

The Maryland Mute Swan Task Force Recommendations



[A Summary of Information](#)

Prepared by the Maryland Department of Natural Resources' Mute Swan Task Force
January 2001

Overview of Task Force Recommendations

The main issue addressed by the Task Force was whether or not the Maryland Mute Swan [population's](#) rapid growth is an indication that their numbers and use of Chesapeake Bay habitats should be managed and if so, how they should be managed. The Task Force considered their [natural history](#), including the potential of mute swans to multiply through reproduction, their longevity, and their ability to use native habitats more successfully than some native species. The Task Force reviewed and considered information about the real and potential impact of mute swans on [submerged aquatic vegetation \(SAV\)](#) and [native species](#).

The Task Force also considered any real or perceived [impacts on human use](#) of shoreline properties for recreation. The beauty and [value of mute swans](#) for many people also factored into the Task Force's deliberations. The Task Force considered the current [legal status of mute swans](#) in Maryland and deliberated on whether or not this should be changed, as well as the current and historic [management of mute swans](#) in Maryland and in other states.

There are seven primary issues that were identified by the Task Force and provided the framework for their recommendations to the DNR. In addition, the Task Force examined a menu of management techniques and made recommendations on the use of each. The seven primary issues are:

Management Recommendations

Issue 1. Mute Swans are Inherently Valuable

**Issue 2. Mute Swans Impact Native Wildfowl Habitats
(Submerged Aquatic Vegetation = SAV
and Species, as well as State Listed Species**

Issue 3. Mute Swans Impact Water Quality

Issue 4. There is a Lack of Public Information on Mute Swans

Issue 5. Mute Swans Can Conflict with Humans

Issue 6. The Population of Mute Swans in Maryland is an Issue

Issue 7. The Legal Status of Mute Swans is an Issue

Management Techniques

Mute Swans - Population Status, Impacts On Native Wildlife and People, and Management Needs In Maryland

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Introduction

The mute swan (*Cygnus olor*), a native of Eurasia, was introduced to the North American continent from the mid -1800s through the early 1900s. Individual swans were imported to many areas of North America to adorn city parks and large estates and for zoos and

aviculture collections. Introduction of this species continues in many parts of the U.S. Native to Asia, mute swans in the U.S. are descendants of semi-domestic birds from Europe (Bellrose 1980). Feral populations of this exotic species continue to grow steadily throughout the Atlantic Flyway and upper Midwestern States of the Mississippi Flyway.

The mute swan population in Maryland's portion of the Chesapeake Bay originated when five swans escaped from an aviculture collection along the Miles River in Talbot County in March 1962 (Reese 1996). A pair of these birds bred successfully that summer, and the flock increased to 18 by 1968 and exceeded 100 by 1974. In the 1999 midsummer count of mute swans in Maryland, 3955 birds were counted ([Figure 1 - Total Mute Swans in Maryland](#)). The mute swan generally flourishes in association with human civilization, in marked contrast to the tundra swan (Bellrose 1980). Although mute swans are aesthetically pleasing, their potentially deleterious effects on native ecosystems are a concern to some citizens and resource managers. These concerns include overgrazing SAV (submerged aquatic vegetation) and competition with or displacement of native waterfowl and other migratory birds. Mute swans can also pose a limited risk to human safety and, in certain circumstances, can impact human use of private and public properties.

Legal Status

Maryland law (Annotated Code of Maryland, 10-101) classifies swans as "wetland game birds." This law provides protection to game species and permits the establishment of a regulated hunting season for those species. The law was promulgated prior to the establishment of mute swans in Maryland and was intended to give authority to the Maryland DNR (Department of Natural Resources) to protect and manage native swans. Thus, mute swans are afforded

***de facto* protection under the current state law.**

The Maryland DNR is the state agency responsible for managing the wildlife resources of the State and has authority to reduce wildlife populations in any county, election district, or other identifiable area of the State, when thorough investigation reveals that such populations are seriously injurious to agricultural or other interests in the affected area (Annotated Code of Maryland, 10-206). Public notification regarding the control of wildlife is desirable in many instances but is not required by law. The control of wildlife on private property by DNR and other state or federal agencies is done only in extreme circumstances (e.g., disease control) and is done with landowner permission. The control of wildlife in any area of the state must be supported by documentation of the need for control. State law does not require approval of county government to control wildlife. The DNR has no jurisdiction or responsibility regarding the management and control of wildlife on federal properties.

Since mute swans are not endemic to North America, they are not protected by the Federal Migratory Bird Treaty Act of 1916, and therefore do not receive any federal protection. The AFC (Atlantic Flyway Council), an organization comprised of representatives from 23 eastern U.S. states and Canadian provinces, has adopted a policy advocating population control of mute swans in the Atlantic Flyway. The AFC has urged state and federal partnerships to institute effective management programs to control existing population levels while preventing establishment of new problem areas. The USFWS (U.S. Fish and Wildlife Service) has supported this approach and has directed all USFWS managers to take effective steps to protect habitats under their jurisdiction from degradation and destruction by mute swans (USFWS Internal Memo, May 24, 1996).

Natural History

Mute swans are the largest birds in Maryland. On average, adults weigh 20-25 pounds and have a wing span of nearly seven feet. As their name implies, mute swans are silent most of the time. They can hiss, grunt, and make snorting sounds if threatened or alarmed.

Mute swans generally do not nest until they are two or three years old. In Chesapeake Bay, for females, about 4% paired the first year and 0% nested at less than 1 year; 40% and 14% at 1 year; 76% and 53% at 2 years; 90% and 79% at 3 years; 97% and 92% at 4 years; 96% and 92% at 5 years; and 96% and 96% at 6 years (Reese 1980). Younger birds sometimes form pairs and may defend a territory. Mute swan pairs remain together until one member dies, when the survivor may choose another mate.

Nesting begins in March or early April. Mute swans nest very close to water, usually on small islands, along isolated shorelines, or in shallow marshes. The nest itself is a large mound of vegetation, made of rushes and coarse grasses, about 4 - 6 feet in diameter and 1.5 feet above the high-tide mark. In freshwater wetlands, cattail is the preferred nest material. In brackish wetlands, *Phragmites*, needle rush, and saltmarsh cordgrass are used to form nests. These plants are easily broken down and trampled into a satisfactory nest platform, or mound.

The female, or pen, does most of the nest building and is the principal incubator of the eggs. The mute swan is unique among waterfowl of the Northern Hemisphere in that the male has been observed incubating in the absence of the female (Witherby et al. 1952, Wood and Gelston 1972). Clutch size in 151 Maryland nests ranged from 4-10, with a mean of 6.2 (Reese 1996). Incubation begins after

the clutch is complete and lasts about 35 days (mid-May to mid-June). Smaller clutches, especially of one or two eggs, may be due to inexperienced pairs or the result of egg-thieving. The earliest clutches are usually the largest with clutch-size decreasing fairly steadily through the season. During incubation, the female leaves the nest infrequently to feed. The male, or cob, is often on guard nearby and may sit on the eggs when his mate is feeding, but he does little real incubation. Renesting is uncommon, but may occur if the first nest is lost before mid-May.

Peak of hatching occurs in mid-May. The cygnets leave the nest within a day or so of hatching. They usually hatch with some 40% of the yolk unused and can survive off this food source for up to a week, if necessary. Cygnets produced are of two color phases. The grayish-brown or white cygnets grow rapidly, to near adult size in less than six months. They become independent when 125 to 132 days old.

