CHESAPEAKE BAY NUTRIA ERADICATION PROJECT: STRATEGIC PLAN

The Nutria Management Team

www.fws.gov/chesapeakenutriaproject

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PREFACE

At the direction of the Nutria Management Team (NMT), the following Strategic Plan was prepared for the Chesapeake Bay Nutria Project during August 2011 and reflects status at that time. It should be viewed as a general guide to charting the future course of the Project. It is not intended to be a rigid document, and therefore should not serve as a constraint or barrier to initiative, creativity, and adaptability by Project staff. As socio-economic and bio-political conditions change through time, so too will certain priorities and challenges within the Project. The obstacles facing this undertaking are both technical and social; to allow the latitude to apply the tenets of adaptive management is inherent to completion of undertakings of this nature.

Although eradicating nutria is an extremely daunting task, it is merely a means to an end. The ultimate goal is to safeguard and restore the ecological integrity of wetland systems on the Delmarva Peninsula. The initial act of controlling nutria provides immediate relief to besieged habitats. Damage that has not reached the mudflat stage can usually recover in a relatively short time without palliative measures. As perturbations become increasingly severe, damage may require abatement by mechanical means that diminish erosional energy and hasten marsh accretion.

BACKGROUND

Nutria are invasive, non-native South American rodents first released into Dorchester County, Maryland in 1943. Nutria did not evolve in Maryland's wetland ecosystems, therefore inherent biofeedback mechanisms that naturally control populations do not exist. Consequently, succeeding population increases and range expansion resulted in established populations in at least eight Maryland counties and unknown expanses of Delaware and Virginia. Populations on 10,000 acres of the Chesapeake Marshlands National Wildlife Refuge Complex (CMNWRC) Blackwater Unit grew from less than 150 animals in 1968 to as many as 50,000 in 1998. Populations found in the remainder of the Chesapeake Bay region were incalculable, but may have exceeded several hundred thousand.

Loss or degradation of Maryland's coastal marshes has expanded to alarming proportions, not only affecting wildlife but also citizens of the Chesapeake Bay region. It is estimated that between 45 - 65 percent of Maryland's wetlands have been lost since the 1700's. A host of factors influence wetland loss in the Chesapeake Bay watershed including: sea-level rise, salt water intrusion, land subsidence, groundwater withdrawal for irrigation, erosion (flood, tide and wind driven), and herbivory by overabundant wildlife including invasive species. Nowhere has this trend been more dramatic than at Blackwater National Wildlife Refuge where approximately 50 percent of its

emergent marshes (5,000 acres) have been converted to shallow open water habitats since the introduction of nutria.

Nutria foraging behavior damages or destroys the root mat that binds the marsh together and maintains existing elevation levels. When this fibrous network is compromised, emergent marshlands are quickly reduced to unconsolidated mudflats. These areas in turn are highly susceptible to erosion, and are eventually converted to open water systems. This downward spiraling progression influences the distribution and status of a myriad of sympatric species. The region's marshlands function as sediment and contaminant traps, and are nursery grounds for the largest and most productive estuarine ecosystem in North America. The health of the Bay proper is chiefly dependent on the quality of its marshes and tidal wetlands. Fiscally, it is estimated that wetland degradation by nutria was responsible for $4 million annual lost revenue in Maryland during 2004, with predicted losses to exceed $30 million per year by 2050.

In an effort to determine the relative impact of nutria versus other factors contributing to marsh loss, fenced exclosures (30 meters square) designed to exclude nutria were erected in damaged marshes throughout Blackwater NWR in the mid 1990s. Very quickly, damaged wetlands protected from continuous nutria herbivory began to recover, while adjacent wetlands continued their precipitous decline. This experiment identified nutria herbivory as a key catalyst leading to the rapid conversion of emergent marsh to open water habitat. It also suggested that eradicating nutria could enable some partially damaged marshes to recover on their own.

In 1993, The Maryland Department of Natural Resources (DNR) and the United States Fish and Wildlife Service (USFWS) established the first multi-agency task force to investigate potential approaches to combat feral nutria populations. During the following 10 years, the task force systematically attacked the problem and reached several milestones including development of a draft eradication plan, enlistment of 17 partners into the fledgling Nutria Control Partnership, and convening of the inaugural 'Nutria Control Summit'. These efforts culminated during 2003 with passage of the Nutria Eradication and Control Act that authorized sustained federal funding of the Project.

Between 2000 and 2002, the Partnership expanded to 26 members, and the University of Maryland completed a Pilot Project investigating nutria physiological and behavioral characteristics (phase 1). From 2002 until 2006, USDA Animal and Plant Health Inspection Services (APHIS) Wildlife Services was recruited to assess the feasibility of eradicating nutria. APHIS employees successfully applied eradication tools and strategies across 100,000 acres in Dorchester County (phase 2). Since then, APHIS has entered phase 3 and expanded the eradication zone to include portions of Talbot, Caroline, Somerset and Wicomico counties. To date, all moderate to high-density populations have been reduced to near zero on 150,000 wetland acres.

