ECOLOGICAL STUDIES AND REPRODUCTIVE BIOLOGY OF THE NUTRIA

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Abstract. The geographical range and overall population status of the feral nutria (Myocastor coypus) in the United States was reviewed. The species was released or has escaped in virtually all states, but established permanent, thriving populations only in the more mild climatic portions of the West and South. A detailed population study was made of a nutria population found thriving and rapidly multiplying in dairy cattle sewage lagoons in Florida. Nutria foraged extensively on the introduced water hyacinth (Eichhorina crassipes) which formed massive unlimited floating food supplies in the sewage lagoons. Population densities reached 24.7 nutria per surface hectare of water and breeding occurred on a year-round basis without periods of decline. The mean litter size based on embryo counts for 148 pregnant females was 5.75 ± .51 young (range 3 to 12 and mode 5.0 embryos). Nutria are polyestrous, exhibit post-partum pregnancies, and produce an estimated 2.7 litters per year in the dairy lagoons. It is concluded that the nutria is very adaptable to a wide range of ecological conditions in the United States and notably insensitive to certain types of aquatic pollution.

INTRODUCTION

The nutria (Myocastor coypus) is a beaver-sized rodent native to South America which is now widely established in many western and southern states. It often causes damage to the banks of drainage canals and to wetland crops, and thus is a source of considerable interest and concern to man. In the 1930's nutria were brought to Louisiana for a fur farming operation and subsequently were liberated in substantial numbers by hurricanes and by accidental escapes. They quickly colonized and spread throughout the Louisiana marshes. There, they outcompeted and largely replaced the native muskrat (Ondatra zibethicus) which is smaller but possesses a more valuable fur coat.

The purpose of the present study was to determine the population status and reproductive performance of a nutria population found thriving in an unusual environmental situation located in Florida.

MATERIALS AND METHODS

The geographical range and overall population status of the feral nutria was reviewed from the literature and summarized on the national basis as well as for the State of Florida.

A study of the ecological relationships and breeding cycle of Myocastor coypus was initiated in late 1972 and continued throughout 1973 in the vicinity of Brandon and Tampa in Hillsborough County, Florida. It became evident that nutria were exceedingly abundant in barnyard runoff canals and polluted holding ponds maintained by several large milk-producing dairies in the Tampa Bay area. Florida State Health Department regulations require that all dairies keeping high numbers of cows in feeding lots construct a series of polishing pollution ponds to trap and settle out much of the excreta and other organic wastes generated by dairy operation.

In order to quantify the high nutria numbers observed, sampling was conducted in one typical five-acre pollution pond and compared to the nutria density in another five-acre unpolluted farm pond located about one mile away. At both ponds one-day shoots were conducted simultaneously by two groups of three persons each using rifles to harvest all nutria observed swimming or feeding in the ponds during a single eight-hour period.

In order to study the breeding cycle and overall productivity of these high-density nutria colonies with an abundant food supply, individuals were collected at 30 day intervals throughout the 12 months of 1973. They were readily obtained with rifles having telescopic sights during the daytime, and with shotguns using spotlights at closer range at night. Between 25 and 35 nutria were obtained each month and the reproductive tracts removed and fixed in AFA.

Ovaries of females were sectioned serially at 10μ, mounted on slides as interrupted serials and stained with hematoxylin and eosin. Reproductive activity was determined by the developmental status of Graafian follicles and corpora lutea rather than the much less accurate secondary breeding characteristics. One testis from each male nutria was weighed after being cleaned of its investing membrane. The other testis and attached epididymis were sectioned, stained, and examined histologically.

RESULTS

Data collected by Dye (1975) clearly indicates that nutria were released or have escaped in virtually all the adjacent 48 states of the United States. However, permanent thriving populations became established in the more mild climatic locations. These include portions of most of the Gulf Coast states in the South, the shores of Chesapeake Bay in the East, and the valleys of western Oregon and Washington in the Pacific Northwest. By far the most extensive nutria colonies in the country occupy the vast wetlands and marshes of eastern Texas and Louisiana.

With regard to the history of nutria in Florida, they were first reported as exotics there in the 1950's when feral animals were captured in the Panhandle and in the Hillsborough River drainage of west central Florida (Griffo, 1957). The Florida Panhandle colonies apparently resulted from the eastward expansion of populations along the Gulf Coast which originated in the Louisiana marshes (Atwood, 1950). By contrast, the colonies of nutria recorded from the Hillsborough River and other locations in peninsular Florida resulted from escapes or outright releases from abortive fur-farming operations in the 1950's and later.

The results of population sampling for nutria in two ponds in central Florida were surprising in that the pollution pond yielded 50 nutria (24.7

per surface hectare of water) and the unpolluted pond yielded only 12 nutria (5.9 per surface hectare of water) in the identical inventories. These numerical estimates are believed to be fairly close to the actual population present in each pond because no nutria were observed at either site on the day following the inventory. Such differences in the carrying capacity of nutrient-rich ponds versus unpolluted ponds were observed repeatedly throughout the course of this study.

