

Chesapeake Executive Council

Chesapeake Bay Waterfowl
Policy and Management Plan

Chesapeake
Bay
Program

Agreement Commitment Report

December 1990



Chesapeake Bay Waterfowl Policy and Management Plan

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the Chesapeake Executive Council

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ADOPTION STATEMENT

The Chesapeake Bay Waterfowl Policy and Management Plan has been prepared for the Chesapeake Bay Program and adopted by the Chesapeake Executive Council.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	ii
PREFACE	iv
POLICY	vi
INTRODUCTION	1
THE WATERFOWL RESOURCE	2
Types of Waterfowl	2
Migration	6
Defining the Waterfowl Resource	7
Status and Trends	8
EXISTING MANAGEMENT PROGRAMS	10
Federal	10
Maryland	12
Virginia	14
Pennsylvania	15
NEW INITIATIVES	17
Chesapeake Bay Agreement	17
North American Waterfowl Management Plan	18
North American Wetlands Conservation Act	18
RESEARCH	19
NEW MANAGEMENT STRATEGY	20
Management Objectives	20
Management Actions	20
Management Tasks	24

EXECUTIVE SUMMARY

Historically the Chesapeake was rich in waterfowl abundance, to the point that they seemed to "blanket areas of the Bay." Today, their numbers are greatly reduced. Wide spread deterioration of shallow water habitats and wetlands, coupled with an increasing human population, has reduced the value of many Chesapeake Bay areas to waterfowl.

Signatories of the 1987 Chesapeake Bay Agreement have committed to the protection and restoration of Chesapeake Bay's living resources. In support of this commitment, a "Schedule for Developing Bay-wide Resource Management Strategies" was adopted for a variety of "commercially, recreationally, and selected ecologically valuable species." Waterfowl, including ducks, geese, and swans, are one of the major categories of living resources for which management strategies are being developed.

The Waterfowl Workgroup (WW) of the Chesapeake Bay Program's Living Resources Subcommittee developed the strategy for protection and restoration of Chesapeake Bay's waterfowl resource. The workgroup includes representatives from the U. S. Fish and Wildlife Service, the Maryland Department of Natural Resources, the Pennsylvania Game Commission, and the Virginia Department of Game and Inland Fisheries.

The Plan will guide the protection and restoration of native waterfowl species using the Chesapeake Bay, its tidal tributaries, and adjacent uplands. The Plan emphasizes the protection and restoration of habitats on which these species depend.

Management Issues

The Waterfowl Policy of the Chesapeake Executive Council is *"to restore, protect, and enhance waterfowl populations and their habitats to derive the greatest long-term ecological, economic, and social benefits from the resource."* To achieve this Policy, the Plan defines the resource, life history characteristics, research priorities, and it outlines three major objectives and twelve actions:

Objective 1: Prevent loss or degradation of habitat, and restore or enhance habitats presently degraded or unsuitable for use by waterfowl.

Actions

1. Identify essential habitat requirements for waterfowl in the Chesapeake Bay region, including water quality requirements.
2. Determine suitable habitat management practices that benefit waterfowl, taking into account interests for conservation of other natural resource values.
3. Encourage measures to restore submerged aquatic vegetation to pre-1960's levels of distribution and abundance in Chesapeake Bay.
4. Provide guidance to agencies, organizations, and the public on habitat management practices needed to benefit waterfowl.
5. Encourage programs to control the spread of plants that diminish the value of wetlands for waterfowl.
6. Recommend measures to minimize the adverse affects on waterfowl from human disturbance and land development.

Objective 2: Support responsible waterfowl management programs to restore waterfowl populations and habitats to at least 1970's levels by the year 2000.

Actions

1. Promote responsible use of the waterfowl resource by coordinating with the Atlantic Flyway Council and the U.S. Fish and Wildlife Service regarding harvest restrictions and provisions.
2. Determine the effects of releasing captive-raised mallards on wild waterfowl populations.
3. Identify management actions needed to reduce concentrations of waterfowl where they damage habitat or are exposed to an increased risk of disease.
4. Survey waterfowl in the Chesapeake Bay region as needed to monitor their population trends and habitat use.
5. Support development and implementation of new or improved waterfowl management techniques.

Objective 3: Improve public understanding of the waterfowl resource and its habitat needs.

Action

1. Identify opportunities to develop new educational programs and products.

Specific waterfowl management tasks are presented in this plan. If these tasks are pursued by interested citizens, resource managers, and legislators, we can "restore, enhance, and protect waterfowl," thus meeting a goal of the 1987 Chesapeake Bay Agreement.

PREFACE

In July 1988, members of the Chesapeake Executive Council approved the "Schedule for Developing Bay-wide Resource Management Strategies." The schedule is designed to commit certain members of the multi-agency Chesapeake Bay Program to develop management plans for a variety of "commercially, recreationally and selected ecologically valuable species." Five major groups of living resources have been identified for development of management plans: (1) submerged aquatic vegetation, (2) wetlands, (3) waterfowl, (4) finfish and shellfish, and (5) other ecologically valuable species.

Waterfowl are the subject of this management plan. The Plan fulfills a commitment presented in the "Schedule for Developing Bay-wide Resource Management Strategies" to set forth specific actions to restore, protect, and enhance waterfowl populations and their habitats. The Plan was developed by a team of federal and state waterfowl specialists and resource managers on behalf of the Resource Management Workgroup under the Living Resources Subcommittee. The Plan is for all species of waterfowl that use Chesapeake Bay. The Schedule for Developing Bay-wide Resource Management Strategies (Chesapeake Executive Council 1988) established the present approach for developing resource management strategies. In that document, the Executive Council determined that each resource management strategy should include a statement of the current status of a living resource, how far this status is from a preferred level of abundance and distribution, a policy and/or a set of goals for restoring and protecting the resources, and steps which could be taken to achieve these goals, both bay-wide and in critical habitats within the Bay ecosystem.

Actions identified in this Plan, when implemented by signatories and their respective agencies, will benefit waterfowl. It will be difficult to restore waterfowl without a strong cooperative effort to restore, protect and enhance habitat, and to relieve other pressures that may be detrimental to waterfowl species using the Chesapeake.

For the most part, short-term tasks of the Plan are being undertaken with existing resources and authorities. The ability to conduct long-term tasks naturally depends on future availability of the necessary funds and authorities.

Members of the Waterfowl Workgroup that developed this plan are:

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POLICY

It is the intent of the Chesapeake Executive Council to set forth this Policy, thus establishing a foundation for developing and implementing a comprehensive Plan for the protection and management of all Chesapeake Bay waterfowl and their habitats.

The Policy is **"to restore, enhance, and protect waterfowl and their habitats to derive the greatest long term ecological, economic, and social benefits from the resource."**

The objectives of the Plan are to:

1. *Prevent loss or degradation of habitat and restore or enhance habitats presently degraded or unsuitable for use by waterfowl.*
2. *Support responsible waterfowl management programs to restore waterfowl populations and habitats to at least 1970's levels by the year 2000.*
3. *Improve public understanding of the waterfowl resource and its habitat needs.*

The Waterfowl Workgroup that developed this plan will become a permanent unit of the Resource Management Workgroup under the Living Resources Subcommittee to guide implementation of the Plan.

INTRODUCTION

Waterfowl help define the wonder and beauty of the Chesapeake Bay. Historically the Chesapeake was rich in waterfowl. It is impossible to know how abundant waterfowl were hundreds of years ago. However, anecdotal information paints a rather awe-inspiring picture. The 17th century explorer, George Alsop, reported that waterfowl "rose in flocks not of ten or twelve, or twenty or thirty, but continually, wherever we pushed our way; and as they made room for us, there was such an incessant clattering made with their wings on the water where they rose, and such a noise of those flying higher up, that it was as if we were all the time surrounded by a whirlwind." "Waterfowl seemed to blanket areas of the bay." During the late 19th century and early 20th century, numbers of waterfowl wintering on the Chesapeake Bay were greatly reduced by uncontrolled market-hunting. Fortunately, the U.S. Congress passed the Migratory Bird Treaty Act in 1918 which prohibited uncontrolled take of waterfowl. It is this law that protects all migratory birds and that forms the basis for annual waterfowl hunting regulations.

The Chesapeake Bay area is of prime importance to waterfowl using the Atlantic Flyway. Today, about one million waterfowl winter on Chesapeake Bay, representing about 35% of all waterfowl in the Atlantic Flyway. Although the average number of waterfowl counted in each of the past four decades has remained about one million birds, species that rely on aquatic habitats have declined significantly. A quick synopsis of the overall trends shows that over the last forty years, the abundance of ducks has declined 70-80% from highs in the mid-1950's. Species showing significant declines are the American black duck, American wigeon, northern pintail, canvasback, and redhead. In contrast, geese have increased over the last forty years, because they have taken advantage of grains left in agricultural fields after harvest and are not as dependent upon aquatic foods as ducks.

The Chesapeake Bay has not escaped problems in recent times. Habitat for breeding waterfowl, particularly black ducks, has been significantly degraded. Many species find it difficult to cope with the increasing human population on the Bay. The biggest problem faced by waterfowl in the final decade of this century is wide spread deterioration of shallow-water habitats and marshes around the bay. Deterioration of aquatic habitats is caused by pollutants such as excess nutrients, suspended sediments, and contaminants. The principal impact has been reduction in valuable food for wintering waterfowl, especially submerged aquatic vegetation, mollusks, and other invertebrates.

Special efforts are necessary on Chesapeake Bay to enable waterfowl to survive and increase in abundance. This plan establishes a framework for management, with particular attention to habitat and public awareness. It complements the North American Waterfowl Management Plan, signed by the United States and Canada in 1986, and helps fulfill the 1987 Chesapeake Bay Agreement. The plan defines the resource, its importance, threats to it, and its needs. The plan is ambitious, but illustrates clearly the magnitude of work needed to restore our valuable Chesapeake waterfowl resource.

THE WATERFOWL RESOURCE

Waterfowl can be found in every available aquatic habitat from ocean surf and coastal marshes to inland potholes and bottomland forest. Each species has its own habitat preferences, breeding behavior, food preferences, and migration patterns. The one unifying aspect of waterfowl is their dependence on aquatic habitat or wetlands. To a large extent, the quantity and quality of our wetland resource will dictate the condition of our waterfowl resource in the Chesapeake Bay. Waterfowl usually migrate from breeding grounds to wintering grounds, and back. Discussion on the unique characteristics of each waterfowl group follow. In this report, waterfowl are grouped into five general types: swans, geese, dabbling ducks, bay ducks, and sea ducks and river ducks. It is essential to understand the various characteristics of these groups when deciding which management strategies are necessary for Chesapeake Bay.