In phase 3, emphasis has shifted from large-scale aggressive reduction of high-density populations to a more focused detection and removal of low-density populations on the Delmarva Peninsula's remaining 350,000 acres of potential nutria habitat. After this is accomplished, all areas must be monitored vigilantly for 2 to 3 years before eradication can be proclaimed.

CURRENT STATUS OF NUTRIA ON DELMARVA

By the 1970s, nutria had become firmly established in Dorchester County and had spread to the Choptank, Nanticoke, and Wicomico Rivers, and Deal Island Wildlife Management area. Trappers at Prime Hook National Wildlife Refuge on the Delaware Bay reportedly captured nutria in 1993 indicating that nutria had dispersed across the width of the Delmarva Peninsula, possibly using the Nanticoke River and an extensive network of drainage ditches in Delaware as travel routes.

The distribution of wetland and riparian habitats illustrates areas with the potential to harbor core populations, and indicates likely dispersal corridors and sites facilitating the establishment of satellite populations.

Zone 1: Denotes areas where eradication strategies have been deployed and nutria densities have been reduced to nearly undetectable levels. It includes those areas of Maryland's Lower Eastern Shore that historically harbored the largest nutria populations on Delmarva.

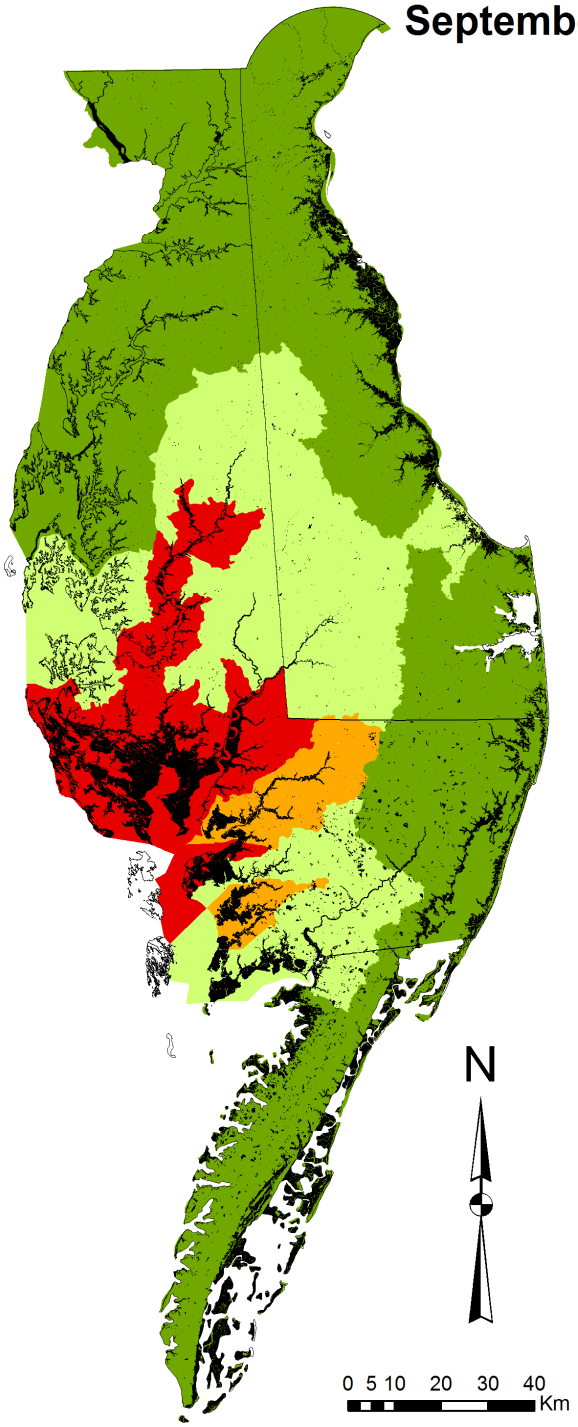
Zone 2: Denotes areas where nutria are confirmed to exist, but eradication strategies have not been deployed as of 2011. Currently, these small isolated populations are being used to test new detection methodologies, and we anticipate deploying eradication tactics in the future.

Zone 3: Denotes areas where nutria have the potential to exist in small isolated populations based on their proximity to former populations in Zones 1 and 2. Project staff conducted habitat assessments throughout Zone 3 in order to prioritize areas for intensive ground searches in 2012. Eradication strategies for these areas will be refined once distribution of nutria has been determined.

Zone 4: Denotes areas where there is little evidence that nutria have ever established populations. Although sightings are reported periodically in this area, few have been verified as nutria, and none have led to the confirmation of established populations. However, given the potential for nutria to disperse large distances, project staff will conduct expert opinion surveys, continue to track sightings and conduct on-the-ground surveys on a sample of priority areas to confirm the presence of nutria. If nutria are not detected in Zone 4, trapping will not be initiated.

Nutria Population Status

September 2011



Zone 1 : Denotes areas where eradication strategies have been deployed and nutria densities have been reduced to nearly undetectable levels.

