# Eradication Strategies for Nutria in the Chesapeake and Delaware Bay Wetlands
# Phase II of the Maryland Nutria Project

**July 2003**

## The Maryland Nutria Management Team

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## Introduction

The Marsh Restoration: Nutria Control in Maryland Pilot Program (Bounds 1998) was designed in two phases with the expressed goals of generating an efficient strategy for eradicating nutria *(Myocastor coypus)*, implementing innovative marsh restoration techniques, and educating the public about the importance of sustaining the Chesapeake Bay's dwindling wetland resource. During phase I, data were collected to determine nutria population size, movement, physiological health, and reproductive status.

This protocol outlines the methodology being followed in Phase II to determine whether nutria can be eradicated from the coastal wetlands of Maryland's Eastern Shore using a subset of wetland acreages encompassing Chesapeake Marshlands National Wildlife Refuge Complex (CMNWRC) Blackwater Unit, Fishing Bay Wildlife Management Area (FBWMA), and Tudor Farms (TF). These are contiguous properties with a total of about 60,000 acres in Dorchester County, Maryland. Phase II is simply called the Nutria Project. This program is predicated on the assumption that nutria can be eradicated from local environs to the extent that the population cannot subsist. Efforts in Great Britain demonstrated that nutria can be systematically eradicated in an island population. A number of population studies both in Great Britain and the United States also have demonstrated that most nutria have small home ranges, if habitat remains supportive, thus making the nutria susceptible to intensive trapping strategies.

Decades of random commercial and recreational trapping and hunting of nutria in the study area have not significantly affected nutria population growth. Phase II is designed to systematically eradicate local nutria populations and to detect and eliminate remaining or transient nutria that could re-infest depopulated areas. In this way, the systematic trapping, shooting, and use of other lethal means to remove nutria will drive the existing population on these areas toward a population of zero in a way that random, commercial trapping could not. A report describing the results of this study will be drafted to include the cost of eradication (or control and containment, if eradication is not possible). Results are expected to be applicable to a broader nutria eradication or population control effort (if eradication proves infeasible) across the 4 southern counties of Maryland's Eastern Shore and beyond.

The eradication effort is a portion of a larger project, which includes (1) the restoration of marsh damaged by nutria and (2) an on-going effort to educate local, national, and even international audiences about nutria, the importance of wetlands, and the damage that exotic, invasive species can do to native habitats and species.

## Brief Project History

The U.S. Fish and Wildlife Service (USFWS) Chesapeake Bay Field Office (CBFO) and Chesapeake Marshlands National Wildlife Refuge Complex; the U.S. Department of Agriculture AHPIS Wildlife Services; the U.S. Geological Survey (USGS) Cooperative Fish and Wildlife Research Unit; the U.S. Army Corps of Engineers; Tudor Farms, Inc.; the Maryland Department of Natural Resources; and the University of Maryland Eastern Shore make up the Nutria Management Team and administer the Project. A partnership of 22 organizations has supported the Pilot Project.

In 1997, the U.S. Geological Survey conducted a study in Dorchester County, Maryland on the CMNWRC Blackwater Unit to compare the relative contribution of nutria to the decline of brackish,

three-square bulrush (*Schoenoplectus americanus*) marsh with sea level rise, saltwater intrusion, land subsidence, and erosion. This study concluded, through the apparent restoration of the marsh within exclosures designed to exclude nutria, that nutria activity is a principle factor in the decline of this marsh habitat.

In 2000, USFWS conducted an Environmental Assessment (EA) in compliance with NEPA. The EA evaluated nutria damage management alternatives designed to protect marsh habitats throughout the Chesapeake Bay. The EA analyzed alternatives to reduce or eradicate nutria populations and the associated damage in the marsh, and the potential environmental and social effects of each alternative. The USFWS issued a "Finding of No Significant Impact" for the Nutria Pilot Program as proposed in the EA.

The Pilot Project Proposal was drafted and submitted to Congress for funding in 1998. It proposed a two-year project consisting of collection of baseline population data for Maryland's Eastern Shore nutria population and one year to test eradication strategies. The collection of data was recommended by Dr. Morris Gosling, who spearheaded the successful nutria eradication effort in Great Britain in the 1980's. Dr. Gosling recommended that the Nutria Management Team attempt to ascertain differences between the population ecology of Maryland nutria and British nutria populations and to use the analyzed data to test eradication strategies. Data were collected to affirm or better estimate nutria population size, investigate movement, and examine physiological health and reproductive status of nutria in the Maryland study area.

