

Mute Swans in Maryland: A Statewide Management Plan



Maryland Department of Natural Resources
Wildlife and Heritage Service

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MUTE SWAN MANAGEMENT PLAN

EXECUTIVE SUMMARY

This plan describes the status and impacts of mute swans in Maryland. It is a guidance document that provides direction and objectives for the Maryland Department of Natural Resources (DNR) to manage this overabundant species through 2008. The plan's goal, objectives, and strategies will be evaluated at the end of the 5-year period.

Mute swans are an invasive, nonnative species that now inhabit the Chesapeake Bay in large numbers. The mute swan population in Maryland increased dramatically between 1986 and 1999 (Figure 1). At the rate of increase observed during this period, and absent management, the swan population may have exceeded 30,000 birds by 2010. Between 1993 and 1999, the population grew more slowly, attributed, in part, to limited population control by the DNR and Federal National Wildlife refuges. The population decreased from 3,955 in 1999 to 3,624 in 2002 (Figure 1). Egg addling and the removal of adult swans from Federal National Wildlife Refuges and authorized scientific collecting played an important role in the population change.

Adverse ecological effects are occurring as a result of this swan population and will increase if the population is allowed to grow. The mute swan population threatens the protection and restoration of SAV beds in areas of critical importance to the Bay's living resources. Concentrations of foraging swans can severely impact submerged aquatic vegetation (SAV) beds and restoration plantings. Foraging by swans during the growing season reduces plant survival and the plant's ability to reproduce. This large swan population reduces the availability of SAV for wintering waterfowl and other fish and wildlife populations dependent upon SAV. Large numbers of mute swans have displaced state-threatened species of colonial waterbirds (terns and skimmers) from their island nest sites. The antagonistic behavior exhibited by mute swans toward other native wetland birds can prevent native waterfowl from using traditional nesting and feeding areas. In some cases, mute swans kill other wetland bird species. Mute swans also impact humans. The display of aggressive behavior by some swan pairs instills fear into citizens, preventing them from using their shoreline property and adjacent waters.

To address these concerns, the DNR appointed a Mute Swan Task Force in 1999 to develop management recommendations. The Task Force compiled a comprehensive summary of information about mute swan ecology, population dynamics, and management that can be viewed at <http://www.dnr.state.md.us/wildlife/mstfpc.html>.

The cornerstone of the Mute Swan Task Force recommendations was the protection of native species and their habitats from the effects of mute swans. The Task Force recommended that the DNR establish Swan-Free Areas, areas where mute swans would be excluded or removed to protect critically important habitats and wildlife resources. The Task Force recommendations (Appendix A) were made available to the public for comment for 60-days in March 2001. The DNR Waterfowl Advisory Committee endorsed the Task Force recommendations, but further recommended a rapid reduction of the mute swan population and the elimination of State protection for the species (Appendix A). The recommendations provided by these two advisory committees, along with biological and wildlife management principles and public input, were considered in the development of the goals, strategies, and objectives contained within this management plan.

The overall management goal is to manage the mute swan population in Maryland at a level that (1) minimizes the impacts to Maryland's native species and habitats; (2) is consistent with the objectives of the Chesapeake 2000 Agreement; and (3) minimizes conflicts with humans. To achieve this goal, the management of mute swans shall be conducted in an effective, efficient manner, consistent with accepted wildlife management practices.

Specific management objectives to achieve this goal are as follows:

- Develop a program of public outreach that facilitates understanding of the status of the mute swan population in Maryland, its impacts on the Chesapeake Bay ecosystem, and the problems it creates for humans.
- Exclude or remove all mute swans from "Swan-Free Areas" to afford protection to habitats critical to the Bay's Living Resources.
- Reduce the mute swan population as quickly and efficiently as possible, consistent with activities to protect, restore and enhance the Bay's Living Resources.
- Prevent the escape and reproduction of captive mute swans.
- Reduce conflicts between mute swans and people by permitting a wide variety of effective and efficient control methods.
- Monitor the size and distribution of the mute swan population and evaluate the effectiveness of management actions.
- Conduct additional research that will increase understanding of the role of mute swans in the Chesapeake Bay ecosystem and their impacts on the Bay's Living Resources.

INTRODUCTION

Mute swans are not native to Maryland and North America. Mute swans from Europe were introduced along the Atlantic coast as early as the late 1800's. However, sizeable numbers were not imported until after the turn of the century. Initial introductions centered around the New York City area. Estate owners and public officials sought to have mute swans to add elegance and charm to the visual beauty of public parks and estate ponds. Some swans eventually escaped or were deliberately released into the wild and subsequently established breeding populations. Currently, over 22,000 mute swans occupy coastal and freshwater habitats along the Atlantic coast from New Hampshire to Florida, the Great Lakes, Washington State, southern Ontario, and British Columbia.

The first recorded observations of mute swans in the tidewater areas of Maryland occurred when three birds were observed near Ocean City in February 1954 and then again when three swans were seen near Gibson Island, Anne Arundel County, in January 1955. These likely were transient birds forced south by severe winter weather. The mute swan population in Maryland's portion of the Chesapeake Bay has been attributed to the escape of five captive birds along the Miles River in Talbot County during a spring storm in March 1962. Following this accidental introduction, the mute swan population grew slowly for two decades. However, after the mid-1980s, the swan population underwent dramatic growth and range expansion, rising to about 4,000 birds by 1999.

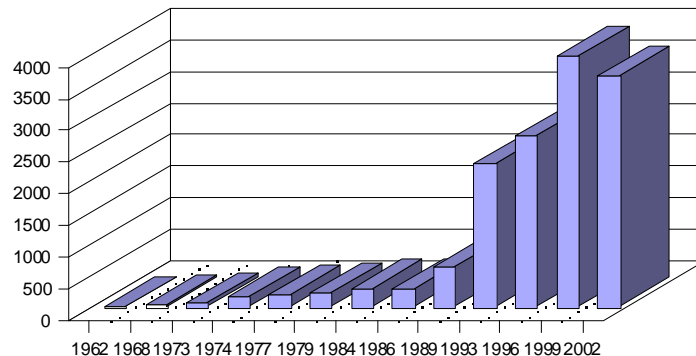
Although valued for their aesthetic beauty, the mute swan is one of the world's most aggressive species of waterfowl. In Maryland, aggressive mute swan pairs have become a nuisance, preventing people from using their shoreline properties and riparian waters where swans vigorously defend their nest and young during the breeding season. Concomitant with the dramatic rise in mute swan numbers, conflicts between mute swans and native wildlife have increased, including the displacement of colonial waterbirds and native waterfowl from nesting and feeding areas. Furthermore, mute swan grazing on submerged aquatic vegetation (SAV) has reduced the amount of SAV available to several native waterfowl species and other fish and wildlife. Although the impacts upon SAV are not well quantified, it is clear that maintaining a large mute swan population in Chesapeake Bay poses a threat to the remaining SAV beds and the establishment of new SAV beds, and therefore, is an impediment to achieving the goals of the Chesapeake 2000 Agreement.

This management plan describes the status and impacts of mute swans in Maryland. It is a guidance document that provides direction, objectives, and strategies for the DNR to manage this species through 2008. Progress made toward achieving management objectives will be assessed annually and the plan will be updated in 2008.

STATUS AND DISTRIBUTION

The mute swan population in Maryland's portion of the Chesapeake Bay originated when five birds escaped from an aviculture collection along the Miles River in Talbot County in March 1962. A pair of these birds bred successfully that summer, and the flock increased to more than 100 by 1974. Prior to 1986, the swan population grew slowly and remained fairly stable at <500 swans. However, periodic summer swan surveys conducted by the DNR revealed a rapid increase in swans after 1986 from 264 in 1986 to 3,955 in 1999 (Figure 1). During this period, the population grew at an annual rate of about 23%. A number of factors could have led to this increase, including milder winters and reduced mortality due to lead poisoning. Studies have shown that immigration of mute swans from other states contributed very little to the increase in Maryland, for mute swans rarely move more than 30 miles from their original banding site. Had this rate of growth continued, the population might have exceeded 30,000 by 2010. Between 1993 and 1999, the population grew more slowly, attributed, in part, to limited population control by the DNR and Federal National Wildlife refuges. The population decreased from 3,955 in 1999 to 3,624 in 2002 (Figure 1). This change was at least partly related to egg addling (about 70% of nests) by DNR, the removal of adult swans from Federal National Wildlife Refuges, and authorized scientific collecting.

