

OBSERVATIONS ON THE BEHAVIOR AND ECOLOGY OF THE NUTRIA IN LOUISIANA

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ABSTRACT

A population of feral nutria (*Myocastor coypus*) on Tulane University's Riverside Campus near Belle Chase, Plaquemines Parish, Louisiana, was observed at 2-3 day intervals from January 29, 1967, through July 11, 1967. Twenty-eight nutria were trapped, marked with permanent numbered tags and with distinctive field markers, and released. There were 21 recaptures. Activity peaked at noon, late afternoon, and late evening. No observations were made of predawn activity. The major type of activity changed from sunning to constant grooming and feeding with increasing ambient temperatures. Solitary nutria were rarely observed. Daily cruising ranges of nutria were usually less than 200 yds. Preference was shown for areas of shade and areas covered by duckweed. Nutria lived colonially in large dens built into the banks of ponds. Each colony lived in a separate den; a typical colony consisted of 15-20 nutria. No nests or platforms were built; instead, floating objects or exposed roots of willow trees were utilized for sunning and feeding. The main diet was duckweed (*Lemna minor*, *Wolfia* sp., and *Wolffiella floridana*) and white clover (*Trifolium* sp.).

Within each social group, there was one alpha female and one alpha male; all other animals were equally subordinate. The alpha female dominated the alpha male. Aggression consisted of warning sounds ("mooring") and chasing subordinate animals. Fighting was ritualistic in the water. There was little care of young by the mother and no attempt was made to protect them from predators. Garfish, snakes, and red-shouldered hawks took young nutria. Man was the major predator on adult nutria. When alarmed, nutria assumed a "watching" position in the water, or dived underwater, slapping the water with the hind feet to produce an alarm sound.

The South American beaver or nutria, (*Myocastor coypus*), is a large hystricomorph rodent which was first successfully introduced into Louisiana from Argentina by E. A. McIlhenny in March, 1937, as a fur animal to be raised in captivity. The subspecies found in Louisiana and Texas, according to Lowery (1943), is *Myocastor coypus bonariensis*, a form native to northern Argentina, Uruguay, Paraguay, and southern Brazil. Many nutria which escaped or were released from fur ranches have established feral colonies throughout Louisiana (Harris, 1956). These colonies have done great damage in agricultural areas, especially to rice and sugar cane crops (Evans, pers. comm.). In an effort to develop some method of control, much interest has arisen in the behavior and ecology of nutria.

Tulane University's Riverside Campus near Belle Chase, Plaquemines Parish, Louisiana, supports a moderately large, relatively isolated population of nutria. The purpose of this paper is to report on a study of the habits and habitat of this population of feral nutria.

Description of Study Area

Three interconnected ponds (comprising an area of 130,000 sq ft) were chosen as the study site. Two biotic communities were found around these ponds. Disturbed areas, which had been cleared of trees and shrubs, were in closely-cropped grass and white clover, *Trifolium* sp. Undisturbed areas, which surrounded the ponds on three sides, were typical lowland wooded habitat. The dominant vegetation was *Acer rubrum*, *Ulmus americana*, *Populus deltoides*, *Acer negundo*, *Salix nigra*, *Myrica cerifera*, *Quer-*

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cus virginiana, *Corundus drummondi*, *Celtis laevigata*, and *Sambucus canadensis*. Several species of the mustard family grew along the water's edge wherever there was sufficient sunlight.

During this study, the ponds were always covered to some extent by a mixture of *Lemna minor*, *Wolffia* sp., and *Wolffiella floridana* (all referred to as "duckweed" in the remainder of the paper). During February and early March, this cover was relatively sparse, but by April, a thick blanket of aquatics covered the ponds. All ponds contained numerous underwater fallen logs on which the nutria sat while eating. Many of these logs were later exposed when water levels in the ponds dropped.

METHODS AND MATERIALS

Nutria were observed in the study area at regular (2-3 day) intervals from January 29, 1967, through July 11, 1967. Attempts were made to observe nutria activity at all hours, but due to lack of adequate night-viewing equipment, most observations were made during daylight hours. Observations usually lasted 3-4 hours (for a minimum total of 200 hrs), and whenever possible, air and water temperatures, as well as current water conditions, were recorded for each group of observations. Most observations (75%) were made from a boat in the center of the first pond.

