TRAP AVOIDANCE BY MARKED NUTRIA: A PROBLEM IN POPULATION ESTIMATION

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Abstract: Data from the use of live traps in marking and recapturing nutria (*Myocastor coypus*) for an estimate of the population size showed a disproportionate level of recapture in adults and subadults. The use of radio transmitters to determine movement and the use of steel traps and shooting to obtain recaptures demonstrated that the adult and subadult nutria were avoiding the live traps. Population estimates by the Schnabel method and the Lincoln Index illustrated the error introduced by trap avoidance. The use of a different recapture technique eliminated this source of error.

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Research on furbearer ecology and management has become increasingly important in the last few years. Since 1975 increased demand for wild fur by foreign markets has resulted in higher prices, greater numbers of trappers, and an increased harvest of furbearers (Stevens 1978). With this higher harvest it becomes important to have accurate information on furbearer populations in order to assess the effect of the increased harvest and to put into operation plans for management of furbearers.

Reliable techniques for estimating population levels are necessary when conducting such studies. Mark-recapture techniques are often used for estimating populations. Such techniques are based on several assumptions which are rarely met under field conditions. One assumption is that all animals in the population have equal probability of being captured. Caughley (1977) states that this is an unrealistic assumption and one which is potentially the greatest source of error in mark-recapture techniques.

Unequal catchability has been documented in populations of house mice (*Mus musculus*) (Young et al. 1952), wood mice (*Apodemus sylvaticus*) (Tanton 1965), and cottontail rabbits (*Sylvilagus floridanus*) (Geis 1955) due either to a trap prone or trap shy response. This paper documents a trap shy response in a nutria population due to an apparent learning process from previous captures.

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MATERIALS AND METHODS

The study was done at Boggy Slough Hunting Club of Temple-Eastex, Inc. Boggy Slough is located in Trinity County in the Pineywoods region of Texas, 176 km north of Houston and 19 km west of Lufkin, Texas. The major vegetation consisted of mixed pine-hardwood forest. Lakes, marshes, and sloughs are scattered throughout the hunting club.

The site of trapping was Blackcat Lake, a 44 ha lake containing 13 ha of marsh. A large number of islands formed by swelling clays are located in the lake. The dominant plants in the lake were squarestem spikesedge (*Eleocharis quadrangulata*), maidencane (*Panicum hemitomon*), and pondweed (*Potamogeton sp.*).

The trapping effort detailed in this paper was done to obtain a population estimate through a mark-recapture technique as part of a study on nutria food habits. The traps used were double-door live traps measuring 23 cm x 23 cm x 81 cm. Nutria were removed from the traps and handled using a choker described by Evans et al. (1971) or a restraining

cone (Swank 1949). Numbered metal tags (monel no. 3 self-locking, National Band and Tag Co.) were placed in the ears to mark the nutria.

Data taken from nutria included weight, hindfoot length, tail length, total length and sex. The hindfoot length was used to age the animals (Adams 1956). Those with a hindfoot length of 10.9 cm or less were classed as immature, those from 11.0 cm to 12.4 cm were classed as subadults, and those 12.5 cm and greater were classed as adults.

Trapping began on 12 April 1977 using 16 live traps. Initially 8 traps were placed on rafts as described by Evans et al. (1971) and 8 were placed on land. All traps were baited with carrots. Later all traps were placed on land and baiting was discontinued.

Radio transmitters were placed on 4 adult nutria to determine movements. The animals were located at various times during the day and night.

Live trapping and marking continued through 2 September 1977. On 19 September 1977 an effort was made to eliminate nutria from Blackcat Lake using leg-hold traps and shooting with.22 caliber rifles. Twenty-four Victor no. 1 1/2 double coil spring traps were placed at resting and feeding areas and near dens. Shooting was done from a canoe at night with the aid of a spotlight.

RESULTS AND DISCUSSION

From 12 April to 2 September 1977, 79 captures and recaptures of nutria were made in 1680 trap-nights (16 traps for 105 nights). The trapping success for this effort was 1 nutria per 22 trap-nights. Of the individual nutria captured adults made up 44%, subadults 19%, and immatures 37%. Twenty-two recaptures were made and were composed of 14% adults, 5% subadults, and 81% immatures (Table 1).

TABLE 1. Number and percentages by age class of nutria marked and recaptured with live traps, 12 April-2 September 1977.

Age Class	Number Marked	% Marked by Age Class	Number Recaptured	% Recaptured by Age Class
Adults	24	44	3	14
Subadults	10	19	1	5
Immatures	20	37	18	81
Totals	54	100	22	100

Due to the differences in the age class percentages between the original capture data and the recapture data, the possibility of trap avoidance in adults and subadults was considered. Since trap avoidance introduces a large source of error into mark-recapture techniques, a different method of recapture was used for the purpose of eliminating this error (Overton 1971). Shooting and steel trapping were used since the probability of a nutria being collected in this manner would be independent of its previous live trap experience. From 19 September through 7 October 1977, 9 nutria were shot and 46 were trapped. Adults made up 57%, subadults 32%, and immatures 11% of the total animals obtained. Of these, 65% were marked animals (Table 2).

The assumption that all nutria in the population had an equal probability of being captured the first time with live traps and steel traps is valid since neither method had been previously used on the study area. Therefore, these data should give an accurate indication of the population structure. Since initial capture by both techniques shows

TABLE 2. Number and percentages by age class of nutria steel trapped and shot, 19 September-7 October 1977.

Age Class	Number Shot and Trapped	% of Total Shot and Trapped	Number Marked	% Marked of Total Shot and Trapped
Adults	32	57	21	38
Subadults	18	32	13	23
Immatures	6	11	2	4
Totals	56	100	36	65

much higher percentages of adults and subadults than the live trap recapture data, it is reasonable to assume that adult and subadult nutria learned to avoid the live traps. Movement from the area can be discounted since all 4 of the nutria equipped with radio transmitters remained in the same dens where originally captured with live traps, and yet were not recaptured with the live traps.

Using data collected from live trapping only, the Schnabel method of population estimation (Overton 1971) gave a population estimate of 129 nutria within the confidence limits of 77 to 199.

Using the shootin and steel trapping data as a single recapture, the Lincoln Index estimate of the population, (Overton 1971) was 89 nutria with the confidence limits of 61 to 123 animals.

The difference between the 2 population estimates illustrates the magnitude of error which may be introduced into a mark-recapture technique by the behavior of the animals themselves. The use of a different recapture method (shooting and steel trapping) is thought to have eliminated much of this error, giving the Lincoln Index the best estimate of the population. This is supported by additional shooting and steel trapping conducted after 7 October 1977. By 31 October 1977, no nutria were seen on Blackcat Lake and feeding sign was rare. At this point a total of 61 animals had been removed from the area. Assuming an 80% control level was achieved on the lake as Evans (1970) felt possible, this figure is compatible with the Lincoln Index estimate.

This report is not intended to advocate any mark-recapture technique, but rather to point out the error which can be introduced into an estimate by learning in the animals being trapped and to document such behavior in adult and subadult nutria. The authors feel that the existence of such behavior must be evaluated in all populations of animals being estimated using mark-recapture techniques and appropriate measures taken to minimize or eliminate the error introduced in this manner. The use of alternate methods for recapture is offered as a simple and practical solution.

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