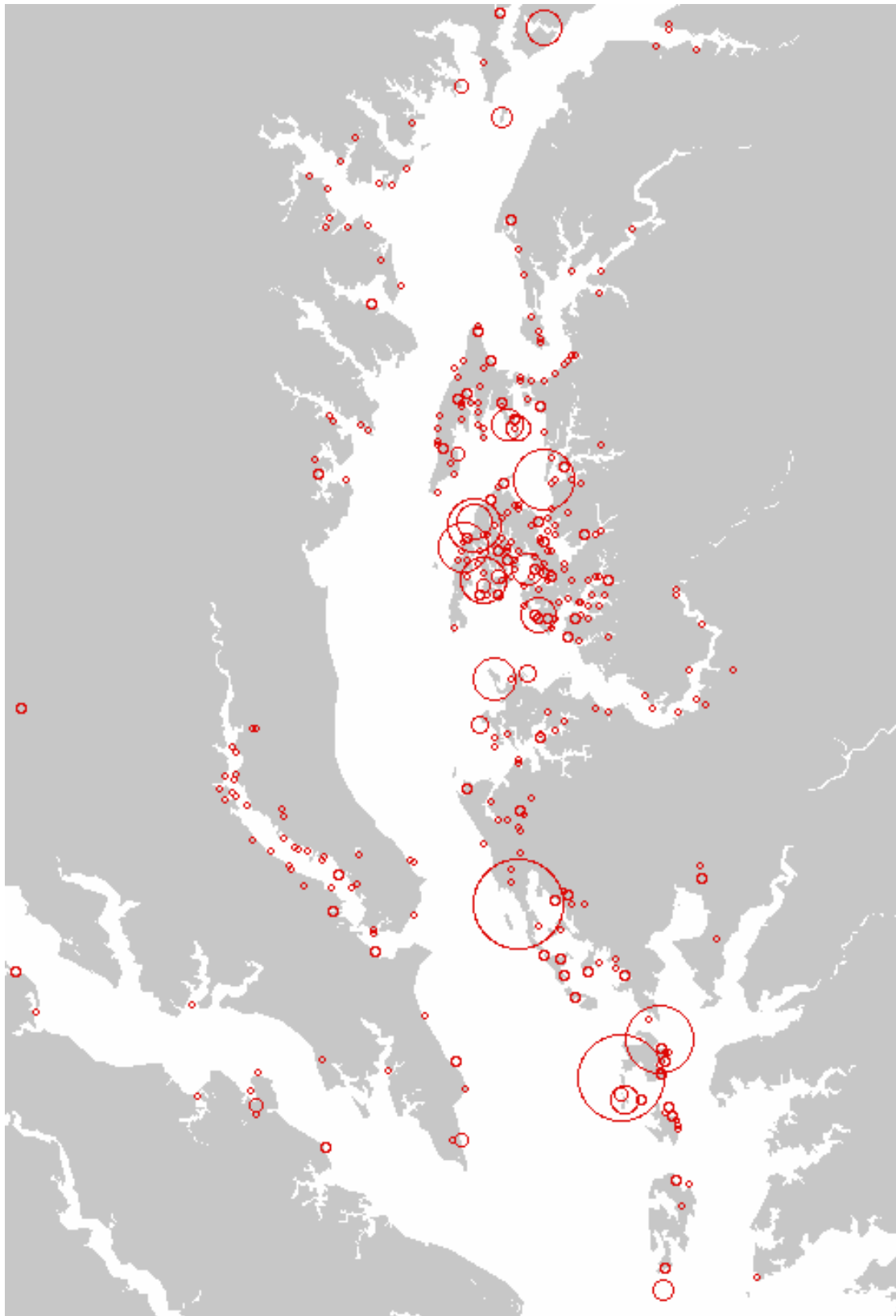
Figure 1: Number of Mute Swans in Maryland 1962-2002.



Mute swans have become common locally throughout Maryland's Eastern Shore and a few western shore tributaries and their range is expanding (Figure 2). Although most nest on the edges of tidal wetlands, the population has increased to the point where swans are now nesting on inland reservoirs, ponds, shallow impoundments, canals, and dredge spoil ponds. A small number of mute swans nest in the coastal bays of Worcester County.

The most recent Bay-wide survey of mute swans was conducted in summer 2002. During this survey, the largest numbers of mute swans were located in the mid-Bay, from Taylor's Island (Dorchester County) to Rock Hall (Kent County) on the Eastern Shore (Figure 2). Large concentrations also occur in the vicinity of Hoopers and Bloodsworth Islands. However, swan pairs have now established breeding territories in all Maryland tidal tributaries.

Figure 2: 2002 Mute Swan Distribution in Maryland (largest circle = 472 swans).



In the absence of population control, the only significant factors that currently limit population growth are flooding of nests, predation of eggs and young, and mortality from collisions with utility lines and other obstructions. Natural mortality of adult mute swans is quite low (less than 10% annually). Mute swans usually begin breeding at 3 years of age and can live up to 30 years. The number of breeding swan pairs in Maryland will increase rapidly as immature swans reach breeding age. In 2002, more than 83% of all the subadult and adult swans observed in Maryland were either nonbreeders or failed breeders. A recent example of how fast the number of nesting pairs of mute swans can increase was observed in the Patuxent River. In 2000, there were only 6 active nests located in the river. In 2001, the number of nests had increased to 40 (+660% increase in 1 year).

Considering the availability of unoccupied swan breeding habitat, the potential for the mute swan population to increase its numbers and expand its range is high. Territory size of mute swans has been reported to vary between less than 3 acres in high quality areas to about 15 acres on large bodies of water and open rivers. The upper Chesapeake Bay includes about 251,454 acres of coastal estuarine wetlands. Even assuming territories are at the upper limit of this range (15 acres) these wetlands could potentially provide nesting territories for about 16,960 mute swan pairs.

Maryland's coastal zone includes 4,358 miles of shoreline along the Chesapeake Bay and Coastal Bays. During a 2001 survey of mute swans along the Talbot County shoreline, DNR observers recorded 119 nesting mute swan pairs or about 0.27 nesting pairs per mile of shoreline. Assuming this density, coastal shorelines of all sixteen coastal counties could provide nesting territory for an additional 1,180 pairs of mute swans. Thus, considering the availability of unoccupied coastal wetlands and shoreline, there is the potential in the state to provide nesting territories for about 18,140 nesting mute swan pairs. Including non-breeders, this could represent a population of about 100,000 mute swans. Furthermore, this estimate does not account for mute swans that occupy inland freshwater wetlands, ponds, impoundments, and reservoirs. Therefore, unless there are widespread disease outbreaks or serious degradation of the quality of remaining wetlands, the size of the mute swan population will likely increase dramatically, and impacts to native species will increase, unless growth is limited by population control.

ECOLOGICAL IMPACTS AND CONFLICTS

Impacts to Public Safety and Use of Private Property

Despite their aesthetic appeal, mute swans are a problem for some people. Some birds threaten or directly attack people who get too close to their nest or young. The aggressive behavior exhibited by these large birds can pose a safety risk, especially to small children and persons swimming or in small watercraft. Although the potential for injury is low, many people who experience this display of aggressive behavior are fearful of it. This behavior prevents some shoreline

landowners from using their shoreline property and adjacent waters during the nesting and brood-rearing season.

Grazing Impacts Upon Submerged Aquatic Vegetation

Unlike the native tundra swans that only spend winter months in the Bay, the nonnative mute swan inhabits the Bay year-round. Mute swans feed solely on SAV. While foraging, each bird consumes an average of about 8 pounds of SAV each day, including leaves, stems, roots, stolons, and rhizomes. Wintering tundra swans also feed on SAV but also consume clams and waste grain and green grain crops in agricultural fields. Mute swans, on the other hand, feed exclusively in shallow wetlands in Maryland where they consume large amounts of SAV. They also utilize large amounts of emergent vegetation for nest building. Adult mute swans tend to paddle and rake the substrate to dislodge SAV and invertebrates for them and their cygnets; thus, more SAV is destroyed and uprooted than is eaten. At high densities, mute swans can overgraze an area, causing a substantial decline in SAV at the local level.

This consumption of SAV has raised serious concerns among shoreline property owners and resource managers. SAV is critical to the health and well being of a myriad of Bay organisms. Not only does SAV protect water quality and prevent erosion, it also provides food and shelter for fish, shellfish, invertebrates, and waterfowl. For example, research has shown that the density of juvenile blue crabs is 30 times greater in SAV beds than in unvegetated areas of the Bay.

The abundance and distribution of SAV has been greatly reduced during the last 30 years. The decline of SAV has been attributed primarily to elevated levels of nutrients and suspended sediments. However, the grazing of SAV by mute swans places additional pressure on this already stressed and vital resource. Grazing of SAV by mute swans reduces the capacity of the remaining SAV beds in the Bay to support wintering waterfowl and other fish and wildlife populations. Food habit studies show that widgeon grass and eelgrass are the most important foods of mute swans in winter and spring. These SAV species are also important foods for many other wintering waterfowl species.

Although data on the reduction of SAV by mute swans is limited, there is sufficient information to conclude that these birds are having a deleterious impact on SAV in the Bay. Bay scientists and shoreline property owners report concentrations of foraging swans severely impacting SAV beds. Citizen tributary organizations have had SAV and emergent transplantings damaged by mute swans, thwarting efforts to improve water quality. The cost of replanting one 0.06 ha restoration site damaged by mute swans in the South River exceeded \$4,000. Today, physical barriers protect nearly all transplant sites from mute swans, at significant additional cost.

Mute swan grazing on SAV has been observed by research scientists, including feeding on reproductive shoots before they mature. Swan foraging on SAV during the spring and summer growing season has been shown to reduce plant survival and reproduction, reducing SAV abundance in subsequent years.