On the Chesapeake Bay, about 49% of eggs laid survive to hatching and about 83% of the cygnets which hatch live to reach the flying stage. Most mortality occurs in the first two weeks of life (Reese 1996). Cygnets are able to fly in four to five months, begin to fly about September, and then may leave their parents' territory. As winter progresses and the parents get ready to breed again, they will chase their offspring from the territory. The young birds gather in non-breeding flocks in bays and tidal tributaries where SAV is abundant. Typically, they will spend one or two years there before leaving to establish a territory of their own. In spring, each breeding pair selects a nest site, often one that has been used for many years. Preferred sites are often on islands, where birds can nest undisturbed. In rare instances, swans nest in small colonies on islands, where nests are often within several meters of each other. In Maryland, colonial nesting has been observed at Barren Island in Dorchester County

and at Hambleton Island in Talbot County (MD DNR files). Pairs select and establish a territory, averaging 13 acres in size, where they remain year-round (Reese 1996). Territories include small, shallow-water, grass-lined coves or bays that provide food and nesting cover. Territories often are enlarged after cygnets hatch to provide the young with greater feeding areas (Bellrose 1980).

Courtship and aggressive territorial defense begins in late February. Nesting territories are defended from intrusion by other swans and other perceived threats during the breeding season. After nesting, mute swans undergo a feather molt lasting about 45 days, during which they cannot fly. Females start their molt in mid-July. Males delay their feather molt until their female partners regain flight. In fall, most family groups break up and young swans are abandoned or forced out of breeding territories. In some cases, young swans may remain with the adults until the next breeding season, when they join other immature and non-breeding swans.

Once mute swans reach breeding age, about 85% survive from one breeding season to the next, which means that the average number of breeding attempts of an adult swan is five. Average life expectancy is about 11 years, the maximum about 21 years (Ciaranca et al. 1997). On the Chesapeake Bay, the oldest known flighted swan was 16 years old and had nested 13 years. The oldest pinioned mute swan was a female known to be at least 20 years old that had nested for 16 years (Reese 1980).

Mute swans are not migratory in the traditional sense; that is, they do not fly south for the winter. They are resident primarily within their breeding range, but their winter distribution is limited by the availability of open water. Mated pairs remain on breeding sites unless forced to move by changes in food availability or by ice

cover. If breeders fail to nest successfully, they may join flocks of nonbreeders. After molting, nonbreeders often move to wintering areas that have an abundance of SAV and remain free of ice. They often move short distances between inland areas and coastal waters as the seasons change.

Mute swans feed primarily on SAV. Analysis of the gullet (esophagus and proventriculus) and gizzards of mute swans from Chesapeake Bay indicate that this species is primarily herbivorous throughout the year. In one study, Widgeon grass (*Ruppia maritima*) constituted 66% and 78% of the food eaten at eastern Bay and Smith Island, respectively, whereas eel grass (*Zostera marina*) formed 2% and 32%, respectively, for these areas. Other SAV and invertebrates (including bryozoans, shrimp, and amphipods) formed a much smaller amount of the food percentage (1%). It is thought that invertebrates are eaten only incidentally while mute swans feed on SAV. (M. Perry, USGS, Laurel, MD, unpubl. data). Adult mute swans consume 4-8 pounds of plant material per day. Analysis of fecal content of Chesapeake Bay mute swans showed 81.8% of mute swan fecal content is SAV, 8.4% algae, 8.3% emergent and terrestrial plants, and 0.3% animal matter (Fenwick 1983). Insects, crustaceans, and fish may be important for young and molting birds (Gelston and Wood 1982, Ciaranca et al. 1997). They graze at the surface of the water and can and uproot underwater plants in water up to four feet deep. The small cygnets often need their parents to pull up the SAV for them because they cannot reach it.

In summer, the birds have no trouble getting SAV - though they need great quantities of it because of their large body size. Some birds find areas where food is provided by waterfront property owners or by visitors to public waterfronts. In particular, corn (*Zea mays*) is often used by people to feed

waterfowl and, can supplement limited natural food resources in late winter (M. Perry, USGS, unpubl. data). Feeding may enable many mute swans to survive extreme winter conditions (Bellrose 1980).

Population Status

The mute swan is the only species of swan that nests in Maryland. However, two native species may also be seen here. Tundra swans (*Cygnus columbianus*) breed in northern Canada and about 20,000 winter in Maryland (MD DNR files). The trumpeter swan (*Cygnus buccinator*), breeds in western North America and may have wintered along the Atlantic coast prior to 1800. In 1984, two young trumpeter swans, a product of a restoration program in Ontario, wintered in Chesapeake Bay near St. Michaels (Hindman 1985). Potential exists for other trumpeter swans to wander into the Bay from Ontario, although artificial feeding is used in the restoration program to prevent southern migration (Harry Lumsden, Ontario MNR retired, pers. comm.).

Monitoring of the mute swan population is done with aerial surveys conducted every three years in Atlantic flyway states. The mute swan's potential for rapid population growth is well documented. Mute swans are counted during mid-summer, when native swans and other migratory waterfowl are not present in the Chesapeake Bay. The mean annual rate of population increase in Maryland was 36% during the first 17-years (1962-78) following the original swans escaped into the wild (Reese 1980). From 1986 to 1999, the mute swan numbers in Maryland increased from 264 to 3,955, an increase of 1398% ([Figure 1 - Total Mute Swans in Maryland](#)). The 1999 estimate represents about 31% of the total mute swans (12,600 birds) inventoried in the Atlantic flyway (Atlantic Flyway Council 2000). Mute swans in Maryland and Virginia have exhibited the highest growth rate (1271%

since 1986) of all Atlantic flyway states. Since 1986, the estimated average annual growth rate of the Maryland swan population calculated from aerial surveys was about 15.6% annually (MD DNR files).

As the mute swan population has grown in Maryland, it has expanded its distribution throughout the Chesapeake Bay, where mute swans are most common from Rock Hall, in Kent County, south to Hoopers Island in Dorchester County. However, mute swans occur in all Maryland tidewater counties.

- [Figure 2 - Mute Swan Survey: Total Swans in Maryland](#)
- [Figure 3 - Mute Swan Survey: Cygnet Swans in Maryland](#)
- [Figure 4 - Mute Swan Survey: Pairs in Maryland](#)

The greatest concentration of swans along the Chesapeake's western shore is in the Patuxent River. Most (over 95%) breeding pairs in Maryland nest on private property (MD DNR files). Mute swans also nest in eastern Delaware and at Chincoteague National Wildlife Refuge in Virginia, and swans from these populations have expanded into Maryland's coastal bays.

Mute swans are a long-lived species with a high mean annual survival rate. Their survival varies with the severity of winter (i.e., ice cover) and with the availability of food. Mute swan survival and mortality also vary annually and by age class. In the Chesapeake Bay, mark-resight data (1970 to 1978) indicated that annual post-fledging survival rates averaged 90% and ranged from 83% to 100% (Reese 1980). In Michigan, mean annual mortality rates of mute swans from fledging to 3 years of age was 12-16%/yr and 2-7%/yr for swans 4

to 8 years of age. At 5 years of age, annual mortality averaged only 2% (Gelston and Wood 1982).

Adult swans have few natural enemies. Cygnets are sometimes killed by predators. The hunting of swans, including mutes, is currently prohibited in Maryland. A common cause of death among subadult and adult mute swans is collision with overhead wires or other man-made structures. Some mute swans perish from lead toxicosis from consuming lead shot pellets and fishing sinkers. Several birds die during periodic epizootics of avian cholera (*Pasteurella multocida*) and severe winter weather in Chesapeake Bay (MD DNR files). Flooding from exceptional high tides or human disturbance of nests may contribute to lower production in some years.

Ecological Effects of Mute Swans on Native Wildlife

Ecological effects of exotic mute swans on native wildlife are of concern to the public and resource managers. Control of mute swans and other exotic species that may or are known to have a deleterious impact on native Chesapeake Bay habitats and wildlife is part of the Living Resources Protection and Restoration goal of the recently signed Chesapeake 2000 Agreement. To address this goal, a Non-native Invasive Species Task Force has been formed to address environmental issues raised by such species, including mute swans. This agreement can be viewed by visiting the Chesapeake Bay Program website at www.chesapeakebay.net/agreement.htm This goal will be addressed in concert with the Agreement goal entitled Vital Habitat Protection and Restoration, under which an SAV Task Force has been formed to identify strategies that recommit the Program to the restoration of SAV in the Bay.