Data were collected for two years, between 2000 and 2002, as proposed in the Pilot Project Proposal (Phase I). At that point, it became clear to the Nutria Management Team that nutria in Dorchester County, Maryland, were very similar to other closely examined nutria populations around the world, and that data from Phase I could be adaptively applied, along with documented nutria information in the scientific literature, to an eradication program. The Management Team also determined that, in order to test whether or not it was feasible to eradicate nutria on the Eastern Shore, it was necessary to conduct an applied, adaptive eradication strategy rather than to further test methods and compare results with specific population ecology data.

Through its experience during Phase I, the Management Team estimated the effort needed to eradicate nutria on the three parcels of property that were the focus of Phase I (CMNWRC Blackwater Unit, FBWMA, and TF). The number of trappers, or technicians, was increased from 12 to 14 and supervision of field operations was centered in USDA AHPIS Wildlife Services. A time period of 2-5 years was estimated for completion of Phase II, during which time the Management Team would monitor the effort required to depopulate trapping units to determine the feasibility of attempting eradication to the entire acreage (192,870 acres) of available nutria habitat in the four lower Maryland Eastern Shore counties of Dorchester, Somerset, Worcester, and Wicomico. Information applicable to Phase II, including data from Phase I and documentation of other nutria population studies in Maryland, the United States, and abroad, has been collected and compiled for Phase II in a White Paper on nutria by the Management Team. This information is being used adaptively in the progression of Phase II, both in the establishment of this basic protocol and in further process improvements. This document is intended as a companion to the White Paper and the original Pilot Project Proposal.

## Summary of Nutria Biology and Impacts in Maryland

Nutria are large, aquatic rodents from South America that were introduced to Maryland and 22 other states in the 1940's to help support the fur industry. Nutria populations are now established in 16 states, including Maryland. In Dorchester County, Maryland, where nutria escaped from local fur

farms, the population has most recently (in 1993) been estimated at between 35,000 and 50,000 (G.Carowan, pers. comm.). In addition, a small population has been observed on the Western Shore of the Bay in Maryland.

Nutria are prolific reproducers. Female nutria achieve sexual maturity by 4 months of age and can have 5 litters every 2 years. Litter size ranges from 4 up to 13, and averages 4-5 young. Female nutria have teats along their sides, allowing the precocious young to nurse while swimming. Within a few days of birth, nutria can forage for food, although they continue to nurse their young for about 10 weeks.

Nutria are herbivorous and, in Maryland, seem to prefer three-square bulrush in brackish marshes on the Eastern Shore of the Chesapeake Bay. Nutria efficiently remove vegetation in brackish marsh by foraging directly on the vegetative root mat that holds the marsh together. When the root mat is removed, the supporting soil erodes and is lost, leaving pockets of open water that can no longer support marsh. Nutria also create deep swim channels through the contiguous marsh, further contributing to erosion of the soil that supports the marsh, in many areas by allowing for saltwater infiltration which changes the marsh vegetation. Over 7000 acres of marsh have been destroyed on CMNWRC Blackwater Unit, nearly half of the total marsh acreage on the federal refuge.

## Phase II Objectives

1. Determine the feasibility of eradicating nutria populations inhabiting the marshland complex comprised of the CMNWRC Blackwater Unit, FBWMA, and TF (the Nutria Eradication Zone or NEZ).
2. Utilizing animal management tools (e.g. trapping, toxicants, shooting, dogs), ascertain control strategies that provide the highest efficacy in permanently removing nutria from infested wetlands.
3. Determine the economics of a nutria eradication program.
4. Develop written guidelines to aid conservation agencies in other locales to develop effective nutria control or eradication programs.