Over time, areas with high densities of mute swans exhibit a decrease in plant diversity and abundance, sometimes becoming devoid of SAV.

The presence of a large mute swan population in the Bay is in conflict with public policies aimed at restoring the Chesapeake Bay. A simple mathematical extrapolation of SAV consumption by mute swans suggests that 4,000 mute swans may consume up to 12 million pounds of SAV annually, representing about 12% of the SAV biomass in the Bay. This level of impact is greatest on the mid-Eastern Shore where high numbers of mute swans concentrate and acreage of SAV is small. This level of grazing, especially during spring and fall SAV growth and reproductive periods and in SAV restoration plantings, is an impediment to achieving the objectives identified in the Vital Habitat Protection and Restoration Section of the Chesapeake 2000 Agreement (Appendix B), in particular the goal to “Preserve, Protect and Restore those habitats and natural areas vital to the survival and diversity of the living resources of the Bay and its tributaries.”

Impacts to Property and Agricultural Resources

Few instances of property damage by mute swan have been reported. Currently, there is no evidence to suggest that mute swans are causing any impact to agriculture in Maryland. Elsewhere in the U.S., mute swans have caused economic losses to agricultural crops. In New Jersey, mute swans have caused several thousands dollars of damage to commercial cranberry crops. In Washington State, British Columbia, and in Europe, mute swans feed in agricultural fields. They cause damage to small grain crops (i.e., winter wheat and canola) and pastures in Europe.

Direct Impacts to Native Wildlife

The accidental and intentional introduction of exotic waterfowl has negative ecological impacts on native species. Adverse effects are particularly likely if the introduced species is aggressive, competes with other waterfowl for food or habitat and/or hybridizes with native species. The aggressive behavior exhibited by some mute swans toward humans is commonly directed toward other waterfowl. Observations in Maryland and findings reported in scientific literature support the fact that territorial mute swans can be very aggressive towards other waterfowl, displacing native species from their breeding and foraging habitats.

Mute swans occupy and defend relatively large territories of wetland habitat during nesting, brood rearing and foraging, and thus compete with native birds for habitat. Not only do they displace native waterfowl from breeding and staging habitats, they have been reported to attack, injure, or kill other wetland birds. This is especially true of male swans defending either their nesting territories or cygnets.

The most serious instance of conflict between native wildlife and mute swans occurred in the early 1990's, when a large flock of mute swans (600-1,000 swans) caused the abandonment of nesting sites for state-threatened colonial nesting birds at Tar Bay in Dorchester County. These colonial nesting birds nested on oyster shell bars and beaches that were used by swans as loafing sites. Tar Bay was the only area in

the Maryland portion of the Bay where black skimmers and least terns nested on natural sites.

Maryland has the largest population of mute swans in the Atlantic flyway. There is growing concern among wildlife managers that the increase in mute swans in Maryland is contributing to factors that have suppressed population growth among tundra swans that winter in Maryland. Tundra swans nest in Alaska and Canada and migrate to Chesapeake Bay to spend the winter. While tundra swans wintering along the east coast (e.g., adjacent states of Pennsylvania, Virginia and North Carolina) have increased during the past two decades, tundra swans wintering in Maryland have declined about 40% during the past 25 years.

Mute swan pairs have been observed exhibiting aggression toward wintering tundra swans in Maryland, driving them from foraging areas and protected coves used for winter shelter. Food habit studies show that tundra swans and mute swans do compete for limited SAV food resources, but tundra swans feed on invertebrates and agricultural foods to a greater extent. The extent to which aggressive behavior and competition from mute swans is related to the inability of the state's wintering tundra swan population to increase is unknown.

Mute swans consume large amounts of SAV that might otherwise be available to native waterfowl. This competition for space and food imposed by mute swans reduces the carrying capacity of breeding, staging, and wintering habitats for native species of migratory waterfowl in Chesapeake Bay where mute swans are established. Numbers of several waterfowl species (e.g., redhead, canvasback, American widgeon, black ducks, and Atlantic brant) dependent upon SAV have declined in the Bay. The declines in these wintering waterfowl populations in the Bay are attributed to the reduced abundance of SAV. Except for black ducks, continental populations of these species are quite healthy, at or above North American Waterfowl Management Plan objectives.

POSITIVE VALUES AND USE

Aesthetic Values

For centuries, mute swans have symbolized beauty, purity, elegance, and wealth in art and legend. Mute swans provide enjoyment for many people, who photograph, paint, draw, or just watch them. They are very large, conspicuous birds that are now widely distributed along Maryland tidal shorelines, including many areas occupied by waterfront residential homes. Mute swans have little or no fear of humans perhaps because of their domestic origin. Some people also derive enjoyment from feeding waterfowl, including mute swans, and can become emotionally attached to individual swans, sometimes treating them like pets.

Economic Values

Mute swans are sold for display on ponds and lakes. They are also sold as a biological control for removing unwanted filamentous green algae from small lakes and ponds. In some instances, they are purchased to reduce nuisance problems associated with resident Canada geese. The purchase price of a single mute swan is about \$250

and a pair sells for \$400-\$500. The economic value of the commercial mute swan trade is unknown in Maryland but is believed to be relatively small.

LEGAL DEFINITION AND PUBLIC POLICIES

Legal Status

Prior to a recent court ruling (<http://www.ll.georgetown.edu/Fed-Ct/Circuit/dc/opinions/00-5432a.html>), mute swans were not regulated by the U.S. Fish and Wildlife Service (USFWS). Primary management authority was held by individual states. The USFWS based its exclusion of the mute swan from the Migratory Bird Treaty Act (MBTA) on its argument that the mute swan was exotic to the United States and non-migratory. However, on December 28, 2001, the U.S. District Court of Appeals for the District of Columbia, ruling in the case of Hill v. Norton, found that this was not legally supportable and that the mute swan should not be excluded from the List of Migratory Birds (Title 50 Code of Federal Regulations Part 10.13).

In Maryland, mute swans are included in the statutory definition of Wetland Game Birds (Natural Resources Article [NR], Section 10-101) (Appendix B). This law does not list the specific names of native species of waterfowl that winter in Maryland, but only identifies ducks, mergansers, brant, geese, and swans as wetland game birds. The state law was promulgated prior to the accidental introduction of mute swans in Maryland. The law gives DNR the authority to allow the taking of wetland game birds during an open hunting season, although no swan season has been opened in the state since 1918. Further, it gives the DNR the authority to regulate the possession, sale, trade, exportation, and importation of mute swans in Maryland (NR Article Section 10-903).

With the inclusion of the mute swan in the MBTA and federal List of Migratory Birds, a federal permit is now required for all activities directly involving the mute swan, their eggs and young. These activities include take, possession, transportation, sale, purchase, barter, importation, exportation, banding, and marking mute swans. The MBTA does not necessarily afford strict protection or preservation to any species. Rather, appropriate management of migratory bird populations is provided for in the MBTA. Thus, mute swan management activities conducted in Maryland can be implemented, but are now subject to federal permit requirements. Currently, there is no open hunting season for mute swans in the U.S. Thus, a hunting season for mute swans in Maryland is not a management option, until the U.S. Fish and Wildlife Service completes an Environmental Impact Statement and proposes regulations that offer state wildlife agencies mute swan hunting season frameworks.

Public Policies Pertaining to Invasive Species and Mute Swans

Several federal, regional and state public policies address the concerns associated with invasive species and specifically are directed at the management of mute swans (Appendix C). An invasive species is defined as a species that is (1) non-native (or alien) to the ecosystem under consideration and (2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

- The Migratory Bird Treaty Act (U.S. Code [USC] 703-712, Ch. 128; July 13, 1918; 40 stat. 755) authorizes the U.S. Department of Interior, represented by the USFWS, to regulate the take of migratory game birds that appear in the List of Migratory Birds (50 CFR 10.13). The mute swan is now included on this list. In February 2002, the USFWS distributed a leaflet to USFWS regional offices, state wildlife agencies and private entities describing the management implications of the recent court ruling and activities involving mute swans that are now regulated by the USFWS.
- The Chesapeake 2000 Agreement is a cooperative agreement signed by the Governor's of Maryland, Pennsylvania, and Virginia, Mayor of the District of Columbia, Chesapeake Bay Commission, and the Environmental Protection Agency representing the federal government. The Agreement includes goals that address invasive species and SAV restoration. Specifically, the Agreement directs the jurisdictions to identify non-native, invasive species, which are causing or have the potential to cause significant negative impacts to the Bay's aquatic ecosystem. Further, the Agreement requires the development and implementation of management plans for those species deemed problematic to the restoration and integrity of the Bay ecosystem. In December 2001, the mute swan was identified as one of the priority species requiring regional management planning and population control.
- Executive Order 13112 enacted February 13, 1999, by the President of the United States, directs all federal government agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. The order further directs federal agencies to refrain from actions likely to increase invasive species problems.
- The National Invasive Species Act (NISA) (1996) (16 U.S.C. § 4701. et seq.) established an Aquatic Nuisance Species Task Force (ANSTF) to assess whether aquatic nuisance species threaten the ecological characteristics and economic uses of U.S. waters. The ANSTF is also directed to evaluate approaches for reducing risk of adverse consequences associated with unintentional introduction of aquatic species. The NISA also authorized funding for state and regional management of aquatic non-indigenous species plans, research on aquatic nuisance species prevention and control in major aquatic systems, including the Chesapeake Bay.
- On August 1, 1997, over growing concern for the impacts mute swans were having on habitats important to migratory birds, particularly waterfowl, the Atlantic Flyway Council (AFC) adopted a policy directing its member government agencies to manage and control mute swans. The AFC is an administrative body comprised of 23 state and provincial wildlife agencies, including Maryland, in the easternmost flyway. Presently, the AFC is developing a flyway mute swan management plan.