Some environmental conservation organizations and Maryland citizens have expressed concern about the possible effects of mute swans on native waterfowl. Mute swans do exhibit aggression toward other waterfowl, displacing native species from their breeding and feeding habitats, and sometimes attacking, injuring, or killing other birds (Willey 1968, Stone and Masters 1970, Kania and Smith 1986, Ciaranca 1990). Interspecific antagonism varies between breeding pairs and the intensity changes seasonally. On wintering sites, territorial behavior is more frequent at the start and end of the winter (Scott 1984). However, interspecific aggression can be intense and reaches a peak during the breeding and brooding season (Ciaranca 1990, Anderson and Titman 1992).

This is especially true of male swans defending their nesting territories or young cygnets. In a Rhode Island study, one pair of mute swans vigorously defended a five-acre pond, preventing use by other waterfowl (NY DEC 1993). In central New York, three pairs of captive mute swans killed at least 50 ducks and geese (mostly young birds) on a small zoo pond over a 20-month period (NY DEC 1993). In Maryland, mute swans have been documented killing mallard (*Anas platyrhynchos*) ducklings, Canada goose (*Branta canadensis*) goslings, and cygnets of other mute swan pairs (MD DNR files). This type of interspecific behavior is exhibited by some breeding pairs, not subadult or nonbreeding swans.

Maryland citizens report mute swans preventing waterfowl use of managed waterfowl impoundments and small ponds (MD DNR files). Ciaranca et al. (1997) reported that other species will avoid or be chased from the territory, or at least to nest in less preferred locations. Mute swans exhibit interspecific interactions with other waterfowl species, most often Canada geese (Ciaranca 1990).

Using the aggressive behavior of mute swans to their advantage, some people have released mute swan pairs and placed swan decoys onto ponds and lakes in suburban areas where local-nesting Canada geese are a problem, with the hope that the swans would drive the unwanted geese from these areas. However, these releases have been ineffective at reducing nuisance goose problems (G. Costanzo, VA DGIF, Williamsburg, pers. commun.).

Mute swans are not always agonistic towards other birds within their nest territory. Some breeding pairs allow other waterfowl to nest within a few meters of an active nest. Mallards, resident Canada geese, and in rare instances, other mute swans have been observed nesting in close proximity to active mute swan nests (i. e., colonial nesting) (MD DNR files). These circumstances almost always occur on islands where birds appear to be passive in their defense of their nest and territory.

Mute swans are believed to pose a significant threat to the well-being of the Chesapeake Bay tundra swan population (W.J.L. Sladen, Swan Research Program of Environmental Studies at Airlie, Va., pers. commun.). In winter months, most of the eastern population of tundra swans is found from South Carolina to New Jersey (Limpert et al. 1991). Tundra swans have declined in the Chesapeake Bay region since the late 1960s (Limpert and Earnst 1994) and have declined in Maryland about 30% during the last 25 years (MD DNR files). Tundra swans arrive in Chesapeake Bay between mid-November and mid-December and depart in mid-March. During this time, mute swans may disrupt the feeding and other uses of the same habitats by the less aggressive tundra swans. Maryland citizens have reported mute swans driving wintering tundra swans from feeding areas and sheltered coves (MD DNR files).

Tundra swans lose mass during the winter and depart from the wintering grounds at their

lowest mass (Bortner 1985, Limpert et al. 1987). Harassment by mute swans may cause tundra swans to lose mass even more rapidly, which could affect subsequent reproduction (J. Anderson, West Virginia Univ., Morgantown, pers. commun.).

Although both species of swans feed heavily on the same SAV species, tundra swans are more omnivorous. Tundra swans feed commonly in agricultural fields on waste grains left after harvest and small green grains in early winter. They also feed heavily on clams in late winter (M. Perry, USGS, Laurel, MD, unpubl. data). The major difference, however, between the food habits of tundra and mute swans is that the tundra swan does not occur in the Bay during the summer when SAV is growing. The extent to which competition and interspecific antagonism from mute swans is related to the decline in Maryland's wintering population of tundra swans is unknown. However, this remains a serious concern of resource managers and has been prioritized as an important research need (Ciaranca et al. 1997).

One of the more serious conflicts between mute swans and native Maryland wildlife occurred in the early 1990's, when a molting flock of about 600-1,000 nonbreeding mute swans excluded black skimmers (*Rynchops niger*), a state threatened species; least terns (*Sterna antillarum*), classified as a species in need of conservation; and common terns (*Sterna hirundo*) from using the oyster shell bars and beaches in the Tar Bay area of Dorchester County for nesting sites. Tar Bay was the only remaining natural nesting site for least terns in Chesapeake Bay. Following their exodus from Tar Bay, least terns nested entirely on the roofs of buildings in Maryland. Black skimmers were also driven out of the Tar Bay, which supported the only nesting colony of skimmers in the Maryland portion of the Chesapeake Bay from 1985-1992. For three summers, the presence of the mute swans

resulted in total failure of the Tar Bay skimmer colony. The presence of these molting swans also impacted Forester's (*Sterna forsteri*) and common terns that shared the same island habitats (D. Brinker, MD DNR, memo June 8, 1992). Following effective mute swan control performed by the MD DNR and USFWS in the Tar Bay area, a small number of least terns returned to nest in Tar Bay in 2000 (MDDNR files).

Ecological Impacts of Mute Swan Foraging

Submerged aquatic vegetation is a key component of the Chesapeake Bay ecosystem. It performs a number of valuable ecological roles within the Bay. The plants are a major food source for native Bay waterfowl (Martin and Uhler 1951, Munro and Perry 1982). SAV beds provide habitat and shelter for a variety of fish, shellfish, and many small invertebrates (Adams 1976, Orth and Heck 1980, Hurley 1991). SAV contributes to chemical processes such as nutrient absorption and oxygenation of the water column. Dense SAV beds also aid in baffling wave energy and slowing water currents, helping to maintain water clarity by reducing the amount of sediment suspended in the water and by preventing shoreline erosion. (Hurley 1991).

Although no quantitative assessment has been done in Maryland to determine the cumulative effects grazing mute swans on SAV, there is evidence from other areas throughout the world that suggests that such impacts can be serious and detrimental. In Europe, mute swans have been known to completely remove individual plant species from some wetlands, eliminating this food source for other waterfowl that feed on the same SAV species (Gillham 1956, Jennings et al. 1961, Mathiasson 1973, Chairman 1977, Neirheus and Van Ireland 1978, Scott and Birkhead 1983). In high concentrations, mute swans can overgraze an area (Cobb and Harlan 1980, K.

Mountford, pers. commun.), after which they abandon it (Allin et al. 1987). In a recent Rhode Island study, consumption of SAV by mute swans was indirectly measured by comparing control and enclosure plots. Findings indicated that mute swans overgraze SAV when water is shallow (0.5 m), and can reduce SAV biomass by 92-95% (Allin and Husband 2000). Where mute swans congregate in shoal, tidal waters and shallow ponds, their feeding activity can cause extensive disturbance of SAV. Mute swans uproot large quantities of aquatic plants (Owen and Kear 1972, Birkhead and Perrins 1986) and can disturb much more vegetation than they actually eat. Mute swans not only pull out whole plants while feeding, but also use foot movements to help dislodge plants. Sometimes this is done to provide food for cygnets. In extreme cases, the bottom substrate is left barren and "cratered" in appearance (NY DEC 1993).

The baywide distribution and abundance of SAV has undergone a severe decline in recent decades due to decreased sunlight penetration throughout the water column and by excessive algal growth on SAV plant surfaces, caused by nutrients and sediments that run into the Chesapeake Bay from the surrounding watershed (Hurley 1991). These environmental factors are the primary cause of SAV decline in the Chesapeake Bay. Although the impact of mute swans on SAV in the Chesapeake Bay is unknown, mute swans consume large amounts of SAV (Berglund et al. 1963, Willey 1968) and exert additional pressure on this already stressed habitat. Heavy grazing of SAVs by waterfowl during SAV growth and reproduction can reduce the reproductive success of these plants (Allin and Husband 2000, Bortolus 1998 and Sondergaard 1996) and reduces those macroinvertebrates that are dependent on these plants for food and shelter (Krull 1970, Voigts 1976, Whitman 1976, Petersen 1986, Engel 1990).