Nutria were trapped, marked, and released during three different periods. On March 1, 1967, ten traps were placed around the edges of two ponds in areas showing definite signs of nutria activity. Traps used were double-door treadle traps, 10" × 10" × 32", baited with carrot cubes. Traps were set with both doors open. These traps were removed on March 10, 1967. On April 19, 1967, one 4' × 4' raft was placed in the center of the first pond. During the second period of trapping, four traps of the same size as above, baited with carrots, were placed on this raft and trapping continued for six days (April 24-30). On the raft, only one door of each trap was opened and the traps were arranged so that each one had a "lead-in" of carrot bits. On May 19, 1967, a second raft, 4.5' × 6.5', was placed on the third pond. During this period of trapping, six traps were placed on this raft and four traps were placed on the raft in

the first pond. Trapping started on June 26, 1967; all traps were removed on July 2, 1967.

Each captured nutria was removed from the trap by means of a handling bar, measured, weighed, and then marked in three ways: by a National #3 metal numbered tag through the cartilage of the left ear, by a correspondingly numbered #3 tag in the webbing of the left hind foot, and by a distinctively colored plastic flag pinned by a stainless steel safety pin through the skin of the nape of the neck. The numbered tags were for long-term identification; the nape marker was for field identification and was generally short-term due to sloughing. Each animal was released at the site of capture.

If a nutria was recaptured, the location of the trap and the animal's number were recorded. The nutria was then measured and weighed, and if necessary, the nape marker was replaced.

Samples of the vegetation around the study ponds were collected regularly from February through July, 1967. Specimens were pressed, dried, identified, and placed in the Environmental Biology Herbarium of Tulane University to be mounted at a later date.

RESULTS AND DISCUSSION

In the first ten days of trapping, 19 nutria were marked and 3 were recaptured. Marked animals included 8 adult females, 5 juvenile females, and 5 juvenile males. One adult male was taken. Two juvenile females and 1 juvenile male were recaptured. In the second period of trapping, 5 nutria (3 juvenile males, 1 juvenile female, and 1 adult female) were recaptured a total of 11 times, but only 1 new animal, a juvenile male, was marked. During the last trapping period, 8 nutria (4 juvenile females and 4 adult males) were marked and 4 animals (2 juvenile females, 1 juvenile male, and 1 adult female) were recaptured a total of 7 times. Age determination was in accordance with the findings of Atwood (1950): all animals with a total length greater than 29.5 inches were considered to be adults. Total lengths at initial marking varied from 23.3 inches (a juvenile male) to 36.1 inches (an adult female); 54% were less than 29.5 inches, that is, were juveniles. Insufficient data were obtained

