# Virginia Department of Game & Inland Fisheries

# Mute Swan Management Plan

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## I. EXECUTIVE SUMMARY

This plan presents status and background information on mute swans (*Cygnus olor*) in the Mid-Atlantic, and describes concerns about their impacts on the native wildlife of the Commonwealth of Virginia and the Chesapeake Bay ecosystem. It is a guidance document that provides direction and objectives to the Virginia Department of Game & Inland Fisheries (VDGIF) for the management of mute swans in Virginia.

The mute swan is an exotic species that was first introduced in Virginia around the turn of the 20th century to adorn private estates and city parks. Mute swan numbers remained relatively small and localized until the late 1980's. Progeny from these swans coupled with additional releases by private citizens over the past 20-30 years has allowed for a growing feral and semi-captive population in the Commonwealth that currently numbers around 300 birds and will continue to grow if left unmanaged. This population presents major challenges to the many stakeholders committed to protecting and restoring native natural resources in the Commonwealth. Mute swans compete with native wildlife for limited food and habitat resources. They are large birds that consume substantial amounts of wetland and Submerged Aquatic Vegetation (SAV). Mute swans can negatively impact SAV beds and restoration plantings, especially during the summer growing season, by uprooting plants and denuding areas of vegetation. This reduces the availability and abundance of SAV for wintering waterfowl and other fish and wildlife populations dependent upon this habitat. Reductions in SAV growth also negatively affect water quality and other ecosystem functions.

Mute swans can be very aggressive and intimidating, often exhibiting antagonistic behavior toward other wildlife species. They can prevent native waterfowl from using traditional nesting and feeding habitats. They have displaced colonial nesting birds and native shorebirds from traditional nesting and roosting areas, and in some cases, mute swans have killed other wetland bird species. Their aggressive behavior has also been directed at other animals, pets and at people. Some human/swan conflicts have been severe enough to prevent people from using shoreline property and adjacent waters. Compounding these concerns is the fact that mute swans are non-migratory and therefore have impacts on these resources throughout the entire year.

The mute swan is classified as a non-native exotic (nuisance) species in Virginia and is illegal to possess, sell or liberate in the Commonwealth without a permit from VDGIF. This classification allows mute swans to be removed from areas where they are causing negative impacts to their surroundings. However, few landowners have the ability or the resources to conduct control efforts. To date, efforts to control mute swans in Virginia have been limited in extent, and have not been coordinated among natural resources agencies. A cooperative statewide population management effort is needed to limit mute swan numbers and distribution, and reduce their impacts on native fish and wildlife resources. This Plan proposes population management strategies that include the removal of adult swans and the reduction or elimination of mute swan reproduction in the wild, along with the enforcement of existing importation, liberation and permitting regulations.

VDGIF's overall goals are to manage mute swans in Virginia at a level that (1) minimizes the impacts to Virginia's native wildlife, native habitats, and local economies; (2) minimizes conflicts with humans; (3) is in agreement with [1]Chesapeake 2000 Agreement goals for SAV and invasive species; and (4) is in agreement with the [2]Atlantic Flyway Council's Mute Swan Plan.

[1]*The Chesapeake Agreement is a cooperative agreement signed by the Governors of Maryland, Pennsylvania, Virginia, the Mayor of the District of Columbia, the Chesapeake Bay Commission, the Environmental Protection Agency, and the Chesapeake Bay Commission that pledges to achieve over 100 specific actions designed to restore the health of the Bay and its living resources. In December 2001, the mute swan was identified as one of the priority species requiring regional management planning and population control.*

[2] The Atlantic Flyway Council is a coalition of 17 states and 6 Canadian provinces that works in conjunction with the respective federal governments to manage migratory birds and their habitats in eastern North America. Atlantic Flyway Council states, cooperating with various federal agencies and non-governmental partners, deliver many of the conservation programs for migratory birds in a significant portion of the eastern seaboard of North America.
*The AFC Mute Swan Plan was adopted in July 2003.*

## II. INTRODUCTION

The mute swan (*Cygnus olor*) is indigenous to Europe and Asia. It was introduced into North America as an ornamental bird for parks, zoos, and private estates during the later 1800s. However, sizeable numbers were not imported until after the turn of the century. Progeny of these swans and recent releases from private individuals during the past 20 to 30 years have led to a growing feral mute swan population in the Commonwealth (Costanzo 2004). Mute swans are non-migratory and can have detrimental impacts on wetland ecosystems by overgrazing on submerged aquatic vegetation (SAV) and interfering with breeding, staging and wintering waterfowl and other water birds throughout the year.

Although valued for their aesthetic beauty, the mute swan is one of the world's most aggressive species of waterfowl. This behavior has caused human/swan conflicts and has prevented people from using shoreline properties and riparian waters, especially during the breeding season when swans vigorously defend their nest and young. Associated with the dramatic rise in mute swan numbers, conflicts between mute swans and native wildlife have also increased, resulting in displacement of colonial water birds and native waterfowl from nesting and feeding areas.

Furthermore, mute swans forage on SAV and have reduced the amount of SAV available to native waterfowl species and other fish and wildlife. Maintaining a mute swan population in the Chesapeake Bay poses a threat to the remaining SAV beds and the establishment of new SAV beds, and therefore, is an impediment to achieving SAV restoration goals.

Since the mid 1970s, many wildlife agencies have conducted some form of population control on mute swans in their respective states/provinces. Rhode Island conducted an egg-addling program (1978-2002) that addled over 10,500 eggs. State policy also included euthanasia of sick, injured and nuisance birds and prohibited the sale, import and export of birds or their eggs. The states of Delaware, Pennsylvania, and Virginia consider mute swans exotic unprotected birds. Pennsylvania and Virginia allow mute swans to be harvested, and Delaware has aggressively removed birds from state lands. New York established a policy in 1993 that allowed harassment, egg addling, removal, and euthanasia of nuisance birds. As birds spread northward in the Atlantic Flyway, Vermont (1997) established a policy for total removal of all swans from the state. In addition, Vermont prohibits the importation and sale of birds, and requires that all captive birds be pinioned, marked for identification, and be prevented from reproducing. Maryland, along with U.S. Fish and Wildlife Refuges in that state, conducts egg addling and removal of adult swans from state and federal properties, and from private properties where they have access. During the mid-1990s, approximately 250 birds from a Maryland mute swan flock that damaged a skimmer and tern colony, were removed and exported to Asia by a game breeder based in New Mexico. In Maryland, until 1998, local residents were allowed by permit to addle eggs, destroy nests, and shoot nuisance birds. Shooting was prohibited in Maryland in 1998. Other states attempting to manage mute swans include Michigan, Minnesota, Oregon, Washington, and Wisconsin. Control efforts include egg addling, removal of nuisance birds, pinioning of privately owned swans, prohibition against releasing into the wild, prohibition of ownership, and sterilization.

In Virginia, mute swan impacts have been most evident in areas where these birds concentrate. To date, limited control efforts have been conducted on some state and federal lands, and on private lands where swans have caused problems. However, population management is needed to limit mute swan numbers and distribution across the state, and reduce their impacts on native fish and wildlife resources.

## III. DESCRIPTION AND BIOLOGY OF MUTE SWANS

Included in the family Anatidae with ducks, geese, and other swans, mute swans are the largest bird found in the Chesapeake Bay. Adult males are larger than females; averaging 10.8 kg (22.1 lbs but can commonly reach 30lbs) while females average 8.4 kg (18.5 lbs) (Ciaranca et al., 1997). The average length of males and females is 1.27 to 1.52 m (4.2 to 5.0 ft). Adults can have a wing span that ranges from 1.8-2.4 m (5.9 to 7.9 ft). Like all swans indigenous to the Northern Hemisphere, adult cobs (males) and pens (females) have white plumage, though there may be some orange staining on the head, neck and/or chest. The staining is due to living in tannic or dark staining water or from areas with red clay soils such as Virginia's Piedmont. Closely resembling, though slightly heavier, than the native tundra swan, mute swans can be distinguished by their orange bill with a black, basal knob on the forehead and a black terminal nail. This feature is often more prominent in males. The legs and feet of adults range in color from black to grayish pink. Cygnets (young swans) also are grayish brown or white with slate gray legs and feet or pinkish/tan feet. Cygnets lack the basal knob present in adults. White morph cygnets have tan bills and grey morph cygnets have slate bills. Mute swans can also be identified on the water by their characteristic posture: necks held in an S-shaped position, bills pointed downward, wings arched over their backs, almost in a sailboat position. They are the only swans in the Northern Hemisphere that exhibit this trait. Lacking vocal structures, mute swans are relatively silent, although they do hiss or snort when threatened or agitated. Being a large bodied bird, most swans exhibit a creaking or droning sound during flight that is generated by their wings.

