A Study of the Ozark Hellbender Cryptobranchus Alleganiensis Bishopi
Author(s): Max A. Nickerson and Charles E. Mays
Published by: Ecological Society of America
Stable URL: http://www.jstor.org/stable/1935586

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at http://www.jstor.org/page/info/about/policies/terms.jsp. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at http://www.jstor.org/action/showPublisher?publisherCode=esa.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is a not-for-profit organization founded in 1995 to build trusted digital archives for scholarship. We work with the scholarly community to preserve their work and the materials they rely upon, and to build a common research platform that promotes the discovery and use of these resources. For more information about JSTOR, please contact support@jstor.org.

Ecological Society of America is collaborating with JSTOR to digitize, preserve and extend access to Ecology.
A STUDY OF THE OZARK HELLBENDER CRYPTOBRANCHUS ALLEGANIENSIS BISHOPI

MAX A. NICKERSON
Arkansas State University, State University, Arkansas 72467

AND

CHARLES E. MAYS
DePauw University, Greencastle, Indiana 46135

Abstract. A tag-recapture study of the Ozark Hellbender salamander, Cryptobranchus a. bishopi, was made on the North Fork of the White River, Ozark Co., Missouri. During the summers of 1969 and 1970, animals were tagged along a 2.67-km stretch of stream bed. Population estimates were 428 with 95% C.L. of 341–573 hellbenders/km of stream bed. Biomass estimates were 156 kg/km with 95% C.L. of 124.5–210 kg/km of stream bed. Density estimate in "prime habitat" was one/8–10 m² with 95% C.L. of one/6–7 m²—one/13–16 m². Recaptures indicated little movement. Ozark Hellbenders are one of the dominant organisms in this stream system.

INTRODUCTION

Since Grobman (1943) described the Ozark Hellbender as Cryptobranchus bishopi, only the study of Dundee and Dundee (1965) has added any appreciable information concerning the life history of these salamanders. Consequently, we undertook a tag-recapture study of a population of C. a. bishopi in the North Fork of the White River, Ozark Co., Missouri during the summers of 1969 and 1970. The North Fork is a heavily spring-fed stream that drains southward from the Salem Plateau, cutting steeply through dolomite, limestone, and sandstone en route to its junction with the White River (Beckman and Hinchey 1944, Thornbury 1965). The study section changes from white water riffles to large sluggish pools that may be 2.5 m deep (non-flood stage). The bottom is most variable with long stretches of gravel, piles of dolomite, limestone, and sandstone rocks, and smooth swept beds of limestone. Year-round water quality parameters (1970–1971) varied as follows: temperature 9.8–22.5°C, dissolved O₂ 8.4–13.6 ppm, CO₂ 0–9.8 ppm, alkalinity 122–289 ppm, pH 7.6–9.0 Additional ecological data and analysis are presented by Nickerson and Mays (1972).

MATERIALS AND METHODS

A 4.6-km section of the North Fork of the White River was marked off in 92-m increments. Using skin diving gear, salamanders were collected between 0900 and 1700 hours. They were measured, tagged (Turtox mammalian ear-tags or Floy T-tags), weighed, and released at the capture station. Some specimens were harvested outside the research area for hematological, hybridization, and food studies (Wortham 1970, Jerrett 1971). Population estimates were made by the Peterson Index Method (Overton and Davis 1969).

RESULTS AND DISCUSSION

Tail and rear-leg tagging with mammalian ear-tags proved unsuccessful. These aluminum tags were re-
jected, leaving large gaping holes. This allowed identification of formerly tagged specimens but not individual movement. Floy T-tags were used exclusively and successfully during 1970.

Population estimates
The study for 1969 consisted of two 21-day work periods (each approximately 375 man hours). Tagging took place along 2.67 km of stream bed. We tagged the first sample of 200 salamanders in June, and the second sample of 240 salamanders (not including 51 recaptures) mainly in July. The population estimate for the 2.67-km stretch was 1,142 with 95% C.L. of 910 and 1,531.

In 1970, a population estimate for a riffle was undertaken. The study consisted of two 6-day periods, each representing approximately 54 man hours. Tagging took place along 92 m of stream-bed between stations two and three (Fig. 1). In June and early July, we tagged 72 salamanders in the first sample and 57 (not including 25 recaptures) in the second sample. The population estimate for the riffle was 269 with 95% C.L. of 168 and 396.

Density
The riffle between stations two and three contained a high concentration of hellbenders. Its dimensions are 92 x 50 m (4,600 m²). We estimate only 50–60% of this area as suitable “diurnal habitat” for “taggable-sized” salamanders. Applying our population estimate, this means one hellbender per 8–10 m² in “prime habitat” with 95% C.L. of one per 13–16 m² and one per 6–7 m².

Biomass
Mean weight of 435 hellbenders in the 2.67-km stretch was 365 g, resulting in a biomass estimate of 416.8 kg with 95% C.L. of 332.2 kg and 558.8 kg. The hellbender biomass estimate for riffle two-three is 98.2 kg with 95% C.L. of 61.3 kg and 144.5 kg.

Movement
Little movement was noted among recaptures during the period June–August 1969 and 1970, and only one was collected outside the tagging area.

Of 58 hellbender recaptures, only three were farther than 90 m from the tagging site (Table 1). Seventy percent of the recaptures were less than 30 m from the tagging site, and 34% were found at the tagging site. At least two were recaptured under the rock of initial capture.

One trend was noted. An area near the west bank (station one-two) had a high population of hellbenders except in late June–August. Recapture data indicated downstream movement from this area to riffle two-three. This time period correlates with the highest temperatures recorded. A similar situation is suspected between stations 26 and 28.

Acknowledgments
We wish to thank Karl Schmidt, Dr. Harvey Barton, Richard Spieler, Edward Wortham, Charles Selman, Mike Selby, Rebecca Cooper, Ron Austin, Leland Peyton, and Kris Scroggins for their assistance. Arkansas State University, Max Allen’s Zoological Gardens, DePauw University, and the Indiana Academy of Science, provided financial support.

Literature Cited