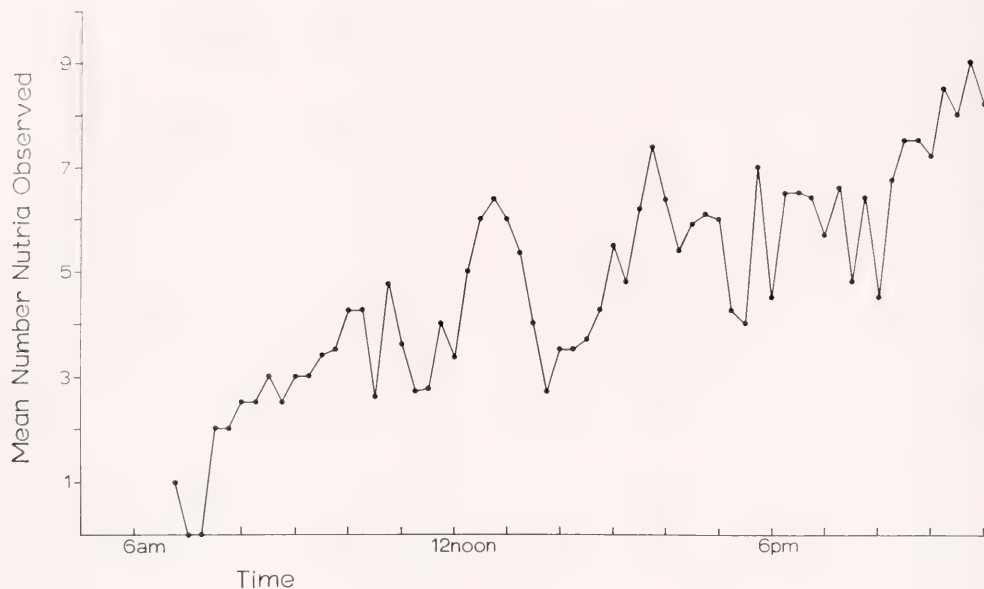


Figure 1. Mean number of nutria observed at different hours of the day.

from recaptures to determine any growth increments.

Recaptures were low. The nutria became trap-shy very rapidly, particularly if the traps were placed on land. One individual was recaptured 7 times, but 7 other nutria were retrapped less than 4 times each.

Only observations on nutria with field markers were recorded. Of the 28 nutria marked, 5 were never seen again, 13 were seen only once, and 7 others were seen on 5 or more separate occasions. The low number of sightings may have been due to the sloughing of field markers during the study. Thus, many of the animals originally marked may actually have been present but not recognized.

Activity

Nutria were active periodically throughout the day and night. Activity (based on the number of animals seen at any given time) peaked at noon, late afternoon, and late evening (Fig. 1). No observations were made of predawn activity. Chabreck (1962) found that activity was highest during the night, peaking just before sunrise. On the other hand, Norris (1967) reported greatest activity between 1800 hrs and sunset, when nutria were grazing. He observed only a

limited amount of activity at night. Increased activity during dawn hours was below the peak amount seen prior to sunset.

Davis and Jenson (1960) reported that in England in cold weather, more nutria were seen in the daytime than usual. This did not appear to be the case at Riverside. The number of animals observed at any given time did not change with temperature, but the type of activity did change. At temperatures up to approximately 27° C, most nutria were seen lying in groups of three or four, sunning or sleeping. The areas chosen for this were generally the same (Fig. 2), but at ambient temperatures above 15.5° C, only those not in bright sunlight were used. At night the major activity changed from sleeping to eating; grooming was rarely observed. At temperatures above approximately 28° C, most nutria were seen eating, with frequent grooming; few were seen sleeping. When the temperature exceeded 34° C, no animals were seen sunning. The nutria spent most of the time grooming, or swimming about, frequently stopping to eat for a short period before swimming again.

Single nutria were rarely observed. Generally, two or more nutria were in the same area; the maximum number seen together

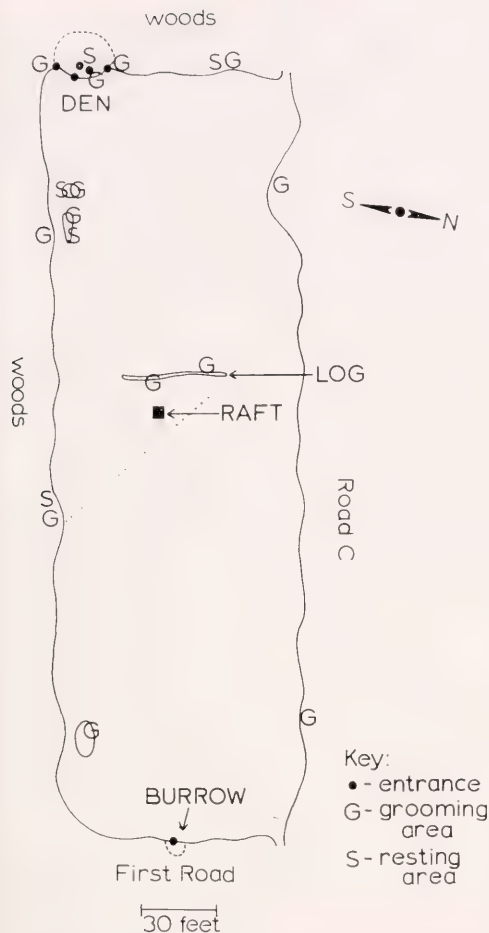


Figure 2. Map of one of the ponds studied showing locations of den entrances, grooming stations, and resting areas. Nutria were seen eating only to the left of the dotted line during the day, but were seen on both sides of the line at night.

was 13. The only exception to this was in the case of several adult males, which were always seen alone.