- On March 24, 1996, the USFWS enacted a policy directing managers to control mute swans on federal lands, including National Wildlife Refuges, to protect the habitats from degradation and damage by mute swans.
- In 2001, Maryland Natural Resources Article, Section 10-211 was enacted, requiring the DNR to establish a program to control the population of mute swans and authorizing the DNR to include the managed harvest of adult mute swans in this program.
- In 2002, the Maryland General Assembly adopted Senate Joint Resolution 15 urging the USFWS to act with expedience to craft and conduct appropriate regulatory processes under the MBTA which would allow Maryland to establish a method of controlling the mute swan population and to mitigate the mute swan population's impact permanently and statewide

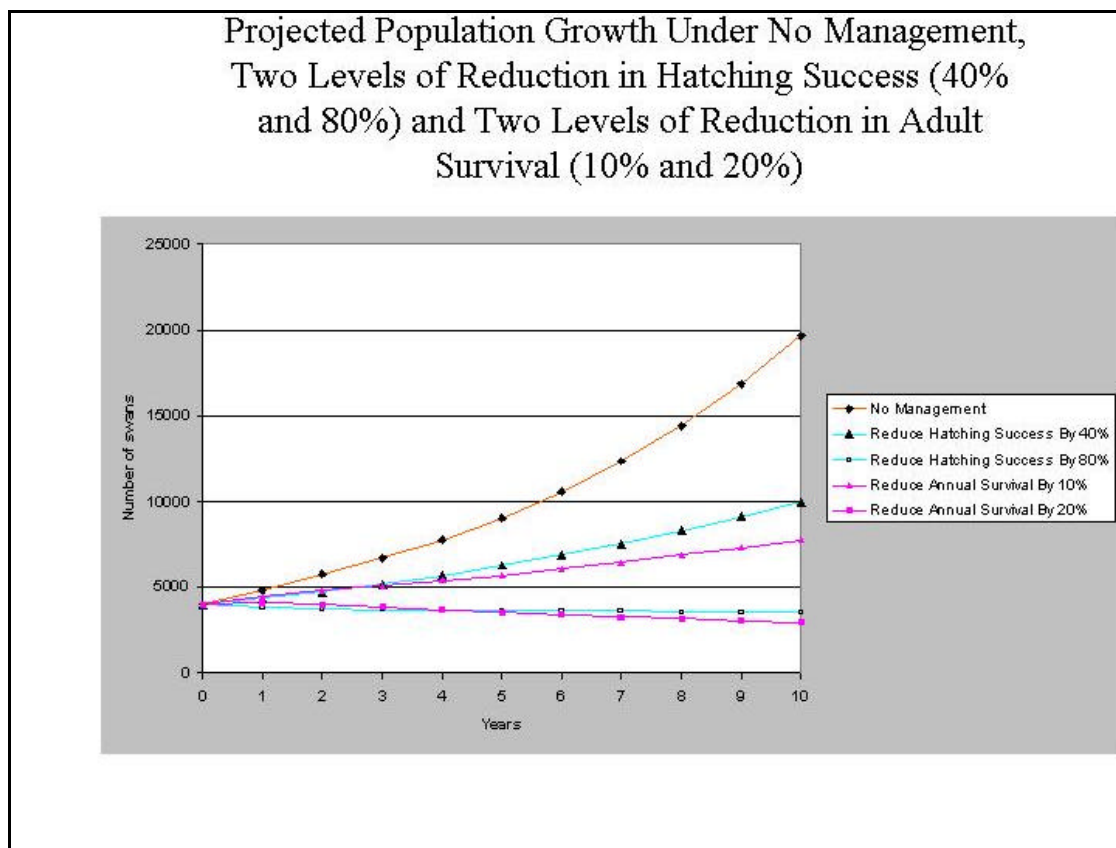
POPULATION ANALYSIS

Impacts of Reducing Survival and Recruitment on Population Growth Rate

The DNR constructed a mathematical model of the Maryland mute swan population. The model used average values for survival and productivity. Most values came from studies of mute swans in Maryland. The model does not take into account events such as weather that might affect population change in a particular year. The model also assumes that population growth is independent of the size of the population. In other words, the values for survival and productivity do not change as the population grows. The model was used as a tool to compare the relative effects of different management strategies on population growth.

Most wildlife population management falls into two main categories: (1) affecting reproductive output or recruitment and (2) affecting the survival rate of adult birds. The model allows a comparison of how changes to the reproductive output or survival rates influence the growth rate of the population. A common means of decreasing waterfowl reproductive output is through egg and nest destruction. Addling eggs reduces the proportion of nests that successfully produce cygnets (i.e., hatching success). The model was run at different levels of hatching success to simulate various levels of egg addling effort. The simulations indicated that it is necessary to reduce hatching success by 80% just to stabilize the population (Figure 3).

Figure 3: Projected Population Growth Under Different Management Scenarios



In contrast, when annual adult survival rates in the model were reduced, it took just a 20% reduction to result in a population that will slowly decline over time. While egg removal/destruction can reduce production of cygnets, merely destroying eggs does not reduce a population as quickly as removing immature or breeding adult swans. The comparisons show that the mute swan population is much more sensitive to changes in adult survival than to changes in hatching success (Figure 3). These findings are very similar to other modeling exercises for long-lived waterfowl species of geese and swans.

CONCLUSIONS AND MANAGEMENT RECOMMENDATIONS

The mute swan is an invasive, nonnative species that now inhabits the Bay in large numbers. The mute swan population in Maryland has increased dramatically since 1986. A large mute swan population threatens the protection and restoration of SAV beds in areas of critical importance to the Bay's living resources. Furthermore, the foraging of mute swans reduces the likelihood of achieving the Chesapeake 2000 Agreement objective of protecting and restoring 114,000 acres of SAV. Mute swans reduce the carrying capacity of habitat for native plant and animal species and can cause conflicts with people.

Adverse ecological effects are being caused by the large mute swan population in the Bay and will increase if the population continues to grow. The

DNR believes the mute swan population should be managed at a level that will protect critically important SAV beds and allow for the restoration of SAV, as well as minimize swan impacts to native wildlife and habitats. The management of mute swans in the Bay complements other efforts to protect and restore these habitats and should be viewed as part of a more comprehensive Bay restoration effort.

MANAGEMENT GOAL AND POPULATION OBJECTIVE

Management Goal

Manage the mute swan population in Maryland at a level that (1) minimizes the impacts on native wildlife and their habitat; (2) is consistent with the objectives of the Chesapeake 2000 Agreement; and (3) minimizes conflicts with humans.

Long-term Population Objective

Managing mute swans at a level that minimizes impacts on native wildlife and habitats will require reducing the size of the mute swan population. The population level at which key natural resources will be adequately protected is unknown. However, when the state's mute swan population was less than 500 birds, adverse ecological impacts and conflicts between people and mute swans were negligible.

MANAGEMENT OBJECTIVES AND STRATEGIES

Mute swan population management objectives and strategies for the next five years are listed on the next several pages. In 2008, the management plan will be assessed and revised based on progress towards the plan's goals and objectives and the results of research and monitoring efforts.

Public Outreach and Education

Implementation of mute swan management in Maryland must occur concurrently with an effort to educate and inform Maryland citizen's about mute swans. These programs should convey an understanding of the status of the mute swan population in Maryland, the impact of mute swans in the Bay's ecosystem, and the problems they create for people.

Objective: Increase public awareness about mute swans and their impact to the Bay's Living Resources

Strategy A-1: Conduct a statewide, random survey of public knowledge, perceptions and values regarding mute swans in Maryland.

Strategy A-2: Develop and implement a comprehensive mute swan communication program. Target programs to specific demographic groups, as well as shoreline owners and watershed community residents. There is a

critical need to increase public awareness of the difference between mute swans and native tundra swans and the impacts that mute swans have on the Chesapeake Bay ecosystem. Emphasis should also be placed on discouraging the winter-feeding of mute swans for it increases their winter survival.

Population Management and Resource Protection

An aggressive egg-addling program began in 2001 and will be continued, with the objective of reducing reproductive output (e.g., cygnet production) by at least 60%. In addition to efforts by state and federal wildlife managers, the DNR will continue to involve nongovernmental organizations such as those concerned with tributary conservation.

Population modeling and experience in other states demonstrates that egg addling, while a valuable tool, is unlikely to reduce the size of the swan population. In Rhode Island, a long-term egg-addling program reduced recruitment by 80%, but the number of nesting pairs continued to grow. Further, egg addling does not address the impacts on SAV and other living resources caused by an overabundance of mute swans.