Zone 2 : Denotes areas where nutria are confirmed to exist, but eradication strategies have not been deployed as of 2011.

Zone 3 : Denotes areas where nutria have potential to exist in small isolated populations based on their proximity to former populations in Zones 1 and 2. In 2011, project staff are conducting habitat assessments throughout Zone 3 in order to prioritize areas for intensive ground searches in 2012.

Zone 4 : Denotes areas where there is little evidence that nutria have ever established populations. Although sightings are reported periodically in this area, few have been verified as nutria, and none have led to the confirmation of established populations.

Nutria Population Status

- Zone 1
- Zone 2
- Zone 3
- Zone 4
- Wetland Habitat

VISION STATEMENT

Systematically protect, enhance and restore aquatic and riparian ecosystems on the Delmarva Peninsula, thereby providing for the ecological, cultural and economic health of its citizenry.

MISSION STATEMENT

To eradicate nutria from the Delmarva Peninsula by December 2015 and prevent their reestablishment.

OVERVIEW OF GOALS

In October 2009, the Nutria Management Team commissioned Invasive Species International (ISI) to conduct an independent program review of the eradication project. Based on recommendations received in the ISI report and extensive discussion by the management team the following seven goals critical to the successful implementation of our mission have been identified.

1. Nutria Management Team and field staff decisions and activities are guided by a well-defined operational plan.
2. Tools and tactics for detection and removal are effective, efficient and selective at all population densities.
3. Access to private lands is secured, stakeholders are aware and supportive of project, and institutional support is strong and long term funding needs are met.
4. A dedicated and committed field team is developed and retained.
5. Progress toward mission achievement is subject to regular internal and external scrutiny and confirmed independently.

The purpose of this strategic plan is to present objectives and supporting strategies to achieve these goals. An operational plan based on these goals, objectives and strategies will be developed to clarify measures of progress, tactics for implementation, establish timelines, and assignment of roles and responsibilities.

TIMELINE

The definition of eradication as it pertains to invasive species is the complete removal of all individuals from a defined area in a specified time frame. Invasive species eradication campaigns are by nature relatively short-term, high intensity projects. Protracted eradication campaigns are vulnerable to loss of political and financial support as well as employee burnout. Initiated in 2002, the Chesapeake Bay Nutria Eradication Project has been in operation for nearly a decade. This extended time frame is largely due to the size and scope of the target area, the phased pilot approach that was implemented, and the fact that an eradication effort of this size and scope has not been undertaken in North America. This strategic plan sets a goal of December 2015 to achieve eradication from the Delmarva Peninsula. Additional resources will be required for verification for 2-3 years following the capture of the last nutria. All of the action items identified in this plan therefore have a limited time window in which to be implemented.

GOAL 1. NUTRIA MANAGEMENT TEAM AND FIELD STAFF DECISIONS AND ACTIVITIES ARE GUIDED BY A WELL-DEFINED OPERATIONAL PLAN.

OBJECTIVE 1. TO IDENTIFY KEY ROLES AND RESPONSIBILITIES OF MANAGEMENT TEAM MEMBERS AND PARTNERS.

It is important that all members of the Nutria Management Team and partnership members have a clear understanding of their roles and responsibilities regarding the implementation of the CBNEP. One of the first tasks of the operational draft will be to establish key functions required of the NMT and partners, identify unmet needs and unrepresented stakeholders, and expand partnerships accordingly. The operational plan will also identify agencies and personnel responsible for carrying out time specific priority actions.

GOAL 2. TOOLS AND TACTICS FOR DETECTION AND REMOVAL ARE EFFECTIVE, EFFICIENT AND SELECTIVE AT ALL POPULATION DENSITIES.

The combination of applied research and eradication activities is fundamental to achieving this goal and lasting project viability. Research needs are interdependent and the successful completion of one objective is dependent on conclusion of the others.

OBJECTIVE 1. DEFINE THE TACTICS, MANAGEMENT UNITS, AND TOOLS AND TECHNIQUES USED TO ACHIEVE ERADICATION.

Existing protocols describing when, where and how field operations are conducted are out of date and do not reflect current procedures that have adapted to meet changing conditions as the scope of the project has expanded. New methods under development need to be incorporated into the operational plan. Criteria for eradication phases need to be clearly defined, and start and stop rules for switching between phases need to be established. The eradication area (Delmarva Peninsula) needs to be divided into Management Units that take into consideration hydrological, biological, logistical, jurisdictional, and social constraints.

Strategies

1. *Establish management units that meet logistical constraints and are biologically sound.*
2. *Establish strategic priorities for deployment of effort.*
3. *Develop Standard Operating Procedures that incorporate Best Management Practices for tools and tactics employed during removal and detection efforts.*

OBJECTIVE 2. TO FULLY INTEGRATE RESEARCH AND ADAPTIVE MANAGEMENT PRINCIPLES INTO ERADICATION CAMPAIGN.