Types of Waterfowl

Twenty nine species of waterfowl use the Chesapeake Bay for wintering, breeding, or as a stopover during migration. Only a small portion of the birds breed in the Chesapeake Bay watershed. The major importance

of Chesapeake Bay to waterfowl is the extensive wintering habitat it provides (Table 1). To a lesser and largely unknown extent it is also important as a stopover for migrating birds.

Swans

Two species of swans, the mute swan and the tundra swan, are found on Chesapeake Bay. The mute swan, the common orange-billed swan of waterfront residences, city parks, and zoos, is not native to North America. It has established breeding populations in several areas of the country, including Chesapeake Bay. Submerged aquatic vegetation (SAV) is the mainstay food item for the adult mute swan. The mute swan is mentioned in this plan because of its potential to cause destruction of habitat and out-compete native waterfowl species. Control of mute swans may be necessary if local populations continue to increase.

Until recently, Chesapeake Bay has been the most important wintering area for tundra swans in North America. However, the population in North Carolina has recently increased to include more than half of the Atlantic Flyway population. Tundra swans have traditionally fed on the leaves, stems, and tubers of SAV and marsh plants. The decline in SAV throughout Chesapeake Bay has led to the southern shift of wintering birds to the Carolinas. Additionally, with the decline in SAV during the early 1970's, swans began feeding in agricultural fields on waste corn, waste soybeans, winter wheat, and barley. They commonly fly as far as fifteen miles inland to feed.

Geese

The three species of geese that winter on Chesapeake Bay are the snow goose, Canada goose, and brant. Although brant were once abundant on Chesapeake Bay, during the 1930's they declined drastically as a result of the almost complete disappearance of eelgrass, their principal food. Most brant now are found in Atlantic coastal bays and lagoons where they feed primarily on sea lettuce, eelgrass, widgeon grass, and smooth cordgrass.

Canada geese are the most abundant species of waterfowl in the Chesapeake Bay area. Wintering Canada geese have greatly benefited from agriculture. On the Atlantic Flyway, Canadas have largely forsaken aquatic food plants for upland crops including waste corn, waste soybeans, winter wheat, and clover. The most attractive areas to geese are large, open grain fields close to water. Increases in populations of Canada geese since the late 1960's have provided extensive hunting opportunities on the Eastern Shore of Chesapeake Bay; however, over the past five years, Canada geese have declined considerably on the Eastern Shore and hunting seasons and bag limits have been reduced.

Non-migratory or "resident" Canada geese have been increasing in the region. These birds are not the same subspecies which migrate to the Bay each winter. Rather, these birds are the result of introductions of birds to farm ponds and parks. Populations of the local birds are estimated at over 50,000 in the Chesapeake Bay Region. Conflicts often arise with resident geese that inhabit airports golf courses, parks, and similar public open space.

Two sub-species of snow geese, the lesser and greater, winter in the region, although greater snow geese are far more abundant than lesser snow geese. Fewer than 4,000 lesser snow geese winter at Blackwater and Presquile National Wildlife Refuges. About 60,000 greater snow geese feed in agricultural fields and roost on inland ponds and tributaries of the Bay. Greater snow geese are expanding their winter range to include more of the Chesapeake area, resulting in increased conflicts with agricultural interests.

Although snow geese have adapted to feeding in agricultural fields, favorite foods of this species are estuarine emergent wetland plants and rootstocks. Preferred food plants include: common threesquare, smooth cordgrass, and saltmarsh bulrush. Concentrations of feeding snow geese often root and dig-out marshes creating "eat-outs" in the coastal marshes of Delaware and Virginia; they have yet to cause similar problems in Chesapeake Bay marshes. This may become a more serious management concern if the greater snow geese population increases and expands its winter range.

Table 1. Waterfowl and their use of Chesapeake Bay. The categories of use are: **high** = greater than 25,000 birds and/or of high importance to Atlantic Flyway population; **medium** = 5,000 to 25,000 birds and/or of moderate importance to flyway population; **low** = less than 5,000 birds and low importance to flyway populations; **none** = little or no use.

SPECIES	WATERFOWL USE		
	BREEDING	MIGRATING	WINTERING
SWANS			
Tundra Swan (<i>Cygnus columbianus</i>)	none	medium	high
Mute Swan (<i>Cygnus olor</i>)	low	none	low
GEESE			
Snow Goose (<i>Chen caerulescens</i>)	none	medium	medium
Brant (<i>Branta bernicla</i>)	none	none	low
Canada Goose (<i>Branta canadensis</i>)	medium	medium	high
DABBLING DUCKS			
Green-winged Teal (<i>Anas crecca</i>)	low	medium	low
American Black Duck (<i>Anas rubripes</i>)	high	high	high
Mallard (<i>Anas platyrhynchos</i>)	high	high	high
Northern Pintail (<i>Anas acuta</i>)	none	medium	low
Blue-winged Teal (<i>Anas discors</i>)	low	medium	none
Northern Shoveler (<i>Anas clypeata</i>)	none	low	low
Gadwall (<i>Anas strepera</i>)	low	medium	low
American Wigeon (<i>Anas americana</i>)	none	medium	medium
Wood Duck (<i>Aix sponsa</i>)	high	high	low
BAY DUCKS			
Canvasback (<i>Aythya valisineria</i>)	none	high	high
Redhead (<i>Aythya americana</i>)	none	low	low
Ring-necked Duck (<i>Aythya collaris</i>)	none	low	low
Greater Scaup (<i>Aythya marila</i>)	none	high	medium
Lesser Scaup (<i>Aythya affinis</i>)	none	high	high
Common Goldeneye (<i>Bucephala clangula</i>)	none	medium	medium
Bufflehead (<i>Bucephala albeola</i>)	none	medium	medium
Ruddy Duck (<i>Oxyura jamaicensis</i>)	none	high	high
SEA DUCKS AND RIVER DUCKS			
Oldsquaw (<i>Clangula hyemalis</i>)	none	high	high
Black Scoter (<i>Melanitta nigra</i>)	none	low?	low?
Surf Scoter (<i>Melanitta perspicillata</i>)	none	medium?	medium?
White-winged Scoter (<i>Melanitta fusca</i>)	none	low?	medium?
Hooded Merganser (<i>Mergus cucullatus</i>)	none	low	low
Common Merganser (<i>Mergus merganser</i>)	none	low	low
Red-Breasted Merganser (<i>Mergus serrator</i>)	none	low	medium

Dabbling Ducks

Dabblers and wood ducks are associated with the small, shallow, fresh to brackish areas of Chesapeake Bay as well as inland lakes, ponds, and marshes. Species using the Chesapeake include the American black duck, mallard, northern pintail, gadwall, green-winged teal, blue-winged teal, northern shoveler, American wigeon, and wood duck. The black duck and mallard are the most abundant. Dabblers which breed in the Chesapeake include the black duck, mallard, gadwall, blue-winged teal, and wood duck. Their ability to forage ashore, to feed efficiently in the shallows, and to dive moderately well makes dabbling ducks the most versatile feeders of all waterfowl. As a group, the dabblers make use of dozens of submerged, emergent, and moist soil aquatic plants; innumerable species of aquatic and terrestrial animals, especially invertebrates; and many kinds of farm crops.

A wide variety of habitat types are used by nesting black ducks; however, they generally construct ground nests well hidden in densely vegetated upland areas. In Chesapeake Bay, uninhabited offshore islands and remote marshes are the best black duck production areas. Black ducks raise their broods in intertidal flats, emergent marshes, beaver ponds, beds of submerged aquatic vegetation, impoundments, and alder-fringed streams. It is important that brood rearing habitat is close to nesting habitat. Intense development throughout the Chesapeake watershed has limited the area where these two types of habitats occur together. This, coupled with the black duck's intolerance to human disturbance, is limiting local production.

The population of mallards breeding in the Maryland area of the Chesapeake Bay Region has significantly increased in recent history primarily from game-farm stock. In the 1940's the State of Maryland and private groups began releasing farm-reared mallards for recreational hunting. Today, the Maryland Department of Natural Resources is mandated by law to spend 50% of the revenues from its State duck stamp sales for its mallard release program. In 1989, over 180,000 mallards were released by private farms (Regulated Shooting Areas) and the Department of Natural Resources. Over 10% of the released birds came from State stocks.

Nesting habitat preferences are similar between the black duck and mallard, although the mallard will nest in close association with humans. The majority of resident Chesapeake Bay mallards are semi-domesticated, and are often associated with housing, marinas, and other areas of intense human use. Resident mallards may negatively affect black duck populations by competing for nest sites and food resources, or through hybridization with black ducks.

Wood ducks are unique in that there is a large population breeds in the Chesapeake Bay region, but they do not use the Bay during the winter. The major wintering range occurs in the Atlantic States south of the Chesapeake Bay. Wood ducks use mixed hardwood forested wetlands which provide food and nesting sites for these cavity-nesting ducks. A nest box program that provides predator-proof nesting sites has increased local production of wood ducks in areas where cavities are limited, but where foods are plentiful. Preserving forested wetlands is the most critical need for wood ducks.

Bay Ducks

Although wintering bay ducks use most aquatic habitats of the Bay, they most often use extensive open water shoals with fresh to brackish water. The species of bay ducks occurring in the Chesapeake Bay are the canvasback, redhead, greater scaup, lesser scaup, ring-necked duck, common goldeneye, and bufflehead. Formerly, two of the most significant areas for bay ducks were the mouth of the Chester River and the Susquehanna Flats. Due to drastic declines of submerged aquatic vegetation (SAV) these areas no longer attract large numbers of ducks.

The canvasback is the most abundant bay duck on the Chesapeake. These birds rely heavily on small clams for food, although in years past they fed extensively on wild celery in the Susquehanna Flats when this plant was abundant. Declines in wild celery caused canvasback to shift their diet to eating clams. In spite of enormous declines, canvasbacks continue to be the most abundant bay duck wintering on Chesapeake Bay.