To achieve the management goals and objectives within this plan, it will be necessary to remove subadult and adult swans. The removal of subadult and adult mute swan from the wild will be linked to the protection of key resource areas.

These areas, termed “Swan-Free Areas” include:

(1) wetlands, including SAV areas, identified to achieve the goals and objectives of the Chesapeake 2000 Agreement; (2) wetlands on Federal National Wildlife Refuges and other Federal lands, State Wildlife Management Areas, Natural Resources Management Areas, State Parks, and other state-owned and managed lands; (3) SAV and emergent wetland restoration areas; (4) colonial waterbird nesting areas; and (5) black duck nesting habitats (Appendix D). Lethal methods to remove swans will occur where nonlethal methods to exclude swans from Swan-Free Areas are not effective or practical. Lethal methods will include shooting or capture and euthanasia. Small numbers of swans may be captured and placed in permitted waterfowl collections. However, mute swans will not be relocated to other wetland habitats in Maryland. Federal guidance for permit issuance involving mute swans prohibits the release of mute swans into areas outside their existing range.

Management actions identified in Strategies B-1 and B-2 that will be used to reduce the swan population within areas of the state are authorized under NR Article, Section 10 - 206 (Appendix B). DNR personnel are experienced and professional in their use of wildlife control methods, and methods are applied as humanely as possible. For situations where it is necessary and practical to capture and euthanize swans, the DNR follows euthanasia methods recommended by the American Veterinary Medical Association.

Objective: Exclude or remove all mute swans from Swan-Free Areas to afford protection to habitats critical to the Bay's Living Resources; reduce the mute swan population as quickly and efficiently as possible, consistent with activities to protect, restore and enhance the Bay's Living Resources.

Strategy B-1: The DNR will continue to implement an aggressive egg addling effort to reduce hatching success by at least 60%. Implementation of this strategy will slow the population growth rate and reduce the number of adult swans that would have to be removed to achieve the management goal. The DNR will make every effort to treat all swan nests located in public waters and on private property with landowner permission. The DNR will continue to involve local tributary organizations and other nongovernmental organizations to oil swan eggs.

Strategy B-2: Starting in 2003, the DNR will seek federal authorization (Depredation Order 50 CFR Part 21.41) to begin removing mute swans from Swan-Free Areas. Beginning in 2003, the DNR will initiate activities to either prevent or remove mute swans from occupying Swan-Free Areas. No federal permit is required to scare mute swans. Recognizing that swans impacting SAV beds and other habitats classified as Swan Free Areas may occur immediately adjacent to these habitats, the scope of swan control efforts may be expanded to include these adjacent areas. If non-lethal methods to prevent mute swans from occupying Swan-Free Areas are ineffective or impractical, swans will be removed using lethal methods. Swans killed under this strategy may be donated to public museums or public scientific and educational institutions for scientific or educational purposes, or charities for human consumption.

Federal guidance for permit issuance involving mute swans prohibits the release of mute swans into areas outside their existing range. With federal authorization, small numbers of swans may be captured, sterilized, and placed in existing captive waterfowl flocks. However, the DNR will not authorize the relocation of swans, including same-sex pairs, to natural habitats in Maryland. The relocation of mute swans into unoccupied habitats would increase the distribution of mute swan in Maryland.

The relocation of same-sex pairs does not prevent breeding if a bird of the opposite sex locates and enters the relocation site. The possibility of breeding with wild, opposite-sex birds is high and would contribute to expansion of the breeding population, which is contrary to the objective of this management plan and USFWS and Atlantic Flyway Council policies.

With federal authorization, mute swans may be captured and relocated to zoos where the birds would be used for scientific and educational purposes. However, the DNR will prescribe restrictive permit conditions for the possession of swans through the existing federal permit process (50 CFR 21.25). Any relocation of swans to other jurisdictions shall be done only with the approval of the USFWS and the government agency responsible for wildlife conservation in that jurisdiction and in accordance with any flyway, national, or international mute swan management plan, policy, law, or regulation.

Strategy B-3: The DNR will work with other states, flyway councils, the International Association of Fish and Wildlife Agencies, and the USFWS to develop federal regulatory language to facilitate efficient population management. Reducing the size of the mute swan population in the short-term will require active intervention by the DNR. However, if the population can be reduced to a level that alleviates resource concerns, removing regulatory barriers will help maintain the population at an acceptable level.

Strategy B-4: The DNR will work with the Maryland General Assembly to amend existing state law (NR Article, Section 10-101), which classifies the mute swan as a Wetland Game Bird. The statute should be amended to include only native migratory game bird species. The DNR will also encourage the Maryland General Assembly, consistent with federal regulations, to amend NR Article, Section 10-101, by adding the mute swan, Australian black swans, and other invasive, non-native bird species to the list of unprotected birds in Maryland. Presently, the only non-native, unprotected birds listed in this law are the English house sparrow and European starling.

Captive Mute Swan Management

Captive swans that either escape or are released may be insignificant in terms of numbers, but they can dramatically affect distribution by introducing swans to new areas of the state. The possession of captive mute swans is now regulated by federal permit (50 CFR 21.25). Federal permits authorizing activities involving live mute swans will include restrictive conditions to ensure that permitted activities do not facilitate expansion of the range or population of mute swans, for example, prohibiting the release of live mute swans or their eggs into areas outside their existing range, or onto any federal lands. State regulations and policies will be developed to further prevent the release and escape of mute swans into the wild. Natural Resources Article, Sections 10-205, 10-903, and 10-905 (Appendix B) give the authority to the DNR to adopt regulations to restrict, possession, purchase, sale and exportation and importation of wildlife. Further, the DNR has the authority to require persons who possess mute swans to obtain a state permit.

Objective: Prevent the escape and reproduction of captive mute swans.

Strategy C-1: In 2003, promulgate regulations and/or add conditions to federal and state permits that prohibit the sale, trade, barter, and importation of mute swans, or their eggs, in Maryland.

Strategy C-2: Persons possessing mute swans now must possess either a Federal Waterfowl Sale and Disposal Permit or a federal Form 3-186. Persons possessing mute swans will be required by the DNR to secure a state permit. However, the DNR shall only permit the possession of mute swans at locations where swans have legally been held in captivity prior to enactment of state regulations. After this date, the DNR will not authorize any additional state permits to purchase or import mute swans.

Strategy C-3: In 2003, promulgate state regulations or add conditions to all federal and state permits governing the possession of migratory birds, prohibiting

the release of mute swans to the wild. Following capture of healthy swans and/or recovery of sick or injured swans, every effort will be made by the DNR to place the swans in captivity at a facility permitted to possess mute swans. In the event that this is not possible, swan(s) will be humanely euthanized by a veterinarian authorized by DNR in accordance with a federal permit.

Relief of Human Safety and Nuisance Conflicts

Natural Resources Article, Sections 10-205 and 10-206 (Appendix B) and federal regulations (50 CFR 21.41) (Appendix C) authorize the DNR to resolve conflicts between mute swans and people by allowing either the capture or lethal removal of mute swans.

Objective: Reduce conflicts between mute swans and people.

Strategy D-1: The DNR with the U.S. Department of Agriculture's Wildlife Services will continue to provide technical information and guidance to property owners who are experiencing nuisance, safety, and habitat depredation problems caused by mute swans. Wildlife Services and DNR personnel may suggest the use of nonlethal, lethal, or a combination of techniques to resolve swan conflicts. The recipient of technical assistance is responsible for securing the required federal and state permits before implementation of recommended, lethal control actions.

Strategy D-2: In 2003, the DNR shall seek a Federal Depredation Order that will authorize property owners, land or water management authorities, municipalities, and other responsible parties in Maryland to control or remove mute swans occurring on lands or waters under their jurisdiction. Such a depredation order will apply to situations where control or management of mute swans is necessary to protect personal property, human health and safety, or native plant and animal resources. The depredation order will include guidelines to ensure, to the extent possible, that control measures used are safe and effective. No federal or state permit is needed to scare swans. Property owners will have primary responsibility for deciding, on a case-by-case basis, whether mute swans on their property are desirable and what control measures are acceptable. The DNR will recommend that effective and practical nonlethal methods be used to resolve the problem where appropriate, before lethal control is initiated by the permittee. Prior to the adoption of a Federal Depredation Order in 50 CFR Part 20, property owners will be required to obtain a Federal Depredation Permit to control or remove mute swans occurring on lands or waters under their jurisdiction. Federal permits will be reviewed by the DNR and shall include conditions to ensure, to the extent possible, that control measures used are safe, effective, and practical. However, the permittee is responsible for implementation of any and all control actions.

Population Monitoring and Research

Objective: Monitor the size and distribution of the mute swan population and the effectiveness of management actions.

Strategy E-1: Conduct an annual spring aerial survey of mute swans in the tidal portions of the Bay to determine the locations of active mute swan nests and breeding pairs to facilitate effective egg addling and removal of swans from Swan-Free Areas.

Strategy E-2: Conduct an annual summer aerial survey of mute swans on the tidal portions of the Bay to determine the size and distribution of the swan population. This survey will also be used to measure the effectiveness of population control efforts and provide the locations of breeding pairs for removal of swans from Swan-Free Areas, and other population control efforts.