Mute swans breed by their third spring and may remain fertile throughout their life (Ciaranca et al., 1997). Pairs generally form life-long pair bonds; however, if a mate dies they will seek a new mate. Polygamous males are not uncommon and males may choose a new mate if their mate fails to be productive. Nesting begins in March or early April and pairs often use the same nest sites over multiple years. On average 0.18 $km^2$ (4.5 acres) (range of 0.002 to 0.48 $km^2$ / 0.49 to 5.9 acres) of habitat are required for nesting and brood rearing. Nesting occurs close to the water on small islands, isolated shorelines or in shallow marshes. If food and nesting habitat are readily available, swans may nest colonially (Bacon and Harild 1987, L. Hindman, pers. comm.). Mute swans favor *Phragmites* and *Typha* for nesting material. However, nesting material can vary from salt marsh cordgrass (*Spartina* spp.), black needlerush (*Juncus* sp.), to woody vegetation (Berglund et al, 1963; Willey and Halla, 1972; Reese, 1980; Gelston and Wood, 1982). Nests range from 1.2 to 2.4 m (4 to 8 ft) in diameter and can be over 1.2 m (4 ft) tall. The female does most of the nest building and is the principle incubator of the eggs. Unlike other waterfowl in the Northern Hemisphere, mute swan males have been observed incubating in the absence of a female (Witherby et al., 1952). Clutch size in the Chesapeake Bay ranges from 4 to 10 eggs with a mean of 6.2 (Reese, 1996), while brood sizes range between 3.1 and 5.6 cygnets. Incubation continues for about 35 days after the first egg is laid. Mute swans generally nest once per year, although if a nest is disturbed early in the nesting season and eggs are lost, a pair may attempt to nest a second time. The number of cygnets fledging per brood in October ranges between 1.9 to 3.0 birds, indicating a 59.7% survival rate for the first year of life (Allin et al 1987).

Territory sizes of mute swans have been reported to range from less than 0.012 $km^2$ (1.214 hectares) in high quality areas for nesting, brood rearing, and feeding to about 0.06 $km^2$ (6.07 hectares) on large bodies of water and open rivers (Birkhead and Perrins, 1986; Ciaranca, 1990;

Ciaranca et al 1997). Cygnets are precocial; they begin swimming within a day or two of hatching and are fully grown in less than six months. In the Chesapeake Bay, 49% of eggs laid survive to hatch and about 83% of hatched cygnets are able to fledge (Ciaranca et al., 1997). Mute swans utilize a variety of aquatic habitats, including ponds, lagoons, and fresh or salt water marshes. In the Northeastern United States, mute swans have been found to use coastal ponds (salt, brackish, and freshwater), estuaries, backwaters, and tributaries of embayments, and often occupy these habitats year round (Ciaranca et al., 1997). As the Northeast Atlantic coastal population began to grow, some birds began to occupy inland freshwater wetlands, ponds, impoundments, and reservoirs (MDNR, 2003). In the warmer months, mute swans spend most of their time in shallow water. As shallow water freezes they move to deeper water, but will utilize deep water throughout the year.

As with all waterfowl, mute swans go through an annual molting process to renew worn flight feathers. During the molt, which renders the birds flightless, large concentrations of swans generally gather on large open shallow water areas which provide protection and abundant SAV food resources. The molt period occurs between mid July to late August, during peak SAV biomass production. Molt concentrations as large as 300+ birds have been reported in Virginia.

Mute swans are herbaceous; they primarily feed on SAV, algae, agricultural waste grain and winter wheat. However, they will also feed on invertebrates such as clams, shrimp, and snails. Although a small component of their diet, invertebrates provide the necessary calcium and protein for egg production and feather growth. The mute swan's diet in areas of high human interaction (i.e. waterfront communities and city parks) is often supplemented through artificial feeding (bread, corn, commercial bird food). In the Chesapeake Bay, it consists of SAV (81.8%), algae (8.4%), emergent and terrestrial plants (8.3%), and animal matter (0.3%) (Fenwick, 1983). Willey and Halla (1972) and Ciaranca et al. (1997) documented that mute swans will feed on at least 23 different species of SAV. Mute swans have the capability to feed in water up to 1.07 m deep (Owen and Cadbury, 1975) but typically feed in shallow water requiring less energy. Studies conducted in both North America and Europe found that mute swans feed on the same species of SAV used by other waterfowl (Gilham, 1956; Jennings et al., 1961; Willey and Halla, 1972; Mathiasson, 1973; Chairman, 1977; Nierheus and Van Ireland, 1978; Scott and Birkhead, 1983).

Survival rates fluctuate annually depending upon winter severity and available food sources (AF 2003). Annual survival rates increase with age (Reese 1980). 90% of cygnets that reach post-fledging age survive their first year and 50% survived to age 7. Mute swans in Michigan have been reported to have a 12-16% annual mortality rate after fledging to their 3rd year, a 2-7% rate from 4 to 8 years, and only a 2% rate after age 5 (Gelston and Wood 1982). Life expectancy in the wild may extend to over 25 years; however, the average is probably closer to 11 years (Ciaranca et al. 1997). Natural mortality is low and is usually less than 10% annually.

Due to their large size and aggressive nature, mute swans have few natural predators. Large predators (raccoons, otter, fox, coyote, and domestic dog) will take advantage of an unoccupied nest to eat the eggs or take cygnets. However, active nests are well defended and nest mortality is usually low. The greatest source on nesting failure appears to be caused by flooding, but the extent is unknown and can greatly vary from year to year and localities. Snapping turtles will take cygnets during the first few weeks of life (AF 2003). In some instances, territorial adult males may kill young cygnets (L. Hindman, personal communication, in AF Draft Plan, 2003) and even rival males during territorial fighting (M. Ciaranca, personal

comm.., in AF Draft Plan, 2003). Other sources of natural mortality include various waterfowl diseases, parasitic infections, and starvation.

Mute swans are susceptible to a variety of epizootic diseases that may be passed on to native waterfowl or domestic poultry, including avian cholera, duck virus enteritis (DVE), and avian influenza. Recent research indicates that mute swans may be particularly susceptible to the highly pathogenic form of the avian influenza (HPAI) virus subtype H5N1 (Brown et al. 2008). The potential for viral transmission of H5N1 from mute swans to both migratory and non-migratory birds is of continued concern. This concern is exacerbated by certain aspects of the biology of mute swans. For example, relative to other avian species, mute swans shed moderate to high concentrations of the H5N1 virus for several days prior to the onset of any clinical signs of the disease (Brown et al. 2008). This may result in infected swans having more time to spread the virus during movements. This factor coupled with the tendency of mute swans to inhabit local native habitats and private impoundments represents a potentially significant risk to native waterfowl, as well as domestic poultry.

Humans have a limited impact on the mortality of mute swans due to the absence of a traditional hunting season. In some states, mute swans are protected under general wildlife laws, while other states have specifically removed these protections for management and control purposes. In Virginia, mute swans are listed as a nuisance species and can be taken anytime (except on Sundays), although the number taken is believed to be relatively low. Some birds are taken during the tundra swan hunting season or during other waterfowl seasons. Other less common causes of mortality include accidental death resulting from collision with overhead wires and man-made structures. Lead poisoning from fish sinkers and spent shotgun pellets has also been reported in North America (M. Ciaranca, personal communication, in AF Draft Plan, 2003).

## IV. VIRGINIA'S NATIVE SWANS

The tundra swan (*Cygnus columbianus*) is the most common native swan in Virginia, but is only present in the state typically from November to late March. Roughly, 7,000 to 10,000 tundra swans are counted during Virginia's portion of the Mid-Winter Waterfowl Survey. They can be visually distinguished from mute swans by the fact that tundra swans generally hold their necks more erect and their wings lie flat to their bodies. They are slightly smaller and have a black bill. Tundra swans also can have a varying amount of yellow on the lore-area between eye and the bill.

Historically, a relatively small number of trumpeter swans (*Cygnus buccinator*) wintered in the Atlantic Flyway and in Virginia. This swan was extirpated along the East Coast by unregulated commercial harvests and the millenary trade in the late 1800s and early 1900s. Now trumpeter swans are a rare visitor along the East Coast. The continental trumpeter swan population is estimated at 16,000 with the vast majority found in the Western U.S. and Alaska. They are similar in appearance to the tundra swan, but are generally distinguished by their large size and the lack of a yellow spot on the lore. The call of the trumpeter swan is deeper and more resonant than that of the tundra swan and as it name implies sounds like a trumpet.