## Nutria Eradication Zone (NEZ)

Chesapeake Bay wetlands in Dorchester County on the CMNWRC Blackwater Unit, FBWMA, and TF (approximately 60,000 acres), comprise the Nutria Eradication Zone (NEZ) in Phase II (Figure 1). The areas are described in the original Pilot Project Proposal, and contained the experimental sites for the Phase I research activities. These areas have an abundance of nutria in a variety of habitats, including three-square bulrush marsh. Systematic trapping began on the western side of the NEZ on the CMNWRC Blackwater Unit in the headwaters of the Blackwater River and has progressed eastward toward TF and FBMWA. During the first year of Phase II, trapping is focused on the CMNWRC Blackwater Unit and adjacent private lands. Tudor Farms and FBWMA will be trapped during subsequent years.

The following is a detailed description of field work being done to determine whether or not it is feasible to eradicate nutria on Maryland's Eastern Shore, and, if so, to identify the most successful methods and costs on a per unit area basis. This information will then be applied to a nutria eradication or control program on the remaining acreage of Maryland habitats occupied by nutria.

## Phase II Methods

Training of project personnel, development of trapping techniques, and testing of systematic trapping strategies took place during the finals stages of Phase I on seven of the original Phase I study sites through the summer of 2002. These sites are described in detail in the Pilot Program Proposal and total approximately 8,000 acres. Trapping was conducted by 14 technicians and a supervisor employed by the U.S. Department of Agriculture (USDA) Wildlife Services, who will continue to work during Phase II.

This Phase I effort provided valuable information to project personnel regarding equipment needs and logistical considerations, as well as closure to the Phase I research by recovering as many of the animals remaining in the marsh that were tagged for physiological, population, and movement evaluations of Phase I. Implementation and refinement of trapping strategies, tested during Phase I, is being implemented in Phase II, which commenced in September of 2002 on the western portion of the NEZ. Eradication over the entire NEZ will continue for 2-5 years, depending on a number of variables, including level of funding and staff maintained, weather, and nutria habitat conditions. The unpredictable nature of the landscape and its response to various climatic and hydrological changes may prolong or shorten the 2-5 year time frame projected for completion of Phase II.

Careful planning is required to establish starting points for the eradication effort. Ideally, the NEZ should be bordered by non-nutria habitat (e.g. upland) to prevent recolonization of areas in which total removal has been achieved. Although the hydrology of the region does not provide complete closure to the NEZ, several watersheds feeding the marshland complex may constrict nutria movements to a relatively narrow corridor that can be effectively protected from immigration. Since the headwaters of the Blackwater River form such a geographic bottleneck, it was selected as a logical first starting point. Tributaries flowing from outside CMNWRC Blackwater Unit into the Blackwater, Transquaking, and Chicamicomico Rivers will need to be examined for the presence of nutria populations, and if necessary, included in the NEZ. These tributaries will be trapped where access to private land can be obtained.

## Trapping Protocol

In order to facilitate implementation of a systematic progression of trapping effort, the NEZ was divided into consecutively numbered, 40-acre trapping grids overlaid on aerial photographs of the area using Geographic Information Systems (GIS; Figure 2). Wildlife Services technicians locate assigned grids in the field using handheld Global Positioning System (GPS) units. In large, contiguous blocks of marsh, grids will be designed and traps positioned to form a long line across the marsh that reaches non-nutria habitat on either side of the line. This will reduce the likelihood that dispersing nutria can escape around the flanks of the line. This strategy is impractical to implement along long stretches of riverine habitat such as along the Blackwater River west of Route 335. In this case, technicians will be assigned a stretch of river and will leapfrog adjacent technicians as grids are trapped out. Trapping on each grid will progress through 3 phases: set up, tending, and blockade.

During the set up phase, each grid is saturated with traps, particularly where signs of activity and movement are concentrated. Saturating each plot with traps takes approximately 2-5

days, depending on the number of technicians assigned to the setup effort. In areas of open water, colony, float, or submersible traps may be used. Also, technicians are encouraged to develop innovative trapping sets to adjust to the changes in marsh conditions. Multiple technicians may be assigned to a plot during the setup phase in order to maximize efficiency. The primary sets being used include leg-hold, and lethal, mechanical concussion traps, however, snares, cage, and other trap set designs are being evaluated, as well as other lethal removal techniques, including toxicants and shooting. Trapping variables being assessed include trigger configuration, trap type and placement and a variety of set designs. Trapping strategy relies on normal daily movements, but it may be necessary to actively seek or entice trap-shy nutria to specific sites for capture or removal. Therefore, poisoned-bait platforms, scent lures, and dogs may be utilized when trapping becomes unproductive and trapping effort per unit increases.