Strategies

1. *Establish an effective Scientific and Technical Advisory Group (STAG).* Peer review bolsters the underpinnings of sound science. Resources and expertise outside of immediate Project personnel can contribute greatly to overall direction and success. The STAG will provide fresh insights, a less biased perspective of informational needs, guidance on establishing research priorities, and allow for an infusion of specialized skills, expertise, and resources not currently available within the confines of the Project. The composition of STAG shall be dynamic and issue driven. Individuals that contribute to specific research needs shall be included on an as-needed or revolving basis.
2. *Inventory and review existing data and resources.* A number of entities have evaluated nutria characteristics before and after the inception of this project. Data generated by these sources may augment current and/or future investigations or identify research needs and information gaps. A thorough review of existing data sets and reports should be completed before initiation of new research projects.

OBJECTIVE 3. TO CONDUCT A DELIMITING SURVEY TO DETERMINE DISTRIBUTION OF NUTRIA THROUGHOUT DELMARVA

Determining the distribution of nutria throughout Delmarva is a critical first step to developing a strategic eradication plan. Developing and implementing systematic survey methods and applying them according to standard protocols is key to delimiting the population accurately and efficiently.

Strategies

1. *Stratify Delmarva into priority zones based on risk of colonization.*
2. *Conduct "expert opinion" surveys of natural resource managers, trappers, hunters and other resource users.*
3. *Develop land based and aerial habitat assessment protocols to guide ground based searches.*
4. *Implement systematic detection surveys in areas with increased likelihood of past or current inhabitation.*

OBJECTIVE 4. TO BETTER UNDERSTAND NUTRIA COMMUNICATION, MOVEMENTS AND BEHAVIORAL ECOLOGY IN LOW DENSITY POPULATIONS AS A MEANS OF DEVELOPING IMPROVED DETECTION TOOLS.

Strategies

1. *Establish a captive nutria research facility.* In terms of total values and scientific reliability, investigations conducted in controlled environments often offer significant advantages over those completed in open systems. Evaluations of attractants, detection devices and aversive responses to sampling procedures lend themselves to experimentation with captive animals. A small pond should be located or excavated in a secure and easily accessible

location. Additional minor improvements including erection of a nutria proof fence and construction of observation portals will allow rigorous testing and yield quantifiable results for various detection and/or harvest apparatus and techniques.

2. *Develop and evaluate visual, auditory and olfactory attractants, including synthetically produced lures.* The ability to attract nutria to a remote detection device or harvest tool is paramount to the success of this project and cannot be overstated. Realistically, to deploy these instruments precisely in the exact pathway of all nutria is physically impossible. Attractants that capitalize on nutria behavioral responses to various stimuli will markedly increase effective range and probability of interception. Additionally, attractants derived through analytical testing could increase selectivity and target particular classes or status groups of nutria that are crucial to imploding existing populations.
3. *Develop cost effective and simple detection devices that can effectively monitor broad spatial and temporal expanses.* Even imperfect detection devices and methods can yield robust results if effort is taken to define the probability of detecting nutria using a given method. Experimentally derived detection probabilities can be subjected to statistical modeling that can be used to interpret the risk of failing to detect nutria when they are present.
4. *Determine temporal, spatial, age, and gender specific home range, movement, habitat selection, and dispersal characteristics in low population density areas.* Wildlife is not distributed randomly or uniformly across natural systems. A basic understanding of species-specific movement patterns and behavioral parameters that dictate habitat use is essential to harvest and/or detection of animals at varying densities. This information can aid in development of harvest / detection strategies and could help ameliorate some concerns associated with limited access on private properties. An expansion of current research efforts with 'Judas Nutria' would supply much of this needed information.
5. *Periodically evaluate new and innovative remote sensing and detection tools and techniques, and assess their potential value in fulfilling project goals.* Advances in the digital sciences render state of the art technology obsolete in a relatively short period of time. The next generation of Forward Looking Infrared (FLIR), or another yet to be identified technology, may enhance abilities to locate nutria at low densities. Refinements in real-time satellite imagery and aerial photography may allow identification of locations occupied by nutria (e.g. evidence of beds, grazing areas etc.). Advanced GPS and telemetry units could answer fundamental questions about nutria movements and habitat use. Likewise, GIS can be used to identify preferred nutria habitat. Staff will be tasked with monitoring relevant journals and other pertinent sources of information.

OBJECTIVE 5. TO DEVELOP A BIOSECURITY PLAN TO MITIGATE RISKS OF NATURAL OR HUMAN-MEDIATED REINTRODUCTION OF NUTRIA TO THE DELMARVA PENINSULA.

Biosecurity plans that outline appropriate quarantine, surveillance and contingency measures are key components of projects to eradicate invasive mammals from islands and to keep islands pest-free. The Delmarva Peninsula is effectively a 'mainland island' with respect to nutria distribution; therefore, the same principles should apply. Biosecurity plans are described in-depth in the 2010 ISI project review report to the NMT.

