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RETURN OF CAPTIVE OZARK HELLBENDERS, *CRYPTOBRANCHUS ALLEGANIENSIS BISHOPI*, TO SITE OF CAPTURE.

—When an animal is returned to its natural habitat after being maintained in captivity, any number of factors may alter its ability to reestablish. With today's shrinking natural habitats and populations, it is important to consider consequences of returning animals used in certain research projects to their original population. However, our knowledge of how successful such restockings may be is woefully lacking, especially when applied to amphibians. In 1975, I initiated a study to determine if Ozark hellbenders might reestablish within a riffle from which they had been removed. This paper is based on the results of that study.

Materials and methods.—Two samples of 15 *Cryptobranchus alleganiensis bishopi* each were removed from optimal habitat within a well-studied section of the North Fork of White River, Ozark County, Missouri (Nickerson and Mays, 1973a, b, riffle 2–3). Sample 1 was collected 2 July 1975 and Sample 2 on 14 October 1975. Animals were transported to Milwaukee and maintained at 22.5 C (±3 C) until February 1976, in nonaerated aquaria which lacked substrate. Few fed and none fed sufficiently to maintain initial captive weight. They were measured, tail tagged with Floy T-tags, weighed and returned to riffle 2–3 on 19 February 1976. Although noticeably gaunt, they were vigorous upon release. Three hellbenders from Sample 1 died either during transport to or maintenance in Milwaukee. On 26 May 1976, riffle 2–3 was searched for the tagged hellbenders.

TABLE 1. *Cryptobranchus alleganiensis bishopi* RECAPTURES FROM RIFFLE 2–3 IN NORTH FORK OF WHITE RIVER, OZARK COUNTY, MISSOURI.

Sample	Tag no.	Capture weight (g)	Release—19 Feb. 76 Weight (g)	Release—19 Feb. 76 Length (cm)	Recapture 26 May 76 Weight (g)	Recapture 26 May 76 Length (cm)
1	762	369.0	116	32.0	*675	33.4
1	766	227.0	173	36.5	390	37.9
1	769	331.0	116	32.5	303	34.0
2	994	332.6	200	37.5	295	37.6

* Much of weight increase attributed to large quantities of food in the gut.

Weights were taken under varying conditions; left column—after capture and transport to base camp with some regurgitation occurring, center column—at end of laboratory holding period, right column—at capture site with no regurgitation.

Results and discussion.—Five of the 27 (18.5%) released hellbenders were recovered within riffle 2–3. This was higher than the recapture rate during the first three days of a 1970 survey of the riffle (ca. 10%) and indicates faithfulness to the "home site."

Wild-caught animals are subjected to stressful conditions during collection, transport, maintenance and experimentation (Meier et al., 1973; Young, 1973; Horseman et al., 1976). In this experiment stressful conditions were presumably created by: 1) maintaining hellbenders in still, nonaerated water at 22.5 C (±3 C), 2) in aquaria without rocky substratum necessary for dorsal thigmotaxis and 3) by reduced food supply. *C. alleganiensis* is thigmotropic and rocks back and forth when placed in still, warm (ca. 22–25 C, partially deoxygenated, water (Nickerson and Mays, 1973b). These movements are known to be stress-related (Harlan, 1978). During laboratory maintenance the recaptured hellbenders lost 32 to 65% of their capture weight.

The experiment was designed to place the captured animals at a distinct disadvantage for reestablishment within the riffle. Behavioral observations and spacing indicate that hellbenders are at least seasonally territorial (Hillis and Bellis, 1971; Nickerson and Mays, 1973b), and some seasonable movements may also occur (Alexander, 1927; Nickerson and Mays, 1973b). Both of these factors, coupled with prolonged

absence, may effect an animal's ability to successfully return to the riffle.

All of the recaptures on 26 May 1976 had increased dramatically in weight and 3 of 4 had grown more than one cm TL (Table 1). Therefore, some *C. alleganiensis* were capable of successfully reestablishing in riffles from which they were absent for more than seven months.

The release of captive animals or those reared in the laboratory should be done judiciously and with caution. In this study, animals were returned to the same populations and capture site. Occasionally, captured animals may be safely returned to the wild. These may be at a disadvantage when returned. The release of other genetic stocks or nonindigenous species has resulted in harmful introductions and competition with native forms (Bury and Luckenbach, 1976; King and Krakauer, 1966; Smith and Kohler, 1977).

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SPRINT VELOCITY OF TADPOLES (*BUFO BOREAS*) THROUGH METAMORPHOSIS.—Developmental stages 42 through 46 (Gosner, 1960) are key stages during the metamorphosis of an anuran tadpole. At stage 42 the forelimbs erupt; at stage 43 reabsorption of the tail begins; by stage 46 reabsorption is complete—the anuran has now transformed from a swimming, aquatic larva to a saltatory, terrestrial frog. These metamorphic transitions involve not only the locomotor apparatus, but also the respiratory system, hemoglobins, feeding appendages, digestive system and physiology, nervous integration and excretory physiology. Remarkably, this metamorphic "climax" is very rapid and may involve as little as 10% of the entire larval period (Wassersug and Sperry, 1977).

The rapidity of this transition may be related to the avoidance of hazards associated with metamorphosis (Szarski, 1957). Arnold and Wassersug (1978) demonstrated that garter snakes (*Thamnophis* spp.) in nature preyed nonrandomly on different developmental stages of toad (*Bufo boreas*) tadpoles; specifically, snakes