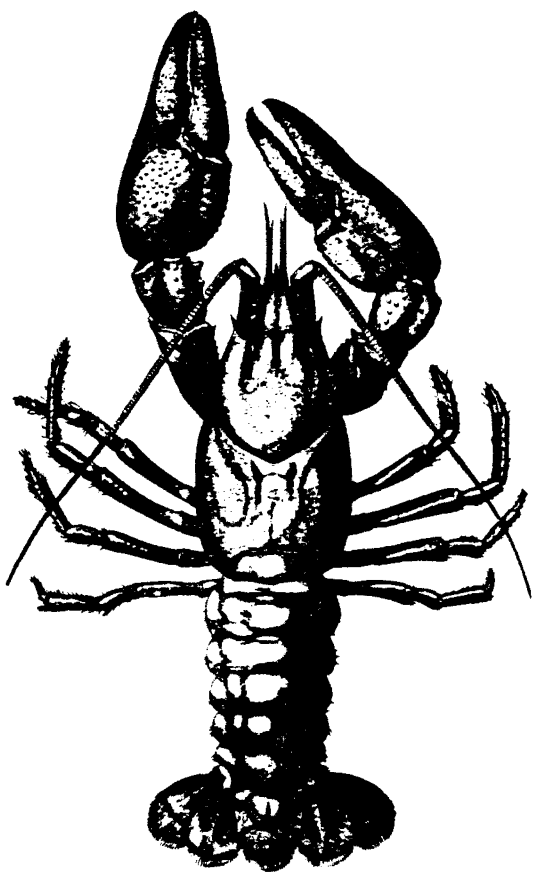
An Inventory of Crayfish (Order Decapoda) at the Erie National Wildlife Refuge in Northwestern Pennsylvania

Carrie Lyle Carrie Lyle
Steph Swaney Steph Swaney



THE COMMON CRAYFISH

Erie National Wildlife Refuge Internship
2 Credits
Spring 1998

Introduction:

Whatever their local name may be, crawfish, crawdads, or crabs, crayfish are the longest-lived and largest of all freshwater crustaceans and are observed to be quite successful , with close to three hundred species and sub-species throughout the systems of North America (Hobbs 1972). Within the Erie National Wildlife Refuge in Northwest Pennsylvania, there is no current information as to crayfish diversity and abundance. Given their importance in aquatic habitats (Ott 1997), this study is of great ecological value importance. Crayfish foraging and reproductive habits can have large effects on the analogous habits of other species in their shared habitat (Rickett 1974). Also, it is worth mentioning that crayfish do not conform to any one specific trophic category and can therefore maintain dense populations in relatively unproductive aquatic systems (Momot et al. 1978). Crayfish also may be of economic importance as their chimneys can be a nuisance to agricultural machinery and can actually destroy young crops. Chimneys can also weaken levees. Crayfish feed on numerous organisms in aquatic systems such as amphipods, isopods, midges,caddisflies, mollusks, carrion, and live and dead fish (Ott 1997). Additionally,crayfish are an important source of food for game fish (Turner 1926), as most higher consumers in an ecosystem will utilize crayfish as part of their diet (Hogger 1988).

Methods:

Sampling of crayfish occurred in twelve streams and two wetlands within the Erie National Wildlife Refuge (Fig. 1). By carefully turning over stones in the streams, crayfish were captured by hand-picking or by scooping them with a net. Mostly, sampling and capture involved a patient and thorough examination of the stream substrate. If crayfish were sited but could not be

captured, they were recorded as a "siting" and added to the total number of crayfish at a site. Additionally, the stream shore was checked for evidence of crayfish chimneys. If no crayfish were found after a sampling time of thirty minutes, we recorded that particular site as void of crayfish and continued on to another sampling location.

In wetlands, sampling was done using a standard d-net and sweeping the substrate. Then the contents of the net were thoroughly checked for any crayfish. The banks of the wetlands were also checked for evidence of crayfish.