## V. MUTE SWAN DISTRIBUTION AND POPULATION STATUS

An indigenous species of Europe and parts of Asia, mute swans were introduced into North America as decorative birds for parks, zoos, and private estates during the late 19th century. Significant numbers were not imported until after the turn of the century. Progeny of these swans and recent releases from private aviaries during the past 30 to 40 years have led to the current feral mute swan population in the Commonwealth.

Prior to the 1960s, mute swans were seldom noted during Mid-Winter Waterfowl Surveys (MWS) in the Atlantic Flyway (AF), with the first recording of mute swans in 1954. During the early 1960s, however, low numbers of birds began to be reported. In 1966, the MWS count for mute swans was 2,100, increasing concerns of biologists of the growing numbers of mute swans. A lack of information on mute swans in North America instigated early studies by Willey (1968) and Reese (1980) that investigated its biology and population dynamics in Rhode Island, Chesapeake Bay, and Maryland. These studies found that their respective populations were growing rapidly and recommended initiation of control programs.

Mute swans are able to utilize a variety of habitats and can be found not only in estuarine systems, but in city parks, golf courses, and inland waters as well. The Chesapeake Bay has had some of the largest concentration of mute swans in North America. In the Virginia portion of the Bay, mute swans are often found around the Tangier/Smith/Fox Island chain. This flock often trades back and forth between Maryland and Virginia. Other birds can be found on the major tidal rivers including the Potomac, Rappahannock and York. Mute swans are found in smaller numbers scattered throughout the state on inland waters. These are more recently established, and likely originated from captive flocks and illegal releases with epicenters around Williamsburg, Chesterfield, Charlottesville, and Warrenton.

Reproduction from these feral birds and the continued releases/escapes from private collections have led to the increase in mute swan numbers in the past 20 years. Virginia's mute swan population level is at a critical stage in its population growth curve. In 1986 when the first statewide census of mute swans was taken, 60 individuals were located; 16 years later, in 2005, those numbers jumped to 725 swans and were growing approximately 5% annually. The 2011 estimate was 265 mute swans. The decline can be greatly attributed to aggressive management by other Atlantic Flyway state, most notably in Maryland, where management efforts were focused on the Chesapeake Bay and the Potomac River. Although the heavy concentration of swans can still be found on the Chesapeake Bay islands, the greatest increase has been recorded on inland waterways which account for a large portion of Virginia's mute swans. .

In general, the winter distribution of mute swans is similar to that of their breeding range. Mute swans are non-migratory in North America, but may undertake short local seasonal movements seeking open water and available food sources during winter weather. Willey (1968) reported on the seasonal movement of Rhode Island banded mute swans into Massachusetts, Connecticut, and New York. Ciaranca (2000) further noted seasonal movement in southeastern Massachusetts was related to coastal configurations and the following of watercourses inland (AF 2003).

## VI. POPULATION GROWTH AND POTENTIAL

The number of breeding swan pairs in Virginia can increase rapidly as immature swans reach breeding age. A recent example of how fast the number of nesting pairs can increase was observed in the Patuxent River in Maryland. In 2000, there were only 6 active nests located on the river. In 2001, the number of nests had increased to 40 (660% increase in 1 year).

Considering the availability of unoccupied breeding habitat, the potential for the mute swan population to increase and expand its range is high.

In 1985, the Atlantic Flyway Council (AFC) initiated the Mid-Summer Mute Swan Survey (MSMSS) to better understand the status of this invasive species. The survey is conducted every third year during the birds' mid-July through mid-August molt period. The first MSMSS was completed in 1986 and thereafter in 1989, 1993, 1996, 1999, 2002, 2005, 2008 and 2011. These mid summer surveys indicate a higher than expected annual growth of 9.1%. In actuality, the AF mute swan population had increased 2.2 times by 1999 to over 12,650 birds. Regional growth rates in the Flyway since 1986 have ranged from 25% in New England to 1,116% in the Chesapeake Bay Region (MD and VA). The growth of the Atlantic Flyway population during this 16-year period was 145.6%, making the population 2.6 times larger than in 1986. If the current rate of growth continues, the swan population has the potential to double itself every eight years. A comparison of both the MWS and the MSMSS show that the MSMSS is providing a more accurate count. However, both surveys show an alarming population growth rate for this non-native species.

## VII. VALUES AND IMPACTS

### A. Impacts Upon Submerged Aquatic Vegetation

Mute swans feed almost exclusively on SAV (Ciaranca et al., 1997; Fenwick, 1983). SAV is a vital component of the Chesapeake Bay ecosystem due to a number of valuable ecological benefits that it provides to the Bay. The plants provide food for resident and migratory waterfowl and the beds provide habitat and shelter for a variety of fish, shellfish, and invertebrates. SAV also contributes to chemical processes such as nutrient absorption and oxygenation of the water column. SAV beds, when dense, can also aid in baffling wave energy and slowing water currents, which can reduce shoreline erosion and promote settlement of suspended sediments (Hurley, 1991). Abundance and distribution of SAV in the Bay has drastically declined since the 1970s. This reduction can be mainly attributed to decreased light abundance and biofouling of the plant surface due to excessive loading of nutrients and sediments from the Bay watershed. Efforts to restore depleted populations of SAV and to protect remaining beds of SAV are greatly challenged by the population of mute swans that inhabits the Chesapeake Bay and its tributaries.

Chasko (1986) observed significant reductions in SAV in small Connecticut ponds used by breeding mute swan pairs. A study conducted in the Netherlands by Nienhusi and Van Irerland (1978) noted mute swans were responsible for 87% of the consumption of eel grass beds by birds. An exclosure study conducted in Rhode Island (Allin and Husband, 2000) indicated that SAV biomass was 92 to 95% greater in areas where mute swans where excluded. Fenwick (1983) found that mute swans could consume on average 43% (females) and 35% (males) of their body weight daily. Willey (1968) reported mute swans can consume more than 8 pounds of wet weight daily. SAV loss can be exacerbated by foraging and nesting behavior exhibited by mute swans. Mute swans have been observed pulling plants up by the roots or rhizomes or paddling vigorously to dislodge whole plants to consume or make available for cygnets (Owen and Kear, 1972; Birkhead and Perrins, 1986). Willey (1968) documented mute swans can uproot up to 20 lbs daily during feeding activity. Mute swans can also use large amounts of vegetation for nest building (Gillham, 1956). Foraging by mute swans during the SAV growing season

reduces plant survival and the plant's ability to reproduce.

Reichholf (1984) found that about 20% of available vegetation was removed within breeding territories. Several studies have suggested that mute swan concentrations could significantly reduce SAV in shallow wetlands Gillham 1956, Jennings et al. 1961, Berglund et al. 1963, Willey 1968, Mathiasson 1973, Charman 1977, Nierheus and Van Ierland 1978, Scott and Birkhead 1983, Ryley and Bowler 1994, AFC 2002). These studies reported that in some cases mute swans eliminated individual plant species from some wetlands. In their 2001 report, Maryland's DNR cites reports of overgrazing by mute swans in local areas and the concerns from residents about the loss of SAV habitat and its impact on blue crab and fish populations. Recent attempts to restore eel grass beds in the Chesapeake Bay by Maryland DNR has conversely led to increased mute swan feeding activity on newly restored SAV beds. This in turn has hampered restoration efforts (MD Report 2001).

The abundance and distribution of SAV in Chesapeake Bay 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. Citizen organizations have had SAV and emergent plantings damaged by mute swans, thwarting efforts to improve water quality. The cost of replanting one 0.06ha restoration site damaged by mute swans in the South River exceeded $4,000. As a result, physical barriers are needed to protect transplant sites from mute swans at a significant additional cost.

The mute swan population is a serious impediment to achieving the objectives identified in the Vital Habitat Protection and Restoration Section 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 tributaries." The Chesapeake Bay 2000 Agreement includes a commitment to restore 114,000 acres of SAV. Restoration efforts, particularly in the mid-Bay, where the decline is most severe, are frequently obstructed by feeding mute swans. Over time, areas with high densities of mute swans exhibit a decrease in plant diversity and abundance, sometimes becoming devoid of SAV.