Throughout all trapping phases, the following practices apply: trap sets and triggers are configured to reduce the incidence of non-target species being captured, non-target species will be released whenever possible, all sets are clearly marked with elevated flagging to insure that all traps are found and removed when each grid is vacated, all non-lethal traps are checked daily or sprung if daily checking is not possible (weekends, vacations, and holidays), all lethal sets are to be checked every 72 hours or more frequently. Carcasses are removed from the capture site when practical and disposed of using one of several authorized methods. Health concerns are paramount, so every effort is made for celeritous disposal of dead nutria, either through rendering, incineration, burial, or other practical methods. In the event that carcasses in the field have been significantly scavenged or deteriorated, or retrieval is otherwise impractical, the remains may be buried on site. Removal or burial of carcasses will reduce the possibilities of attracting non-target species to the trapping area.

The tending phase follows setup, and may last up to 4 weeks. During this period of time, technicians check traps, remove captured nutria, and relocate unproductive sets to maximize effectiveness. In the early stages of the tending phase, traps are checked more frequently (daily or every other day) to ensure that productive sets remain in working order. As capture rates decline, the trap-checking interval increases (up to 72 hours) to allow personnel to initiate setup on a new plot. A single technician is responsible for checking traps during the tending phase.

The blockade phase is initiated when all nutria are thought to be removed from a grid. During this phase, non-productive sets are pulled and only proven sets and those blocking potential routes of ingress to the plot are left in place. The blockade phase is intended to prevent re-colonization of the plot by nutria. The interval for checking traps is the maximum allowable (72 hours) during the blockade phase.

Once it has been determined that risk of immigration from adjacent plots is minimal, traps used during the blockade phase are withdrawn and the plot is vacated. Traps are withdrawn when there is an absence of captures for two weeks. Lack of new sign is a verification of the absence of nutria where traps are unproductive for two weeks; however, sign can appear fresh for some time in cold weather.

Although every attempt will be made to limit the vulnerability of the trapping boundary to potential nutria reservoirs, private lands and extended waterways will provide opportunities for nutria immigration. The question of access to private lands for nutria removal is a major issue if an expanded eradication effort is to be successful. On a smaller scale, gaining access to private in-holdings or property adjacent to the NEZ is imperative in order to draw appropriate

conclusions about the efficacy of this program. In order to address these concerns, a private landowner liaison is maintained by the Maryland Department of Natural Resources (DNR). Duck hunting season and other uses of the property are considered and factored into the requests for access to private lands. Liaison staff report to the USDA Wildlife Services trapping supervisor for the project and ensure that proper forms required by USDA for Wildlife Services' activities on private lands are filled out and delivered to the supervisor.

## Monitoring

Long-term monitoring of trapping units for residual nutria populations is an important component of the Phase II eradication strategy. Residual populations could result from resident animals that escaped initial trapping or from animals that immigrated into a trapped grid from neighboring un-trapped populations. Residual populations are detected and removed as quickly and efficiently as possible.

Four members of the trapping team have been designated as full time monitors. Monitoring of trapping units is conducted at three-month intervals for at least one year following initial trapping. Three-month intervals have been selected to: 1) allow nutria sign (i.e. scat, tracks, bedding) present during initial trapping to deteriorate, enabling monitoring personnel to identify fresh sign left by residual populations and; 2) to prevent nutria from having time to go through a complete reproductive cycle before monitoring.

The NEZ is divided into monitoring units comprised of numerous trapping units that share common geography, hydrology, trapping history, and access points. This simplifies the process of determining which plots are due for monitoring and ensures that monitoring resources are used efficiently. As a result, some plots within a monitoring unit may be monitored prior to three months after initial trapping is complete.