Objective: Conduct additional research that will increase understanding of the role of mute swans in the Chesapeake Bay ecosystem and their impacts on living resources. This research should contribute to achieving mute swan management goals and objectives.

Strategy F-1: Beginning in 2003, investigate further the role of mute swan herbivory on SAV growth, biomass, plant survival, and regeneration and reproduction, especially as it relates to the availability of SAV to wintering waterfowl and the achievement of SAV restoration goals.

Strategy F-2: Beginning in 2003, determine the role of interspecific competition between mute swans and native wildlife, especially the impact of mute swans on wintering tundra swans.

Objective: Investigate the use of nonlethal swan population control methods.

Strategy G-1: The DNR will continue to evaluate nonlethal methods of controlling mute swans. Such methods shall include exclusion, hazing (e.g., harassment), and any other methods that may become available.

Strategy G-2: The DNR will evaluate the effectiveness of sterilization of male swans as a method of reducing annual cygnet production at the local level. The use of this technique as a future management tool is conditional upon the success of this research. This technique will not be used as a general population control method. Rather, sterilization may be used at specific sites where the removal of breeding pairs may not be practical. The DNR will seek federal authorization (50 CFR 21.27) to conduct this investigation.

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APPENDIX A: Waterfowl Advisory Committee and Mute Swan Task Force Recommendations

DNR Waterfowl Advisory Committee Recommendations

On February 15, 2001, the DNR Waterfowl Advisory Committee endorsed the Mute Swan Task Force Recommendations and further recommended that the mute swan population be reduced to less than 500 birds over the next 5 years. The Committee also recommended that the legal protection for the species be removed, by amending the existing definition of NR Article, Section 10-201 to include only native species of wetland game birds. In addition, the Committee recommended that NR Article, Section 10-201 be amended to include the mute swan as an unprotected bird, along with the European starling and English house sparrow.

Maryland Mute Swan Task Force Recommendations

In 2001, the Mute Swan Management Task Force made management recommendations to address the concerns associated with the mute swan population. Members included representatives from several animal protection and conservation organizations and the governor-appointed DNR Waterfowl Advisory Committee. Below is a partial list of Mute Swan Task Force recommendations. To review a complete summary of the Mute Swan Task Force Report to the DNR visit the DNR web page at <http://www.dnr.state.md.us/wildlife/mstfpc.html>.

- 1) Mute swans should not be eradicated in Maryland. The DNR should maintain some population of mute swans in the Chesapeake Bay and its tributaries for public enjoyment in select areas.
- 2) Develop criteria to designate "Swan-Free Zones" to protect sensitive habitats and Bay resources from disruptive mute swan activity. Keep mute swans out of them either seasonally or year-round, whichever is appropriate for the resource that is being protected. These areas could include areas where SAV is most sensitive, SAV restoration plantings, areas environmentally sensitive to impacts from fecal Coliform contamination, and rare nesting habitat for state listed water birds.
- 3) Guidelines for management options to exclude or remove mute swans from Swan-Free Zones should be crafted with intent to provide local government agencies and private land managers with the ability to implement appropriate options on properties under their jurisdiction or care.
- 4) Develop an education effort for shoreline landowners about mute swans, their behavior and how to manage conflicts, including information on egg addling, fencing to exclude mute swans, and how feeding may contribute to future swan conflicts.
- 5) Develop criteria and guidelines that specify an appropriate sequence of action choices in conflict situations, with nonlethal actions preferred. These

criteria should require that each complaint be investigated by USDA Wildlife Services. The killing of swans should be done as a last resort and should be conducted by wildlife management professionals.

- 6) Swans removed from Swan-Free Zones should not be donated to charitable food banks to feed the needy.
- 7) DNR should continue to addle eggs on public property and seek permission to addle eggs on private property.
- 8) DNR should move with caution toward relocating swans to other locations to alleviate population impacts in the Bay. Translocation could be an option for reducing mute swan populations in local areas. The capture and relocation of mute swans may be an option for short-term management of local populations that are jeopardizing other resources. However, consideration should be given to the possibility creating unwanted populations in areas not currently occupied by mute swans, thereby increasing distribution and potential for population growth.
- 9) Mute swans should remain "Wetland Game Birds." No hunting season should be set in the foreseeable future. Further, hunting should be considered in view of public preferences and how hunting would contribute to population management goals locally or Bay-wide.
- 10) Develop and enforce regulations for mute swan captivity, sale, transport, import, and breeding in a manner similar to regulations affecting other Wetland Game Birds.
- 11) Permits to transport mute swans to other states should require written permission of the wildlife agency of the recipient state.
- 12) Continue monitoring research on immuno-contraception and the potential for use in mute swan management.
- 13) Monitor population of mute swans in Maryland's Chesapeake Bay annually for numbers and expansion of distribution around the Bay.
- 14) Measure the extent of Bay-wide and local impacts of mute swans feeding on SAV in the Bay, especially where SAV is most vulnerable.
- 15) Measure the extent to which mute swans have or can contribute to the loss of SAV and other habitat, and how this can affect native populations of aquatic species and waterfowl.
- 16) Monitor interactions between mute swans and wintering tundra swans, as well as other native waterfowl.
- 17) Possible Research: (1) The Department of Natural Resources should consider conducting a survey on public perception, values and knowledge

about mute swans to assist in education and outreach efforts. This survey could assist the Department in identifying target audiences so that effective communication strategies can be developed; (2) Measure how well or how poorly SAV beds in the Chesapeake Bay recover from the grazing of mute swans.

- 18) Allocate appropriate funds for mute swan education, research and management needs.

APPENDIX B: Maryland Statutes Pertaining to the Management of Mute Swan

Statutes within the Annotated Code of the Public General Laws of Maryland that pertain to management actions identified in this plan:

Natural Resources Article (NR), Section 10-101 includes the definition of wetland game birds. "Wetland game birds" mean brant, coots, ducks, gallinules, geese, mergansers, rails, snipe, and swan or any part, egg, offspring, or dead body of any of them. This section also defines unprotected birds. "Unprotected bird," means any English sparrow and European starling or any part, egg, offspring, or dead body of any of them.

NR Article, Section 10-205 authorizes the Department of Natural Resources (DNR) to adopt regulations to enlarge, extend, restrict or prohibit hunting, possessing, purchasing, shipping, carrying, transporting, or exporting wildlife.

NR Article, Section 10-206 authorizes the DNR to reduce the wildlife population in any county, election district, or other identifiable area after a thorough investigation reveals that protected wildlife is seriously injurious to agricultural or other interests in the affected area. The method of reducing the population is at the DNR's discretion.

NR Article, Section 10-211 requires the DNR to establish a program to control the population of mute swans; authorizing the DNR to include the managed harvest of adult mute swans in this program; authorizing the DNR to solicit licensed hunters to participate in the managed harvest of adult mute swans; and generally relating to the management of the mute swan population.

NR Article, Section 10-903 provides statutory authority for the DNR to adopt regulations that prohibit or restrict the importation, exportation, sale, release, or possession of wildlife not native to Maryland on a finding that the wildlife is harmful to native wildlife or to natural ecosystems.

NR Article, Section 10-905 prescribes the Game Husbandry License. The license specifies which species of game birds, which can be bred, raised, protected, or sold and for what purpose, the type of fencing or other requirements necessary to prevent undesirable mixing of native wildlife and the captive game birds, and any other conditions necessary to ensure adequate protection of native wildlife.

NR Article, Section 10-908 prescribes the Wildlife Cooperator Permit. The permit allows any properly accredited person desiring to assist the DNR in the control of wildlife injurious to agriculture or other interests, or to provide care and treatment of sick or injured wildlife for rehabilitation and release back into the wild. The DNR may adopt regulations governing the issuance, revocation, terms, and conditions of the permit.

APPENDIX C: Public Policies That Guide DNR Swan Management

There is no central federal authority over exotics, but there are some laws that do apply when federal funds or authority crosses paths with exotic species.

U.S. Fish and Wildlife Service Information Leaflet regarding the Federal Protection of the Mute Swan – Prepared by the U.S. Fish and Wildlife Service (USFWS), Division of Migratory Bird Management, Arlington, Virginia, February 2002

A. Legal Background

Complaint Filed in U.S. District Court

On July 16, 1999, a complaint was filed with the U.S. District Court in the District of Columbia, claiming that the Secretary's failure to include the mute swan on the List of Migratory Birds protected under the Migratory Bird Treaty Act (MBTA) (16 United States Code [USC] 703-712, Ch. 128; July 13, 1918; 40 stat. 755) was arbitrary and capricious under the Administrative Procedure Act (USC Title 5, Part 1. Ch. 5, Subchapter 2).

Opinion of the U.S. District Court

The District Court found that the federal government's failure to protect the mute swan was causally linked to a diminished presence of the birds about plaintiff's property on the Eastern Shore of Maryland, that the decline in mute swans reduced plaintiff's aesthetic enjoyment, and that the decline "will be ameliorated if federal defendants include the bird under the MBTA." This finding established plaintiff's "standing" or right to pursue her claims in federal court.