Redheads tend to feed in shallow waters, and unlike other bay ducks they feed almost exclusively on SAV. Because of drastic declines in SAV, and an apparent inability to switch to animal foods, redheads now use Chesapeake Bay only in small numbers.

Ring-necked ducks feed in shallower water than other bay ducks, usually in depths of less than 6 feet. They are often associated with tidal freshwater wetlands and impoundments where they feed predominantly on vegetation.

Greater scaup feed upon both plant and animal life. In most areas clams constitute the principal food item; however, SAV is a heavily used food item in areas of the Chesapeake where it is available. Lesser scaup feed primarily on animal life, but will consume the seeds and foliage of pondweed and widgeon grass. Habitats as diverse as farm ponds only a few feet deep to estuarine bays up to 25 feet deep are used as feeding sites.

Common goldeneye and bufflehead are associated with open brackish estuarine waters, but bufflehead tend to move up small tributaries further than goldeneye. Both species feed primarily on crustaceans, amphipods, and bivalves.

The ruddy duck is found on open waters as well as on creeks and small ponds. Chesapeake Bay winters nearly 30% of the Atlantic Flyway population, with most of the population arriving by early December. Ruddy ducks are primarily vegetarians and secondarily consumers of animal life.

Sea Ducks and River Ducks

Sea ducks and river ducks use coastal marine and open estuarine waters. These species feed mainly on aquatic animals such as mollusks, crustaceans, amphipods, and fish. The group includes: scoters, oldsquaw, and mergansers.

Mergansers have streamlined bodies and serrated narrow bills which are ideally adapted to pursue fish, their primary food. Upon arriving on the Chesapeake, the red-breasted merganser winters along the coastline, the common merganser uses both inland lakes, rivers, and coastal waters, and the hooded merganser remains almost entirely inland.

Oldsquaw tend to inhabit the deep, open waters of the Bay. They feed on a variety of animal foods, but the predominant foods are crustaceans.

Three species of scoter occur in the Chesapeake Bay. The white-winged scoter is the most common in the bay proper, while surf scoters are more abundant in the open Atlantic coastal waters. Black scoters are the least abundant scoter on the Bay. All scoters feed primarily on bivalves, especially mussels.

In recent years, hunting pressure has increased on oldsquaw and scoters as populations of other more desirable species have declined. Relatively little is known about these species because of their off-shore habits and minimal exposure to harvest pressure.

Migration

Most species of North American waterfowl are migratory, moving from northern breeding areas to southern wintering areas and back again. Many dabblers and divers breed in the prairie pothole regions and migrate south or to the coasts for the winter. Others, such as sea ducks migrate along the Pacific and Atlantic coasts from northern breeding grounds. The Chesapeake Bay is located in the Atlantic Flyway and receives birds from all across Canada, parts of Alaska, and Greenland.

Migration allows waterfowl to escape harsh winter conditions in Canada and Alaska by moving to warmer areas of the country, including the Chesapeake Bay. Waterfowl breeding at northern latitudes can take

advantage of a brief, but insect-rich arctic summer (insects are an important protein source for waterfowl broods), and then fly south or to the coasts to more hospitable climates.

Waterfowl tend to return to the same breeding and wintering areas; however, food supply can alter migratory patterns. For example, tens of thousands of Canada geese now winter several hundred miles north of traditional winter grounds as a result of availability of both feed and cereal grains from agriculture. Likewise, when hurricanes opened up dense coastal marshes in Louisiana, tens of thousands of ducks began wintering there rather than continuing on to the traditional wintering grounds on the Yucatan Peninsula of Mexico. It is important to recognize from a management perspective that waterfowl will take advantage of newly developed food and habitat resources.

The resources of the Bay are of primary importance to waterfowl spending the winter. Their ability to survive the winter and depart for their breeding grounds with energy reserves to make the migration and successfully reproduce depends largely on the Bay's resources. The Bay also provides important resting areas and food for waterfowl passing through the Bay during fall and spring migrations.

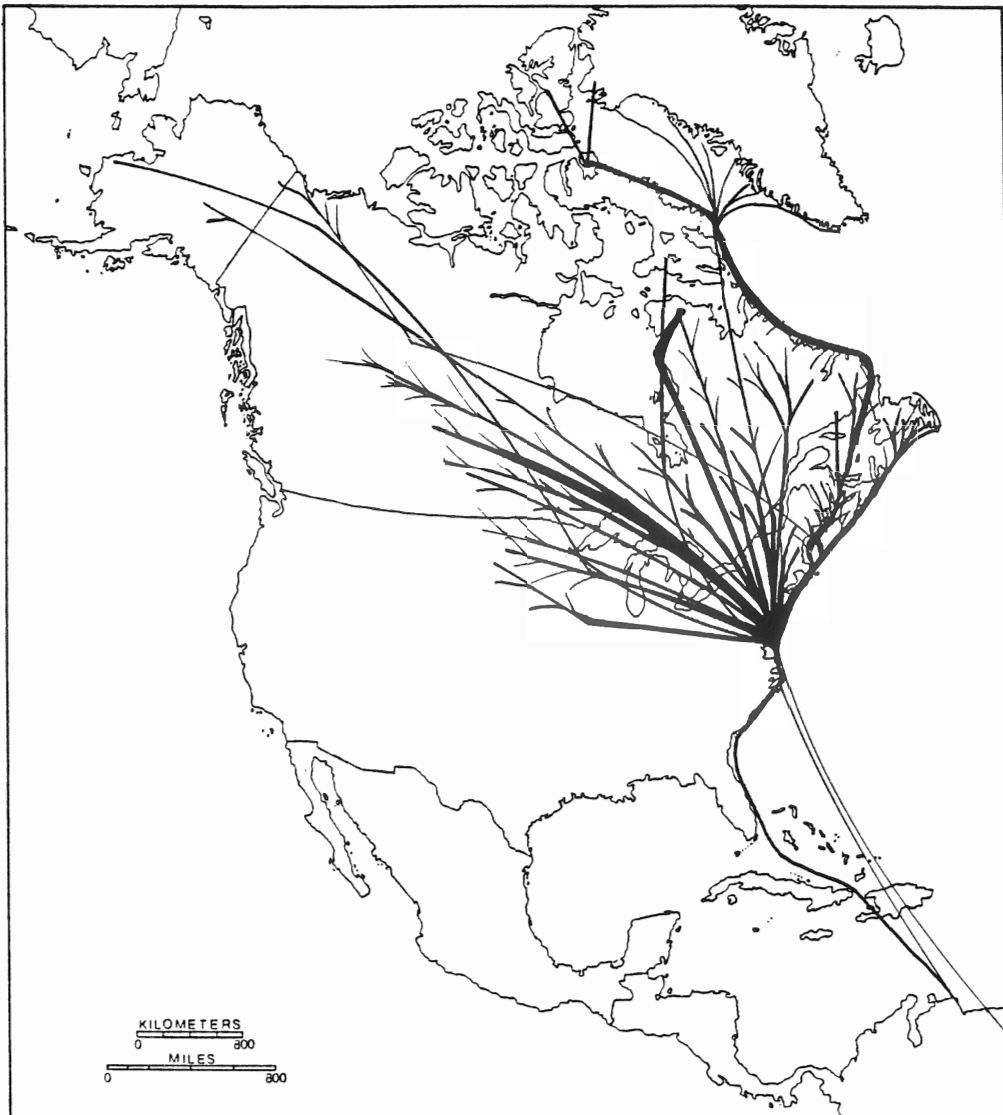


Figure 1. Migratory pathways of waterfowl to the Chesapeake Bay.

Defining the Waterfowl Resource

An essential element in managing migratory birds is to monitor their populations. Population information is critical for establishing limits on the numbers of waterfowl that may be harvested annually and are often indicative of the condition of the habitat.

Since the mid 1930's, Mid-winter Waterfowl Surveys have been conducted annually for virtually all of the contiguous 48 States. The Mid-winter Survey is considered by many biologists as the most important survey in the Atlantic Flyway. It is conducted by all states in the flyway, and counts are made of all species of ducks, geese, and swans observed. The mid-winter is an aerial survey conducted during the first 2 weeks of January. It is used to estimate population trends and distribution of ducks, geese, and swans. Since black ducks are so difficult to survey on their breeding grounds in eastern Canada and the northeastern United States, this survey is also used as an index to the population trend of this species. This survey is the basis for population indexes of most species in the Bay.

In the late 1940's, the U.S. Fish and Wildlife Service developed summer aerial waterfowl breeding and production surveys in the prairie pothole region. These initial efforts evolved into a cooperative effort between the United States and Canada which samples waterfowl populations and habitat for an area of over 1.4 million square miles. Beginning in the mid 1950's, the breeding bird survey became the primary source of information used in the development of annual waterfowl hunting regulations. Beginning in the spring of 1990, breeding survey coverage will extend farther into boreal areas of eastern Canada, the St. Lawrence lowlands, and portions of the northeastern United States. Information derived from these surveys is expected to increase our knowledge of birds that winter in the Chesapeake Bay.

Maryland, Pennsylvania, and Virginia all conduct a breeding waterfowl survey. These surveys provide valuable information on Canada geese, mallards, black ducks, and wood ducks.

Numerous surveys have been developed which are oriented toward individual species and local populations. These surveys also are used extensively in our area to measure waterfowl abundance and distribution. These population data are used along with other information to set waterfowl hunting regulations, to support habitat acquisition programs, develop mitigation plans, assess environmental impacts, provide information for legal actions, and appraise potential impacts of disease outbreaks.

In addition to the Mid-winter and breeding waterfowl surveys, federal and state biologists conduct several other surveys which cover virtually all of the Chesapeake Bay region. One such survey is the November Canada goose survey. This survey had been conducted by the Atlantic Flyway states since the early 1960's and was originally part of a survey designed to determine when goose populations peaked during the year. Maryland, Pennsylvania, and Virginia also use this survey as an opportunity to monitor the abundance of greater snow geese, brant, tundra swans, and four species of diving ducks. Other nationally or flyway coordinated surveys that occur in the area include the November canvasback survey, the mute swan survey, the March greater snow goose inventory, the December swan survey, and a new Atlantic Flyway sea duck survey.

Several points should be kept in mind in any discussion of waterfowl surveys. First, due to annual variations in weather and habitat conditions, distribution of waterfowl may differ from year-to-year. Second, an effort is always made to conduct surveys during the same time period each year simultaneously throughout the flyway. Last, and most important, these are aerial surveys, and while they may be consistent between years, they are not total counts, only an indices of the population.