Strategies

1. *Establish legislation prohibiting the possession and transportation of live nutria on Delmarva without a permit.*
2. *Establish a hotline/website reporting process.*
3. *Develop a network of volunteers to assist with monitoring detection devices.*

OBJECTIVE 6. TO EXPAND THE DETECTOR DOG PROGRAM.

As nutria population densities decline, it has become increasingly difficult to locate remaining animals. Dogs have proven to be a reliable and efficient detection tool. Anticipated need will exceed current resources that rely solely on privately owned dogs provided by project personnel. The program should be expanded to include Project owned dogs that have been exposed to rigorous institutionalized training.

Strategies

1. *Secure access to professional support for development of training protocols and procurement of effective detector dogs.* Project staff have initiated a relationship with the USDA APHIS National Detector Dog Training Program in Newcomb, Georgia. NDDTC staff can provide assistance for developing dog and handler training protocols, conducting training and field test evaluations, procurement of suitable detector dogs, and guidance on kennel maintenance.
2. *Enhance training of employee-owned dogs and handlers currently employed on the project.* The project currently employs five staff members who use their personally owned dogs to detect and hunt nutria. As nutria densities have fallen, opportunities for ongoing training to keep dogs interested and target specific have become rare. Structured training protocols and sessions need to be incorporated to ensure that existing dogs meet reliability standards.
3. *Establish a kennel of agency-owned detector dogs and handlers specifically trained to detect scat and other sign.* Dogs currently used are largely hunting dogs that are trained to give chase to live nutria. Their reliability in alerting handlers to the presence of older sign (scat, urine, etc) is undetermined, but this ability would be a great asset in the field. Agency-owned dogs could be trained according to project needs, and would be available for use regardless of handler turnover, unlike employee owned dogs whose training is not as closely supervised and whose retention is dependent on the handler.

OBJECTIVE 7.TO ENSURE THAT RESEARCH IS MANAGEMENT DRIVEN.

Field staff routinely hold the most pragmatic view of the tools and knowledge necessary to complete their duties. Participation by these individuals in the conceptualization and review of research endeavors will help ensure that investigations are relevant and the resultant data will add to their arsenal.

Strategies

1. *Include field staff in development discussions and field testing of new concepts.*
2. *Elicit feedback from staff on challenges faced in the field.*

OBJECTIVE 8. TO INCREASE EFFICIENCY OF FIELD OPERATIONS, ACCURACY OF REPORTING, AND REAL TIME ANALYSIS FOR DECISION-MAKING THROUGH DIGITAL COLLECTION OF FIELD DATA.

Staff currently collect field data on paper forms and handheld GPS units. Data is then manually entered into a relational database and downloaded from GPS units into the GIS. Staff must set aside at least four hours weekly to enter data. Additional time is required by staff and supervisors to review, verify and correct data. Additional staff resources are required to link field data to GIS layers. These inefficiencies take away from time better spent in the field. In addition, staff have no access to GIS data when in the field. The ability to access aerial imagery, parcel data, previous captures, route planning, and device locations would be a great advantage to field staff.

Strategies

1. *Implement digital data collection in the field using professional grade handheld GPS data loggers.* Professional grade GPS data loggers have declined significantly in price in recent years. The ability to develop customized data collection forms would greatly reduce data handling time and increase accuracy through integrated data validation procedures. Many units have built in digital cameras allowing staff to document observations in the field with georeferenced images. ArcPad software would enable the display of base imagery as well as project generated data in the field, where staff could use information to make timely decisions. While the initial cost outlay would be significant, (approximately $3,000/unit) the cost savings would be realized quickly through increased efficiency, more accurate data, and real time access to mission critical data in the field.
2. *Increase accessibility of data in order to facilitate real-time or on-demand data analysis.* Efficiency would be enhanced by utilizing data driven decision-making tools.

GOAL 3. ACCESS TO PRIVATE LANDS IS SECURED, STAKEHOLDERS ARE AWARE AND SUPPORTIVE OF PROJECT, INSTITUTIONAL SUPPORT IS STRONG AND LONG TERM FUNDING NEEDS ARE MET.

Maintaining strong support from private landowners, the general public, and agency administrators through the final phases of the eradication campaign is critical for success. As remaining nutria populations decline, catch per unit effort wanes, and nutria-caused damage becomes less apparent; support for the eradication campaign may diminish. Landowners may not see the need to provide access to key habitats, the public may perceive the program as a waste of funds, and administrators may cut funding at a time when program needs are actually at their highest. For the CBNEP to maintain critical support in the final stages of eradication, the program must implement aggressive measures to increase public awareness of the problems nutria create and ongoing efforts to mitigate the issue. It is critical that institutional support and commitment from all relevant agencies remains high until the eradication goal is achieved; an accomplishment that may require 2-3 years of intensive monitoring following the capture of the last nutria.

OBJECTIVE 1. TO DEVELOP AN EFFECTIVE PROCESS FOR ACQUIRING LANDOWNER AGREEMENTS AND TRACKING CONDITIONAL ACCESS AND METHODOLOGY RESTRICTIONS.