Direct observations of SAV consumption in the Chesapeake Bay by mute swans have been made by many SAV researchers in MD (M. Naylor, MD DNR, pers. commun.) This has been confirmed by examination of the gullets and gizzards of swans taken from Chesapeake Bay (M. Perry, USGS, Laurel, MD, unpubl. data). Unlike the migratory waterfowl species found in the Chesapeake Bay, mute swans are present here all year and so may impact the reproductive success of certain SAV species which have evolved to time their reproduction prior to the arrival of migratory birds in the Bay. (M. Naylor, MD DNR, pers. commun). Fenwick (1983) determined that male swans in Chesapeake Bay consumed 34.6% 10.8 SD of their body weight per day, females 43.4% 12.9 SD. Assuming that an adult/subadult mute swan consumes an average of 3.789 kg wet weight of SAV per day (Willey and Halla 1972), a population of 4,000 swans has the potential to consume more than 12 million pounds of SAV annually (L. Hindman, MD DNR). Consumption of immature seeds, removal of biomass before plant maturation, and uprooting of whole plants may have a very negative effect on SAV with minimal consumption (M. Naylor, MD DNR, pers. commun).

When viewed from a bay-wide perspective, the biomass of SAV currently being consumed by the Chesapeake Bay mute swan population is almost certainly negligible. However, anecdotal reports and complaints received by the Maryland Department of Natural Resources suggest that mute swans reduce the biomass of SAV on a local level (M. Naylor, MD DNR, Annapolis, pers. commun., MD DNR files, Chesapeake Bay Foundation, letter Sept. 25, 2000, Severn River Association, letter Sept. 22, 2000, South River Federation, letter Sept. 18, 2000). It is the consensus of the Chesapeake Bay Program SAV Task Group that continued expansion of the mute swan population runs counter to the Vital Habitat Protection and

Restoration goal of the Chesapeake 2000 Agreement, 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 rivers. (Chesapeake Bay Program SAV Task Group Position Statement, Dec. 2000)

Citizen complaints largely focus on the reduced value of the shallow waters for fishing and crabbing and reduction of critical foods for native waterfowl. Other citizens have complained about mute swans grazing on SAV in shallow freshwater impoundments specifically managed as habitat for waterfowl and other wetland dependent wildlife species (MD DNR files). Efforts to restore SAV and emergent habitats in the South River, a tributary of Chesapeake Bay, have been hampered by mute swan grazing (South River Federation, letter Sept. 18, 2000). Similar reports of overgrazing by concentrations of mute swans have been voiced by scientists conducting SAV research in the Bay (M. Kemp, Univ. of Md., Center for Estuarine Studies, Horn Point Env. Lab, Cambridge, pers. commun.).

Elimination of SAV results in a shift to a phytoplankton dominated food chain in the water, which increases turbidity and reduces the overall availability of foods used by migrant and wintering waterfowl (NY DEC 1993). Shallow water habitat is critical for wintering ducks and geese (Jones and Drobney 1986, Dubovsky and Kaminski 1994, and Perry and Deller 1996) and any reduction in habitat quality forces redistribution of animals and increases their physiological stress.

The upper Chesapeake Bay region is one of the most important areas in North America for migrating and wintering waterfowl. (Stewart 1962) One of the reasons the Bay has held such attraction for these birds has been the quantity and variety of SAV species (C. Rawls, Univ. Md., Center for Environmental and

Estuarine Studies, Solomons, unpubl. rep.). Reese (1998) indicated that a large sedentary population of mute swans could jeopardize SAV, lessening its availability to native nesting and wintering waterfowl. Certain wintering waterfowl species dependent upon SAV have declined in Chesapeake Bay and remain suppressed due to the reduced abundance of SAV (Krementz 1991, Haramis 1991, Haramis 1991). Declines in SAV abundance appear to correlate with declines in local black duck (*Anas rubripes*) abundance (Krementz 1991). Population trends suggest that habitat degradation in Chesapeake bay, especially loss of SAV, may be the principal cause of the decline of the Bay's canvasback (*Aythya valisineria*) population (Haramis 1991). Furthermore, the loss of SAV over the past several decades has prompted the near abandonment of Bay waters by redheads (*Aythya americana*), leaving only a remnant population today (Haramis 1991).

Allowing the mute swan population in Maryland to increase and expand its range may increase the impact on native waterfowl species dependent upon SAV for their survival. Furthermore, conservation efforts to enhance Chesapeake Bay waterfowl populations could be adversely affected by the failure of management agencies to manage mute swan numbers at a level that is compatible with native wildlife and their habitats.

Few instances of property damage by mute swans have been reported. In one case, mute swans caused several thousand dollars of damage to cranberry bogs on Cape Cod, Massachusetts, by their destructive feeding technique (Willey and Halla 1972). In Maryland, citizens often complain about concentrations of mute swans overgrazing SAV beds, thus indirectly affecting their crabbing and sport fishing opportunities (MD DNR files). At the local level, mute swans have interfered with vegetative plantings of saltmarsh

cordgrass (*Spartina alterniflora*) made to restore wetlands and improve water quality in the South River, a tributary of Chesapeake Bay. The cost of replanting the site twice was about \$4,700 (J. Flood, South River Assoc., Annapolis, MD, pers. commun.)

Value of Mute Swans to Humans

For centuries, swans have symbolized beauty, royalty, and wealth in art and legend. This image stems from the historical status of mute swans in England, where they were considered property of the British Crown. Today, mute swans still have an appeal, often appearing on greeting cards, in advertisements and various products. The American public perception of mute swans is one of grace and beauty. It is likely that most people are unaware of the potential problems related to their presence in Chesapeake Bay.

Mute swans have little or no fear of humans. They are easily observed and provide opportunities for people to come in close contact with wildlife. Some people raise mute swans for display or sale to other breeders, collectors, and individuals who want to keep a pair on their property for aesthetic reasons. Some swans are sold to property owners as a biological method of removing unwanted filamentous green algae from small lakes and ponds. People also value mute swans for viewing and as subjects for artistic expression (e.g., photography, painting, etc.). Others enjoy feeding waterfowl, including mute swans, and often become emotionally attached to individual swans. Although swan hunting is currently not permitted (no open hunting season) in Maryland, some hunters would enjoy the opportunity to take mute swans while hunting ducks and geese. Understanding the implications of people's attitudes about mute swan for future mute swan management policy is an important research need.

Impacts on Humans

Despite their aesthetic appeal, mute swans can be a problem for people. Mute swans are known to aggressively protect their nests and young from all perceived threats. Some birds may threaten or attack humans, such as swimmers, small children or those in small watercraft. Mute swan aggression may also be directed at pets. A mute swan's nesting territory can include about 13 acres of land and water along the shoreline, making it possible for people and pets to trespass without knowing they are near a nest. Although the potential for serious injury is low, this behavior can prevent the use of some or all of private or publicly held property during the mute swan nesting and brood rearing period.

Mute swans and other waterfowl can contribute to water quality problems by defecating in the water. On Long Island, New York, elevated counts of coliform bacteria have been detected where mute swans congregate (NY DEC 1993). Public health authorities and natural resources management agencies are concerned about the impacts of nutrient loading where waterfowl congregate because coliform counts are widely used to determine whether waters may be used for drinking, swimming, or shell fishing (NY DEC 1993, MD Dept. of Environ. files). Defecation by waterfowl contributes to nutrient loading of surface waters, which can stimulate algal blooms. This is most likely to occur in inland ponds where rooted SAV has been removed by mute swans (NY DEC 1993).