Status and Trends

Knowing the status and trends of waterfowl populations over long periods of time is essential to management. However, gaining a clear picture of status and trends for migratory birds can be extremely difficult because they are so mobile and influenced by numerous environmental conditions. While this Plan

focuses on the Chesapeake Bay region, population levels of ducks, geese, and swans may be influenced by environmental conditions outside the region. For example, canvasback numbers in any given year may be down in the Chesapeake Bay because of drought conditions in the prairie pothole region where they breed. The following information considers status and trends of certain species, with the understanding that conditions in the Chesapeake Bay may satisfy only a portion of a species' needs during an annual cycle.

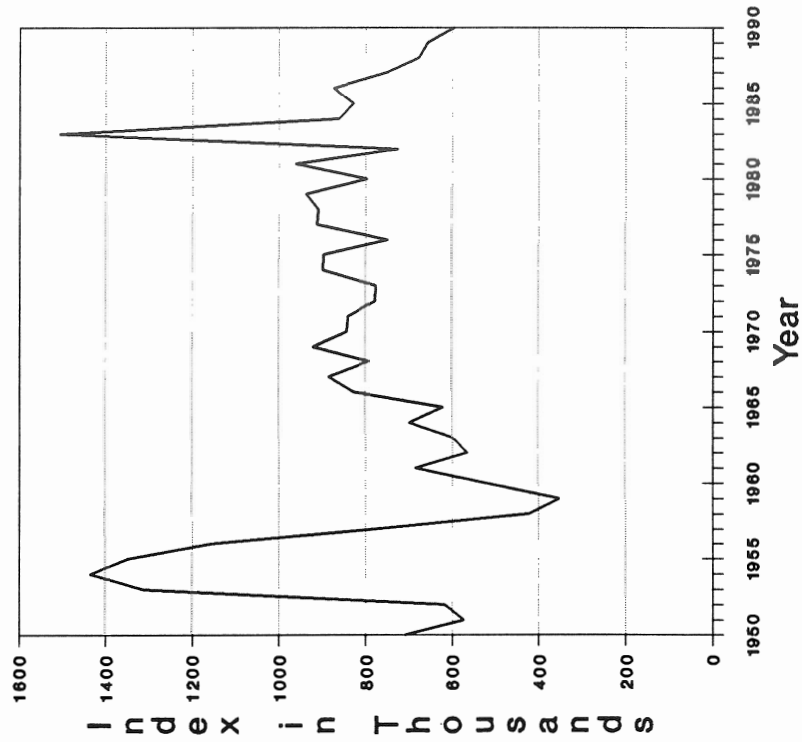
The Chesapeake Bay's primary contribution to the nation's migratory bird resource is as a major wintering site and stopover site during migration. Although some waterfowl breed locally, this is a relatively minor component of the Bay's overall value to waterfowl. Based on the past decade's average Mid-winter counts, it is estimated that over one million waterfowl winter on the Bay each year (Table 2 and Figure 2). This represents more than 35% of all waterfowl wintering along the Atlantic coast. Twenty-nine species of waterfowl have been identified wintering on the Bay, although only a few species make up the largest percentage of birds using the Bay.

Despite an apparent stable decade-wide average of about one million birds counted each winter during the past four decades, there were major changes in the species composition. Populations of Canada geese during the early 1980's were three times higher than the average levels recorded in the 1950's; however, in the late 1980's populations exhibited a sharp decline (Figure 2). Coincidentally, since the 1950's, most ducks have shown population declines, which coincided with the degradation of aquatic habitats in Chesapeake Bay (Table 2 and Figures 2 and 3).

Table 2. **Results of mid-winter waterfowl surveys for Maryland and Virginia summarized by decade.** For the most part the data are representative of Chesapeake Bay, but they also include the birds recorded on the Atlantic coastal bays. For the 1980s data, these coastal areas account for 10% of the swans; 11% of the geese; 23% of the dabbling ducks; 2% of the bay ducks; and 20% of the sea ducks. These numbers probably still underestimate Chesapeake Bay populations because the surveys do not record all birds, occur after the hunting season, and are primarily coastal, thus, they underestimate the numbers of sea ducks in open waters. Nevertheless, the data are very useful as an index of change.

Species	Highest Recorded 1940-1990	Year Recorded	MEAN FOR DECADE			
			1950s	1960s	1970s	1980s
SWANS						
Tundra Swan	75,854	1955	32,337	40,065	38,790	34,100
GEESE						
Snow Goose	127,200	1985	6,634	23,885	27,600	62,906
Brant	62,200	1954	19,600	10,310	9,415	23,331
Canada Goose	701,400	1981	177,710	318,040	561,340	570,138
DABBLING DUCKS						
Green-winged Teal	55,927	1941	3,100	2,330	1,970	1,062
American Black Duck	281,485	1955	142,922	86,600	54,420	49,338
Mallard	182,195	1956	71,379	41,260	47,160	56,812
Northern Pintail	78,211	1956	40,428	14,186	4,000	3,381
Blue-winged Teal	10,700	1949	550	40	35	43
Northern Shoveler	18,900	1966	85	960	905	194
Gadwall	15,300	1980	1,000	1,085	4,080	3,475
American Wigeon	144,350	1955	74,230	18,710	8,010	4,925
BAY DUCKS						
Canvasback	399,320	1954	179,072	102,450	63,890	52,963
Redhead	118,900	1956	76,429	34,485	10,930	3,162
Ring-necked Duck	18,500	1942	5,090	2,825	865	2,081
Greater and Lesser Scaup	403,700	1954	101,545	71,610	54,630	30,900
Common Goldeneye	40,700	1956	22,068	25,920	12,060	12,563
Bufflehead	24,700	1967	9,105	11,730	22,470	17,112
Ruddy Duck	124,740	1953	65,995	30,720	18,060	17,262
SEA DUCKS AND RIVER DUCKS						
Oldsquaw	21,900	1972	3,550	3,615	9,500	7,088
Black, Surf, and White-winged Scoter	130,900	1971	19,064	8,350	32,085	6,538
Hooded, Common, and Red-Breasted Merganser	33,400	1955	8,073	5,180	2,840	5,213
TOTAL			1,059,996	854,356	985,587	964,460

Winter Population Index Total Waterfowl



Winter Population Index Ducks and Geese

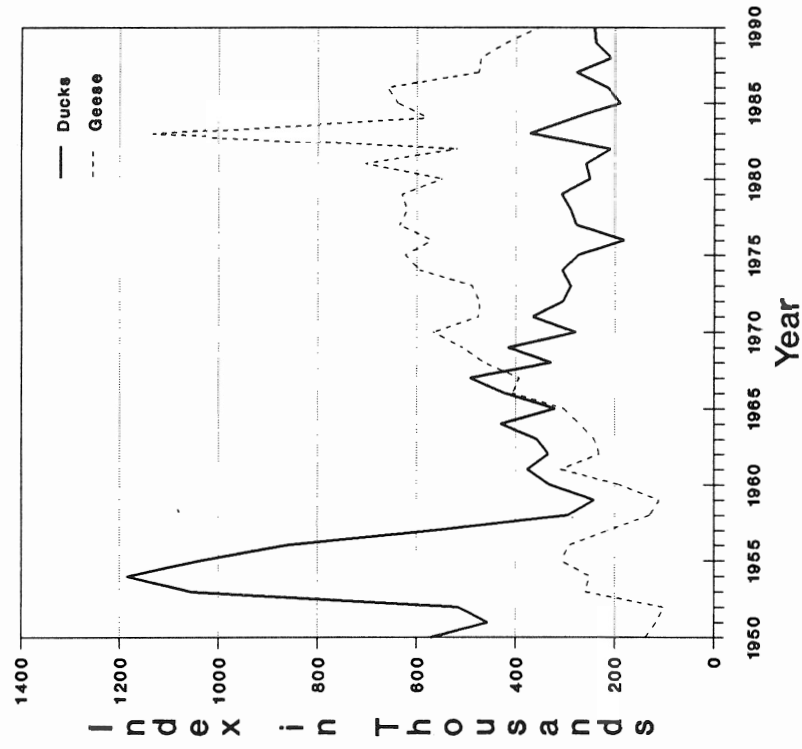
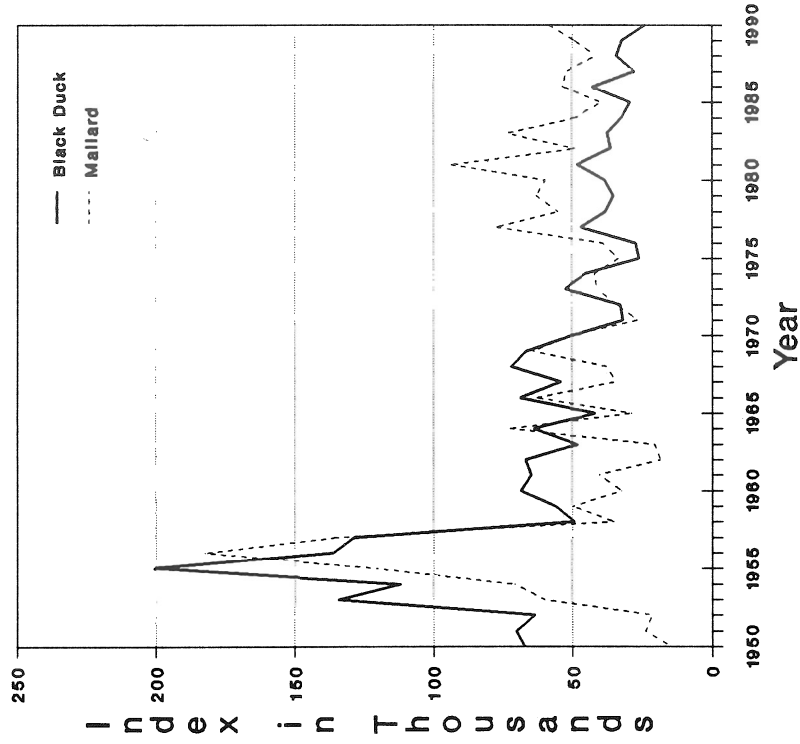


Figure 2. Winter population index for total waterfowl and for ducks and geese as derived from the aerial Mid-winter Waterfowl Surveys conducted in January each year in the Chesapeake Bay from 1950 through 1990.

