Poster Presentation

Managing Invasive Nutria: The Role of Olfactory Cues

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ABSTRACT: Nutria were introduced from South America to the United States in the 1930s for fur farms and, due to releases and escapees, are currently established in 15 states. Nutria are important to the Louisiana fur industry, but they also cause extensive damage to coastal marsh ecosystems when populations are high. Louisiana uses an incentive program for hunters and trappers during trapping season (winter), which helps to control the fast-growing nutria populations. While this approach is effective, additional management tools are needed to control nutria year-round and over large areas. Other tools for nutria control include toxicants, baits and lures, and multiple-capture traps. In this study, we evaluated nutria responses to olfactory cues in a Y-maze that potentially could be used as lures in traps or bait stations. Three olfactory cues were selected more frequently than others: Nutria #1 (apple-based commercial lure), nutria gland secretion, and female nutria fur extract. We also evaluated attention by nutria to two species of fertilized and non-fertilized marsh plants that potentially could be used as lures in multiple-capture traps on coastal marsh. Nutria did not show a strong preference for either plant species, but they gave significantly more attention to fertilized plants than non-fertilized plants or soil treatments. Results with nutria urine were equivocal. The materials identified in this study show potential for the development of additional tools to manage nutria populations and their impacts on coastal marsh ecosystems.

KEY WORDS: attractant, coypu, invasive species, lure, *Myocastor coypus*, nutria

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INTRODUCTION

Nutria (*Myocastor coypus*) were introduced from South America to the United States in the 1930s for fur farms and are currently established in 15 states (Willner 1982). Nutria are important to the Louisiana fur industry, but cause extensive damage to coastal marsh ecosystems at high densities (Grace and Ford 1998, Marx *et al*. 2004). The Louisiana Department of Wildlife and Fisheries (LDWF) uses a payment-incentive program to increase nutria harvest efforts by hunters and trappers, which helps control the rapidly growing populations (Marx *et al*. 2004). While this approach is effective, additional management tools are needed to control nutria outside of the trapping season and that, when used with hunting and trapping, would maintain lower nutria densities. Other potential tools for nutria control include toxicants, induced infertility, repellents, and baits and lures (Mach 2002). Social odors play important roles in rodent biology, affecting both behavior and reproduction and functional odors are produced in urine, feces, and from several glands (Macdonald and Fenn 1994). Development of nutria attractants, such as baits and lures, to increase the effectiveness of kill-traps, live-traps, or rodenticide bait stations is a research priority. Effective lures could significantly improve control efforts of nutria. The objectives of this study were to use wild-caught captive nutria to identify potential olfactory cues in Y-maze trials; assess marsh vegetation and fertilizers as attractants; and assess nutria urine as an attractant. Our research builds on the earlier work of Nolte *et al*. (2004).

STUDY AREA AND METHODS

This study was conducted at the outdoor pens of the Louisiana Department of Wildlife and Fisheries in New Iberia, Louisiana. The LDWF assisted in the live-capture of nutria, using airboats, from nearby marshlands. Nutria were maintained in groups of 5-8 per pen. Each pen had a pond that was cleaned daily. The nutria were maintained on a diet of rodent chow pellets and sweet potatoes.

Y-Maze Trials

For Y-maze trials, we conducted 2-choice trials with a test material in one arm and distilled water in the other. Right and left arm assignments of odors and water were randomized. One cc of a test material or distilled water was placed on filter paper in a shallow tin pan and placed at the end of its assigned arm of the Y-maze. An exhaust fan mounted above the start box (base of the maze) pulled air through the maze at 8.3 m/sec. Nutria were placed in the start box and released into the Y-maze by the observer who lifted a black, plastic drop door via a pulley system. The observer sat on a platform within a blind near the fork of the Y-maze where the choice point (fork of the maze) and selection points (SP; 2/3 distance from the choice point toward the end of the arms of the Y-maze) were visible by direct observation. The trials were conducted at night using red lights. If after 5 minutes a nutria did not reach a selection point, a "no choice" was recorded. Test odors consisted of food flavors and fragrances, commercial nutria lures, and synthetic anal gland secretion or fur extract from nutria. Twenty-four adult nutria were divided into 3 groups of 8, with 4 males and 4 females per group. Each of the 8 animals within a group was exposed only once to each odor within an assigned odor group. *Post hoc* Fisher exact test estimates and one-sample proportion tests were run to detect differences in treatment selections versus non-treatment selections.