Management History

Federal law does not provide protection to mute swans. The USFWS considers this species to be a serious threat to the ecological integrity of many areas, including the National Wildlife Refuge System and other Federal lands committed to the maintenance of natural

wildlife diversity. The USFWS has directed all National Wildlife Refuges to control mute swans on these areas. ([Appendix A: USFWS Internal Memo, May 24, 1996](#))

In July 1997, the AFC adopted a mute swan policy that encouraged state wildlife agencies and other resource management agencies to control mute swans in the Atlantic flyway ([Appendix B: Atlantic Flyway Council Technical Session Recommendation No: 25](#)).

Since natural mortality is low among mute swans, their population size is strongly influenced by two primary factors: (1) recruitment (i.e., cygnet production), and (2) adult annual survival rate. Aggressive egg-addling and nest destruction has the potential to slow population growth, but likely will not cause a reduction in the mute swan population (B. Harvey, MD DNR, unpubl. data). For example, Rhode Island has conducted the most aggressive mute swan egg addling program of any state in the U.S. Between 1979 and 1998 Rhode island Division of Wildlife staff and volunteers addled eggs in an average of 79% of all active mute swan nests (C. Allin, Rhode Island Div. Wildl., pers. commun.). Nevertheless, the mute swan population continues to grow at a high rate . Six midsummer surveys conducted between 1986 and 1999 show a 79% increase in Rhode Island's swan population during the period.

With long-lived waterfowl species, like swans and geese, the most effective means of influencing population size is to manipulate the annual adult survival rate (e.g., increase or decrease the number of adults). As an illustration, despite an aggressive egg addling program (eggs addled in 90% of all active Canada goose nests) conducted for several years, the Canada goose flock in Rockland County, New York, continued to increase. Increases were noted in both summer molt counts and the number of nesting pairs.

However, removal of adult geese resulted in immediate and significant declines in the number of geese molting and nesting in the area (Swift 2000).

No state has initiated a mute swan sport hunting season. However, state wildlife agencies have initiated varying levels of mute swan population control dependant upon population size and distribution, manpower, and socio-political concerns. At present, only 6 states (DE, MD, NY, RI, VA, and VT) in the Atlantic flyway attempt to control mute swan population growth.

The New York DEC (Department of Environmental Conservation) has developed a policy to prevent further growth of their feral mute swan populations. Where mute swans have existed in New York for many years, environmental groups, local officials, and residents have advocated a control program. The DEC encourages landowners to control swans on their own property. Measures that may be used include harassment (scaring the birds away), egg-shaking, and removal. Swans removed must either be humanely killed or be adopted by individuals who are licensed to keep the birds in captivity (NY DEC 1993).

Mute swans receive no protection in Pennsylvania. Thus, swans may be shot at any time of the year (J. Dunn, Pa. Game Comm., Harrisburg, pers. commun.).

Delaware considers the mute swan an unprotected, exotic species. Since the mid-1970s the Delaware DNREC (Department of Natural Resources and Environmental Control) has aggressively controlled feral swans by removing adult swans on state lands. The DE DEC also encourages similar control on federal lands (Lloyd Alexander, DE DEC, Dover, pers. commun.).

Mute swans are unprotected in Vermont. In 1997, the VTFWD (Vermont Fish and Wildlife Department) developed a position to prevent the establishment and expansion of mute swans in the state (VDFW Position Statement Aug. 5, 1997). In addition to removing all mute swans, including nests and eggs, from the lands and waters of the State, they also prohibit the importation and the release of this species into public waters. The VTFWD regulates mute swans in captivity through permits, but since 1997 has prohibited further establishment of new captive flocks of mute swans. They further require permittees to mark and pinion birds held in captivity. All eggs produced by captive birds are addled to prevent any reproduction. Furthermore, the VTFWD prohibits captive swans from being sold or given away in the state (VDFW Position Statement Aug. 31, 1998).

In 1997, three mute swans (molting birds) were captured and shipped to a private estate in Texas. Since then, mute swans found on public waters of the state (and private waters, with permission from the landowner) have been removed by VTFWD law enforcement personnel (B. Crenshaw, Vermont Fish and Wildl. Dept., Essex Junction, pers. commun.).

Mute swans are not protected in Virginia and are considered to be an undesirable, invasive species. Thus, mute swans may be taken by hunters and by people experiencing conflicts with mute swans at any season of the year. Virginia annually conducts a limited tundra swan hunting season regulated by the issuance of 600 permits. A few mute swans are taken during this season. Limited egg addling and removal of adults by shooting is performed by state personnel (G. Costanzo, VA Dept. Game and Inland Fish, Williamsburg, pers. commun.). Virginia has also authorized Dr. William Sladen of the Swan Research Program of Environmental Studies at Airlie, Virginia, to remove swans from the wild and relocate

celibate pairs (female with female and vice versa) on inland wetlands. However, this technique has not been effective in controlling mute swan population growth in Virginia. The rapid increase in the Virginia mute swan population (n=400) is second only to Maryland (Atlantic Flyway Council 2000).

The Maryland DNR and USFWS National Wildlife Refuges in Maryland have used egg-addling and the removal of adult swans to prevent the establishment of mute swans on state and federal properties. In the mid-1990s, these agencies conducted a population reduction of a local flock of mute swans in the vicinity of Tar Bay, Dorchester County, where mute swans were found trampling the nest of state-threatened water bird species (least terns, black skimmers) on a coastal island. As part of this local flock reduction, 250 swans were captured and exported to Asia by a New Mexico game breeder. Following the removal of several hundreds of swans, the number of swans using this area has been significantly reduced and a small number of least tern pairs have returned to nest on Barren Island (MD DNR files).

Limited mute swan control by landowners has also been authorized by the Maryland DNR (e. g., issuance of permits) to resolve nuisance, safety, and depredation problems. This has included egg addling, nest destruction, and removal of adults by shooting. These methods satisfactorily resolved property owner's safety and habitat depredation problem associated caused by mute swans at these sites. However, since 1998, prescribed permit conditions have included only egg addling and nest destruction - no lethal removal of adult swans has been permitted. Permits limiting landowner action to egg addling have been ineffective in resolving nuisance, public safety, and depredation problems caused by swans. The DNR has not provided the manpower or equipment to resolve any swan complaints from property or

corporate owners. Furthermore, permits are not issued to capture and relocate mute swans to other areas of the state. Relocation is considered a method that could accelerate both range expansion and population growth of the species in Maryland. Although a few requests are made each year from citizens to export mute swans to other states, state wildlife agencies within the recipient states have not authorized importation - a prerequisite required by the Maryland DNR.

States in the Mississippi, Central, and Pacific flyways have attempted to control mute swan populations. Control efforts have included egg-addling, adult removal, and incidental harvest during legal tundra swan seasons (Ciaranca et al 1997). In the Mississippi Flyway, the Michigan DNR has begun the development of a mute swan management and control program. The estimated mute swan population is about 4,000 swans (Michigan DNR files). The mute swan is a protected bird in Michigan. Presently, Michigan DNR removes swans from state-owned wildlife management areas. They also remove birds (infrequently) causing safety problems. Mute swans causing a safety problem are removed at the request of property owners. The Michigan DNR also requires privately owned cygnets to be pinioned within 10 days of hatching. (G. Souillier, Michigan DNR, pers. commun.).

Minnesota classifies mute swans as a "regulated" and "unlisted exotic" species. They are legal to possess and sell, but they may not be released into the wild (Minnesota DNR Regulations).

In 1997, the Wisconsin DNR initiated a mute swan control program with a goal of eliminating mute swans from the wild by the year 2005 (Wisconsin DNR, news release, April 18, 2000). This control program is being done to aid the restoration of native trumpeter swans. They have further recommended that

the mute swan be listed as an "injurious or nuisance animal" under proposed changes in the state's captive wildlife law (Wisconsin DNR news release, May 14, 1997).

In the Pacific Flyway, Washington has been removing mute swans in attempts to reestablish trumpeter swan populations. The Washington Department of Fish and Wildlife has classified the mute swan as a "deleterious," exotic species, and feral birds are removed. This classification infers that mute swans are animals that pose a serious threat to native wildlife and habitat. It is illegal to possess mute swans in Washington (WSDA Regulations Nov. 1997).