When crayfish were captured, their weight and carapace length were measured. These variables were plotted to construct a graph of comparative growth rates. Time of day, weather, air and water temperatures, and substrate composition were also recorded to gain a better understanding of where and when crayfish can be found.

Results:

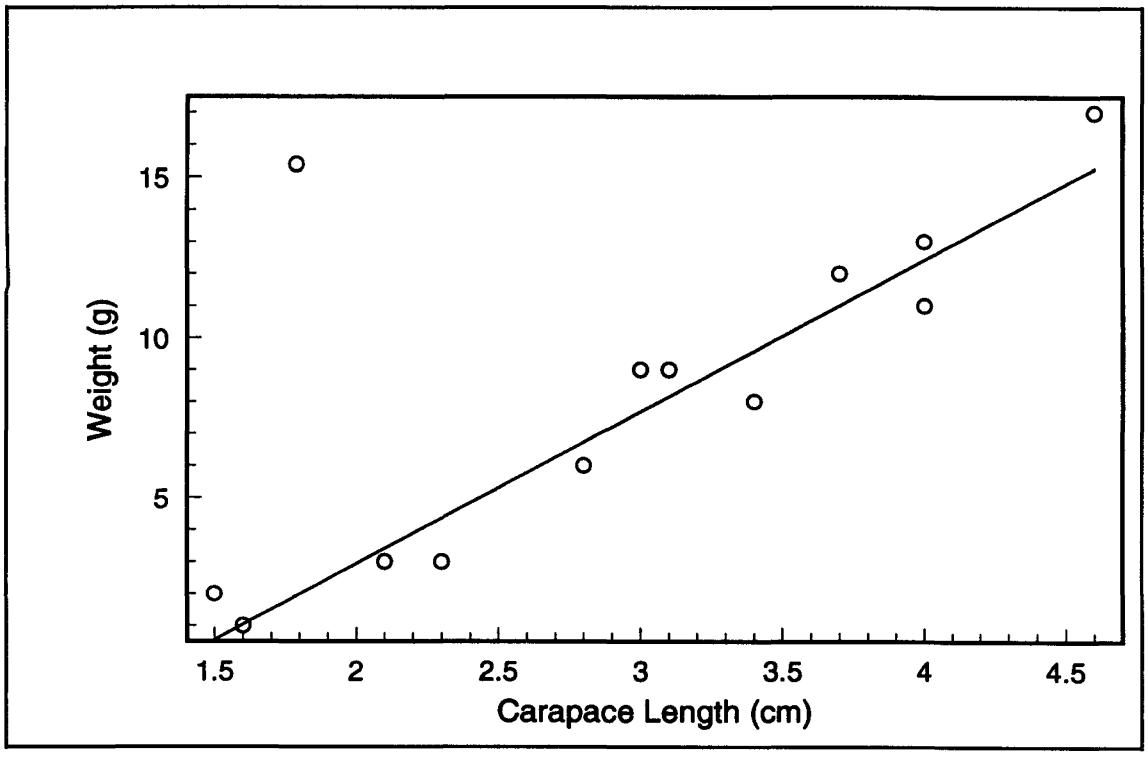
All crayfish that were found were identified as *Cambarus bartonii bartonii*. These individuals were found in three out of fourteen sites that we sampled. We did not encounter crayfish in the majority of our streams sites, and no crayfish were found in the wetlands that we sampled (Table 1).

Table 1: Crayfish abundance and site characteristics.