Colonies of nutria are therefore capable of living and thriving at unusually high population numbers in nutrient-rich cattle sewage lagoons. The ecological factor which greatly augments nutria productivity in these polluted waters appears to be a virtually unlimited food supply. The fertilizing effect of dairy runoff waters produces a much ranker growth of shoreline vegetation on a year-round basis which the nutria utilize heavily. In addition to shore vegetation the cattle sewage lagoons are also chocked with a dense carpet of water hyacinths (Eichhornia crassipes) which is a widespread, exotic aquatic weed in Florida originally introduced from South America like the nutria. Florida dairy farmers utilize the water hyacinth to help cleanse the polluted runoff water because of its rapid growth rate and uptake of dissolved substances. Nutria were observed feeding heavily on the water hyacinths and in some limited areas partially decimated them. However, they take mainly the new tender vegetative growth rather than the older tough leaves. The vast floating mats of water hyacinths insure a virtually unlimited supply of fast-growing aquatic plant growth available on a year-round basis.

The age composition of the nutria collected was broken down into adults, subadults, and juveniles based on a combination of body size and pelage characteristics. Juveniles exhibited a duller wooly pelage and weighed less than 1.25 kg. Subadults were in the process of moulting from the immature pelage to the rich-brown adult pelage and weighed 1.25-4.25 kg. for males and 1.00-4.00 kg. for females. Adult nutria weighed 4.25-8.00 kg. for males and 4.00-7.50 kg. for females, and exhibited the dark brown adult fur characteristic of the species. The mean body weight for 145 adult males was 5.52 $\pm$ 1.14 kg. and for 114 adult females was 5.38 $\pm$ 1.06 kg.

The percentage of adults in the monthly samples was fairly constant and ranged from a low of 66.6% in December, 1973, to a high of 78.2% in July, 1974. Juvenile and subadult animals were represented in small numbers in every monthly sample taken during 1974. Nutria in the younger age categories may not have been collected in proportion to their actual numbers because they are smaller, less conspicuous, and presumably less mobile.

The sex ratio for the 360 nutria collected during the one-year period was 200 males (55.6%) to 160 females (44.4%). It is perhaps possible that the greater number of males in the samples reflects their slightly larger size, mobility, or visibility rather than a skewed sex ratio.

Histological examination of Graafian follicles and corpora lutea in adult ovaries revealed that virtually all female nutria were reproductively active on a year-round basis. Federspiel (1941), Matthias (1941), Wilson and Dewees (1962), and others have previously shown that female nutria are polyestrous, that ovulation is induced by copulation, and that there is a post-partum heat period 48 hours after birth of young. In nutria taken from the cattle sewage lagoons, no obvious seasonal peaks or valleys in female breeding activity were evident, and virtually every adult female collected during the twelve-month period was pregnant and/or lactating. This contrasts with the reproductive cycle of nutria studied in the natural Louisiana marshes where Adams (1956) reported that there was a main breeding season in December and January and a secondary one in June and July.

Adult males examined in all twelve monthly samples exhibited large quantities of spermatozoa in the seminiferous tubules and epididymides. No obvious seasonal changes in testis size or signs of regression in spermatogenic activity were observed in the adult males collected during 1974 from the sewage ponds. The mean testis weight for adult males was 4.80 ± 0.76 gms. and the range was 4.0 to 6.5 gms.

The mean litter size in the dairy pond nutria based on embryo counts from 148 gravid females was 5.57 ± 1.51. The range in number of embryos per female was 3 to 12 and the mode was 5.0 embryos. In a Louisiana study by comparison, Federspiel (1941) and Adams (1956) reported the mean fetus count was 5.0 and the range 1 to 11. This strongly suggests that litter sizes are significantly higher in Florida pollution pond nutria than in Louisiana.

The length of the gestation period in nutria is reported by Skowron-Cendrzak (1956) to average 134 days (range 129-139 days). This length of gestation suggests that with a continuous breeding period under non-limiting environmental conditions, approximately 2.7 litters could be produced per adult female per year. In these Florida nutria, this would represent a total maximum reproduction potential which would average 15 young per adult female per year.

DISCUSSION

Juvenile mortality rates appear to be minimal at least from predation losses in pollution ponds, because virtually no nutria predators live in the dairy sewage lagoons. The American alligator (Alligator mississipiensis), which is an important potential nutria predator elsewhere in Florida, does not appear able to thrive in the polluted dairy ponds. The possible adverse effects of pathogenic bacteria, viruses, parasites, etc., on nutria survival and health could not be assessed, but little evidence of diseased, dying, or unhealthy animals was noted during the course of the one-year study.

Thus, the combination of a high reproductive potential and a continuous breeding season, coupled with an unlimited food supply under the mild semi-tropical climatic conditions in Florida seems responsible for the very high observed population densities of nutria in dairy pollution ponds. I conclude that the nutria is extremely adaptable to a wide range of aquatic conditions and apparently rather insensitive to dairy pollutants. This species thus exhibits the potential of being as ubiquitous in certain disrupted aquatic systems as is the black rat (Rattus rattus) under more terrestrial situations in many portions of the world.

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