Movements

Most nutria remained in the study area. Of animals marked, six were observed in the pond adjacent to the original trap site, and three were seen two ponds away (approximately 300 yds) from the original trap site. Only one marked nutria, a large female, was seen further from the study area, at a distance of 600 yds. Adams (1956) and Kays (1956) found that in southwestern Louisi-

ana, daily cruising ranges of nutria rarely exceeded 200 yds and that nutria usually remained in one general area throughout their life. Norris (1967) observed that males ranged farther and most movements out of the home area were made to exploit temporary food supplies. At Riverside, although the only marked animal found outside the study area was a female, a few males were observed wandering alone, at distances up to 200 yds from a pond. These animals were generally grazing on clover.

Movements of nutria within the ponds were closely correlated with the location of duckweed (when the ponds were only partially covered) and with amounts of shade. A preference was always shown for areas of the ponds covered with duckweed, even if the animal was not feeding at the time. At high ambient temperatures, a preference was also shown for shady spots, both in ponds and on land. Nutria suffer from heat prostration if exposed to hot sun for any length of time (Evans, pers. comm.) and were rarely seen in brightly sunlit areas except when moving from one section of a pond to another or when sunning at ambient temperatures below 15.5° C.

Burrows

Nutria lived in large dens in the banks of ponds. A den usually had 3-5 above-water entrances and at least two below-water entrances. The surface of the den was free of vegetation and slickened from the constant activity of household members. Each den complex covered an area 13-18 ft in width, extending into the bank to a depth of 10-13 ft; the height of the top of the den above water varied from 4 ft to 10 ft. Each underwater opening was 8-10 inches in diameter, but above-water entrances were larger (20-30 inches) and often opened into two or more tunnels extending back into the den. Water levels in the ponds dropped 21 inches during May and June, so that many underwater entrances were revealed.

In addition to large dens, there were also many simple burrows with 1-2 openings into the bank close to water level.

Ashbrook (1948) reported that each pair of nutria builds its own burrow. They work in and up until they are well above water level, then a space is cleared and grasses deposited. As the family grows, the burrow

is enlarged, since the offspring from the original pair continue to live in the same burrow. Eventually the burrow, now a den, becomes the home of a large colony. As long as the water supply is sufficient and food plentiful, the colony will remain in the same locality.

Observations of colonies at Riverside agreed with the findings of Ashbrook. Each colony lived in a separate den and spent most of the time in the "home" pond. The number of active dens per pond and the number of individuals in each colony varied. A typical colony consisted of 15-20 nutria and was composed of approximately equal numbers of adults and juveniles and of males and females.

No nests of the type reported by Laurie (1946) were observed, nor did nutria build platforms for sunning, as reported by Atwood (1950). Instead of platforms, nutria utilized floating logs or exposed roots of willow trees located in the water near the pond's edge. The size of the areas varied from 2-3 ft $\times$ 6-10 ft and were 2-17 inches above water. Sticks and bits of bark were carried onto these constantly. Most sunning was done in these areas; nutria usually lay in close contact, often partly on top of each other. These areas were also used to some extent as grooming areas (Fig. 2).

Feeding

Feeding appeared to be a major activity of nutria when they were not in the dens. Shady areas were usually chosen for feeding locations. The main diet consisted of duckweed and white clover, but occasionally red maple leaves or bark of willow trees were also eaten. Swank and Petrides (1954) and Atwood (1950) listed many foods consumed by nutria, but neither included duckweed or clover as a major component of the diet. Laurie (1946) noted that in England, nutria barked trees only in captivity.

When eating a maple leaf or a piece of carrot, the nutria sat up on its hind feet and held the food item in its forepaws. Duckweed was eaten with a shovelling motion, both forepaws scooping it into the mouth with a rapid, coordinated motion.

Young nutria ate duckweed in the same manner as adults, except that motions were less well coordinated, much more rapid, and frequently resulted in the young animal get-

ting a face-full, rather than a mouthful, of the aquatics.