As the number of agreements increases, the difficulty of management by any means other than a spatial GIS database is likely to lead to inefficiencies and potential misunderstandings. Understanding the private property owner's specific restrictions on allowable methods and seasonal access is critical to maintaining their continuing support, and gaining the support of future cooperators. It is imperative that landowner requests be clearly communicated to, and honored by, all staff. A GIS database that provides property specific conditions would be the most effective means of communicating that information.

Strategies

1. *Acquire spatial property ownership data.*
2. *Develop a relational database to store landowner agreement information.*
3. *Integrate agreement data and spatial property ownership into a Geographic Information System (GIS).*

OBJECTIVE 2. TO IDENTIFY FACTORS THAT LIMIT ACCESS TO PRIVATE PROPERTY AND DEVELOP MEASURES THAT OFFSET RELUCTANCE BY SOME LANDOWNERS.

To carry any eradication attempt to fruition requires access to all parcels of land that may function as population reservoirs. Unless geographically isolated, small sub-populations of animals that remain may serve as founder sources allowing re-colonization of areas that have been successfully depopulated. Many of the remaining properties targeted by the Project are under private ownership and individual landowners determine admittance. The ability to gain entry to strategic properties will potentially make or break the final stages of Project implementation and could conceivably force direction to switch from eradication to long-term control. When permission to enter is denied, it is often symptomatic of distrust of the government by individual landowners or the concern that Project activities will conflict with existing land use practices. Counter measures that mollify these concerns must be explored and instituted. Additionally, it may be necessary to assess methods for perimeter trapping properties where access is denied.

Strategies

1. *Conduct a user conflict survey of participating landowners.* A basic survey evaluating what impacts Project activities have had on the landowners ability to use their property will be completed. Questions should explore real or perceived conflicts with deer and waterfowl hunting, as well as other land use practices. Questions will also be structured to document observed benefits from Project activities (e.g. habitat quality, decreased marsh loss, increased population densities of sympatric species, etc.) Results from the survey should be distributed to prospective landowners when Project personnel make initial contacts. They will also be incorporated into outreach materials, and on the Project website(s).
2. *Establish simpler agreement forms that facilitate landowner understanding and acceptance.* The existing standardized landowner agreement is imposing and many of the provisions do not apply to Project activities. Some landowners are wary of entering into an agreement that they feel takes away autonomy and control of their property. The agreement form must be legally defensible; however, it should be streamlined and user-friendly.
3. *Create separate forms allowing survey access and direct control.*

OBJECTIVE 3. TO ENHANCE COMMUNICATION AND FOSTER COLLABORATIVE RELATIONSHIPS WITH PARTICIPATING LANDOWNERS.

Strategies

1. *Develop and distribute a bi-annual newsletter to all landowners and partners.* The more informed an individual is, the more apt they are to take possession of a concept. A newsletter advising landowners of overall Project activities and progress and that solicits feedback should be produced bi-annually, distributed to landowners, and featured on the Project website(s).
2. *Provide individualized annual reports to cooperating landowners.* Advising landowners of actions completed on their property should be a basic courtesy offered by the Project. Individualized yearly reports describing any activities conducted specifically on their holdings will be distributed. When possible, reports will be hand delivered by Project representatives. The familiarity created by landowners associating a face and name with the Project will contribute towards a lasting relationship.
3. *Train effective communicators to initiate contacts with landowners.* Personal interactions and connections often accomplish more with landowners than the apparent long-term benefits of an action to themselves and their property. Field staff with good communication and people skills are often successful in reaching reluctant individuals. Project administration should identify staff to serve as liaisons and authorize them to initiate contacts with landowners.
4. *Target influential landowner groups with outreach efforts.* Strategically, it is often advantageous to expose people initially to concepts informally and in familiar group settings. This approach allows individuals to feel secure and not singled out while facing something new. When the collective opinion of a group is formed, it is typically based on the common good and not on individual biases. Groups representing rural landowners, such as the Farm Bureau and Ruritans, will be targeted for the Nutria Roadshow and other outreach efforts.

OBJECTIVE 4. TO DEVELOP A NETWORK OR COMMITTEE OF PARTICIPATING LANDOWNERS TO PROVIDE FEEDBACK, AND ACT AS AMBASSADORS FOR THE PROJECT.

Participating landowners can advocate to neighboring landowners and community members. They can personally attest to positive or negative attributes of the Project. Additionally, the committee will function as a rational sounding board to estimate reactions to proposed actions, and to determine what remedies would be appropriate to offset negative responses.

Strategies

1. *Identify key supportive landowners throughout target area.*
2. *Hold periodic meetings for committee members to review progress, provide feedback, and assist with landowner contacts where necessary.*

OBJECTIVE 5. TO DEVELOP AND IMPLEMENT A COMMUNICATION STRATEGY AND MARKETING PLAN THAT TARGETS STRATEGIC STAKEHOLDERS.