Members of the monitoring crew will ensure that adequate coverage of monitoring units is obtained through GPS tracks of their movements. These GPS tracks will be appended to a GIS layer that can be superimposed on aerial photographs and trapping units to allow inspection for adequate coverage. Monitoring personnel will collect data on the presence or absence of residual populations, categorize the type of sign found when present and estimate the number of residual nutria, and determine their status as resident or transient. Small, isolated groups of resident nutria will be removed by the monitoring crew. Elimination of wide-spread re-infestation of nutria from outside trapped grids will be tasked to full-time trappers. Results of monitoring surveys will be used to gauge the efficacy of initial trapping efforts and, if necessary, to modify the strategies used during initial trapping.

In some cases, dense nutria populations may thrive just outside the NEZ (i.e. on lands owned by private individuals who declined to participate in eradication efforts). Trapping grids adjacent to these populations require more frequent monitoring in order to detect immigrant nutria.

## Data Collection

Data will be collected to determine catch per unit effort of nutria and non target animals, depopulation rates, nutria demographics, depopulation efficacy, and geographic distribution of

captures. Data will be collected on trapping effort, captures, and monitoring results and will be linked together in a database that will allow the development of a complete trapping and monitoring history for each trapping unit.

Each trapper maintains a log of all trapping activities that take place on each trapping unit. Each day, the trapper will record the number of traps of each type (body-gripping, foothold, box, snare etc.) set or removed from a trapping unit, as well as the status of each trap checked (open, sprung with capture, sprung without capture), and the number of traps not checked. This data will be used to calculate the number of trap nights expended over time on each trapping unit.

Data also are collected on each animal captured or otherwise removed from trapping units. The amount of data collected on each animal will vary as specified in the table below according to whether the captured animal is a nutria, migratory bird, threatened or endangered species, or other non-target species.

| Data Parameter | Nutria | Migratory Bird | T&E Species | Other non-targets |
|---|---|---|---|---|
| Date | Yes | Yes | Yes | Yes |
| Agreement # | Yes | Yes | Yes | Yes |
| Trapper | Yes | Yes | Yes | Yes |
| Trapping Unit | Yes | Yes | Yes | Yes |
| Species | Yes | Yes | Yes | Yes |
| Identification # | Yes | No | No | No |
| Sex | Yes | Yes* | Yes* | No |
| Weight or Age Class | Yes | Yes* | Yes* | No |
| Capture Method | Yes | Yes | Yes | Yes |
| Killed or released | Yes | Yes | Yes | Yes |
| UTM Coordinates | Yes | Yes | Yes | No |

* Sex and age class will be collected if readily determinable.

During monitoring, data collected include date, monitoring unit, trapping unit, observer, ground/tracking conditions, weather, presence or absence of nutria, type of sign encountered, estimated residual population size, presence of sign of other species encountered, and GPS tracks for each observer.

**Local/Community Support and Education**

The DNR will coordinate and conduct programs in cooperation with CBFO, USDA Wildlife Services, and CMNWRC to reach out to local community groups and schools to inform local citizens about the project. A “Frequently Asked Questions” sheet will be created for local trappers who lease lands on the CMNWRC Blackwater Unit or FBWMA. Additionally, a log of private lands will be kept by the private landowner liaison to identify and list participating landowners.

## Research Potential

The nutria capture protocol requires a minimum of data to be collected for assessment of the efficacy of the techniques employed. However, the Nutria Project Phase II provides numerous opportunities for the collection of data on nutria for a variety of research questions. The Management Team is interested in continuing to collect data from this targeted nutria population and will utilize carcasses collected in Phase II, as well as data from Phase I to continue research. The Management Team will support such investigations to the extent that they do not burden the technicians with work that is secondary to their primary duties. Research that will enhance trapping effectiveness, improve techniques toward the eradication of nutria, and provide insight to marsh restoration will be encouraged and supported.

## Eradication vs. Commercial Trapping

Many experienced trappers in the study area, who lease property for trapping a variety of fur-bearing mammals in the marsh occupied by nutria, wonder why the Management Team has chosen not to use commercial trappers to reduce the nutria population in these marshes. While commercial trappers can and have removed thousands of nutria from these marshes over the past decade, the approach to commercial trapping, which targets high density and easily accessible segments of the nutria population and selects habitats and trapping techniques that present minimal trapping costs, has proven to be unsuccessful in creating significant changes in the nutria population. Commercial trappers are paid per animal trapped; when trapping to eradicate a species, traps must continue to be set and checked in areas known to be unproductive for some time. As nutria become scarcer in areas more easily accessible to trappers, the cost of trapping each animal increases and the profit motive for commercial trappers is diminished. To capture the last nutria, many unproductive traps must be set and maintained for some time. Also, the results from the Nutria Project regarding the feasibility of eradicating nutria must be defensible with systematic and scientific methods.