Nutria did not form feeding platforms from non-eaten material, as mentioned by Swank and Petrides (1954), nor was food carried to specific feeding stations, as observed by Atwood (1950). Both previous studies were in a marshy habitat, where cattail, bulrush, and other coarse emergents were utilized to a great extent. At Riverside, the ponds contained no such vegetation; the only food carried was an occasional leaf or piece of bark.

As reported by Atwood (1950), whenever possible, nutria utilized floating objects capable of supporting their weight, such as large branches, planks, or logs. If these were not available, shallow or exposed areas along banks were used. In either case, forepaws were left free to hold and manipulate food. Occasionally a nutria would swim around slowly as it ate, paddling with the hind feet, using the tail as a rudder, and scooping duckweed with the forefeet.

Although duckweed was the major component of the diet, clover was also eaten, mainly during hours of darkness. Nutria appeared to select primarily the clover blossoms, leaving leaves and stems, as well as surrounding grasses, untouched.

Grooming

Periodically a feeding nutria would stop and groom itself thoroughly. Young animals stopped to groom more often than adults, but they appeared to be less efficient at removing duckweed from the fur. Grooming always started with much scratching of the sides and stomach by the hind feet. Then the fur was groomed, using the forefeet. The grooming motion is back and forth, rapidly, with the apparent intention of roughing the fur rather than cleaning it; the forefeet were never licked to remove the dirt and duckweed gathered from the fur. Forefeet were used together whenever possible, especially on the head, stomach, and chest. They were used out of phase or only one at a time when grooming the flanks, axilla, and back. Occasionally the teeth were also used, especially on the flanks. Most attention was paid to the abdomen, insides of the flanks, and genitalia. After these areas were thoroughly groomed, the head was cleaned and attention was given to the rest of the body.

Grooming motions appeared to be somewhat stereotyped. Nutria were observed to continue grooming even in a pouring rain, just as if they were dry. A young nutria which was kept in captivity exhibited exactly the same pattern of grooming as animals in the wild, even though it was neither wet nor covered with duckweed. There was never any evidence of mutual grooming; each individual groomed only itself.

Dominance Relationships

A simple hierarchy existed among nutria in the ponds. Within each social group, there was one alpha female and one alpha male. All other animals were equally subordinate; that is, there was no dominance among subordinate members of the group. The alpha female exhibited aggressive behavior towards the alpha male and all subordinate females. The alpha male exhibited aggressive behavior towards all subordinate males and females. Only when the alpha female was in estrus was she submissive to the alpha male.

Dominance was expressed by the alpha animal chasing the subordinate individual. The dominant nutria would swim up very rapidly to a subordinate nutria, sometimes "mooing" several times either before or during the approach. Response in the subordinate animal was generally flight. When the aggressive nutria approached within 5-10 ft, the subordinate animal would dive with a loud splash, swim underwater for a considerable distance (20-100 ft), and re-emerge. The dominant animal usually turned 180° at the spot where the other had dived and would begin to feed or groom, paying no attention to any other nutria.

During the course of the study, the dominant female in one of the social groups was displaced by a subordinate female. While the subordinate female was establishing her superiority, she continuously chased all other females and occasionally also chased the males. None of the nutria actually fought with her, although the original alpha female sometimes waited until the last moment before retreating. Dominance was established in 2-3 weeks, but the exact time is not known.

Actual fighting was observed in only four instances. In each case, a male was persistently sexually aggressive toward the al-

pha female when she was not in estrus. When the male ignored warning sounds (low-pitched "mooing") from the female, she turned on him and they fought literally tooth-to-tooth. During this battle, the only sounds were the gnashing of teeth as the nutria lunged at one another with mouths open, pushing incisors against incisors. Although there appeared to be some attempt to bite the opponent, the main effort was directed at the opponent's teeth. Most fighting took place with heads above water; occasionally the animals rolled underwater and re-emerged splashing as each tried to overpower the other by pushing its head underwater. In the four fights observed, after less than 3 minutes the male exhibited the typical subordinate flight pattern described above.