Winter Population Index Black Duck and Mallard



Winter Population Index Canvasback and Redhead

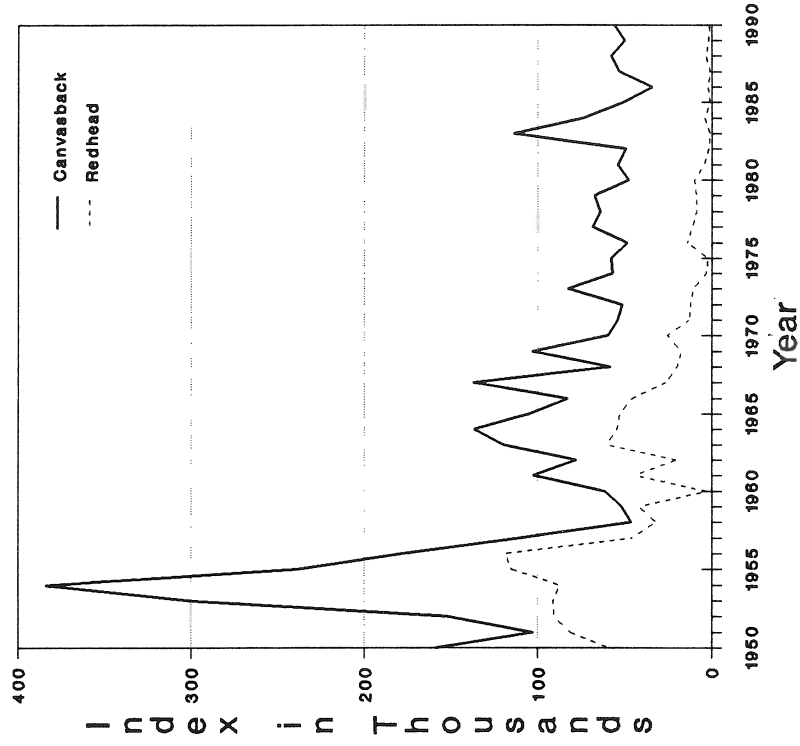


Figure 3. Population index for black ducks and mallards, and for canvasbacks and redheads as derived from the aerial Mid-winter Waterfowl Surveys conducted in January each year in the Chesapeake Bay from 1950 through 1990.

EXISTING MANAGEMENT PROGRAMS

For most of this century, waterfowl on Chesapeake Bay and in the nation have been managed for harvest. Management encompasses a wide variety of activities, but they are generally grouped as either population management or habitat management. Population management primarily involves factors affecting mortality; recreational hunting is of primary importance here. Other factors in population management include diseases, lead poisoning, illegal killing, human disturbance, and conflicts with man (e.g., geese on golf courses, in housing developments, and in industrial areas). Habitat management is equally important. It involves activities designed to prevent loss or degradation of waterfowl habitat, or to restore areas that have already suffered loss or degradation. These activities include acquisition of important habitats, restoration of wetlands, management of marshes, creation of wetlands, and improvements to water quality.

An important consideration for management of migratory waterfowl is that they require different habitats at different times of the year, and that habitat needs vary between species. Consequently, waterfowl management strategies must encompass requirements for breeding habitat, migratory stopover habitat, and wintering habitat for each species. For the majority of waterfowl, Chesapeake Bay will only provide one or two habitat components (e.g., stopover or wintering habitat). The specific actions put forth in this plan to restore, protect, and enhance waterfowl habitats and populations are intended to complement other waterfowl management efforts that address factors outside of Chesapeake Bay.

Much has been done in the Chesapeake watershed to protect waterfowl from excessive harvest and to provide wintering habitat. Following are descriptions of the activities of state and federal agencies toward those goals.

Federal

Harvest Management

The Fish and Wildlife Service has the responsibility to provide federal leadership for the conservation, protection, management, and enhancement of the nation's waterfowl resource. The Service's goal is to perpetuate and improve migratory bird populations for the benefit of people. With a limited resource in high demand, management is needed to provide optimum opportunity for people to use and enjoy migratory birds. Under provisions of the Migratory Bird Treaty Act, annual hunting regulations are used to regulate sport hunting of migratory birds, afford significant recreational opportunity, and play an important role in migratory bird management.

The objectives of annual regulations for the hunting of migratory birds are:

- o To provide an opportunity to harvest a portion of certain migratory game bird populations by establishing legal hunting seasons.*
- o To limit harvest of migratory game birds to levels compatible with their ability to maintain their populations.*
- o To provide equitable hunting opportunity in various parts of the country within limits imposed by abundance, migration, and distribution patterns of migratory game birds.*

The regulatory process has evolved dramatically from its inception in 1918 when it was a liberal, brief, simple, and uniform procedure. Severe drought conditions, concern about habitat, and a growing general interest in the welfare of migratory birds led to more restrictive regulations in the 1930's; however, they still remained uniform and relatively simple. In the 1940's, state involvement and investment in migratory bird programs grew and demands for greater participation in the process of developing annual hunting regulations increased. Responding to these demands, regional differences in hunting conditions were recognized, and by 1947, the nation was divided into four administrative 'flyways' for purposes of setting

regulations. By 1952, all states had organized along flyway lines into flyway councils: Atlantic, Mississippi, Central, and Pacific. In 1953, the National Waterfowl Council was established.

As a result of these changes, regulations became more complex. Waterfowl populations were generally abundant in the 1950's and with flyway and state input, regulatory activities proceeded without difficulties. In the 1960's, however, waterfowl populations were down and regulations became more restrictive. Public and private interests became focused on habitat protection. Restrictions in harvest also led to more specialized regulations, such as identifying regional harvest units. By the 1970's special harvest strategies, such as the point system, were used to reduce hunting pressure on more desirable species which were declining.

Restrictions also were introduced to protect declining species such as the black duck and special harvest strategies were initiated. The 1970's was a decade of greater public awareness in environmental issues. Laws such as the National Environmental Policy Act began regulating certain wetland alteration activities. By the 1980's, waterfowl populations were down nationwide, demand for the resource was even higher, and a commitment to habitat conservation was stronger than ever.

Annual regulations are divided into two categories, framework regulations and special regulations. Framework regulations are the oldest and include a window of time for opening and closing seasons, season length, and daily bag limit. Special regulations generally are species-, area-, or situation-specific. They employ measures such as split seasons, zoning, or bonus bag limits. Most have been developed in response to specific interests and management needs. These regulations tend to be complex and they now comprise most of the volume of annual regulations.

Habitat Protection and Enhancement

In 1918, the Migratory Bird Treaty Act emphasized the need to acquire lands to protect and conserve migratory bird populations. Through enactment of the Migratory Bird Conservation Act in 1929, Congress set in motion acquisition of refuges to preserve important migratory bird habitat.

Each refuge has one or more primary purposes for which it is established and around which its management is designed. The purposes of individual refuges range from very narrow ones, such as preserving or managing the habitat for a single species, to much broader ones such as conserving natural diversity, fulfilling international treaty obligations, ensuring water quality, and providing opportunities for scientific research and public use. All National Wildlife Refuges (NWR) within the Chesapeake Bay drainage support waterfowl populations. The federal refuges are listed in Table 3.

Table 3. Federal Refuges in the Chesapeake Bay Region.

MARYLAND		VIRGINIA	
Blackwater NWR	15,687 acres	Featherstone NWR	164 acres
Eastern Neck NWR	2,286 acres	Fisherman Island NWR	1,025 acres
Martin NWR	4,424 acres	Marumscoc NWR	63 acres
Patuxent NWR	4,682 acres	Mason Neck NWR	2,277 acres
Susquehanna NWR	4 acres	Nansemond NWR	208 acres
		Plum Tree Island NWR	3,276 acres
		Presquille NWR	1,329 acres
	Total 27,083 acres		
			Total 8,342 acres

Research

Information to support waterfowl management at the national level is generated by wildlife research centers of the Fish and Wildlife Service. Most of the Service's research on waterfowl in Chesapeake Bay is performed by the Patuxent Wildlife Research Center, in cooperation with universities, state agencies, and wildlife refuges. Studies are undertaken in response to needs of the Service for regulation of the waterfowl harvest, and for management of habitat. Currently, habitat research is emphasizing needs identified by the North American Waterfowl Management Plan and the Chesapeake Bay Program.

Patuxent Wildlife Research Center has conducted waterfowl research on the Chesapeake Bay for 50 years. Current efforts include an investigation of the survival rates of female black ducks and mallards during breeding and of their broods during the pre-flight period. This study uses radio-marking of birds to help answer questions about the long-term decline of black duck populations.

Extensive research on the ecology of canvasbacks on Chesapeake Bay involves three studies by Patuxent Wildlife Research Center: (1) effects of age, sex, and body weight on winter distribution, (2) habitat use and survival of juvenile canvasbacks wintering on the Bay, and (3) influence of foraging habitat on survival, energetics, and reproduction of canvasbacks wintering on the Bay.

Canada goose populations are the subject of intensive study, involving the Fish and Wildlife Service and states throughout the Atlantic Flyway. Data from observations on geese marked with numbered neck collars are treated using sophisticated statistical methods to analyze regional changes in the survival and distribution of populations.

Toxic materials in Chesapeake Bay may have contributed to the decline of waterfowl populations. Patuxent Wildlife Research Center is conducting studies to: (1) assess metal residues from oldsquaw in the Bay, (2) determine the affects of contaminants on submerged aquatic vegetation from the Bay, (3) investigate the relationship of between waterfowl that forage in Baltimore Harbor and benthic invertebrate assemblages and to contaminants that may be in the benthic organisms, and (4) survey the contaminant loads of waterfowl wintering in Baltimore Harbor.

Maryland

Management of waterfowl by the Maryland Department of Natural Resources is the responsibility of the Migratory Bird Program, whose long-range goals are to ensure the continued existence of the migratory bird resource and to meet the demand of recreation oriented toward this resource.

Harvest Management

Maryland, develops and publicly advertises hunting regulation proposals for public input. Each year in late August, three to four public hearings are held in the state to solicit public opinion regarding these proposals. Following the public review process, the Secretary of the Maryland Department of Natural Resources, in consultation with the Department's biological staff and the twelve-member Wildlife Advisory Commission, makes season and bag limit recommendations to the U.S. Fish and Wildlife Service. The Service promulgates and publishes the final season and bag limits. The state recommendations can be more restrictive than federal frameworks, but may never exceed them. State regulations have been more restrictive than federal regulations in the past, particularly for Canada geese.

