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# A STUDY OF THE OZARK HELLBENDER *CRYPTOBRANCHUS ALLEGANIENSIS BISHOPI*<sup>1</sup>

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**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 m<sup>2</sup> with 95% C.L. of one/6–7 m<sup>2</sup>–one/13–16 m<sup>2</sup>. 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 O<sub>2</sub> 8.4–13.6 ppm, CO<sub>2</sub> 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 (Turtlox mammalian ear-tags or Floy T-tags), weighed, and released at the capture station. Some specimens were harvested outside the research area

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for hematological, hybridization, and food studies (Worham 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-

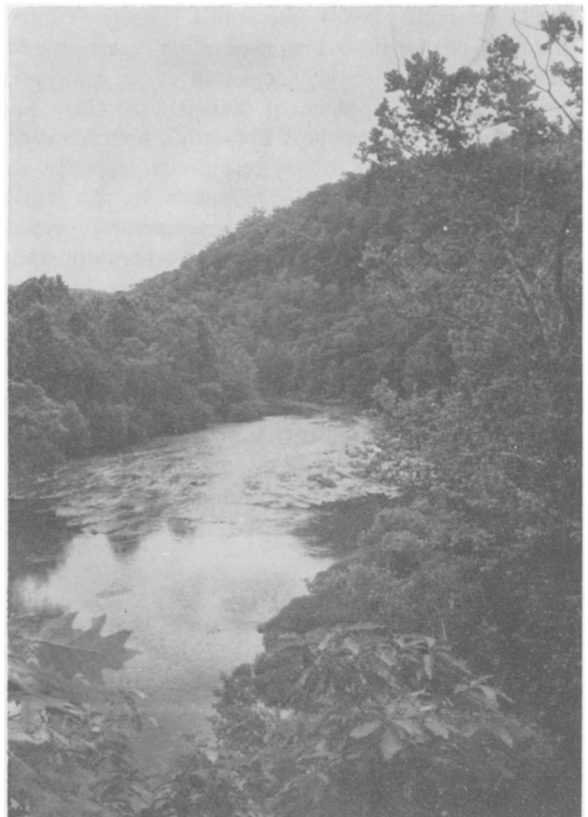


FIG. 1. Riffle two-three on North Fork of White River, Ozark Co., Missouri.

TABLE 1. Movement analysis of three Ozark Hellbenders recaptured more than 90 m from tagging site

Number	Date tagged or released	Station of tagging or release	Date of recapture	Station of recapture	Direction of movement	Distance moved (m)
110	6-19-69	28	7-17-69	17	upstream	990
	7-17-69	17	7-28-69	16	upstream	60
383	7-23-69	7	8-10-69	0 (200 m above)	upstream	900
54	6-18-70	2	6-26-70	8	downstream	525
	6-26-70	8	8-4-70	2	upstream	525

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 × 50 m (4,600 m<sup>2</sup>). 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 m<sup>2</sup> in "prime habitat" with 95% C.L. of one per 13–16 m<sup>2</sup> and one per 6–7 m<sup>2</sup>.

#### 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

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