**B. Impacts on Native Species of Fish and Wildlife**

In competition for habitat, their large size makes mute swans a threat to native waterfowl. Due to their strong territoriality, mute swans will vigorously defend nesting and brood rearing sites from intrusion by other swans, ducks, geese, or other waterbirds (Anderson and Titman, 1992). Mute swans can attack and displace native birds from breeding and staging areas (Willey, 1968; Reese, 1975; Ciaranca, 1990; Ciaranca et al., 1997). They may even kill the intruding pair and/or their young (Stone and Masters 1970, Reese 1980, Kania and Smith 1986). Mute swans have been documented killing mallard (*Anas platyrhynchos*) ducklings, Canada goose (*Branta canadensis*) goslings, and cygnets of other mute swan pairs (MDNR, unpublished data). In addition, mute swan aggression is not limited to waterfowl. A few attacks have been reported on furbearers and small mammals (Ciaranca et al., 1997). Mute swans have also impacted colonies of black skimmers (*Rynchops niger*), least terns (*Sterna antillarum*), common terns (*Sterna hirundo*), and Foster's terns (*Sterna foresteri*) (MD Report, 2001).

As mentioned in previous sections, mute swans consume large amounts of SAV that might otherwise be available for other waterfowl. This competition for space and food with mute swans reduces the carrying capacity of breeding, staging, and wintering habitats for native species of migratory waterfowl in the Chesapeake Bay. A variety of waterfowl species (e.g., redhead, canvasback, American widgeon, American black duck and Atlantic brant) dependent upon SAV have declined in the Chesapeake Bay and remain well below population goals. These declines have been attributed to the reduced abundance of SAV (MDNR, 2003). Waterfowl are not the only organism affected by loss of SAV. Research has shown that the density of juvenile blue crabs is 30 times greater in SAV beds than in non-vegetated areas of the Chesapeake Bay.

Food habit studies show that tundra swans and mute swans do compete for limited SAV food resources, but tundra swans feed on invertebrates and agriculture foods to a greater extent. Mute swans have been observed exhibiting aggression toward wintering tundra swans, driving them from foraging areas and/or protected coves used for wintering shelter (L. Hindman pers. commun.). There is a concern that the increase in mute swans in Maryland may be contributing to factors that have suppressed population growth among wintering tundra swans (MDNR 2003). The time period during which tundra swans remained at lower levels in Maryland coincided with the rapid increase in mute swan numbers in that state .

**C. Impacts to Property and Agricultural Resources**

Few instances of property damage by mute swans have been reported. Currently, there is no evidence to suggest that mute swans are causing any large impact on agriculture in Virginia. Elsewhere in the United States, however, mute swans have caused economic losses to agricultural crops. In New Jersey, mute swans have caused thousands of dollars of damage to commercial cranberry crops. Mute swans have also been reported to cause damage to small grain crops (i.e., winter wheat and canola) and pastures in Washington State, British Columbia, and Europe (Gillham 1954, Eltringham 1963, Minton 1971, Bacon 1980, Sears 1989). If the Atlantic Flyway's mute swan population continuous to grow, the potential for this bird to include upland grazing in its feeding behavior is likely.

**D. Conflicts With Humans**

Despite their aesthetic appeal, mute swans are problematic for some people. Some birds threaten or directly attack people who get too close to them, their nest, or their young. Aggressive behavior exhibited by these large birds can pose a safety risk, especially to small children and persons swimming or in small watercraft. The mute swan has a 1.8 m (6 ft) wingspan and is capable of breaking bones and severely injuring humans (AF 2003). Mute swans have been reported attacking humans (Allin 1981). There have also been reports of mute swans capsizing canoes and small fishing boats. North Carolina had two reported incidences of mute swans attacking people during 2001, requiring one person to seek medical treatment (AF 2003). In a recent incident in Chicago, a mute swan attacked a man in a kayak, the kayak overturned and the man drowned. Individuals have reported incidents of a mute swan attacking a small dog chained to its doghouse, which was within the bird's territory (AF 2003.). Although the potential for injury may be low, many people are fearful of their aggressive behavior, and are reluctant or are prevented from using their shoreline property and adjacent waters.

**E. Effects on Water Quality**

In large concentrations, mute swans and other waterfowl can contribute to water quality problems (AF. 2003). Indirect impacts by swans include water quality changes that are the result of SAV loss. However swans may have direct impacts on water quality as well. On Long Island, New York, elevated counts of coliform bacteria have been detected where mute swans congregate. Public Health authorities are concerned about the impact 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. Nutrient loading can also cause dangerous algal blooms, especially in inland ponds where rooted SAV has been removed by mute swans (NYDEC, 1993). Potential pollution problems by mute swans have not been researched, therefore little is known, however pollution problems have been credited to resident Canada geese, a related species.

In addition to contributing to excessive nutrient loading, mute swan removal of SAV also has negative effects on water quality. SAV contributes to chemical processes such as nutrient absorption and oxygenation of the water column. SAV beds, when dense, can also aid in baffling wave energy and slowing water currents, which can reduce shoreline erosion and promote settlement of suspended sediments (Hurley, 1991).

### F. Aesthetic Values

Swans (regardless of species) are considered a symbol of beauty, elegance, and tranquility by many people due to their large size, color, and gracefulness. Mute swans provide enjoyment for people, because they are large conspicuous birds that are now widely distributed. People are able to photograph, paint, and view mute swan courtship displays, nest building, brood rearing activities, and fledglings. 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 as pets.

### G. Economic Values

Mute swans have been sold for display on ponds and lakes. They are also promoted and sold as a biological control for removing unwanted filamentous green algae from small lakes and ponds. In some instances, they are purchased with the belief that they will reduce nuisance problems associated with resident Canada geese. However, this is generally not an effective goose deterrent and often creates other problems. The purchase price of a single mute swan is about $250 with a breeding pair selling for up to $1500. The economic value of the mute swan trade is unknown in Virginia, but it is believed to be relatively small, as it is it illegal to buy or sell mute swans in Virginia without a VDGIF permit. As of January of 2012, there are only 7 permit holders of mute swans in Virginia.

## XIV. LEGAL STATUS & MUTE SWAN POLICIES

### A. Legal Status

Prior to 2001, mute swans were not regulated by the U.S. Fish and Wildlife Service (USFWS). Primary management authority was held by individual states. The exclusion of the mute swan from the Migratory Bird Treaty Act (MBTA) was based on the fact that mute swans were exotic to the United States and non-migratory in nature. However, on December 28, 2001,

the U.S. District Court of Appeals for the District of Columbia, ruled in the case of Hill v. Norton, 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). This resulted in the USFWS being designated as the regulating authority. However, three years later, Congress enacted the Migratory Bird Treaty Reform Act of 2004. This legislation specifically addressed and clarified the distinction between native and non-native migratory bird species and their management. The passage of this legislation helped to re-establish the original intent of the Migratory Bird Treaty Act and enabled states to direct efforts toward the management of non-migratory species.

In Virginia, mute swans are listed as a nuisance species similar to other nuisance bird species such as English house sparrows (*Passer domesticus*), European starlings (*Sturnus vulgaris*), and pigeons (*Columba liva*). They are also on Virginia's list of predatory and undesirable wildlife species (4VAC15-30-40). As a nuisance species in Virginia, these birds are not protected and can be taken anytime of the year (§ 29.1-511**)**. To further restrict the spread of feral swans, VDGIF also requires a state permit to possess, propagate, buy and sell any swan in Virginia. This includes other non-native species such as the Australian black swan (*Cygnus atratus*) and the South American black-necked swan (*Cygnus melancoryphus*), both of which have been found free-ranging in Virginia.

There is no central federal authority over exotic bird species; however, there are some federal oversights with federal funds relating to exotic and invasive species. 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. Several federal, regional and state policies address the concerns associated with invasive species and some are specifically directed at the management of mute swans.

**B. The Migratory Bird Treaty Reform Act of 2004**

The Migratory Bird Treaty Reform Act of 2004 amends the Migratory Bird Treaty Act (MBTA) to clarify that the MBTA's prohibition on taking, killing, or possessing migratory birds applies only to native migratory bird species whose occurrence in the United States results from natural biological or ecological conditions. Bird species occurring as the result of human assisted introduction are excluded from coverage under this act unless the species: (1) was native to the United States and extant in 1918; (2) became extinct throughout its range thereafter; and (3) was reintroduced as part of a Federal program. (Sec. 103) It requires the Secretary of the Interior (the Secretary) to publish a list of all non-native, human introduced bird species to which the MBTA does not apply that belong to biological families of migratory birds covered under any migratory bird conventions with Great Britain (for Canada), Mexico, Russia, or Japan.