The Department is represented on the Atlantic Waterfowl Council by the Assistant Secretary, Forest Park and Wildlife Service, and on the Council's Technical Section by the manager of the agency's Migratory Bird Program. These groups meet semi-annually in March and July to discuss waterfowl management and to formulate flyway recommendations to the Fish and Wildlife Service concerning hunting season regulations and related issues.

Habitat Protection and Enhancement

Habitat activities include the development and enhancement of waterfowl habitat on public lands using revenues from the sale of Maryland Migratory Waterfowl Stamps. Also, landowners are offered a tax credit for expenditures used to develop and enhance waterfowl habitats on private lands by entering into a 10-year licensing agreement for approved projects.

The Department also offers landowners a wildlife enhancement program known as the Wildlife Habitat Improvement Program (WHIP). This program pays farmers to leave crops unharvested to provide winter food for Canada geese and upland wildlife. This program is offered to landowners provided they commit at least 10 acres of unharvested crops in fields that are at least 20 acres in size. Foods may include corn, sorghum, millet, grasses, and clover. Waterfowl hunting is not permitted on the property.

Under the North American Waterfowl Management Plan's Atlantic Coast Habitat Joint Venture, a minimum of 140,000 acres are proposed for enhancement and protection by the year 2000. Five focus areas in Maryland have been initially targeted for habitat enhancement. Maryland already has a number of state areas protected for waterfowl (Table 4).

Table 4. Maryland State Waterfowl Areas.

AREA NAME	ACREAGE	COUNTY
Bowen	919	Prince George's
Cedar Island	2,880	Somerset
Deal Island*	11,902	Somerset
Dierrsen	40	Montgomery
Earleville	190	Cecil
E. A. Vaughn	17,501	Worcester
Ellis Bay	2,094	Wicomico
Fairmount	3,883	Somerset
Fishing Bay*	17,208	Dorchester
Islands of the Potomac*	329	Montgomery
Isle of Wight	256	Worcester
McKee-Beshers*	1,947	Montgomery
Myrtle Grove	831	Charles
Pocomoke River	505	Worcester
Pocomoke Sound	922	Somerset
Sinepuxent Bay	25	Worcester
South Marsh Island*	2,969	Somerset
Taylor's Island*	1,020	Dorchester
TOTAL	65,421	

* more acreage is expected to be added to these areas

Research Projects

The Department is currently expanding the use of wood duck nest boxes to increase wood duck production. Annual survival rates of adult female wood ducks are being monitored by capturing and banding incubating females and recapturing them in subsequent years. This technique provides a reliable indicator of wood duck population trends and requires smaller samples of banded birds than banding programs that depend upon hunter-killed recoveries.

Also under investigation is the relative effectiveness of taxidermy-mounted Canada goose decoys in decoying geese within gun range. This popular decoy is being compared to two commercially available decoy types. This research should help managers decide whether the increase in the use of taxidermy-mounted decoys significantly influences harvest success. Results of this research could lead to restrictive use of this decoy type as a means of reducing harvest in lieu of reducing hunting opportunity.

In 1991, Maryland will initiate a three year Canada goose banding project to mark a representative sample of both resident and migrant Canada geese. This research will provide an estimate of geese breeding in the state, the effects of harvest regulations upon annual survival, and survival outside of the hunting season for both resident and migrant geese. This research is a cooperative effort between Atlantic Flyway states and the Fish and Wildlife Service.

The Department is currently involved in the development and implementation of a production assessment for Canada geese in northern Quebec. This is a cooperative venture with the Fish and Wildlife Service and the New York Cooperative Fish and Wildlife Research Unit. This work will be initiated in spring 1990 and will involve an aerial survey in mid-June to determine nesting effort and an aerial survey in July to determine gosling production. This information will be available to managers prior to the setting of harvest regulations in August.

Virginia

Harvest Management

Management of waterfowl by the Virginia Department of Game and Inland Fisheries (VDGIF) is a responsibility of the Wildlife Division. The 10-member VDGIF Board of Directors conducts an advertised public meeting in late August each year to receive staff and public recommendations for waterfowl seasons and bag limits to be selected within the federal frameworks regulations established by the Fish and Wildlife Service. The Board votes on the waterfowl regulation options at the public hearing meeting. In recent years the Board has established regulations more restrictive than those allowed under the federal frameworks.

The agency is represented on the Atlantic Waterfowl Council by the VDGIF Director and on the Technical Section of the Council by the state's Waterfowl Biologist. These groups meet semi-annually in March and July to discuss waterfowl management and to formulate recommendations to the Fish and Wildlife Service concerning hunting regulations.

Habitat Protection and Enhancement

The Virginia Department of Game and Inland Fisheries is committed to the goals set forth in the North American Waterfowl Management Plan and the Atlantic Coast Habitat Joint Venture, which targets 60,400 acres of waterfowl habitat in Virginia for protection or enhancement. Eight of the ten focus areas identified in Virginia are located within the Chesapeake Bay watershed. These Bay focus areas total 36,600 acres; 34,775 of which are to be protected; 1,825 enhanced. Protection can be accomplished by any of several methods (e.g., fee acquisition, easement, lease, cooperative agreement, legislation).

A number of waterfowl habitat programs are underway that will move Virginia toward achieving its habitat objectives. There are nine state wildlife management areas (WMA) in Virginia totalling over 28,000 acres operated with waterfowl management as a major priority (Table 4). Additionally, cooperative wildlife agreements exist with eleven Department of Defense bases in Virginia. Sikes Act-funded waterfowl projects are being conducted on a number of these installations.

The Virginia Department of Conservation and Recreation maintains a natural area preserve system of 15,000 acres which includes natural habitat corridors critical to migratory waterfowl and neotropical migrants. The Department also cooperates with Ducks Unlimited, the National Fish and Wildlife Foundation, and The Nature Conservancy to acquire significant habitat consistent with the North American Waterfowl Management Plan.

Table 5. Virginia Waterfowl Management Areas.

AREA NAME	ACREAGE	COUNTY
Chickahominy WMA	5,155	Charles City County
Game Farm Marsh WMA	429	New Kent County
Hog Island WMA	3,907	Surry County
Kittewan WMA	250	Charles City County
Lands End WMA	463	King George County
Saxis WMA	6,385	Accomack County
Ragged Island WMA	1,537	Isle of Wight County
TOTAL ACRES	18,126	

Research Virginia has been involved in an Atlantic Flyway Canada goose movement and survival study using neck-collared birds and is embarking on a wood duck banding and survival study. Virginia has recently hired a biologist to carry out waterfowl research.

Pennsylvania

Harvest Management

In Pennsylvania, waterfowl management is the responsibility of the Pennsylvania Game Commission (PGC). The eight-member PGC Board of Commissioners enact waterfowl regulations at a public meeting of the Board. The PGC personnel meet with and receive comments from waterfowl hunters and other interested groups and individuals about proposed regulations. Appropriate Harrisburg staff and personnel of the Waterfowl and Migratory Game Bird Section (WAMGABS), of the Bureau of Wildlife Management, complete the specific items for waterfowl regulations. At times, PGC has implemented regulations more restrictive than that provided by the federal framework. The PGC Executive Director represents PGC on the Atlantic Waterfowl Council and the PGC Waterfowl Biologist serves as the representative on the Technical Section.

A number of PGC personnel, especially WAMGABS members, are involved in many diverse projects that directly and indirectly deal with or influence waterfowl populations, management, and regulations. Programs are directed toward benefitting local and migratory waterfowl, waterbirds, other wetland associated wildlife, and providing ample opportunities for consumptive and non-consumptive users.

Habitat Protection and Management

Pennsylvania is participating in the Lower Great Lakes-St. Lawrence Joint Venture and the Atlantic Coast Joint Venture (ACJV) of the North American Waterfowl Management Plan. The ACJV focused on eight areas in Pennsylvania, of which four are in the Chesapeake Bay drainage. In these four areas, 14,800 acres have been identified for protection and 18,300 acres for enhancement.

Since the 1930's the PGC has acquired almost 1.5 million acres of land as State Game Lands (SGL). Of this acreage, about 113,000 acres are of importance to waterfowl and are situated in the Chesapeake watershed. Considerable waterfowl habitat management has been done on these lands.

Additional waterfowl habitat management activities include an extensive wood duck nesting box program on SGLs and to a limited degree on other state and private lands. The PGC also cooperates with other

public agencies, private organizations, and individuals to provide them with information and advice on proper habitat management for waterfowl. PGC is an active participant in the land-use permitting process and actively reviews all permits that affect wetlands. Pennsylvania is an active participant in the Ducks Unlimited Matching Aid To Restore State's Habitat program (MARSH). Each year PGC provides \$10,000 to Ducks Unlimited for habitat management that benefits waterfowl which nest in eastern Canada, migrate through Pennsylvania, and winter in the Chesapeake Bay.

In the last several years the PGC has initiated a stream-side fencing program to exclude farm animals from streams and to reduce degradation of streams and stream banks. The Fish and Wildlife Service and the Chesapeake Bay Program have provided funding for this program. Thus far, 118 farms are participating with a total of 41 miles of streams fenced. The resultant growth of vegetation and use by waterfowl, especially for nesting, has been impressive.

Research

The PGC has expended considerable efforts on banding waterfowl including local breeders, migrants, and chiefly wintering birds. From 1975 to 1985, 100,000 waterfowl have been banded in Pennsylvania. PGC is participating in an Atlantic Flyway (AF) pre-season banding program to assess AF breeding duck populations. Participation in an AF Canada goose banding and neck collaring program has been a major endeavor. Other current or future waterfowl research projects include analyses of game farm mallard releases, experimental plantings of aquatic plants, marsh ecology, and waterfowl ecology.

NEW INITIATIVES

Well over one million birds use the Chesapeake Bay during fall and winter, however, serious problems exist for a number of species, particularly ducks. Existing waterfowl conservation programs do much to protect our valuable waterfowl, but many other problems exist that cannot be corrected under existing waterfowl conservation programs. A few of the more serious problems include: loss of wetland habitat from development; toxic pollution; degradation of water quality from excess nutrients and soil runoff from both farm and urban landscapes; recreational activities that disturb waterfowl; and constriction of migrating and wintering birds into small pockets of habitat, posing threats of disease outbreak and increased pressure from predators.