On the merits of the case, however, the District Court found that the conventions underlying the MBTA impose conflicting obligations, thus creating an ambiguity with regard to whether the mute swan must be included on the list of protected migratory birds. Faced with this apparent ambiguity, the District Court held that "agency deference is the most plausible alternative" for not listing the mute swan and granted summary judgment in favor of the federal defendants.

Appeal to the U.S. Circuit Court of Appeals

Following the adverse judgment of the U.S. District Court, plaintiff appealed to the U.S. Court of Appeals for the District of Columbia Circuit. The case was argued on November 14, 2001, and decided on December 28, 2001. Plaintiff argued that the case primarily presented the straightforward question of whether the mute swan is a swan and a member of the family *Anatidae* as those phrases are used in the conventions with Canada and Mexico.

Opinion of the U.S. Court of Appeals

The Court of Appeals assumed that there was some ambiguity in the language of the MBTA and the conventions as to whether the mute swan is a protected species, but indicated that it was highly skeptical that the plain language of those documents would permit exclusion of the mute swan. The Court noted that the mute swan is indeed a "swan" as referenced in the Canadian convention, as well as a member of the family *Anatidae* as referenced in both the Canadian and Mexican conventions.

However, the Court based its decision on its view that the USFWS failed to offer support for its position in the rulemaking that listed covered migratory birds. The Court noted that the federal defendants were unable to point to anything "in the statute, treaties, or administrative record" to support their arguments (i.e., the non-native status of the mute swan, its harmful effect on native flora and fauna, and potential effects on other treaty obligations) that the mute swan should be excluded from protection under the MBTA. In particular, they found that "no agency decision explains the definition of 'native,' whether the mute swan is native or non-native, and most importantly, why the native or non-native character of a species is relevant under the statute and treaties." The Court therefore vacated the list of covered birds codified at 50 CFR 10.13, insofar as the list excludes mute swans.

As a practical matter, decisions of the D.C. Circuit regarding federal regulations are effectively binding nationwide.

The complete text of the Appeals Court decision is available at <http://www.ll.georgetown.edu/Fed-Ct/Circuit/dc/opinions/00-5432a.html>.

Implications for Management

Immediate and Long-Term Consequences for Mute Swan Management

A final rule for the next revision of the List of Migratory Birds protected by the MBTA (50 CFR 10.13) is now in preparation. We are assessing the ramifications of this decision and will determine what changes may need to be made to the draft final rule.

In the meantime, the technical effective date of the Circuit Court's opinion is not entirely clear; it would probably be safest to consider it already in effect. In any case, once the judgment of the Court becomes effective, the prohibitions of the MBTA should be considered to apply to the mute swan. Therefore, take of mute swans will be prohibited except as authorized by the USFWS pursuant to regulation. Any prosecution for unauthorized take of mute swans will be subject to the enforcement discretion of the USFWS and the Department of Justice.

Appropriate management of migratory bird populations will still be possible in the short term. Specifically, the USFWS may pursue any or all of the following options:

- 1) Development of management plans for the mute swan in cooperation with State agencies and the Flyway Councils;

- 2) Establishment of hunting season frameworks for mute swans in cooperation with state agencies and the flyway councils (as a "swan" and a member of the *Anatidae*, the mute swan is automatically a "game bird" as defined in the MBTA and the conventions);
- 3) Issuance of depredation permits to state agencies and others allowing the take of depredating mute swans; and
- 4) Establishment of a depredation order allowing state agencies and others to take depredating mute swans without need of a federal permit.
- 5) There is a possibility that, at some point in the future, we could develop regulatory language to exclude non-native species such as the mute swan from the protection of the MBTA that would withstand a court challenge. To do so successfully, we would have to show that Congress intended for the MBTA to apply only to species native to the United States. As discussed above, the D.C. Circuit expressed significant skepticism as to whether this would be possible.

C. Permitting Requirements

Once the judgment of the Circuit Court becomes effective, permits will be necessary to legally take, possess, transport, sell, purchase, barter, import, export, band, and mark mute swans. Banding and marking of mute swans can be permitted (50 CFR 21.22), as can scientific collecting (50 CFR 21.23), taxidermy (50 CFR 21.24), sale and disposal of captive-reared and properly marked birds (50 CFR 21.25), and special purpose actions (50 CFR 21.27).

Depredation permits (50 CFR 21.41) will be necessary to control or manage mute swans to protect crops or other interests being injured, such as personal property, human health and safety, or native plant and animal resources, including, but not limited to, those federally listed as endangered or threatened or listed as candidates for federal listing.

Issuance of permits must comply with the National Environmental Policy Act. Because of the possibility of future litigation regarding the issuance of any permit allowing take of mute swans, the USFWS should be careful to document contemporaneously its analysis of how issuance of the permit is consistent with the regulation at issue, the MBTA, and the underlying treaties.

Additionally, offices issuing permits authorizing activities involving live mute swans should consider including restrictive conditions so as to ensure that permitted activities do not facilitate expansion of the range or population of mute swans, such as: The release of live mute swans or their eggs into areas outside their existing range, or onto any federal lands, is strictly prohibited.

The Chesapeake 2000 Agreement

The Agreement (<http://chesapeakebay.net/agreement.htm>), signed by the Governors of Maryland, Pennsylvania, Virginia, the Mayor of the District of Columbia, Chesapeake Bay Commission, and the Environmental Protection Agency representing the federal government includes the following relevant goals:

Living Resources: Restore, enhance and protect the finfish, shellfish and other living resources, their habitats and ecological relationships to sustain all fisheries and provide for a balanced ecosystem.

Exotic Species:

- 1) By 2001, identify and rank non-native, invasive aquatic and terrestrial species, which are causing or have the potential to cause significant negative impacts to the Bay's aquatic ecosystem;
- 2) By 2003, develop and implement management plans for those species deemed problematic to the restoration and integrity of the Bay's ecosystem.

Vital Habitat Protection and Restoration: Preserve, protect and restore those habitats and natural areas that are vital to the survival and diversity of the living resources of the Bay and its rivers.

Submerged Aquatic Vegetation (SAV): Recommit to the existing goal of protecting and restoring 114,000 acres of SAV.

- 1) By 2002, revise SAV restoration goals and strategies to reflect historic abundance, measured as acreage and density from the 1930s to the present. The revised goals should include specific levels of water clarity, which are to be met in 2010. Strategies to achieve these goals will address water clarity, water quality and bottom disturbance.
- 2) By 2002, implement a strategy to accelerate protection and restoration of SAV beds in area of critical importance to the Bay's living resources.

Executive Order 13112 of February 3, 1999 - Invasive Species Laws & Regulations

Executive Order 13112 signed by President Bill Clinton directs each federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law, to (1) identify such actions, and (2) subject to the availability of appropriations, and within Administrative budgets limits, use relevant programs and authorities to (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound

control of invasive species; and (vi) promote public education on invasive species and the means to address them.

National Invasive Species Act

The National Invasive Species Act of 1996 (amends the Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990) and creates the Aquatic Nuisance Species Task Force (ANSTF). Although it was created to specifically deal with ballast water issues (zebra mussel), it does include other items. It specifically mentions the Chesapeake Bay as in need of attention because it is the largest recipient of ballast water on the East Coast. The Chesapeake Bay Program has an ex-officio member on the ANSTF.

In part, the purpose of the act includes the prevention of unintentional introduction and dispersal of nonindigenous species into the waters of the United States and to develop and carry out environmentally sound control methods to prevent, monitor and control unintentional introductions of nonindigenous species from pathways other than ballast water.

The ANSTF, under Sec. 1202(c)(2) Implementation - Whenever the ANSTF determines that there is a substantial risk of unintentional introduction of an aquatic nuisance species by an identified pathway and that the adverse consequences of such an introduction are likely to be substantial, the ANSTF shall, acting through the appropriate federal agency, and after an opportunity for public comment, carry out cooperative, environmentally sound efforts with regional, state and local entities to minimize the risk of such an introduction.

Under Sec. 1202 (e) Control - The ANSTF may develop cooperative efforts to control established aquatic nuisance species to minimize the risk of harm to the environment and the public health and welfare. The ANSTF can develop a control program to achieve a targeted level of control.

U.S. Fish and Wildlife Service Policy to Control Mute Swans on Federal Lands:

Letter from USFWS Director dated March 26, 1996, to USFWS Regional Directors directing all USFWS managers to take effective steps to control mute swans on lands under their jurisdiction to protect those habitats from degradation and destruction by mute swans. Further the managers were directed to increase public awareness as an integral part of the policy to control mute swans on USFWS lands. This policy affects management of swans on the USFWS Chesapeake Marshland National Wildlife Refuge Complex (Blackwater, Martin, Barren Island, Susquehanna, Bishops Head, and Spring Island) and Eastern Neck National Wildlife Refuge within the state. No state permit is needed by federal agencies to control swans on federal lands.

Maryland Senate Joint Resolution 15

A Senate Joint Resolution concerning Natural Resources - Mute Swans - Federal Agency Control Measures for the purpose of urging the U.S. Fish and Wildlife Service to act with expedience to craft and conduct appropriate regulatory processes which will allow Maryland to establish a method of controlling the mute swan population and to mitigate the mute swan population's impact permanently and statewide; urging the U.S. Department of the Interior to appeal a certain holding; and generally relating to certain federal agency measures to control the mute swan population.