Marsh Vegetation Trials

In marsh vegetation trials, groups of nutria were left overnight in a long, narrow, outdoor enclosure. Two rows of 15 holes each, 1 m apart, were dug in each end, or arm, of the pen for placement of potted plant containers. Vegetation or fertilizer treatment groups were randomly assigned to a pen arm (left or right), and individual containers were randomly assigned a hole within an arm (1-15 or 16-60) for each trial. For each trial, nutria were released at the center point of the pen. We evaluated mean time spent by nutria at treatments of potted plants (*Panicum hemitomon* or *Spartina alterniflora*), soil, and fertilizers (foliar spray or soil-based). The three types of fertilizer treatments for each species were 1) plants fertilized with a soil-based slow-release fertilizer tablet and Osmocote® (The Scotts Co., Marysville, OH) slow-release pellets placed in the soil every 30 days during preparation, 2) plants fertilized with Miracle-Gro® (The Scotts Co., Marysville, OH) foliar spray applied once a week, and Osmocote® pellets placed in the soil every 30 days, and 3) plants without fertilizer. Twenty-four adult nutria were captured and divided into 8 groups of 3 individuals, each with mixed sexes. Each group was left overnight in the pen and trials were video recorded with infrared cameras. We used ANOVA tests to determine if preferences were shown for plant species, fertilized versus non-fertilized plants, and type of fertilizer.

Nutria Urine Trials

In one nutria urine trial, we sprayed a trail of female nutria urine along the ground to determine if individual nutria detected and followed the trail. Twelve adult nutria (6 male, 6 female) were released, one per trial run. The percentage of times a nutria passed through an entry marked with urine was determined. In another nutria urine trial, we examined the attractiveness of male urine versus female urine to 3 (all-male, all-female, and mixed sex) groups of nutria left overnight in the long, narrow, outdoor pen. Each end of the rectangular pen had burlap bags soaked in either male or female nutria urine (called urine zones). We determined the mean time per event spent by nutria in each urine zone, the number of events with direct contact of the urine, and the frequency of the maximum number of nutria in a urine zone.

RESULTS AND DISCUSSION

Y-Maze Trials

In Y-maze trials, the three odor cues selected most were Tom's Nutria #1 (apple-based commercial lure), nutria anal gland secretion B, and female nutria fur extract (both of the latter are synthetic formulations). Statistical analyses for each odor, however, indicated no statistically significant difference in treatment versus non-treatment selections. This may have resulted, in part, because many nutria did not make a selection in the allotted time.

Marsh Vegetation Trials

Nutria spent significantly more time, on average, at containers with plant material than without (i.e., soil only). However, there was no statistical significance in the time spent at *Panicum* versus *Spartina* plants. Although the results indicated no statistical significance for time spent at or for visitation frequency of the two plant species, nutria gave approximately 3 times more attention to, and visited twice more frequently, *Panicum* plants (a total of 6,337 seconds in 124 visits) than *Spartina* plants (2,133 seconds total in 58 visits). The statistical insignificance was likely due to the large variation in time spent at *Panicum* by nutria. For example, nutria spent a total of 20 minutes (in 8 visits) at an individual *Panicum* plant during one trial. The next most amount of time spent at any treatment was 8 minutes (in 4 visits).

Nutria did spend more time at fertilized containers than non-fertilized containers. Nutria spent significantly more time at fertilized plants, on average, than at non-fertilized plants. However, fertilizer type (foliar or soil-based) did not influence the time spent by nutria at containers.

Nutria Urine Trials

In urine trials, results suggested that nutria did not detect, or choose to follow, the urine trails. In group trials with nutria urine, the mean time per event spent in the male urine zone versus the female urine zone was different only for the mixed-sex nutria group. Additionally, the all-male nutria group most actively investigated the source of odors relative to the other two groups.

MANAGEMENT IMPLICATIONS

Effective attractants could be used to improve nutria trap success or could be used to lure nutria to bait stations, multiple-capture traps, or to detection sites (i.e., remote camera sites). Several materials were identified in this study with good potential to improve the management of nutria populations and to reduce marsh ecosystem damage by this introduced herbivore. The study identified attractive olfactory cues for nutria that warrant further assessment in the field. Two olfactory cues were synthetic formulations of nutria biochemicals. Further research on nutria biochemicals as attractants may improve the development of effective nutria lures. Hand-reared, fertilized marsh plants may be a useful lure on coastal marshes prior to new spring growth. When used inside multiple-capture traps, several nutria could potentially be removed from an area with relatively low loss to hand-reared marsh plants used in restoration efforts. Nutria urine is worth examining under field conditions, even though our results did not indicate a strong attraction, because it is another nutria biochemical that would be relatively easy and inexpensive to acquire for use as a lure in the field. The use of these attractants for removing a few individuals in areas of low nutria population densities would also be an area of future research worth pursuing.

Although this study identified several potential nutria attractants, field trials are needed to determine if the attractants are effective with free-ranging nutria along with the duration and distance of attractiveness. Fine-tuning might be required to determine the concentration required and if encapsulation or other devices might prolong the effectiveness of the attractants. Currently, field trials are in the planning stage.

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