Many other activities outside the bounds of typical waterfowl management must be accomplished to enhance the survival and reproduction of waterfowl. These activities include new and innovative measures such as the 1986 North American Waterfowl Management Plan, the North American Wetlands Conservation Act, and the 1987 Chesapeake Bay Agreement. The following are discussions of these new areas that are important opportunities for improving the way we manage and affect habitats important to waterfowl.

Chesapeake Bay Agreement

- o Wetlands Policy and Implementation Plan: The Chesapeake Bay Wetlands Policy was approved in January of 1989 and calls for a long-term net gain in wetland resources. The policy emphasizes the importance of Chesapeake wetlands to migrating and wintering waterfowl. Action items presented in the policy will directly or indirectly benefit waterfowl. One action item calls for development of a strategic plan for wetland acquisition. Development of that plan will include a strong consideration for use of wetland areas by waterfowl. It will also consider the goals and purposes of the North American Waterfowl Management Plan.
- o Submerged Aquatic Vegetation (SAV) Policy and Implementation Plan: The Chesapeake Bay SAV Policy, approved in July of 1989, calls for a net gain in SAV. The SAV Implementation Plan (approved in 1990) identifies action items that will promote the restoration of SAV and thus, benefit waterfowl by increasing one of their major food sources. The Plan also calls for research to further our understanding of the relationships between SAV and waterfowl.
- o Habitat Requirements: In 1988 the Chesapeake Executive Council approved "Habitat Requirements for Chesapeake Bay Living Resources." This report fulfilled the first commitment of the 1987 Chesapeake Bay Agreement, and provides guidelines for orienting pollution abatement programs toward habitat requirements of 30 target species of wildlife. The canvasback, redhead, black duck, and wood duck are target species and their habitat requirements have been summarized. A comprehensive revision of the report will be completed by the end of 1990.
- o Other Resource Management Plans: A wide variety of living resource management plans are called for under the 1987 Agreement. These include plans for blue crab, oysters, American shad, striped bass, bluefish, weakfish, spotted sea trout, croaker, spot, summer flounder, American eel, red drum, black drum, and other ecologically valuable species which will be identified. Components of these plans often call for habitat preservation and improvements in water quality. Successful implementation of these plans should also benefit waterfowl.
- o Nutrient Reduction Strategy: The Bay Agreement commits to reducing nutrient levels in the Bay to 40% below levels recorded in 1985. Reductions of nitrogen and phosphorous by this amount are expected to improve ambient water quality and promote higher levels of dissolved oxygen. This should enhance light penetration for SAV, and help sustain oxygen levels for benthic invertebrates. Resurgence of these food resources would benefit waterfowl.

North American Waterfowl Management Plan (NAWMP)

The NAWMP was signed by the United States Secretary of the Interior and the Canadian Minister of the Environment on May 14, 1986. The plan is a broad international agreement which sets forth specific goals and objectives for the conservation and management North America's waterfowl populations through the year 2000. The plan also establishes a framework for cooperative efforts among federal, state, and private organizations in waterfowl and wetland conservation programs.

The NAWMP has a strong focus on protection and management of wetland habitats. Six geographic areas in the United States are recognized in need of special conservation efforts due to their significance to wintering or migrating waterfowl. The Atlantic Coast from Maine to South Carolina is one of those six areas. "Joint Ventures" are recommended as the means to initiate action. The concept of joint ventures recognizes that Federal and state natural resource agencies, national and local conservation organizations, and private landowners will need to combine their collective talents and funding sources, to work together to reverse the decline of North America's waterfowl populations.

North American Wetlands Conservation Act (NAWCA)

The NAWCA was signed in December 1989. Approximately 25-30 million dollars is potentially available each year to support NAWMP projects in the United States, Canada, and Mexico. Funds will be generated by short-term investments of federal excise tax revenues in the Pittman-Robertson Act fund, fines and forfeitures from federal wildlife law enforcement activities, and a Congressional appropriation of 15 million dollars. At least 50% and no more than 70% of the funds will be spent in Canada or Mexico. Acquisition, enhancement, restoration, and development projects are all eligible for funds on a matching basis. Many of these projects will enhance breeding habitat of birds which winter on the Chesapeake Bay.

RESEARCH

Research is an essential part of each resource management strategy, providing new information and ideas upon which management decisions are based. Specific needs for information will arise while this strategy is being implemented. Those anticipated at the outset are listed as tasks under actions specified in this report. However, the strategy is not intended to identify all of the waterfowl research needs. Instead, it establishes processes for identifying and fulfilling those needs, and it outlines broad areas of investigation where needs are expected.

State agencies, universities, and the Fish and Wildlife Service maintain active research programs that address a wide range of issues related to conservation of waterfowl and their habitats in the Chesapeake Bay region. Studies focus on the status, distribution, and trends of populations, and on a wide range of environmental factors influencing waterfowl. Some research activities are concentrated on species of special emphasis, such as the black duck or canvasback, while others are more generally oriented to concerns affecting a range of waterfowl species.

The Waterfowl Workgroup identified the following major types of research needed specifically to support waterfowl management in the Chesapeake Bay region. These needs are reflected to some extent in the actions and tasks listed later in this report. Some of the needs are now being addressed, but further work is required in all of them to guide management decisions.

- (1) Improved survey methods need to be developed to provide better estimates of regional waterfowl populations.
- (2) Better understanding is needed of the population dynamics of waterfowl, with emphasis on immigration, emigration, and survival of populations in the Chesapeake Bay region.

(3) Knowledge of habitat requirements of waterfowl using the Bay needs to be strengthened, not only for those species listed in the Bay Program's "Habitat Requirements for Chesapeake Bay Living Resources" report, but for all other waterfowl regularly occurring in the region.

(4) The relationship of waterfowl to other components of the Bay ecosystem needs to be understood, including interactions between waterfowl and SAV and benthic invertebrates. Research also is needed on how foods available to waterfowl wintering in the Bay region affect physical condition and reproductive ability of the birds.

(5) Effects of environmental contaminants and disease on survival of waterfowl in the Bay region are poorly understood, and require fundamental research.

The Workgroup identified these research needs to the Scientific and Technical Committee's Research Planning Advisory Group for consideration in the development of the 1990 Research Priorities report, and will continue to do so in future years to promote the goal of this plan.

NEW MANAGEMENT STRATEGY

There is concern about the downward trend in waterfowl populations throughout North America and in the Chesapeake Bay region. In response to this concern the Chesapeake Executive Council has adopted the Waterfowl Policy which is "to restore, enhance, and protect waterfowl populations and their habitats to derive the greatest long-term ecological, economic, and social benefits from the resource." The factors responsible for population changes are complex and often difficult to investigate. Obviously, natural phenomena (e.g., drought or inclement weather on the breeding grounds) will impact waterfowl populations regardless of management efforts in the Bay region. However, many other habitat and mortality factors that affect waterfowl are direct consequences of human activities. It is these factors that are the emphasis of management strategies in this Plan.

Management Objectives

The objectives of the Plan are to:

1. *Prevent loss or degradation of habitat, and restore or enhance habitats presently degraded or unsuitable for use by waterfowl.*
2. *Support responsible waterfowl management programs to restore waterfowl populations and habitats to at least 1970's levels by the year 2000.*
3. *Improve public understanding of the waterfowl resource and its habitat needs.*

Management Actions

Specific management actions will be implemented to help achieve the objectives of this plan. The actions are numerous and ambitious. The Waterfowl Workgroup believes these actions will do much to promote the conservation and restoration of waterfowl in the Chesapeake Bay region.

Objective 1: Prevent loss or degradation of habitat, and restore or enhance habitats presently degraded or unsuitable for use by waterfowl.

Actions

1. Identify essential habitat requirements for waterfowl in the Chesapeake Bay region, including water quality requirements.

2. Determine suitable habitat management practices that benefit waterfowl, taking into account interests for conservation of other natural resource values.
3. Encourage measures to restore submerged aquatic vegetation to pre-1960's levels of distribution and abundance in Chesapeake Bay.
4. Provide guidance to agencies, organizations, and the public on habitat management practices needed to benefit waterfowl.
5. Encourage programs to control the spread of plants that diminish the value of wetlands for waterfowl.
6. Recommend measures to minimize the adverse effects on waterfowl from human disturbance and land development.

Objective 2: Support responsible waterfowl management programs to restore waterfowl populations and habitats to at least 1970's levels by the year 2000.

Actions

1. Promote the responsible use of waterfowl resource by coordinating with the Atlantic Flyway Council and the U.S. Fish and Wildlife Service regarding harvest restrictions and provisions.
2. Determine the effects of releasing captive-reared mallards on wild waterfowl populations
3. Identify management actions needed to reduce concentrations of waterfowl where they damage habitat or are exposed to an increased risk of disease.
4. Survey waterfowl in the Chesapeake Bay region as needed to monitor their population trends and habitat use.
5. Support development and implementation of new or improved waterfowl management techniques.

Objective 3: Improve public understanding of the waterfowl resource and its habitat needs.

Action

1. Identify opportunities to develop new educational programs and products.

To restore waterfowl populations to at least 1970's levels by the year 2000 (Objective 2), a benchmark is necessary. A mean waterfowl abundance index was calculated from Mid-winter waterfowl aerial surveys for 1973 to 1977 to represent the 1970's, and for 1986 to 1990 to represent the present population index (Table 6). The goal for the year 2000 was determined by taking the larger of the two figures for each species. Overall the goal is to increase all waterfowl by 16%. This goal will be a short term measure of success for the next decade, but it should also be recognized as an intermediate goal to restoring the waterfowl of Chesapeake Bay.

Table 6. Population indices for waterfowl in the Chesapeake Bay for the 1970's, 1980's, and the goal for the year 2000. The Index was derived from mid-winter waterfowl surveys of the Chesapeake Bay. The goal for each species is based on the mean number of waterfowl counted on surveys from 1973 through 1977, or the present population (1986-1990) if it is greater than the 1970's period.