Whereas, the bird species known as the mute swan is not native to the Chesapeake Bay; and

Whereas, surveys of the Chesapeake Bay indicate that the mute swan population is growing at an alarming rate, increasing from less than 100 birds in 1973 to nearly 4,000 in 1999; and

Whereas, mute swans negatively impact native species and habitats in parts of the Chesapeake Bay by displacing State-listed nesting waterbirds and removing large amounts of submerged aquatic vegetation which is vital to all life in the Bay; and

Whereas, mute swans have repeatedly disrupted efforts to restore submerged aquatic vegetation, obstructing progress toward the Chesapeake 2000 Agreement goal of restoring 114,000 acres of the vegetation by 2010; and

Whereas, the U.S. Court of Appeals for the District of Columbia ruled that mute swans are protected by U.S. Fish and Wildlife Service regulations governing activities involving direct contact with protected birds under the Migratory Bird Treaty Act; and

Whereas, the Maryland General Assembly passed House Bill 728 during the 2001 Legislative Session, requiring the Department of Natural Resources to establish a program to control the State's mute swan population; and

Whereas, the urgent need to plan and implement mute swan population control measures and to mitigate mute swan impacts increases exponentially each year; now therefore, be it

Resolved by the General Assembly of Maryland, that the U.S. Fish and Wildlife Service is urged to act with expedience to craft and conduct appropriate regulatory processes which will allow Maryland to establish a method of controlling the mute swan population and to mitigate the mute swan population's impact permanently and statewide; and be it further

Resolved, that the United States Department of the Interior is urged to appeal the holding of the U.S. Court of Appeals for the District of Columbia that declared the mute swan to be a migratory bird protected under international treaties; and be it further

Resolved, that a copy of this Resolution be forwarded by the Department of Legislative Services to the Honorable Parris N. Glendening, Governor of Maryland; the Honorable Thomas V. Mike Miller, Jr., President of the Senate of Maryland; the Honorable Casper R. Taylor, Jr., Speaker of the House of Delegates; the Honorable Barbara A. Mikulski, U.S. Senate, 709 Hart Senate Office Building, Washington, D.C. 20510; the Honorable Paul S. Sarbanes, U.S. Senate, 309 Hart Senate Office Building, Washington, D.C. 20510; the Honorable Wayne T. Gilchrest, U.S. Congress, 2245 Rayburn House Office Building, Washington, D.C. 20515; the Honorable Robert L. Ehrlich, Jr., U.S. Congress, 1632 Longworth House Office Building, Washington, D.C. 20515; the Honorable Benjamin L. Cardin, U.S. Congress, 2267 Rayburn House Office Building, Washington, D.C. 20515; the Honorable Albert R. Wynn, U.S. Congress, 434 Cannon Office Building, Washington, D.C. 20515; the Honorable Steny H. Hoyer, U.S. Congress, 1705 Longworth House Office Building, Washington, D.C. 20515; the Honorable Roscoe G. Bartlett, U.S. Congress, 2412 Rayburn House Office Building, Washington, D.C. 20515; the Honorable Elijah E. Cummings, U.S. Congress, 1632 Longworth House Office Building, Washington, D.C. 20515; the Honorable Constance A. Morella, U.S. Congress, 2228 Rayburn House Office Building, Washington, D.C. 20515; the Honorable Gale A. Norton, Secretary of the Interior, U.S. Department of the Interior, 1849 C Street NW, Washington, D.C. 20240; Mr. Marshall Jones, Director (Acting), U.S. Fish and Wildlife Service, 1849 C Street NW, Washington, D.C. 20240; and Mr. Jon Andrew, Chief, U.S. Fish and Wildlife Service, Division of Migratory Bird Management, 4401 N. Fairfax Drive, Arlington, VA 22203.

Atlantic Flyway Council Policy (August 1, 1997) to Control Mute Swans in the Atlantic Flyway:

The policy endorses the following actions:

- 1) State and provincial wildlife agencies, if they do not already have the authority, should seek to gain authority over the sale and possession of mute swans and their eggs.
- 2) The sale of mute swan adults, young or their eggs should be prohibited.
- 3) States should seek to eliminate all importing and exporting of mute swans without a special purpose permit issued by the state wildlife agency.
- 4) Mute swan captured due to nuisance complaints, sickness, or injury should be removed from the wild or be euthanized.
- 5) Egg addling program where feasible should be encouraged.
- 6) Both state and federal wildlife agencies should institute programs to prevent the establishment and or eliminate mute swans.
- 7) States and provinces should seek to make the mute swan an unprotected species if this is not already the case.
- 8) States should strive to manage mute swan populations at level that will have minimal impacts to native wildlife species or habitats.

APPENDIX D: Swan-Free Areas

All mute swans will be either excluded or removed from the following areas:

Important SAV Beds – Submerged Aquatic Vegetation (SAV) is one of the most critical living resources in Chesapeake Bay; not only do SAV beds support fish, crab, and native waterfowl populations, but they directly improve water quality through a variety of physical and chemical processes. SAV populations are already far below historic levels, primarily due to water quality degradation following increases in human population and land use changes in the Chesapeake Bay watershed. Although the consequences of the recent accidental introduction of mute swan to the Chesapeake Bay region have not been quantified, studies of mute swans in several areas of the world have shown that these birds can negatively impact SAV communities. Whether through direct consumption, interrupting reproduction, or even trampling, mute swans could potentially exert significant local pressure on SAV survival and thus on many living resources of the Bay. The continued growth and expansion of the mute swan population in the Bay is counter to the Chesapeake 2000 Agreement's Vital Habitat Protection and Restoration goals, in particular the goal to "Preserve, Protect and Restore those habitat and natural area vital to the survival and diversity of the living resources of the bay and its rivers."

All species of SAV will receive equal protection, for all species provide physical and water quality benefits such as reducing sediment re-suspension, increasing dissolve oxygen levels, and absorbing and sequestering nutrients. For these reasons, there are clear ecological benefits to the presence of any species of SAV. Below are SAV beds that are critically important to the Bay's living resources and have been identified by the Chesapeake Bay Program as partial fulfillment of the goals and objectives of the Chesapeake 2000 Agreement. Submerged aquatic vegetation beds to be protected from mute swans are mapped and include:

- 1) SAV restoration sites
- 2) Areas vegetated less than 30% of the time since 1990 to current survey
- 3) SAV in areas that contain less than 25% of its historical acreage
- 4) SAV beds that are declining in size
- 5) SAV in the vicinity of large numbers of mute swans
- 6) Core SAV bed areas (areas that have the highest persistence of SAV coverage between 1984 and 2002). These sites are believed to be consistent seed and propagule source areas.

Submerged Aquatic Vegetation Transplanting Sites - These are plots that are transplanted in areas where SAV are completely absent or far below historic levels. Transplantings range from about 1/16 to 1 acre in size. Only native SAV species are used for transplanting (e.g., redhead grass, sago pondweed, wild celery, and eelgrass). Fencing is often erected the first year to prevent grazing and uprooting by Canada geese and mute swans. The protection to SAV from fencing declines over time as the fencing is not maintained and deteriorates due to tidal action, etc.

Many of these areas are identified and can be viewed at:

http://www.dnr.state.md.us/bay/sav/rest_locations.html or,

<http://mddnr.chesapeakebay.net/savrrc/index.html>

Publicly owned Wetlands – Wetlands on DNR Wildlife Management Areas, State Parks, and Natural Resource Management Areas, U.S. Fish and Wildlife Service’s Chesapeake Marshland National Wildlife Refuge Complex (Blackwater, Martin, Barren Island, Susquehanna, Bishops Head, and Spring Island) and Eastern Neck National Wildlife Refuge and the National Park Service’s Assateague Island National Seashore and other publicly owned wetlands.

Colonial Waterbird Nesting Sites - These are known sites where black skimmers and terns (common, least, Forster’s) nest on natural sand or oyster shell beaches where mute swans may loaf and cause either chick mortality or nest abandonment. Areas to be protected from swans include the Chincoteague, Sinepuxent, and Assawoman Bays, where about 75% of the colonial waterbird colonies presently occur. Other nesting areas requiring protection from swans include Tar Bay and Barren, Bloodsworth, Smith, Coaches, and Popular Islands.

Black Duck Nesting Habitats - Black ducks use salt marshes, coastal islands and meadows, brackish and freshwater impoundments, and riverine marshes for nesting. Because of the black duck’s aversion to human disturbance most black ducks nest on uninhabited islands or remote marshlands and adjacent uplands. Known nesting occurs throughout the Chesapeake Bay area with the greatest densities thought to occur on the Eastern Shore of Maryland from the Chester River south to the Crisfield area. Known black duck nesting areas are mapped (Map 35 in S.L. Funderburk, S.J. Jordan, J.A. Mihursky, and D. Riley, editors. Habitat requirements of Chesapeake Bay living resources. Maryland Department of Natural Resources, Annapolis, USA).