**C. The National Invasive Species Act of 1996**

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 issues 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 is to prevent the unintentional introduction and dispersal of non-indigenous species into the waters of the United States, and to develop and implement environmentally sound control methods to

prevent, monitor and control unintentional introductions of non-indigenous species from pathways other than ballast water. 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

**D. Executive Order 13112**

Executive Order 13113 directs each federal agency whose actions may affect the status of invasive species, shall, to the extent practical and permitted by law, (1) identify such actions, and (2) subject to the availability of appropriations, and within Administrative budget limits, use relevant programs and authorities to (i) prevent the introduction of invasive species; (ii) detect, 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 of invasive species and the means to address them.

**E. USFWS Policy**

On March 26, 1996, the USFWS enacted a policy directing all USFWS Refuge/Land 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, managers were directed to increase public awareness as an integral part of the policy to control mute swans on USFWS lands.

**F. Migratory Birds Convention Act-**

In Canada, mute swans are managed under the Migratory Birds Convention Act (MBCA), meaning that the possession of this species is regulated by the Federal Government. The release of mute swans to the wild is prohibited and wild swans may not be taken by any means, except under a permit issued by the Canadian Wildlife Service (CWS). The CWS issues permits to its staff to control mute swans on National Wildlife Areas. There are few to no feral mute swansin the Atlantic Region (which includes Newfoundland and Labrador, Prince Edward Island, Nova Scotia, and New Brunswick). This is due, in large part, to a policy implemented in 1999 which states that any captive birds must be maintained under an aviculture permit with the following conditions; all mute swans must be rendered permanently flightless, all swans must be banded with numbered leg bands provided by CWS, and all young swans must be rendered permanently flightless and banded by August 15 of each year. The band numbers of all swans sold to other aviculturists must be recorded and included in the permittee's annual report to CWS. Any swan found off the owner's property may be captured and disposed of by any Federal or Provincial Wildlife Officer. Failure to keep the swans confined to the aviculturist's property or failure to band the swans may result in loss of the swans, loss of the aviculture permit, or both.

## G. The Chesapeake 2000 Agreement

The Chesapeake 2000 Agreement is a cooperative agreement signed by the Governors of Maryland, Pennsylvania, and Virginia, the Mayor of the District of Columbia, the Chesapeake Bay Commission, and the Environmental Protection Agency. 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 on 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.

## H. Atlantic Flyway Council Mute Swan Management Plan-

On August 1, 1997, over growing concern about 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 Virginia, in the easternmost 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 swans captured due to nuisance complaints, sickness, or injury should be removed from the wild or be euthanized. 5) Egg addling programs, where feasible, should be encouraged. 6) Both state and federal wildlife agencies should institute programs to prevent the establishment of feral populations 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 a level that will have minimal impacts on native wildlife species or habitats.

## I. Chesapeake Bay Program Invasive Species Working Group-

In January 2003, the CBP ISWG convened a Mute Swan Workgroup comprised of researchers and federal and state natural resource managers, to develop a finalized Bay-wide regional management plan. The goal of the plan is to manage the Chesapeake Bay population of mute swans at a level that a) minimizes the impacts on native wildlife, important habitats, and local economies; b) minimizes conflict with humans; c) is in agreement with Chesapeake 2000 Agreement goals for SAV and invasive species; and d) is in agreement with the Atlantic Flyway Plan.

## J. Virginia Legislation Related to Mute Swans

### i. Virginia State Code

• **§ 29.1-103, § 29.1-412, §29.1-417** – Gives VDGIF the authority to permit or authorize individuals to capture, possess, propagate, buy, and sell certain wildlife in Virginia.

• **§ 29.1-100 - Definitions of nuisance Species**. As used in and for the purposes of this title only, or in any of the regulations of the Board, unless the context clearly requires a different meaning: "Nuisance species" means blackbirds, crows, cowbirds, grackles, English sparrows, starlings, or those species designated as such by regulations of the Board, and those species found committing or about to commit depredation upon ornamental or shade trees, agricultural crops, wildlife, livestock or other property or when concentrated in numbers and manners as to constitute a health hazard or other nuisance. However, the term nuisance does not include (i) animals designated as endangered or threatened pursuant to §§ 29.1-563, 29.1-564, and 29.1-566, (ii) animals classified as game or fur-bearing animals, and (iii) those species protected by state or federal law.

• **§ 29.1-511. Open season on nuisance species.** There shall be a continuous open season for killing nuisance species of wild birds and wild animals as defined in § 29.1-100.

• **§ 29.1-542. Importation**. Live wolves or coyotes, or birds and animals otherwise classed as predatory or undesirable, may not be imported into the Commonwealth or liberated therein, or possessed therein, except under a special permit of the Board. Nonpredatory birds, animals or fish may be imported, but upon arrival in the Commonwealth, shall be subject to the laws governing the possession of such birds, animals and fish in Virginia.

**ii. VDGIF Regulation**

• **4 VAC 15-20-160. Nuisance Species Designated.** This regulation lists the mammal and bird species identified as nuisance species in Virginia and includes the U. S. Fish and Wildlife Service list of 125 non-native bird species as defined in the Migratory Bird Treaty Reform Act of 2005.

**4 VAC 15-30-10. Possession, importation, sale, etc., of wild animals**. This regulation states that it shall be unlawful to import, export, buy, sell, offer for sale, or liberate within the Commonwealth any wild animal unless otherwise specifically permitted by law or regulation.

• **4 VAC 15-30-40. Importation requirements, possession and sale of nonnative (exotic) animals.** This regulation states that mute swans are illegal to import, possess or sell in Virginia without a permit. This designation of mute swans as a "predatory and undesirable" species provides the basis for prohibiting ownership without a DGIF permit.

**POPULATION MANAGEMENT OF MUTE SWANS**

Wildlife population management falls into two main categories: (1) affecting reproductive output and/or recruitment and (2) affecting the survival rate of adult individuals. Methods of controlling a population should be efficient and, when possible, socially acceptable. In managing mute swan populations, a variety of techniques will need to be implemented. A common means of affecting waterfowl reproductive output is through egg and nest destruction. Addling eggs is a common practice in attempts to manage resident Canada geese. The coating of the eggs with an oily substance (e.g. corn or vegetable oil) prohibits oxygen exchange through the shell

membrane and kills the embryo within the shell. This method is particularly favored in urban/suburban settings due to its high social acceptability. Although, for some, there is a strong attachment to the mute swans in their communities, to the point where VDGIF staff have been aggressively approached and even threatened by the public while addling mute swan eggs on public waters. Mute swans are very aggressive and for those lacking experience in handling large aggressive wildlife it can be very difficult to conduct egg addling activities. Other drawback to this population control method is that it needs to be conducted annually and often requires a significant time commitment to locate nests. Additionally, its effect is limited to that portion of the population with the greatest natural mortality rate, and therefore has the least effect on population control or reduction (Cooper and Keefe 1997).

While egg removal/destruction can reduce production of cygnets, merely destroying eggs does not reduce a population as quickly as removing adult swans. Mute swan populations are much more sensitive to changes in adult survival than to changes in hatching success. This is similar to other long-lived waterfowl species such as geese and other species of swans. A model for mute swans in the Chesapeake Bay was constructed by Maryland DNR (2003) that allows exploration of how changes to reproductive output and survival rates may influence the growth rate and size of the population. The model was run at different levels of hatching success to simulate various levels of egg addling effort. These simulations indicated that it is necessary to reduce hatching success by 80% just to stabilize the population. 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. Rockwell et al. (1997) noted that actions taken to increase the mortality rate of adult lesser snow geese would be the most effective way to reduce the size of an overabundant mid-continent population of the species. Capture and removal of adult mute swans, however, has proven to be controversial among the public and could be costly during the short term to state wildlife agencies.

The use of same-sex pairing is still under investigation and at this point has not been accepted among wildlife professionals. The method requires very stringent controls to ensure the same-sex pair remains on the property or no foreign mute swans immigrate into the property. It does not provide any relief from having mutes swans in the environment and may inadvertently increase public appreciation for mute swans. It may provide a compromise to limit reproduction for those that already have mute swans and seek a permit to legally possess them.

## X. MANAGEMENT GOAL AND OBJECTIVES

The overall management goals are to manage the mute swan population in Virginia at a level that: (1) minimizes the impacts to Virginia's native wildlife, important habitats, and local economies; (2) minimizes conflicts with humans (3) is in agreement with Chesapeake 2000 Agreement goals for SAV and invasive species; and (4) is in agreement with the Atlantic Flyway Council's Mute Swan Plan. To achieve these goals, the management of mute swans shall be conducted in an effective, efficient manner, consistent with accepted wildlife management practices. Five specific management categories are addressed by this management plan. They are: (A) Public Outreach and Education, (B) Feral Population Management and Resource Protection, (C) Captive Mute Swan Management, (D) Relief of Human Safety and Nuisance Conflicts, and (E) Population Monitoring and Research.