In Oregon, mute swans are classified as a "controlled" species. Swans may be possessed and sold, but all males must be neutered and all individuals must be surgically pinioned. Importation of mute swans into Oregon is prohibited.

In Canada, Ontario is in the early stages of developing a mute swan management plan (Scott Petrie, Long Point Waterfowl Wetlands Research Fund, Long Point, pers. commun.) Presently, mute swans are being removed from the Long Point National Wildlife Refuge. For several years, mute swan eggs have been removed and replaced with trumpeter swan eggs under foster mute swan parents as a method of introducing trumpeters and controlling mute swans (Harry Lumsden, retired Ontario MNR, pers. commun.).

History of Public Awareness Efforts

Public awareness of the increase in Maryland's mute swan population and its impacts on the Chesapeake Bay and Maryland residents has been accomplished largely through the news media. Since 1997, several television programs (CNN, WBOC-Salisbury, Channel 5 - Washington, National Geographic, and

Maryland Public TV broadcasts) have been televised describing the mute swan as an invasive species that causes problems for native wildlife and people. Numerous newspaper and magazine articles have been written about the species. Many popular articles have originated in response to periodic Maryland DNR news releases announcing the results of mute swan population surveys.

In 1999, mute swans were included as part of the DNR Bay Game to increase awareness among children about this species and problems it is causing to the Bay's ecosystem. Currently, [information about mute swans](#) is available on the MD DNR web site.

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MANAGEMENT RECOMMENDATIONS

The Maryland Mute Swan Management Task Force has identified the following issues and made management recommendations to address them. The Task Force has also made recommendations with regard to a selection of management techniques, which are listed after their management recommendations below.

Maryland Mute Swan Task Force Recommendations To The Department of Natural Resources Regarding Mute Swan Management in Maryland

With due consideration to the Department of Natural Resources' priorities to protect and enhance native fish and wildlife and their habitats in the Chesapeake Bay and throughout Maryland, the Maryland Mute Swan Task Force's recommendations with regard to the management of mute swans in Maryland are as follows:

Issue #1: Mute Swans are Inherently Valuable

Mute swans are beautiful and pleasing to many Maryland citizens. Mute swans can represent positive emotions to those who feel a special connection to them.

Possible Research:

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 identify target audiences so that

effective communication strategies can be developed.

Recommendation:

- **Maintain some population of mute swans in the Chesapeake Bay and its tributaries for public enjoyment in select areas.**

Issue #2: Mute Swans Impact Native Wildfowl Habitats (Submerged Aquatic Vegetation = SAV) and species, as well as state listed species.

The Department of Natural Resources considers protection and enhancement of habitat for native species a priority, especially nesting habitat of threatened birds. The Task Force agreed (with one dissention) that the removal of mute swans from rare nesting habitat of sensitive or threatened water birds was/is reasonable when mute swans negatively impact them. The Task Force discussed and agreed (with one dissention) that mute swan competition with state threatened and other colonial waterbirds for open sandy beach should be addressed to ensure that this habitat is available for colonial waterbirds during their nesting period.

SAV has declined in the Chesapeake Bay in the past 40 years and is currently at 58% of the biomass and distribution goals for SAV set by the DNR. SAV is a limiting factor for some waterfowl species. Mute swans exert additional pressure on SAV. Mute swans could exert local pressure on SAV that could affect SAV regenerations, based on exclosure studies.

Possible Research:

- **Measure the extent of Bay-wide and local impacts of mute swans feeding on SAV in the Bay, especially where SAV is most**

vulnerable.

- **Measure the extent to which mute swans have or can contribute to loss of SAV and other habitat and how this can affect native populations of aquatic species and waterfowl.**
- **Monitor interactions between mute swans and tundra swans, as well as other native waterfowl.**
- **Measure how well or how poorly SAV beds in the Chesapeake Bay recover from the grazing of mute swans.**

Recommendations:

- **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, which ever is appropriate for the resource that is being protected. These areas could include areas where SAV is most sensitive, SAV restoration plantings, and rare nesting habitat for state listed water birds. Develop criteria and guidelines to determine appropriate management options to remove or discourage mute swans from using Swan Free Zones, with preference given to nonlethal options. Determine how these areas are to be monitored for mute swan activity. Swans should be killed only after nonlethal options are exhausted and in situations where it is necessary as a last resort. Criteria for killing swans should be as restricted as it is for killing resident Canada geese. There was one dissention regarding the killing of swans under any circumstances.**
- **Guidelines for management options to**

exclude or remove mute swans from "Swan Free Zones" should be crafted with an intent to provide local government agencies and private land managers with the ability to implement appropriate options on properties under their jurisdiction or care.

- Concern was voiced about the repetitive killing of mute swans in "swan free zones." Therefore, if mute swans repopulate "Swan Free Zones" after removal, strategies for excluding or removing them again will be based on the set of guidelines that were used to determine the appropriate option for initial exclusion or removal.
- Chemical repellents should not be used to discourage mute swans from using Swan Free Zones.
- Consider restricting the artificial feeding of mute swans in environmentally sensitive areas.

Issue #3: Mute Swans Impact Water Quality

Mute swans may impact water quality by dislodging sediment while feeding. They may also contribute to an increase in coliform counts where mute swan flocks congregate. This is of particular concern in shellfish beds meant for human consumption.

Possible Research:

- Very little is known about this issue. Research is needed to determine its occurrence in Bay waters.

Recommendation:

- Areas identified by DNR as being environmentally sensitive to coliform counts from mute swan flocks should be designated as "Swan Free Zones." Criteria for this designation in Issue #2 should be developed for water quality issues.

Issue #4: There is a Lack of Public Information on Mute Swans

As far as we know, most people know very little about mute swans. Educating people about their biology and interaction with Chesapeake Bay habitats and native wildlife could help increase public support for their management and could help shoreline landowners and recreationists learn to avoid conflict with them.

Possible Research:

- [See Issue #1.](#)

Recommendation:

- Develop an education effort for shoreline landowners about mute swans, their behavior and how to manage conflicts, including information on egg addling and on how feeding may contribute to future conflicts.
- Develop information for shoreline landowners about fencing to exclude mute swans.

Issue #5: Mute Swans Can Conflict with Humans

On shoreline properties, nesting mute swan pairs have been known to threaten or show aggression toward humans and pets. Nesting

swans may defend a territory of 10-13 acres, making it possible for people and pets to trespass unknowingly.

Complaints have been received by the DNR regarding the economic impacts of mute swans on SAV beds that are designed to shelter fishery resources.

Recommendations:

- **Develop criteria and guidelines that specify an appropriate sequence of action choices in conflict situations, with nonlethal actions preferred. These should be similar to criteria and guidelines used to manage conflicts involving resident Canada geese. These criteria should require that each complaint is investigated by Wildlife Services and the killing of swans should be a last resort. Criteria should include an historical record of the problem and past use of nonlethal techniques. Permits to kill swans in such situations should not be provided for recreational hunting but should be carried out by professional biologists or wildlife control operators. Swans to be killed should be killed in the most humane manner possible. There was one dissention about the agreement to kill swans under certain circumstances, even as a last resort.**
- **Guidelines for management options to exclude or remove mute swans from "Swan Free Zones" should be crafted with an intent to provide local government agencies and private land managers with the ability to implement appropriate options on properties under their jurisdiction or care.**
- **Concern was voiced about the repetitive killing of mute swans in "Swan Free Zones", therefore, if mute swans**

repopulate "Swan Free Zones" after removal, strategies for excluding or removing them again will be based on the set of guidelines that were used to determine the appropriate option for initial exclusion or removal.

Issue #6: The Population of Mute Swans in Maryland is an Issue

The Maryland Chesapeake Bay population of mute swans has increased from about 100 birds in the mid-1970's to nearly 4000 birds in 1999. Not only has the number of swans increased, but the rate at which this population grows has also increased. Barring disease or unforeseen catastrophe, the mute swan population in Maryland's Chesapeake Bay is expected to continue this pattern and could reach 20,000 birds in 10 years (model projection only).

