The Decline of Cicindela hirticollis Say in Ohio (Coleoptera: Cicindelidae)

GENE KRITSKY, NICOLA T. GALLAGHER, JESSEE SMITH, AND ANN WATKINS

Department of Biology, College of Mount St. Joseph, Cincinnati, OH 45233

Abstract. The current distribution of Cicindela hirticollis was determined by revisiting sites where C. hirticollis had been previously collected and by surveying likely sites along Lake Erie and the Ohio River. C. hirticollis was not found along the Ohio River or at any of the historical inland county localities. Along Lake Erie, C. hirticollis is restricted to beaches in Ottawa and Erie counties. Sand from beaches where C. hirticollis still occurs was compared to the beaches where C. hirticollis had been previously collected to help understand the causes of its decline. Habitat destruction caused by housing developments, changes to the shoreline, installation of irrigation ditches, and flood control has taken its toll on this sensitive beetle. For C. hirticollis to survive in Ohio, its remaining populations must be protected.

Introduction

Cicindela hirticollis Say (Figure 1) was once a common tiger beetle on the sandy beaches of our rivers and large lakes in the eastern United States. However, it has declined in recent decades and may be in need of protection. It was last seen in New Hampshire in 1958 and was last collected along the Ohio River in southwestern Ohio in 1911 (Graves and Brzoska, 1991; Kritsky *et al.*, 1996). It is a summer species and is easily identified by its slightly recurved humeral lunule. The purpose of this work was to determine its current status in Ohio.

Materials and Methods

To determine the current status of *C. hirticollis* in Ohio, we surveyed the historical localities listed by Graves (1988) as well as locations that could be potential sites. Sites were visited each year during a three year period to make sure that failure to find the beetle was not due to annual variations. Surveys were conducted using aerial nets. To determine if there was a substrate preference for *C. hirticollis*, sand samples were taken and analyzed for sand, gravel, and clay/silt composition.

Results

The survey results are shown on Figure 2. Open circles are sites where *C. hirticollis* had been collected in the past and the solid circles show where *C. hirticollis* is still present. Our survey found that *C. hirticollis* now occurs only along a 25 mile stretch of the Lake Erie shoreline. In Ottawa County, approximately 10 beetles were observed south of the public beach. In Erie County, approximately 25 beetles were observed on the private beaches east of Cedar Point and well over 100 beetles were observed at Sheldon Marsh State Nature Preserve. All observations were made during late June and early July.

The sand analysis is presented in Table 1. Composition is presented as percentage of the sample. Gravel is defined as particles larger than 2 mm, sand is defined as particles between 0.2 and 2 mm, and clay/silt is defined as particles less than 0.2 mm in size.

Discussion

Cicindela hirticollis has suffered a significant decline in Ohio during this century. In the past it was found along the Ohio River, along most of the Lake Erie shore, and inland in Darke, Lucas, and Huron counties. The causes of this decline are likely related to habitat destruction, development, and water control. For example, C. hirticollis was last collected in Hamilton

County in southwestern Ohio in 1911. Since that time seven locks and dams were constructed along the Ohio River that destroyed the sandy beaches and replaced them with mud banks (Kritsky *et al.*, 1998). In Darke County, most of the creeks have been modified into irrigation ditches with steep walls covered with vegetation. Only a few pockets of sand are still found in that western county and they are small and littered with trash and tires. In Lucas and Huron counties, the sandy creeks were filled in for the construction of interstate highways.

Along the Lake Erie shoreline, development has greatly reduced the sandy beaches. Along eastern Lake Erie at Headland Dunes State Park and Nature Preserve and Geneva on the Lake State Park, break-walls have encouraged gravel deposition on the beaches, which changed the sandy beaches to a predominantly gravel shoreline.

Our analysis of the substrate composition showed that *C. hirticollis* has a very distinct sand preference. At all the sites where *C. hirticollis* is present the substrate analysis found high amounts of sand with little gravel and no silt. At sites where *C. hirticollis* has disappeared, the substrate analysis found gravel compositions ranging from 20 - 27%. This sandy preference was further verified by an analysis of the Indiana Dunes State Park beaches where *C. hirticollis* has been found for decades and is still present. Our substrate analysis revealed the same preference found in Ohio, a high sand percentage with little gravel and no silt or clay.

A large sand beach west of the Meldahl Lock and Dam on the Ohio River appeared to be a likely *C. hirticollis* habitat. However, three years of sampling has failed to find any *C. hirticollis*, although other tiger beetles, *C. repanda* Dejean and *C. cuprascens* LeConte, are common. The substrate analysis has revealed that this beach does not have the typical sand composition found at other *C. hirticollis* sites, but rather a higher gravel and clay/silt composition.

Graves and Brzoska (1991) argued that *C. hirticollis* should be protected in Ohio if we are to maintain this species in the state. Fortunately, the largest population occurs in a state nature preserve and therefore is protected. Even though *C. hirticollis* is sensitive to human alterations of the beaches, we found it on public beaches at East Harbor State Park and along the residential beaches at Cedar Point, a fact which suggests that it can tolerate some human interaction.

Actions can be taken to promote *C. hirticollis* populations at East Harbor State Park. In 1996, we found a significant population on the restricted beach north of the public beach. Unfortunately, the beach was lost to erosion and in 1997 was replaced with large rocks rather than with sand. We have found that introduced sand in large quantities is attractive to tiger beetles and that they will eventually colonize the area. If the restricted area north of East Harbor State Park's public beach was restored to its previous sandy conditions, it is likely that *C. hirticollis* would return to its former numbers. If that were to happen, it would be one of the few success stories in tiger beetle conservation.

Conclusion

Cicindela hirticollis has suffered a significant decline in Ohio during this century and is now restricted to an approximately 25 mile stretch along Lake Erie. The causes of this decline are likely habitat alterations from road construction, flood control, irrigation, and development. The decline of C. hirticollis in Ohio is evidence that this beetle should be protected if we want to maintain this tiger beetle in the state. Its elevation by the Ohio Division of Wildlife from the special interest listing to threatened listing, and the presence of a large population in an already protected area promise that this tiger beetle will maintain a foothold in the state.

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Table 1. Analysis of sandy substrate for percent composition of gravel, sand, and clay/silt.

Location	% gravel	% sand	% clay/silt
Sheldon Marsh Preserve*	0.34	96.92	2.75
East Harbor North Beach*	0.29	98.77	0.65
East Harbor South Beach*	0.02	97.70	2.28
Indiana Dunes St. Park*	0.19	99.80	0.18
Geneva on the Lake	21.65	78.32	0.03
Crane Creek State Park	24.75	74.76	0.46
Headlands State Park	27.57	71.37	1.06
Meldahl Lock and Dam	4.18	85.53	10.28

^{*} Beaches with C. hirticollis populations



Figure 1. Cicindela hirticollis Say.

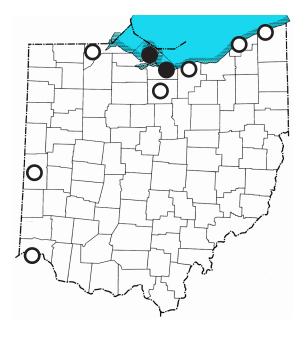


Figure 2. Distribution of *C. hirticollis* in Ohio. Solid circles represent counties with *C. hirticollis* populations and open circles represent counties where *C. hirticollis* has disappeared.