Strategies

1. *Develop effective messages.* The greatest effect the Project can achieve is to empower the public to become its chief advocates. Labors that influence the people who in turn influence decision makers will pay multiple dividends. To gain widespread support, outreach materials must be crafted to reach a continuum of demographic groups. Messages that appeal to rural landowners may not resonate with urban conservation groups or local lawmakers; therefore, products shall be tailored to appeal to particular audiences.
2. *Revive the Nutria Roadshow.* The Roadshow was the seminal tool in garnering initial approval and funding for the Project. It effectively informed audiences ranging from local civic groups to the U.S. Congress. The Roadshow will undergo timely updates that reflect Project status and the need for evolving messages. Audiences with strategically determined groups will be solicited. Presentations will be scheduled to meet distinct needs and in advance of initiation of field operations in new geographical areas.
3. *Establish an updated consolidated website.*
4. *Develop audience targeted signs, brochures and other printed materials to distribute to stakeholder groups.*
5. *Establish information kiosks at strategic locations, (nature centers, wildlife refuges, etc.)*
6. *Develop an information booth to staff at festivals, conferences and other events.*
7. *Explore web based social media outlets for enhanced information dissemination.*
8. *Develop an annual "Nutria on the Hill Day" presentation for Congressional leadership.*

OBJECTIVE 6. TO ENSURE THAT KEY AGENCY ADMINISTRATORS AND LOCAL, STATE AND FEDERAL LAWMAKERS ARE INFORMED OF PROJECT GOALS, ACCOMPLISHMENTS, AND NEEDS.

Strategies

1. *Rejuvenate contacts and dissemination of information to key Federal, State, and Local Lawmakers.* The NMT and senior Project staff need to ensure that Lawmakers are not making uninformed determinations. To empower informed decisions, Lawmakers and their aides should be provided with relevant information including Project justifications and goals, funding needs, progress reports, and potential impacts on specific constituent groups. Many of the general messages and products developed for the public may also be appropriate for distribution to Lawmakers. Additionally, attempts will be made to schedule face-to-face meetings, conduct presentations and organize Project field trips.
2. *Establish contacts, supply information and conduct presentations for governmental agencies and departments, professional natural resource organizations, and influential NGO's.* These entities possess the knowledge and authority to expedite application of Project goals and objectives. Sister agencies and mainstream conservation groups sharing similar missions can provide advocacy, resources and additional technical expertise that is absent in the existing project framework. Concerted efforts will be undertaken to establish networks with peers that allow the free exchange of information. Project personnel will capitalize on opportunities provided by participation in technical meetings and conferences, and by authoring and/or reviewing relevant publications.

OBJECTIVE 7.TO ENSURE THAT THE PROJECT MANAGEMENT TEAM IS FULLY REPRESENTED BY AGENCY STAKEHOLDERS.

Strategies

1. *Expand composition of the Nutria Management Team to include members from Delaware and Virginia.* The NMT is the body charged with providing leadership to the project. Secondarily, it is responsible for streamlining the administrative process and identifying various funding sources. Successful completion of the Project will require depopulation of nutria throughout the Delmarva Peninsula. To date, efforts have only focused on the Maryland portion of the Peninsula. Broadening the geographic scope of the Project will require the explicit consent, support, and commitment of officials in Delaware and Virginia. It is imperative that governmental officials from these jurisdictions be included in the decision making process if substantive cooperation is to be expected. Individuals tend to become supportive of an initiative when they become equal partners and are aware of the Project's intrinsic value to fulfillment of their professional mandates.

OBJECTIVE 8.TO ENSURE THAT ALL AGENCY PARTNERS ARE COMMITTED TO THE ERADICATION GOAL.

Strategies

1. *Establish an MOU and Cooperative Agreements as appropriate between agencies and organizations involved with the Management Team and Partners.* Reaffirming the commitment of existing agency and partnering organizations to the goal of eradication is a prerequisite to success. Additionally, the need to garner the support of strategically important, but not yet involved entities, is essential. Declarations of support from agency and organization leadership will pave the way for negotiating fiscal, regulatory and logistical commitments as the program expands throughout Delmarva.

OBJECTIVE 9. TO ESTABLISH THE CHESAPEAKE BAY NUTRIA ERADICATION PROJECT AS A MODEL PROGRAM THAT BENEFITS NATURAL RESOURCE MANAGERS NATIONWIDE.

Strategies

1. *Produce and broadcast relevant control and/or eradication information that can be exploited by Natural Resource Managers struggling with nutria management and control.* The initial federal funding (Public Law 105-322, 1998) included the justification that information derived from the Project would provide ecological and economic benefit on a scale larger than the Delmarva Peninsula. Professional ethics dictate, and federal law mandates, that the Project share information that can be applied to combat feral nutria populations elsewhere in the United States. Achieving this goal will significantly increase the overall value of the Project to Federal Lawmakers and Officials.

GOAL 4. A DEDICATED AND COMMITTED FIELD TEAM IS DEVELOPED AND RETAINED.