	# found	air temp (*C)	H2O temp (*C)	substrate and characteristics
Woodcock Creek TribA	17	9	8	shallow, slow-medium speed, rocky
Woodcock Creek TribB	0	22	13	shallow, slow speed
Woodcock Creek TribC	0	22	15	shallow, muddy bottom
Woodcock Creek TribD	0	22	12	rocky, deep pools, fast speed, algae
Brawley Run	4	18	14	rocky, calm part of fast-moving
Lake Creek TribA	0	18	14	sandy, muddy bottom, slow-medium speed
Lake Creek TribB	0	18	14	sandy bottom, small pebbles,slow-med speed
Lake Creek TribC	0	18	15	pebbly bottom, medium speed
Lake Creek TribD	0	18	16	sandy bottom
Lake Creek TribE	1	19.5	10	shallow, fast speed
Mackey	0	18	11.5	rocky, fast speed
Mohawk	0	18	11	rocky, fast speed
Wetland A	0	18	16	wetland
Wetland B	0	18	15	wetland

Crayfish carapace length was significant exhibiting a positive correlation with weight for all sites pooled ($F_{1,11}$=4.84), and accounted for approximately 93% of the variation in crayfish weight (r^2=0.9282). Comparative growth rates can be assessed using Figure 2.

Figure 2: Relationship between weight and carapace length for *Cambarus bartonii bartonii.*



Discussion:

Many crayfish actually have specific habitat requirements, such as muddy ditches, lakes, wet meadows, or swift streams (Pennak 1989). Crayfish are generally found to inhabit shallow waters, seldom being found in water deeper than one meter (Pennak 1989). *Cambarus bartonii* is found east of the Mississippi River but not in the southern states and inhabits springs and small streams.

Many crayfish are essentially lotic in nature and do not adapt well to lentic conditions or are not able to compete with species found in lentic habitats (Hogger 1988). This would support the absence of crayfish that we encountered when sampling wetlands. This information, however, does not explain why we did not find crayfish in the more abundant shallow streams throughout the Refuge. The Sugar Lake division of the Refuge is speckled with beaver dams. The damming of water could alter the habitats enough so that they would be unsuitable environments for crayfish.

Our sampling could have been hindered by the turbidity of the water due to recent rainfall. The faster movement of the water brings out its reflective nature. This makes it virtually impossible to see the bottom of the stream, which is also where crayfish reside.

During winter months, crayfish are rarely seen within streams. They are more likely to be found in the banks of the stream, in natural crevices, and in burrows which they dig for themselves (Huxley, 1973). Since most of the sampling that we conducted was done when the air temperature was below twenty degrees Celsius, it is possible that the crayfish were not moving about in the streams, but were instead still burrowed within the banks.

Since sufficient information about crayfish life history and distribution would be beneficial to the fisherman, the fish culturist, the conservationist and also to the farmer, these areas should be investigated further. Future studies should focus on timing of sampling, both in the season and in the time of day, and continue to report stream characteristics.

Literature Cited:

Hogger, J.B. 1988. in Freshwater Crayfish - Biology, Management and Exploitation. D.M. Holdich and R.S. Lowery (Editors). Timber Press, Portland, Oregon.

Huxley, T.H. 1973. The Crayfish - An Introduction to the Study of Zoology. The MIT Press, Cambridge, Massachusetts.

Momot, W.T., H. Gowing, and P.D. Jones. 1978. The dynamics of crayfish and their role in ecosystems. Ame. Mid. Naturalist 99:10-35.

