1982) found that *O. rusticus* was replacing *O. (Crockerinus) propinquus* (Girard) in the Chagrin River in northeastern Ohio and suggested that the aggressiveness of *O. rusticus* was a possible cause for this replacement. Butler (1983) discussed the success of *O. rusticus* in competition with *O. (C.) sanbornii* (Faxon) in Ohio, and concluded that *O. rusticus* was more aggressive, grew more rapidly, produced more young, and attained a larger adult size than *O. sanbornii*. *Orconectes rusticus* was reported to be replacing *O. propinquus* and *O. virilis* in the Kawartha Lakes region of southern Ontario (Berrill 1978). Capelli (1982) found *O. rusticus* displacing other species of *Orconectes* in lakes in northern Wisconsin, but was uncertain of the mechanism responsible for the success of *O. rusticus*. However, Lodge et al. (1986) reported that in Trout Lake, Wisconsin, *O. rusticus* invaded between 1973 and 1979, but has since remained in low abundance and has not displaced other species of *Orconectes* in the lake.

In Ohio, *O. sloanii* has been extirpated from two of the eight counties originally reported by Rhoades (1962). At only one collection site was *O. sloanii* found without *O. rusticus* being present, and at only five of the 19 sites where the two species are sympatric did *O. sloanii* specimens constitute more than 50% of the collection. This appears to support Jezerinac's (1986) statement that *O. sloanii* is a threatened species in Ohio.

In 10 counties in southern and southeastern Indiana, *O. sloanii* was collected without *O. rusticus* in the following stream systems: the East Fork of the White River, the Muscatatuck River, and Graham Creek; and the Anderson River, the upstream portion of the Blue River, and Silver Creek. Four (Dubois, Lawrence, Spencer, and Perry) of these 10 counties are new records for *O. sloanii*. Rather than a range expansion by the species, the new records probably reflect a lack of collections. The rugged topography of the area (the Crawford Upland and Mitchell Plain) has been an impediment to urbanization and industrialization and their accompanying pollution and destruction of habitat. Rhoades (1962) suggested that this area was probably a refugium of *O. sloanii* during pre-Wisconsin glaciation.

Nine of the 10 counties in which *O. sloanii* was found without *O. rusticus* are contiguous with counties in which *O. rusticus* was either sympatric with *O. sloanii* or

existed to the exclusion of *O. sloanii* (Fig. 1). *Orconectes rusticus* was found in Sand Creek, the Flatrock River, and the Big Blue River which are all tributaries of the East Fork of the White River. Likewise, *O. rusticus* was present in the downstream portion of the Blue River. The long-term viability of the *O. sloanii* populations in these areas of southern Indiana may be threatened by the encroachment of *O. rusticus*, if the latter species is indeed more successful when in competition with *O. sloanii*.

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