As the population grows exponentially, the percent of sub-adults dominates. Currently, about half of this population is sub-adult. This has implications for the protection of native habitats, especially SAV, because sub-adult and non-breeding mute swans stay together in flocks. A flock of over 600 birds has already been recorded.

As these sub-adults form pairs and define and defend new nesting territories, opportunity for conflict with humans is expected to increase. Most of the Chesapeake Bay shoreline is privately owned.

Possible Research:

- **Continue monitoring research on immuno-contraceptives that are being developed for geese. Investigate potential for use with mute swans.**
- **Monitor population of mute swans in**

Maryland's Chesapeake Bay annually for numbers and expansion of distribution around the Bay.

Recommendations:

- **Swans should not be captured for the purpose of human consumption.**
- **Mute swans should not be eradicated in Maryland.**
- **Should continue to addle eggs on public property and seek permission to addle eggs on private property. See recommendations on management options.**
- **DNR should move with caution toward providing people with swans to alleviate population management issues. A fee could be charged for this. It 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 creating viable populations in areas not currently occupied by mute swans, thereby increasing distribution and potential for population growth.**
- **Male birds should not be caponized; it is considered inhumane.**
- **Male birds should be vasectomized only when very young and under general anesthesia by a veterinarian. Anesthesia techniques for mute swans need further development to minimize risk to the birds.**

- The Task Force did not set a maximum or minimum number on the Maryland Chesapeake Bay mute swan population.

Issue #7: The Legal Status of Mute Swans is an Issue

The legal status of mute swans in Maryland determines the scope of authority that DNR has to set regulations to manage the mute swan population. The current status is "Wetland Game Bird" in Maryland statute. As such, DNR has authority to set regulation regarding their captivity, breeding, transport, import, hunting or destruction, as well as to set population limits locally or Bay-wide.

Recommendations:

- Mute swans should remain "Wetland Game Birds."
- No hunting season should be set in the foreseeable future. Hunting should be considered in view of public preferences and how hunting would contribute to populations management goals locally or Bay-wide.
- Develop and enforce regulations for mute swan captivity, sale, transport, import, and breeding in a manner similar to regulations affecting other Wetland Game Birds.
- Permits to transport mute swans to other states should require written permission of the wildlife agency of the recipient state.

THE TASK FORCE FURTHER RECOMMENDS THAT THE STATE SHOULD ALLOCATE APPROPRIATE

FUNDS FOR MUTE SWAN EDUCATION, RESEARCH AND MANAGEMENT NEEDS.

Management Techniques

Presented below are summaries and recommendations of the Task Force regarding a menu of various management techniques that might be considered when implementing swan management efforts. Summary information is provided by the Department of Natural Resources. Text in italics indicates Task Force agreement and recommendations.

1. **Exclusion (i.e., fencing).** Fencing may be effective in preventing birds from walking up into yards or other upland habitats, nesting areas, wetland vegetation restoration projects or other sites that warrant protection from mute swans. Fencing would increase cost to property owners and in certain instances might be cost prohibitive. Some landowners may object to defacing their property with fencing and other exclusion devices. Fencing is also impractical in tidal areas subjected to storm surges and also may exclude the use of an area by native species.

Exclusion of mute swans, especially from "swan free zones" and from areas where they are causing conflicts with humans should be attempted wherever possible. Shore landowners need information on how to exclude mute swans from areas where they cause conflict.

Investigation is needed to determine whether or not a form of exclusion can be used to keep mute swans from "swan free zones," especially after swans have been removed from these areas.

2. **Harassment: The use of scare devices**

(balloons, scarecrows, pyrotechnics, etc.) may not be effective to scare swans. Furthermore, the use of certain scare devices may not be practical (i.e., neighbors may object to loud noises from pyrotechnics, gas exploders, etc.).

Investigation is needed to develop effective harassment strategies to keep mute swans from "swan free zones" or other areas.

3. **Chemical repellents:** There are no known effective or EPA-approved chemical repellents that may be used for repelling mute swans.

Chemical repellants should not be used to exclude mute swans.

4. **Immunocontraception:** The concept of alleviating animal damage problems by reducing nuisance populations to acceptable numbers using induced sexual sterility has been researched for more than 40 years. Most attempts to induce sterility of vertebrate pest species have relied on use of a chemosterilant or antifertility agent. Neither chemosterilants nor antifertility agents are being used to control undesirable flocks or populations of waterfowl anywhere in North America. There is current research underway to investigate the effectiveness of nicarbazin as an oral agent to limit the hatchability of Canada geese eggs. (National Wildlife Research Center 2001) However, preliminary results are not available as the research is still in the early stages.

With any chemosterilant there is the problem with distribution of the medication in bait and assurance that the right birds get the medication. Most medication is short-lived and there is

always the possibility of human ingestion when game birds are the target or non target species consume the medication. Whenever food (i.e., bait) is used as the vehicle for providing the medication, there is a potential problem with non target wildlife being affected. Any chemosterilant that would be effective in controlling reproduction in non-captive waterfowl would have to be approved by the U.S. Food and Drug Administration.

Methods are being developed to create effective immuno-contraception for Canada geese. Investigation is needed to determine whether these are effective for mute swans. This option is still under research and is considered an option for the future.

5. **Sterilization:** Two other methods of reproductive control include vasectomy and caponization. Vasectomy was used in one experimental field study conducted in Westchester County, NY, to sterilize a small number of male resident Canada geese (Converse and Kennelly 1994). This technique was investigated to avoid the potential confounding effects of chemical sterilization on reproduction behavior in geese. Thirty-three of 72 vasectomized males were observed to pair with a female and were located during one or more nesting seasons. Of the 56 nesting attempts by the 33 pairs, 84% of the nests were unsuccessful. With one exception, the maintenance of pair bonds for 2 years and the fidelity of treated pairs to a nest site from one year to the next by implying that socio-sexual behavior patterns were not noticeably different altered due to sterility treatment. The exception concerned clutch incubation time: treated pairs incubated clutches for 35 to 120 days before deserting the nest. The results of

this research suggested that male sterilization may reduce productivity of nuisance Canada geese providing one carefully selects areas and flocks suitable for this type of control. Costs associated with this study were not available, but would depend on the number of birds and the personnel involved.

The Michigan DNR attempted sterilization (castration and vasectomy) of swans but all birds died from surgical complications and Aspergillosis infection from holding the birds. They abandoned this as a technique for controlling mute swans (T. Cooley, Michigan DNR, pers. commun.). Sterilization of swans requires general anesthesia and swans do not do well under those conditions (R. Olson, DVM, MDA State Veterinarian, Annapolis, pers. commun.). The procedure requires special veterinarian training.

Live capture of swans is seasonally effective (easily captured during the summer molt when birds are flightless). However, the cost of capture would be much higher for swans than for resident Canada geese because geese can be captured in flocks, while swans must be captured as single birds. Vasectomy of male waterfowl is not used as a practical method of reproductive control for nuisance Canada geese or mute swans in North America.

Castration has been used in captive poultry flocks. This technique also must be done under general anesthesia and under sterile conditions by a veterinarian (R. Olson, DVM, MDA, pers. Commun.) This technique would be impractical and prohibitively costly except on a very limited scale. Castration is not used in North America to control reproduction of nuisance waterfowl.

Caponization (the removal of testes) is considered inhumane and should not be used. Vasectomy is an invasive procedure which requires general anesthesia to be humane. Swans are known to do poorly under general anesthesia and this is a procedure that should only be done by a veterinarian.

- 6. Capture and Relocation: The capture of nuisance swans on private property was done in the past by Maryland DNR, in certain instances. Since the mid-1980's this has not been done. Until 1998, Maryland property owners were empowered to handle their own problems via a state permit that allowed birds to be removed by shooting.**

In Virginia, the capture of relocation of mute swan is done by state authorization contract with a private waterfowl biologist. In this process, birds are pinioned and placed as celibate swan pairs (female with female) on inland waters. However, the population of mute swans in Virginia continues to increase, and is second only to Maryland.