Whenever a male was rebuffed in his efforts, he spent much time grooming himself and marking the area. Marking consisted of dragging the genitalia (penis extruded) over logs, rocks and any other objects which might be encountered. The male also would raise his tail, back toward the object to be marked or just back up the bank, then urinate backwards in spurts carrying 2-3 ft behind him.

Reproductive Behavior

When the dominant female approached estrus, as judged by the increasingly swollen condition of the external genitalia, both she and the adult males spent more time grooming. Frequently they alternated areas where they sat to groom, so that first a male, then the female, sat on a certain log or part of the bank. Each spent much time sniffing spots where the other had been. But until the female was actually receptive, she continued to chase any aggressive males that came closer than 10-15 ft.

Copulation was not observed but probably took place in the woods. After much vocalization and grooming, the female would follow the male into the woods. Several minutes later when the pair emerged, the female was completely submissive to the male, following him in the pond and being chased when she approached nearer than 3-4 ft to him. There was more vocalization ("mawing") between male and female during this time, always soft and in an alternating chorus.

Receptivity is reported to last 2-3 days (Ashbrook, 1948). At the end of this time, the female again became the dominant member in the relationship.

Care of the Young

There was little care of the young by the mother. All nursing took place inside the den. Frequently when the mother sat in one of the den openings, young crawled over her head and back. Occasionally, the mother nuzzled them, but she never groomed them.

When the young were out of the den, the mother did not stay near them. If one of the young called to her, she answered and sometimes went to it. Always, when the mother came up to one of the young, she first touched noses with it, then either swam on by it or stopped to eat. If a young nutria swam up to the mother, again, touching of noses occurred first. Frequently a young nutria swam around the mother, under her chin, nuzzling her, before it stopped to feed.

Other members of the group also looked after the young. As the young grew more adventurous and became better swimmers, they swam farther away from the den. The young always stayed together or with another member of the colony. Generally a young nutria swam out to a juvenile that was feeding nearby. After touching noses, the young nutria would begin to feed, facing away from the juvenile but still touching its body. Often the juvenile would swim away without the young noticing. The young nutria would continue to eat for a few minutes, then suddenly realize it was alone, and with a startled cry, head back to the den as quickly as possible.

Juveniles often played with young nutria and generally spent much more time with them than did the mother. This may have been because the adult nutria were never observed to play or do much adventuring, whereas young nutria were continually chasing each other, splashing in the water, and investigating everything.

There appeared to be no attempt to protect young from predators. When the mother was frightened, she would run away and leave the young to fend for themselves. Depending on how badly frightened she was, the mother might or might not return for

them. It was by frightening away the mother of a litter of five that I managed to catch a baby nutria, which was kept in captivity for four months.

Predation

In the United States, as in England, nutria still have few natural enemies. Man and severe winter weather take the largest toll of nutria in England (Newson, 1966). In the western United States, bobcats and coyotes prey to some extent on nutria, but in the southern United States, predatory birds are the only major predators besides man (Harris, 1956). In the study area at Riverside, garfish (*Lepisosteus* sp.), cottonmouths (*Ancistrodon piscivorus*), and red-shouldered hawks (*Buteo lineatus*) were observed to take young nutria. Only one adult was found killed by another animal, possibly by a bobcat (*Lynx rufus*).

Although at Riverside nutria had few predators except man, they were extremely wary and could disappear very quickly. When mildly alarmed, a nutria would swim behind a log or a branch sticking out of the water. Only its head and back would be above the surface; this was the "watching" position. If a nutria was on land when frightened, it would dash for the pond, enter with a splash, dive, and when it re-emerged, assume the "watching" position described above. As long as the animal was alarmed, it remained completely motionless and in this position easily passed as a log.

When a nutria was frightened to a greater degree, it would dive underwater, slapping the water with its hind feet as it did so. The resounding sound of this splash alerted any other nutria in the area and these also disappeared. Generally the dive lasted 30 sec, and the nutria again emerged at some distant, hidden spot. But occasionally when badly frightened, a nutria would remain submerged for a much greater length of time. Sooter (1943) reported a nutria remained underwater for 3 min 15 sec, but the longest dive observed at Riverside lasted less than 2 min.

No attempt by one animal to protect another was ever observed. Each nutria had to fend for itself, including the young, as discussed earlier.

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