Critical to the success of any eradication program is the commitment of staff members to the goal of catching the last animal in the target population. Maintaining a highly skilled and dedicated team of sufficient size throughout the campaign, and especially to its completion is vital to success. Many eradication attempts, including early efforts to eradicate nutria in England failed when teams were reduced in size and effort was scaled back prematurely. The eradication of nutria from the Delmarva Peninsula is the largest invasive species eradication campaign in North America to date, and the demands and expectations of the field crew are intense. Ultimately, staff will be punished for reaching their goal; they will have worked themselves out of a job. This disincentive must be overcome to achieve widespread commitment and dedication among the entire staff.

OBJECTIVE 1. ENSURE A CONSISTENT LEVEL OF COMPETENCY BY STAFF.

Staff possess diverse educational backgrounds and a gradient of field experience and expertise. Leadership must have confidence in an employee's field assessments and should take appropriate steps to ensure a demonstrable level of competency by all.

Strategies

1. *Assess staffing needs and recruit staff that fill knowledge and skill gaps.* As the project transitions from knockdown and mop-up to verification and surveillance, different skills will be demanded of project staff. Tools and techniques that were successful at high nutria densities, may not work as well at detecting nutria at low densities. Success may require additional training for existing staff and/or recruitment of staff with different skill sets.
2. *Provide requisite intellectual and physical resources for individuals to excel at assignments.*
3. *Establish rigorous standardized training protocols that provide for workshops, conferences courses and non-structured educational opportunities.*
4. *Formalize training procedures for new employees, including the appointment of training officers charged with staff instruction.*
5. *Develop skill sharing opportunities with other invasive species eradication and control programs.* This can be achieved by hosting visiting eradication specialists from other programs and allowing project staff to travel on temporary assignments to other projects.

OBJECTIVE 2. TO FOSTER HIGHLY MOTIVATED FIELD STAFF.

For the Project to succeed, a cohesive and highly proficient corps of field staff is essential. Job responsibilities are not only physically and mentally demanding; they are also conducted in inhospitable terrain and under often-extreme climatic conditions. The circumstances surrounding the Project challenge supervisors to maintain a consistent level of competency and motivation in employees. To promote ownership in the Project and increase morale is critical to retaining qualified staff. Employees should be continually informed of the values of their labors. When individuals feel they are making a difference and contributing towards an identifiable goal, they tend to accept adversity and embrace the challenges it offers. In a real sense, motivation, morale and productivity are intertwined, and the direction of one mirrors that of the others.

Strategies

1. *Establish a process for acknowledging and recognizing staff accomplishments.* Formalized procedures should be instated to acknowledge initiative and achievement by individuals, and by the staff as a whole. The approach should be multi-tiered and range from simple verbal or written recognition to material rewards. These steps will aid in maintaining and/or increasing motivation in field staff
2. *Leadership must provide clear direction, and reestablish goals as the Project shifts from depopulation to detection and monitoring.*
3. *Involve field staff in planning and decision making.* All staff must be afforded the opportunity to contribute to Project planning and direction in a constructive and meaningful fashion.
4. *Include field staff in Management Team Meetings.* Representatives from field staff should be included in NMT meetings. Attendance should be arranged so that small groups attend management team meetings on a rotating basis, and that all individuals be present at least once annually. This will facilitate increased ownership of the Project, provide real world insights to the NMT, and allow staff to understand upper-level management decisions.

GOAL 5. PROGRESS TOWARD MISSION ACHIEVEMENT IS SUBJECT TO REGULAR INTERNAL AND EXTERNAL SCRUTINY AND CONFIRMED INDEPENDENTLY.

This strategic plan and its associated implementation plans are not designed to be static. It must periodically be reviewed internally and externally and modified accordingly to align with changing conditions.

OBJECTIVE 1. PROVIDE FOR ROUTINE EXTERNAL AND INTERNAL REVIEW.

As the project enters the final and most challenging phase of the eradication campaign, there is an increased need for the NMT to take a more active role in guiding and coordinating the project's development by increasing its involvement in planning and reporting and influencing direction and priorities. Although experience is invaluable, familiarity often breeds unintentional biases and myopic views. Review and input by individuals not vested in the Project can provide insightful and objective evaluation. Provisions for periodic critical examination by external sources should be adopted.

Strategies

1. *An external review, similar to the one undertaken by ISI in 2009, should be undertaken on a periodic basis every two years.*
2. *Periodically Review, revise and update the Strategic Plan, Operational Plan and other implementation plans.* A more formalized process for monitoring and evaluating progress based on planned objectives and performance measures will ensure the plans adapt to changing needs. The Strategic and Operational Plans should be reviewed every two years following each external review.
3. *The NMT should meet on a regular basis to review progress towards goals and provide advice to project manager.*

OBJECTIVE 2. TO REDUCE BIAS/CONFLICT OF INTEREST BY SELF DETERMINATION OF ERADICATION SUCCESS.

Strategies

1. *Establish an independent monitoring team to assess whether the eradication goal has been achieved.* Potential monitoring biases should be addressed by employing an independent monitoring team as a safeguard to verify eradication after preliminary determination by Project personnel.