The capture and relocation of celibate mute swan pairs has the potential to accelerate both population growth and range expansion. Territories voided by translocated swans would become occupied by other swans whose breeding may have been suppressed by density-dependent factors. There is little or no assurance that pinioned, celibate swans might not become members of a breeding pair at some time in the future by the release or immigration of another bird of the opposite sex in the area occupied by the celibate pair. Adopting swans and releasing them onto inland waters has the potential for increasing the popularity

of the species, leading to additional purchases and releases, if not regulated. Live capture of swans is seasonally effective. Live capture and relocation by DNR would require significant resources and coordination.

The capture and relocation of swans into captivity has not been an effective option in the past. There is little or no demand for mute swans in zoos or nature centers. There are more nuisance swans than places to put them. Most facility managers do not want mute swans due to agonistic behavior of paired birds toward other waterfowl and people during the breeding season. Similarly, there is no opportunity to export swans to other states for most states view them as a problem, invasive species.

Mute swans should be captured and relocated where possible. Consideration should be given to the possibility of increasing the distribution of viable mute swan populations through capture and relocation, which should be avoided. DNR should move with caution when providing wild mute swans as pets to landowners who want them in any capture/relocation effort.

7. Prohibit artificial feeding of waterfowl during winter: Mute swans may benefit from artificial feeding, especially during in severe winters. Prohibiting feeding of waterfowl could reduce the survival of some local mute swan populations. However, feeding of waterfowl is widely practiced along the shores of Chesapeake Bay and therefore difficult to monitor. Enforcement of such a prohibition could be costly.

Maryland Code 10-1002 through 1009 specifies statutory requirement for a

license from the DNR to feed waterfowl, except in areas where waterfowl hunting is not being contemplated or does not occur.

Prohibit Feeding - this was considered to be unenforceable, except possibly in "swan free zones."

8. **Regulate the importation and possession of mute swans:** Presently mute swans are bought and sold (imported and exported) by licensed game breeders and other persons who are not licensed in Maryland. No state or federal permit is currently required for a person to possess mute swans.

Some restrictions could include a) prohibit the sale of mute swans within the state; b) prohibit importation of mute swans; c) prohibit release of mute swans into the wild; d) prohibit possession of mute swans, but grandfather existing swans in captivity; e) require marking (owner's name and address) and pinioning of all cygnets before 10 days old.

This should be considered in conjunction with the development of regulation regarding mute swan captivity, breeding, sale and translocation.

9. **Egg-Addling:** This is the most practical and widely used form of reproduction control used by wildlife management agencies to address nuisance or an overabundance of waterfowl. Egg-addling terminates the development of the embryo within the egg. Egg-addling includes the following treatments: spraying with fuel oil (federal permit required), spraying with 100% corn oil (no federal permit required), pricking the egg shell with a sharp instrument,

freezing, or shaking. Egg-addling ensures that the adult continues to incubate (often for an extended period of time), preventing renesting. Currently this technique is regulated by state permits issued by MD DNR to corporations and property owners.

This should continue on public and private properties. Egg addling should continue to be done on private properties only by permit. There was discussion about leaving 2 eggs in each nest untouched, however, this may not affect mute swan population numbers or growth in the long term.

10. **Egg Replacement: Dummy eggs made of wood, plastic, or some other material can also be used to replace viable swan eggs to reduce recruitment. Viable swan eggs would be properly disposed. Like egg addling, this technique is very effective in preventing hatching and discourages renesting. By itself, this technique would require a large proportion of mute swan nests be treated annually to effectively reduce productivity of the feral mute swan population. Confounding the use of this technique and egg addling is the fact that most mute swan nests occur either on private lands or along the interface between private lands and public waters. Thus, access to nests is an issue that would have to be addressed.**

This is an acceptable management option and should be conducted with the same parameters in which egg addling is conducted.

11. **Capture and Removal of Swans for Meat Processing: The number of swans to be removed would depend upon an established population objective and the number of birds entering the population**

each year. Swans would have to be captured during the flightless period in mid summer to be transported to a poultry processor. The birds would be slaughtered and the meat processed for human or pet consumption. The live capture of swans would require significant manpower and equipment. This technique could be performed in select areas or any public waters and could target either nonbreeding swans which are found in flocks at this time of year and/or paired adults on territories. Another option would be to have the carcasses rendered (R. Olson DVM, MDA, pers. commun.)

This is not an acceptable management option.

12. **Removal of Swans by Shooting or Euthanasia:** Live-capture and humane euthanasia of swans by lethal injection to resolve landowner complaints outside of the summer flightless period is, in most instances, impractical. Even when swans are flightless during the summer molt, most property owners are either unwilling or unable to capture swans, and so would have to hire a nuisance animal contractor. Net guns, which are sometimes used to capture flightless swans, are expensive (\$3,400 each) and animal control contractors do not possess them. Live-capture and subsequent euthanasia is often cost prohibitive to most landowners.

Shooting is an approved, humane method of euthanasia (1983 panel of American Veterinarians). This method could be used effectively when swans can fly. This technique could include: (a) authorize DNR personnel to shoot flighted mute swans on State lands and waters; (b) authorize DNR personnel to shoot flighted

subadults and/or adult mute swans on all public waters; and (c) authorize landowners via permit to shoot swans in a human/swan conflict situation or where swans jeopardize native species or habitats.

Shooting is an acceptable option where criteria (including historic problems and attempted use of nonlethal management options) show that the killing of swans is necessary in the establishment or maintenance of "swan free zones" and where capture and euthanasia are considered inhuman options.

13. **Implement a regulated swan hunting season:** This would require the DNR to establish a season length and daily bag and possession limits. This option would enable persons to use a regulated hunting season to resolve some local habitat depredation and nuisance problems within guidelines and requirements set by the state. A season on both mute and tundra swans could run concurrent with snow goose seasons, while a mute swan season alone would have to be timed to occur before the fall arrival and spring departure of tundra swans. There is little demand for a mute swan hunting season but some interest in the hunting community for a tundra swan season. Tundra swan hunting is regulated by the U.S. Fish and Wildlife Service, which sets parameters on state hunting seasons for all native waterfowl and migratory birds.

This is not recommended for the foreseeable future. Information is needed about how Maryland citizens perceive the value of mute swans and how hunting may contribute to a reduction of mute swans in the Bay or to the growth rate of this population.

14. **Change the Legal Status of Mute Swans in Maryland:** Mute swans are included in the Maryland statutory definition of "Wetland Game Birds." This means that DNR has authority to set regulation to manage their populations in the state, including the creation of a hunting season. As "nongame" species, DNR could still set regulation to manage their populations, but no hunting season could be created for them. This would involve specifying native swan species in the statutory definition of "Wetland Game Birds." Currently, the definition includes all swans. Specifying tundra swans in the definition, for example, would effectively remove mute swans from that definition.

Mute swan status could also be changed statutorily to "Unprotected Species." This would allow citizens to addle eggs and kill adult or subadult swans without a permit. It would also prevent DNR from creating regulation to manage their populations in any manner.

Change of legal status is not recommended. Mute swans should remain "Wetland Game Birds."

Appendix A: [U.S. Fish & Wildlife Service Memo](#)

Appendix B: [Atlantic Flyway Council Policy Statement](#)

Appendix C: [Maryland Mute Swan Task Force - Purpose and Process](#)

Appendix D: [Chesapeake Bay Foundation - Chesapeake 2000 Agreement](#)

Other Information on Mute Swans:

[Mute Swans: Beautiful, But Controversial Birds](#)

[Mid-Summer Mute Swan Survey Report - Atlantic Flyway Council](#)

[Exotic Mute Swans Continue Population Increase](#)

[Wildlife & Heritage Home Page](#)

[DNR Home Page](#)

[Maryland Mute Swan Management Plan](#)

[Chesapeake Bay Foundation - Chesapeake 2000 Agreement](#)