### A. Public Outreach and Education

Implementation of mute swan management should occur congruently with an effort to educate and inform Virginia's citizens about mute swans**.** These programs should convey an understanding of the status of the mute swan population, the impacts of mute swans on natural resources, and the conflicts mute swans may cause. Public desires to observe swans should be addressed by encouraging them to view native tundra swans.

**Objective A-1:** Increase public awareness and education regarding mute swans and their impact on Virginia's natural resources.

Strategy A-1.1: Develop a web based clearinghouse of information to allow exchange of information. This website could include information on mute swan biology and allow Virginians to post reports of mute swan sightings, survey reports, and current information on mute swan management and research, current laws and policies regarding management of mute swans, and outreach materials.

Strategy A-1.2: Develop informational materials on mute swans and tundra swans describing swan ecology, current status, issues, and research. Materials should be available as web resources. For example, in June of 2006, an article was published in *Virginia Wildlife* on mute swans that described the history of mute swans, swan biology, and their impacts and legal status in Virginia. This article or similar publications could be provided to other media outlets to allow for a larger circulation in order to increase awareness of mute swan issues among the general public. These articles should be posted on the web and disseminated to parties requesting mute swan information from VDGIF.

**Objective A-2:** Work with other state and federal natural resource agencies and environmental organizations to improve public awareness and education regarding mute swans and their impact on Virginia's natural resources.

Strategy A-2.1: Develop materials with technical information for natural resource managers (government and non-government organizations) and property owners regarding the status of mute swans, issues surrounding mute swans and management options for mute swans.

Strategy A-2.2: Work with other natural resource agencies and organizations to educate its members and the general public on impacts of mutes swans and the importance of active management of mute swans. As mute swan management can be controversial the support of public environmental organization is essential.

### B. Feral Population Management and Resource Protection

The number of free-ranging mute swans in Virginia has increased since the first comprehensive survey was conducted in 1986. Efforts by VDGIF to manage feral swans in Virginia should be continued and enhanced. Control programs addressing both reproduction and adult survival are needed to stop population growth. A cooperative effort will be required from a variety of state and local natural resource agencies as well as land owners.

**Objective B-1:** Implement actions that will prevent mute swans from occupying areas where swans have not been previously recorded.

Strategy B-1.1**:** Develop a list of swan free counties or areas (Appendix A). Efforts should be made to have these counties remain "swan-free", not only from feral populations, but from captive swans as well. In the development of the list should be counties in which no known mute swans exist.

Strategy B-1.2: Prevent the accidental or intentional introduction, release, or escape of mute swans into the wild.

**Objective B-2:** Reduce the mute swan population as quickly and efficiently as possible, consistent with activities to protect, restore, and enhance Virginia's natural resources. The ultimate management goal is to greatly reduce or eliminate feral and free-ranging mute swans in Virginia.

Strategy B-2.1: Remove mute swans and/or reduce the annual survival rate on public lands and waters. Population modeling and experience in other states demonstrates that the use of only non-lethal controls, while a valuable tool, is unlikely to reduce the size of the mute swan population. 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 sub-adult and adult swans. The removal of mute swans from the wild will be linked to the protection of key resource areas. Lethal methods to control swans will occur where non-lethal methods 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 Virginia. All lethal control methods are to be applied in a professional and humane manner. For situations where it is necessary and practical to capture and euthanize swans, VDGIF will follow recommendations for euthanasia set by the American Veterinary Medical Association.

Strategy B-2.2: Implement actions that will affect mute swan productivity.

Strategy B-2.2a: Treat (oil/addle eggs) mute swan nests located in public waters and on private property. Secure landowner permission before proceeding on private land. 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.

Strategy B-2.2b: Separate breeding pairs and create same-sex pairs in areas where birds are not or cannot be removed. However, this strategy should only be used in rare instances where other measures are not favorable or practical. The relocation of same-sex pairs does not prevent breeding if a bird of the opposite sex locates and enters the relocation site. This could 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 VDGIF authorization, mute swans may be captured and relocated where the birds would be used for scientific and educational purposes. Any relocation of swans to other jurisdictions shall be done only with the VDGIF approval.

**Objective B-3:** Conduct periodic review of regulations and policy.
Strategy B-3.1: VDGIF should conduct periodic reviews of progress and update this Mute Swan Management Plan every 10 years to reflect changes in the swan population, resource protection, and public attitudes.

## C. Captive Mute Swan Management

Although the number of captive swans that escape or are released annually is relatively small, the cumulative effect of multiple releases over time has greatly contributed to Virginia's feral swan population, due to the bird's longevity and reproductive potential, particularly when the bird is introduced to new parts of the state. Despite the fact that the possession of captive mute swans is regulated and the liberation of mute swans is illegal, mute swans are still being released. Investigations and seizure of illegal captive swans shall follow protocols set by VDGIF Law Enforcement Division Policy Number 27 – Illegal Captive Wildlife (Appendix B).

**Objective C-1:** Prevent the accidental or intentional release or escape of captive mute swans.

Strategy C-1.1: A panel comprised of VDGIF's Law, Permits and Wildlife staff shall review current laws, regulations and permit conditions regarding captive, semi-captive and released mute swans in Virginia. The panel should address any needed enabling legislation/regulation to manage mute swans. The panel shall also review enforcement of current laws, regulation and permit conditions and address any shortcomings.

**Objective C-2:** Persons possessing mute swans must obtain authorization from VDGIF.

Strategy C-2.1: VDGIF shall only authorize mute swan possession to those who can demonstrate that they have held mute swans in captivity at that location prior to VDGIF adoption of this management plan. Authorization shall be granted through the VDGIF Director or designee. Recipients must abide by all conditions set by the VDGIF's authorization letter.
Examples of conditions:

1.) Authorization shall be to hold existing swans. No reproduction shall be allowed nor shall replacement swans be permitted.
2.) Swans must be housed entirely on property of those who receive the authorization.
3.) Swans cannot be transferred from property.
4.) The number of mute swans held will be set by VDGIF.
5.) No wild waterfowl or other captive waterfowl should be allowed to mix or come in contact with the mute swans.
6.) Each swan must be leg-banded with a unique identifier set by VDGIF.
7.) Swans must be either rendered flightless (pinioned or flight feathers annually trimmed) or be enclosed in an escape-proof enclosure.
8.) Any swan found off the owner's property must be reported and those authorized will be responsible for its re-capture. Reasons for the escape must be addressed and corrected or the mute swans will be removed.
9.) VDGIF must be notified if any feral mute swan enters the property where the authorized mute swans are housed.

10.) VDGIF must be notified immediately if the swans become sick, injured or die.
11.) Authorization is non-transferable.
12.) VDGIF can revoke authorization if conditions are not met or if conflicts arise.

Strategy C-2.2: VDGIF staff may conduct site visits to current permit holders to verify the current number of swans, to gather information on the housing facility, to assess the condition of swans, and gather input from the permit holder.

**Objective C-3:** The permitting of mute swans for educational or scientific purposes.

Strategy C-3.1: Those who want swans for educational purpose should be encouraged to display native swans rather than an invasive species. For those holding swans for scientific purposes, there shall be strict conditions concerning where research may be conducted, the numbers of swans to be held, and the disposition of swans at the conclusion of experiment. Permits for scientific purposes shall be restricted to bon-a-fide academic research institutions.

## D. Relief of Human Safety and Nuisance Conflicts

**Objective D-1:** Reduce conflicts between mute swans and people with effective and efficient control methods.

Strategy D-1.1: VDGIF, along with the U.S. Department of Agriculture's Wildlife Services Program, will continue to provide technical information and guidance to property owners who are experiencing nuisance, safety, and habitat depredation problems caused by mute swans.

## E. Population Monitoring and Research

Continue to monitor the numbers and distribution of mute swans, and if needed, conduct additional research that will increase understanding of the role of mute swans in the ecosystem and their impacts on Virginia's natural resources.

**Objective E-1:** Monitor the size and distribution of the mute swan population and the effectiveness of management actions.

Strategy E-1.1: VDGIF will continue participation in the Atlantic Flyway Mute Swan Mid-Summer Survey (MSMSS), which is conducted every three years. This survey provides a "snap-shot" of mute swan distribution and a minimum count of mute swans in Virginia. Even though this survey provides a reliable count of mute swans in the state, effort should be made to improve survey methodology and surveying efforts. Improvements can be made by expanded coverage of aerial portions of the survey, greater efforts of field staff, and improvement and greater oversight of contractors that cover portion of the survey area.