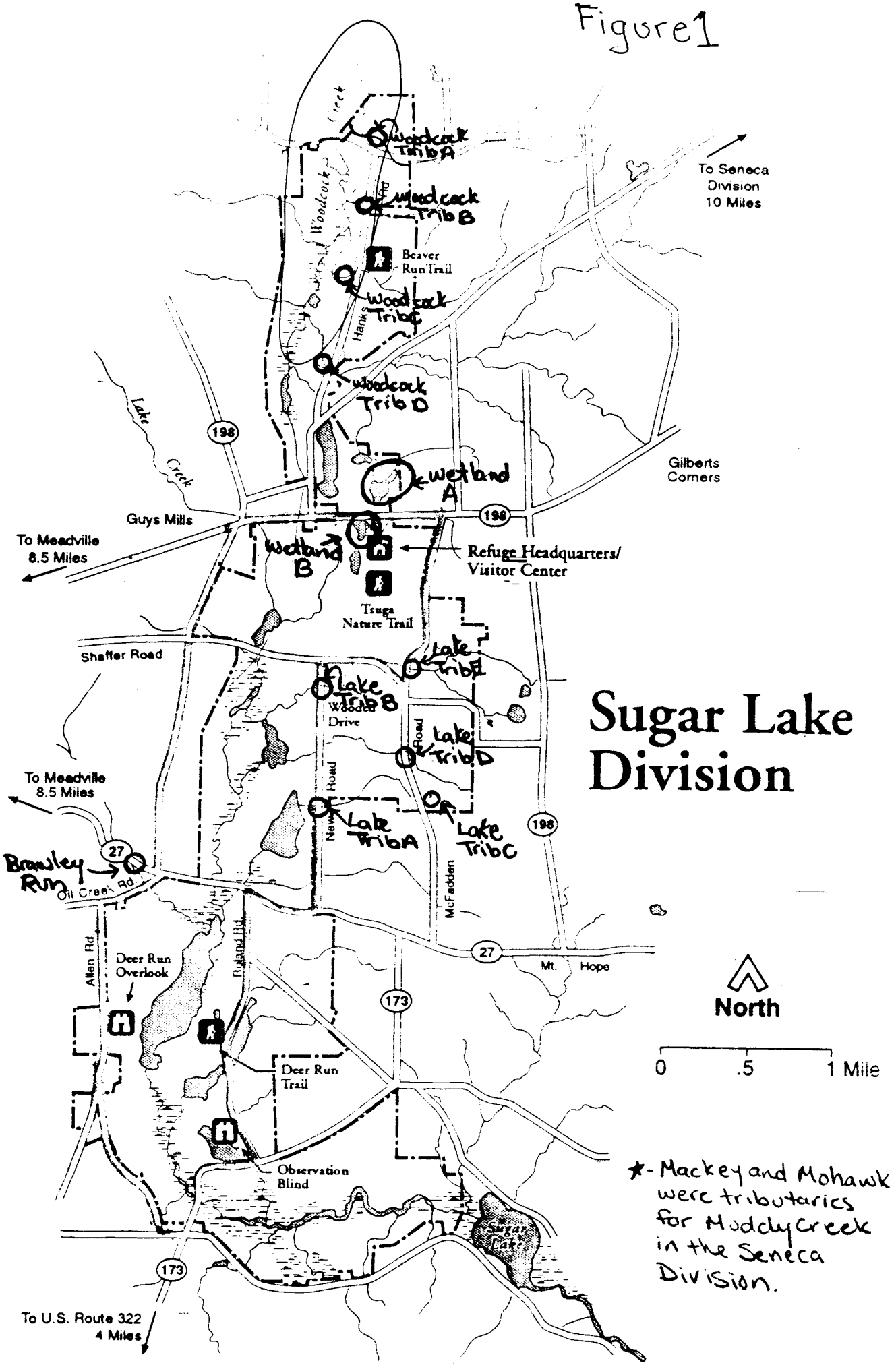
Ott, R.E. 1997. Unpublished Senior Thesis. Does the crayfish *Cambarus bartonii* exhibit switching behavior when presented with two animal prey options? Allegheny College.

Pennak, R.W. 1989. Fresh-water Invertebrates of the United States - 3rd Edition. John Wiley & Sons, Inc., New York.

Rickett, J.D. 1974. Trophic relationships involving crayfish of the genus *Orconectes* in experimental ponds. Prog.Fish-Cult.36:207-211.

Turner, C.L.1926. The crayfish of Ohio. The Ohio State University Bulletin 3:145-195.

Figure1



★- Mackey and Mohawk were tributaries for Muddy Creek in the Seneca Division.