## Conclusion

If the Nutria Project is successful, a full-scale eradication program should be initiated for the entire Chesapeake and Delaware Bay Regions. If, however, sign of resident or transient nutria persists after the monitoring protocol has been followed, the Management Team will focus its efforts on transferring knowledge about trapping and removing nutria from this area to a control/containment program to protect identified sensitive resources from nutria damage. The Management Team also will make this information available to other states struggling to manage or eradicate nutria.

Figure1. Nutria Eradication Zone (NEZ)

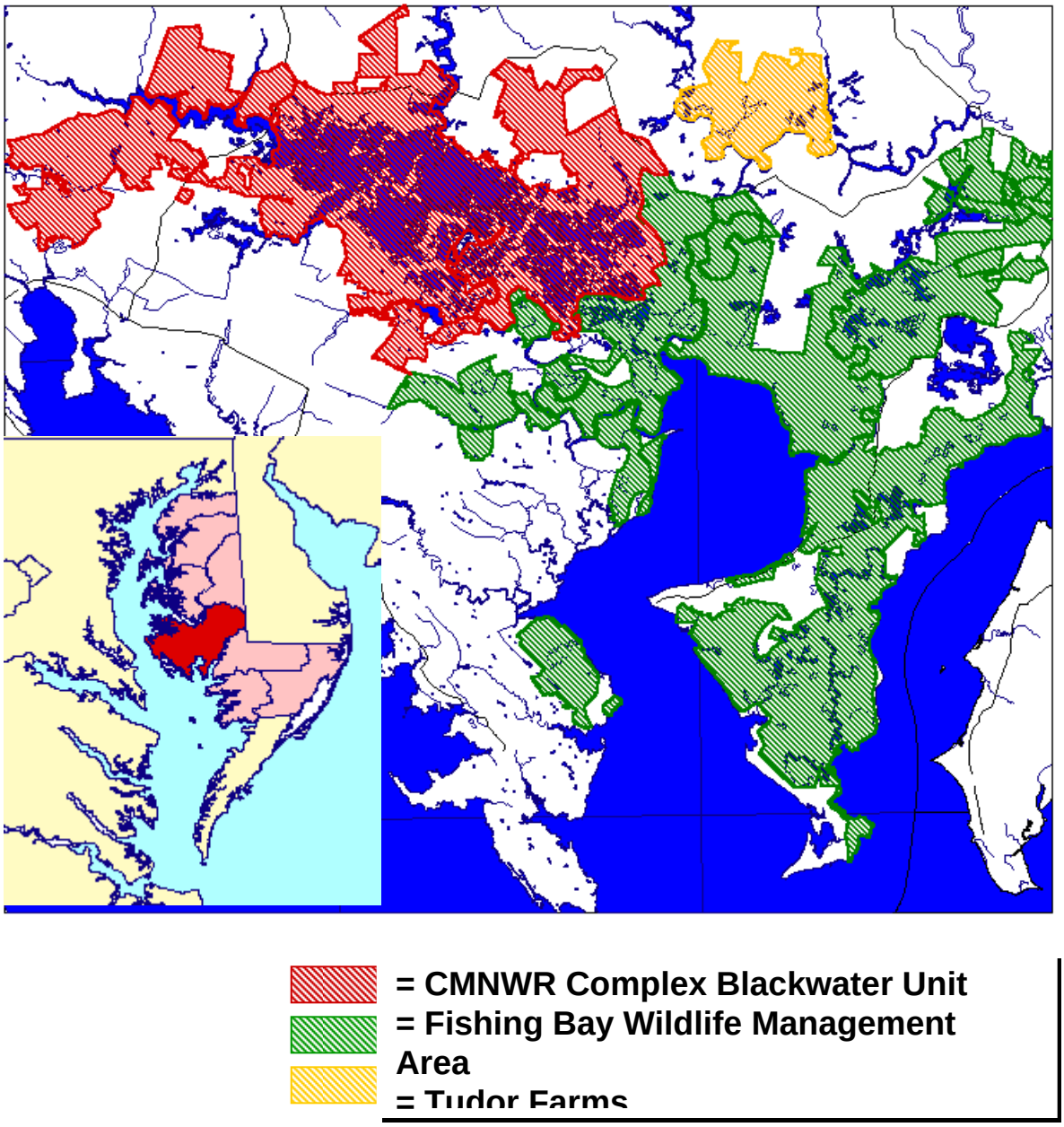
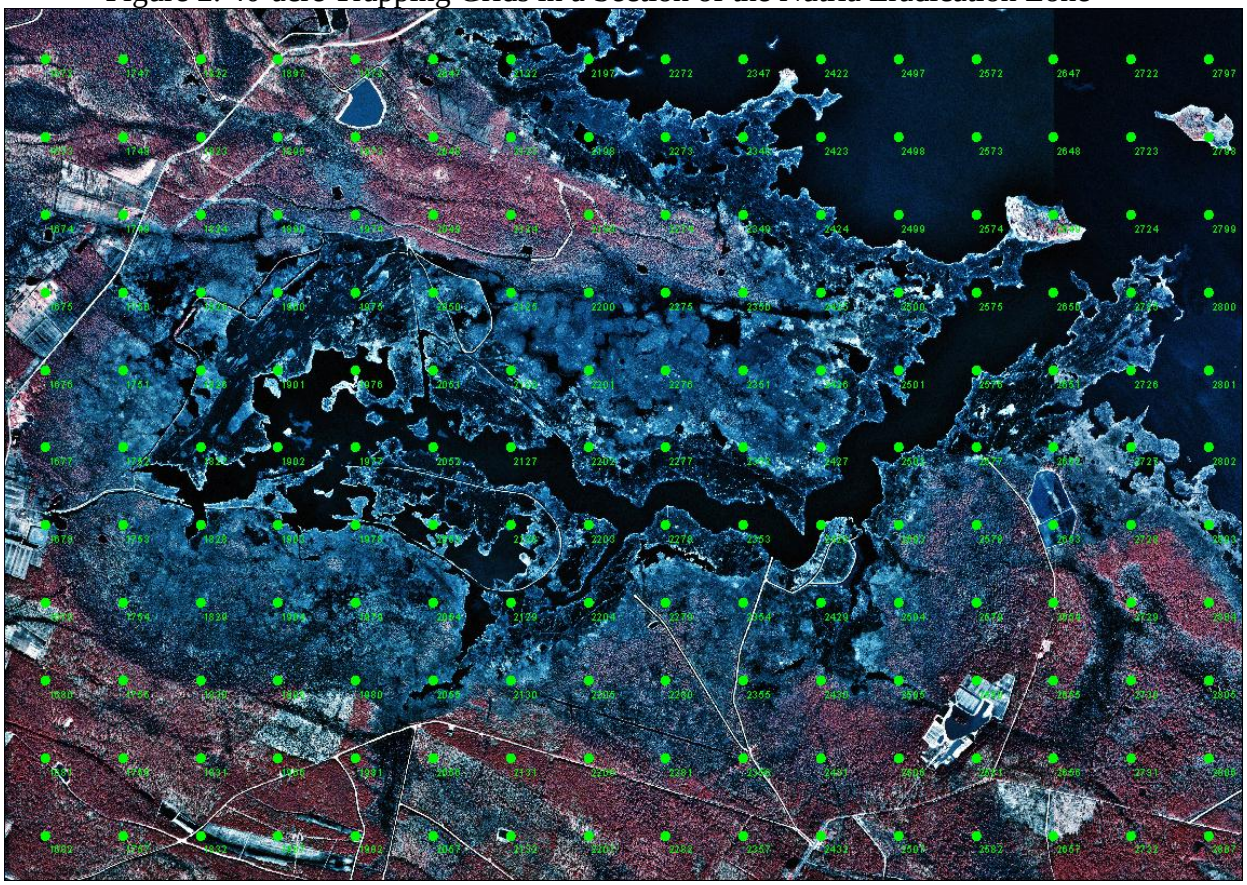


Figure 2. 40-acre Trapping Grids in a Section of the Nutria Eradication Zone



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