Strategy E-1.2: Virginia shall also monitor the mute swan population through its annual Mid-November and Mid-Winter waterfowl surveys.

Strategy E-1.3: VDGIF should maintain a database of known mute swan locations that are reported by field staff and the public throughout the year. These locations are verified during the MSMSS. It would also be beneficial to have an online reporting system where staff and general public would be able to report mute swan sightings.

Strategy E-1.4: Consider 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 E-1.5: Identify factors limiting population growth and how they can be used in management.

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Figure 1. Number of Mute Swans counted (1986-2011) in Virginia's Portion of the Atlantic Flyway Mute Swans Survey.

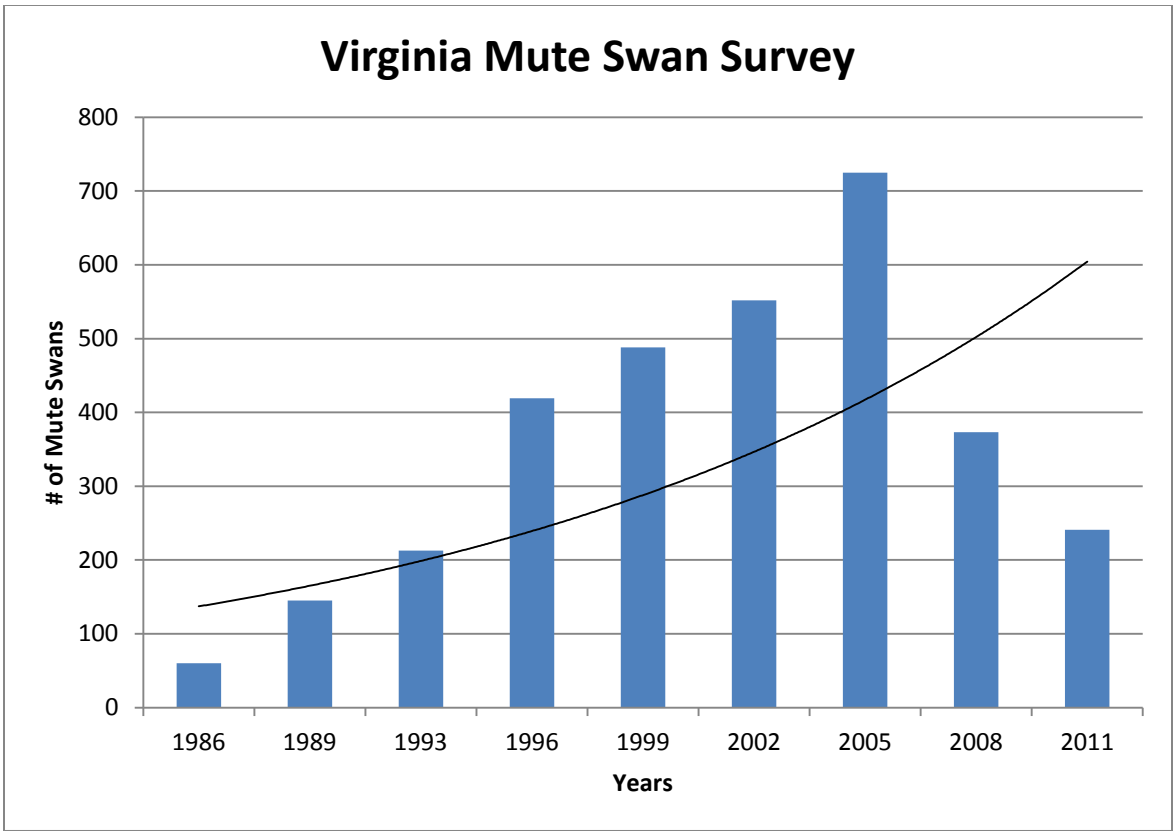

Table 1. Distribution of Mute Swans counted (1999-2011) in Virginia's Portion of the Atlantic Flyway Mute Swans Survey.

| Location | 2002 | 2005 | 2008 | 2011 |
|---|---|---|---|---|
| **Eastern Shore** | 41 | 158 | 25 | 0 |
| **Lower Peninsula** | 62 | 34 | 33 | 88 |
| **Middle Peninsula** | 54 | 107 | 62 | 27 |
| **Virginia Beach** | 42 | 3 | 3 | 0 |
| **Potomac** | 73 | 135 | 44 | 36 |
| **Piedmont** | 56 | 31 | 40 | 27 |
| **Shenandoah** | 7 | 2 | 0 | 2 |
| **Northern Virginia** | 228 | 255 | 163 | 36 |
| **Southwest Virginia** | 0 | 0 | 3 | 25 |
| **Total** | 563 | 563 | 725 | 241 |

## Appendix A

Virginia counties or cities where mute swans have been confirmed

| County/City | Permitted | Unpermitted | No known Location |
|---|---|---|---|
| Accomack | P | X | |
| Albemarle | | X | **X** |
| Alexandria | | | **X** |
| Alleghany | | | **X** |
| Amelia | | | **X** |
| Amherst | | | **X** |
| Appomattox | | | **X** |
| Arlington | | | **X** |
| Augusta | | X | |
| Bath | | | **X** |
| Bedford | | X | |
| Bland | | | **X** |
| Botetourt | | | **X** |
| Bristol | | | **X** |
| Brunswick | | | **X** |
| Buchanan | | | **X** |
| Buckingham | | | **X** |
| Buena Vista | | | **X** |
| Campbell | | | **X** |
| Caroline | | | **X** |
| Carroll | | | **X** |
| Charles City | | X | |
| Charlotte | | | **X** |
| Charlottesville | | | **X** |
| Chesapeake | | | **X** |
| Chesterfield | | X | |
| Clarke | | | **X** |
| Clifton Forge | | | **X** |
| Colonial Heights | | | **X** |
| Covington | | | **X** |
| Craig | | | **X** |
| Culpeper | | X | |
| Cumberland | | | **X** |
| Danville | | | **X** |
| Dickenson | | | **X** |
| Dinwiddie | | | **X** |
| Emporia | | | **X** |
| Essex | | | **X** |
| Fairfax | | X | |
| Fairfax City | | X | |
| Falls Church | | | **X** |
| Fauquier | P | X | |
| Floyd | | | **X** |

**Appendix A (cont.)**

Virginia counties or cities where mute swans have been confirmed

| County/City | Permitted | Unpermitted | No known Location |
|---|---|---|---|
| Fluvanna | | X | |
| Franklin | | | **X** |
| Frederick | | | **X** |
| Fredericksburg | | | **X** |
| Galax | | | **X** |
| Giles | P | | |
| Gloucester | | X | |
| Goochland | | | **X** |
| Grayson | | | **X** |
| Greene | | | **X** |
| Greensville | | | **X** |
| Halifax | | | **X** |
| Hampton | | | **X** |
| Hanover | | X | |
| Harrisonburg | | | **X** |
| Henrico | P | X | |
| Henry | | X | |
| Highland | | | **X** |
| Hopewell | | | **X** |
| Isle of Wight | | | **X** |
| James City | | X | |
| King and Queen | | | **X** |
| King George | | X | |
| King William | | | **X** |
| Lancaster | | | **X** |
| Lee | | | **X** |
| Lexington | | | **X** |
| Loudoun | | | |
| Louisa | | | **X** |
| Lunenburg | | | **X** |
| Lynchburg | | | **X** |
| Madison | | | **X** |
| Manassas | | | **X** |
| Manassas Park | | | **X** |
| Martinsville | | X | |
| Mathews | | | **X** |
| Mecklenburg | | | **X** |
| Middlesex | | | **X** |
| Montgomery | | | **X** |
| Nelson | | | **X** |
| New Kent | | | **X** |
| Newport News | | | **X** |
| Norfolk | | | **X** |

**Appendix A (cont.)**

Virginia counties or cities where mute swans have been confirmed

| County/City | Permitted | Unpermitted | No known Location |
|---|---|---|---|
| Northampton | | | **X** |
| Northumberland | | X | |
| Norton | | | **X** |
| Nottoway | | | **X** |
| Orange | | X | |
| Page | | | **X** |
| Patrick | | | **X** |
| Petersburg | | | **X** |
| Pittsylvania | | | **X** |
| Poquoson | | | **X** |
| Portsmouth | | | **X** |
| Powhatan | | | **X** |
| Prince Edward | | | **X** |
| Prince George | | | **X** |
| Prince William | | X | |
| Pulaski | | | **X** |
| Radford | | | **X** |
| Rappahannock | | X | |
| Richmond | | X | |
| Richmond City | P | | |
| Roanoke | | | **X** |
| Roanoke | | | **X** |
| Rockbridge | | | **X** |
| Rockingham | | X | |
| Russell | | | **X** |
| Salem | | | **X** |
| Scott | | | **X** |
| Shenandoah | | | **X** |
| Smyth | | | **X** |
| Southampton | | | **X** |
| Spotsylvania | | X | |
| Stafford | | X | |
| Staunton | | | **X** |
| Suffolk | | | **X** |
| Surry | | X | |
| Sussex | | | **X** |
| Tazewell | | | **X** |
| Virginia Beach | P | | |
| Warren | | | **X** |
| Washington | | | **X** |
| Waynesboro | | | **X** |
| Westmoreland | | X | |
| Williamsburg | | X | |

**Appendix A (cont.)**

Virginia counties or cities where mute swans have been confirmed

| County/City | Permitted | Unpermitted | No known Location |
|---|---|---|---|
| Winchester | | | **X** |
| Wise | | | **X** |
| Wythe | | | **X** |
| York | P | X | |

**Appendix B**
Virginia Department of Game & Inland Fisheries Law Enforcement Division Policy 27- Illegal Captive Wildlife

Issued: 9/25/06 amended: 09/01/09

**Department of Game and Inland Fisheries**
**Law Enforcement Division**

**Policy Number 27**
**Illegal Captive Wildlife**

**Approved: _____ Reviewer Initials: _____**
**Dabney W. Watts, Jr., Colonel**

**VLEPSC Standards –**

**27.1**
**Policy Statement**

This policy includes the conclusion that sworn employees have a duty to act when presented with credible information that wild animals are being illegally held. Our policy is to make appropriate law enforcement response to situations where wild animals appear to be illegally held in order to enforce applicable laws and/or regulations, protect the public, and aid in addressing concerns related to animal diseases or animal welfare. This response will be in keeping with all applicable laws, court decisions, policies, and accepted law enforcement practices. Tactics and actions will be in consideration of any circumstances that may create exigent or emergent conditions. Acknowledging that sworn employees are usually the point of contact for our agency in such incidences, sworn employees will seek the advice and/or assistance of the Wildlife or Wildlife Diversity Divisions, and may seek assistance from local animal control or other agencies as appropriate and necessary. For the purpose of this policy, wild animal is defined in 4 VAC 15-20-50.

**27.2**
**General Protocol for Illegal Captive Wild Animals**

A thorough criminal investigation will be conducted regarding any situation/allegation of illegal captive wild animal(s) to determine if a violation of law or regulation exists. This investigation will include detailed discussions with the appropriate commonwealth's attorney (CA). When identifying tactics to address what the investigation has indicated are illegal captive wild animals, and release to the wild or immediate seizure are not viable solutions, in the discussions with the CA, the following tactical options shall be considered and implemented unless otherwise directed by the CA.

- Based upon probable cause, obtain a lawful search warrant to enter the property where the illegal animal is located.
- Post search warrant issue and prior to execution of the search warrant the CA will draw a sketch order on behalf of the Commonwealth (ex parte). This order will outline the conditions in which the alleged violator will hold the illegal wild animal(s) pending adjudication by the court. This order will be submitted by the CA to the appropriate judge for his signature.
- Upon lawful execution of the search warrant, and confirmation of the facts of the situation regarding illegal captive wild animal(s), the court order will be served on the alleged violator.
- When all probable cause has been met, and the facts of the illegal activity confirmed, appropriate criminal charges will be placed and a court date set for adjudication of the criminal charges, and to seek forfeiture of the illegal wildlife to the Commonwealth as provided in 29.1-557, Code of Virginia.
- When appropriate, and upon the concurrence of Wildlife Division senior staff, the illegal captive wildlife may be seized and held at an appropriate facility pending court actions.

If the above described process is not supported by the CA and other directions are provided, the direction of the CA will be brought to the attention of supervision as soon as practical. Unless directed otherwise by a supervisor of the rank of captain or higher, the advice of the CA will be followed.

**27.3 Illegal Captive Wildlife Relating to Public Safety, Animal Welfare, and/or Wildlife Disease Concerns**

Supervisors will ensure that a timely and prudent response is made to any situation involving illegal captive wildlife rising to the level of a public safety concern, or any situation in which animal disease could be a significant factor. A significant amount of discretion and judgment is afforded the sworn employee/supervisor when considering responses in these situations. <u>However, whenever possible the processes described in **27.2** above will be followed.</u>

Generally, a public safety concern exits regarding illegal captive wild animals when:

- Credible information indicates an illegal captive wild animal has bitten or scratched a person.
- An illegal captive wild animal is considered to create a situation in which its presence alone causes a safety concern, to include but not limited to: large cats, bears, other large carnivores, venomous or otherwise dangerous reptiles, and rabies vector species, and the manner in which they are held poses a risk of escape.
- An illegal captive wild animal is in close proximity to humans and exhibits signs of sickness or injury.

A wildlife disease/animal welfare concern exits when:

- The illegal captive animal is of a species that has been identified by the Department as a high concern species for potentially having or transmitting diseases, such as cervids, rabies vectors, etc. and is held in a manner that escape would be likely, or in a manner that allows direct contact with local wildlife populations.
- Another agency, such as Department of Health (DOH) or Department of Agriculture (DOA) has identified a specific concern related to the health or disease status of the illegal captive wild animal(s) in question.
- Credible information indicates the illegal captive wild animal(s) exhibit signs or symptoms of illness.
- Credible information indicates the illegal captive wild animals are held in conditions that are grossly inadequate or inhumane.

In instances where illegal captive wild animals are creating an immediate threat to public safety, or significant wildlife disease concern, the sworn employee(s) handling the case will take immediate and appropriate action.

- The sworn employee(s) may, as provided in 4 VAC 15-30-50, capture, temporarily hold, transport or posses, to include holding at an approved facility as indicated in **27.2** above, release or humanely euthanize the wild animal (see below).
- Secure the scene and seek assistance from others having expertise/specialized equipment, such as Wildlife/Wildlife Diversity staff, local animal control, or other resources deemed appropriate by the sworn employee. The need for euthanizing/testing of any such animals shall always be as directed by Wildlife Division senior staff or the Agency veterinarian.
- If the illegal captive wild animal is suspected of being rabid, or if a human has been bitten or scratched, the advice/cooperation of the local Health Department will be sought regarding testing of the animal. The decision to test is solely that of the Health Department. Typically, due to lack of specialized equipment and training, the responding sworn employee will not conduct the removal and transportation of the specimen head. Local protocols for handling suspected rabid specimens should be developed by district supervisors in consultation with local Health Departments in preparation of such events.
- Illegal captive wild animals exhibiting symptoms of illness will be noted and reported to appropriate Wildlife Division staff as soon as possible.
- Standing Agency protocols, such as those related to chronic wasting disease (CWD), captive cervids, avian influenza (AI), etc. will be followed in all instances appropriate.
- In all instances the response must be in accordance with applicable

laws, court decisions, polices and accepted practices. Appropriate cites in Code of Virginia, to include 29.1-521(10), 29.1-542, 29.1-557, 29.1-567, 29.1-569, and 4 VAC 15-20-50, 4 VAC 15-30-40, and 4 VAC 15-30-50 will be considered and applied as appropriate.

In situations where it is necessary to dispatch (euthanize) an illegal captive wild animal, the sworn employee may use an issued firearm as provided in **Policy 1.2.4,** use appropriate drugs/chemicals by injection or tranquilizer gun if they have access to the equipment and they have the appropriate training, or direct another responsible party to dispatch the animal so long as the method of dispatch is humane and respectful. The employee will be mindful of potential public sensitivity to the killing of wild animals in these situations and will immediately report this action through his chain of command.

**27.4 Handling/ Transporting Wildlife**

The handling and transportation of wildlife shall be in accordance with **Policy 26.4**.

**27.5 Generally**

As described, individual situations involving illegal captive wild animals vary greatly. These situations are often emotional on the part of the person(s) holding the animals, as well as sensitive from a public relations perspective. It is not possible to address every contingency by policy. Sworn employees are reminded that this Agency is considered the expert authority regarding wildlife. It is expected that sworn employees will be courteous when dealing with illegal captive wild animal issues, sensitive to the emotional reactions and public perceptions these situations may invoke, and exercise due diligence in seeking lawful resolution to the illegal holding of the wild animal(s). Nothing in this policy is intended to prevent the release to the wild of a captive wild animal when deemed prudent, or the immediate evidentiary seizure of such animal when circumstances indicate and such seizure is practical.