SPECIES OR SPECIES GROUP	INDEX FOR 1973-1978	INDEX FOR 1986-1990	GOAL FOR YEAR 2000	% INCREASE NEEDED
Tundra Swan	33,400	31,300	33,400	6
Canada Goose	580,000	430,400	580,000	26
Snow Goose	1,800	44,800	44,800	-
Brant	200	900	900	-
Swan/Goose Subtotal	615,400	507,400	659,100	23
American Black Duck	39,800	32,300	39,800	19
Mallard	46,800	51,100	51,100	-
Northern Pintail	1,300	1,100	1,300	15
American Wigeon	1,900	1,800	1,900	5
Other Dabblers	900	200	900	78
Dabbling Subtotal	90,700	86,500	95,000	9
Canvasback	62,900	50,200	62,900	20
Redhead	8,200	1,900	8,200	77
Scaup and Ringneck	55,300	36,100	55,300	35
Goldeneye and Bufflehead	11,200	17,100	17,100	-
Ruddy Duck	19,100	16,400	19,100	14
Bay Duck Subtotal	156,700	121,600	162,600	25
Scoters	9,800	4,700	9,800	52
Oldsquaw	4,900	4,200	4,900	14
Mergansers	2,500	13,500	13,500	-
Sea and River Duck Subtotal	17,200	22,400	28,200	21
All Ducks Subtotal	264,600	230,500	285,800	19
Total Waterfowl	880,000	737,900	944,900	16

CHESAPEAKE BAY WATERFOWL MANAGEMENT PLAN

OBJECTIVE 1. Prevent Loss or Degradation of Habitat, and Restore or Enhance Habitats Presently Degraded or Unsuitable for Use by Waterfowl.

Action 1. Identify essential habitat requirements for waterfowl in the Chesapeake Bay region, including water quality requirements.

Background: Relatively little is known of exactly what characteristics of a given area are particularly conducive to waterfowl use. Additionally, more information is needed on the daily activities and feeding behavior of waterfowl species' on Chesapeake Bay. Having a full appreciation of a species behavior and nutritional requirements is essential. Knowing where nutritional requirements can be met is critical. Once habitat requirements are fairly well understood, then that information can be used to enhance waterfowl habitats.

The condition of water plays an important role in the quality of habitat used by waterfowl. On Chesapeake Bay, as elsewhere, habitat includes areas of cover for breeding protection, open water areas for loafing, and waters rich in food resources for feeding. Water quality will largely influence the foods available to waterfowl. Highly turbid waters from soil erosion and nutrient enrichment will eliminate valuable submerged aquatic vegetation such as wild celery and sago pondweed. Also, eutrophication depletes deep and shallow waters of oxygen, thus killing large expanses of benthic food items such as worms, small clams, and crustaceans. Deterioration of water quality in Chesapeake Bay has already limited the abundance and distribution of the canvasback, redhead, northern pintail, gadwall, and American wigeon. Without an abundance of food, waterfowl will be more susceptible to mortality, especially while migrating north to breeding grounds. Clean water quality is a critical need for Bay waterfowl.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Complete the revision of "Habitat Requirements for Chesapeake Bay Living Resources", particularly for the canvasback, redhead, wood duck, and black duck.	Habitat Objectives Workgroup	December 1990
B. Conduct literature synthesis on habitat requirements for the tundra swan, Canada goose, and oldsquaw. Identify where inadequate habitat information exists, and recommend appropriate research.	Maryland Forest, Park, and Wildlife Service	July 1991
C. Develop new management strategies based on new habitat information acquired via Tasks 1.A. and 1.B.	Waterfowl Workgroup (WW)	June 1991

Implementing Tasks	Lead Group or Agency	Schedule for Completion
D. Determine the optimum and maximum sustained levels of nitrogen and phosphorus that must be maintained to promote growth of submerged aquatic vegetation; rely on efforts of SAV Workgroup.	SAV Workgroup with WW member	December 1990
E. Develop a plan for conducting research on acute and chronic impacts of contaminants such as heavy metals and organics on waterfowl and their food resources. Plan will include time schedules and budget support.	U.S. Fish and Wildlife Service (USFWS)	May 1991
F. Ensure that the information derived from Task E is used by EPA and States in developing criteria and standards for water quality.	WW and USFWS	Undetermined

Objective 1: Action 2. Determine suitable habitat management practices that benefit waterfowl, taking into account interests for conservation of other natural resource values.

Background: The management and manipulation of habitat to benefit one species or a group of species may affect non-target organisms, or may also be detrimental to the species it is intended to help. For example, the flooding of an anadromous fish spawning streams for waterfowl may be detrimental to commercial or recreational fisheries, or the impoundment created may be used by waterfowl, but it may also expose them to heavy hunting pressure. Understanding the impacts to other fish and wildlife species and to waterfowl resulting from habitat manipulations needs to be improved so that biologically sound decisions can be made.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Develop guidelines on wetland management practices that benefit waterfowl and are known to have little or no detrimental effects on non-target species.	Waterfowl Workgroup (WW)	August 1991
B. Conduct a literature review and synthesis on known impacts of wetland habitat manipulation for benefiting waterfowl (with particular attention to impoundments and marsh burning). Literature should be reviewed with an emphasis on the assessment of impacts on wetland dependent fish and wildlife species and ecosystem functions.	USFWS	December 1991
C. Base on literature review in 2.B., research should be identified, planned, funded, and conducted.	WW	Plan by March 1992 Begin Research by January 1993
D. Revise guidelines in 2.A. based on information obtained via 2.B. and 2.C.	WW	On-going

Objective 1. Action 3. Encourage measures to restore submerged aquatic vegetation to pre 1960's levels of distribution and abundance in Chesapeake Bay.

Background: Submerged aquatic vegetation (SAV) is an essential component of the Chesapeake Bay ecosystem. It is of immense value as food to waterfowl and its abundance directly affects the use of the Bay by waterfowl. SAV also harbors small fish, insects, and crustaceans that are also important food items for waterfowl. The ability of waterfowl to complete their annual life cycle, migrating to and from breeding grounds, is heavily influenced by the birds' ability to store food reserves for the long flights. Protection and enhancement of SAV will do much to promote waterfowl populations on the Chesapeake Bay and elsewhere in North America.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Provide a Waterfowl Workgroup representative to SAV Workgroup to coordinate the Waterfowl Implementation Plan with the SAV Implementation Plan.	SAV Workgroup and WW representative	December 1990
B. Refine existing knowledge on the life history requirements of SAV to promote management of these species.	USFWS	December 1990
C. Determine the need for research on the impacts of contaminants (heavy metals, organics) and herbicides on the abundance and distribution of SAV.	SAV Workgroup	per SAV plan
D. Assess the impact of commercial clamming on SAV survival, distribution, and abundance.	MFPWS	December 1991

Objective 1. Action 4. Provide guidance to agencies, organizations, and the public on habitat management practices needed to benefit waterfowl.

Background: Within the Chesapeake Bay area a number of critical areas for wintering and migration of waterfowl have been identified. Some of the areas are also important for waterfowl production, especially the wood duck and black duck. All areas identified have been targeted for wetland protection and enhancement efforts by Federal, state, local, and private organizations as part of the Atlantic Coast Joint Venture of the North American Waterfowl Management Plan. The total acreage that needs to be protected or enhanced within each area is also identified. Protection means the long-term viability of the area needs to be secured via acquisition, easement, agreement, lease, or donation. Enhancement means the capability of the area to support waterfowl needs to be improved through application of proven wetland management practices.

In addition, there are actions that can be taken by individual landowners, agencies, and organizations to promote land management practices that will directly or indirectly benefit waterfowl (e.g. forest buffers along streambanks or shorelines, and leaving crops in fields for waterfowl). Moreover, certain government programs can be detrimental to waterfowl habitats. They need to be carefully examined and redirected so they do not cause further degradation of habitats.

Implementing Tasks		Lead Group or Agency	Schedule for Completion
A. Support the efforts of the Atlantic Coast Joint Venture to protect and enhance waterfowl habitat.			
Areas already identified include:			
<u>Maryland</u>			
Blackwater and Nanticoke River Marsh	53,500	5,000	58,500
Lower Eastern Shore Marshes	34,000	6,100	40,100
Dickenson Bay	1,250	0	1,250
Patuxent River Marshes	14,500	500	15,000
<u>Pennsylvania</u>			
Susquehanna River Lowlands	8,300	2,500	10,800
Middle Creek WMA - Ontelaunee Reservoir	2,000	500	2,500
Marsh Creek	1,500	300	1,800
State Game Lands #'s 13, 57, and 66	3,000	15,000	18,000

Implementing Tasks	Lead Group or Agency	Schedule for Completion																																												
<table border="0"> <thead> <tr> <th></th> <th>Protect</th> <th>Enhance</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Virginia</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Virginia Eastern Shore</td> <td>7,000</td> <td>800</td> <td>7,800</td> </tr> <tr> <td>Pamunkey River Marshes</td> <td>9,200</td> <td>100</td> <td>9,300</td> </tr> <tr> <td>Chickahominy River Marshes</td> <td>4,400</td> <td>50</td> <td>4,450</td> </tr> <tr> <td>James River Marshes</td> <td>3,650</td> <td>50</td> <td>3,700</td> </tr> <tr> <td>Rappahannock River Marshes</td> <td>4,150</td> <td>200</td> <td>4,350</td> </tr> <tr> <td>Mattaponi River Marshes</td> <td>2,500</td> <td>100</td> <td>2,600</td> </tr> <tr> <td>York River Marshes</td> <td>1,400</td> <td>250</td> <td>1,650</td> </tr> <tr> <td>Western Bayshore Marshes (Reedville-Mobjack Bay)</td> <td>2,475</td> <td>275</td> <td>2,750</td> </tr> <tr> <td>Total for All States</td> <td>161,125</td> <td>34,225</td> <td>195,350</td> </tr> </tbody> </table>		Protect	Enhance	Total	Virginia				Virginia Eastern Shore	7,000	800	7,800	Pamunkey River Marshes	9,200	100	9,300	Chickahominy River Marshes	4,400	50	4,450	James River Marshes	3,650	50	3,700	Rappahannock River Marshes	4,150	200	4,350	Mattaponi River Marshes	2,500	100	2,600	York River Marshes	1,400	250	1,650	Western Bayshore Marshes (Reedville-Mobjack Bay)	2,475	275	2,750	Total for All States	161,125	34,225	195,350		
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Other areas not already identified may be recommended by the Workgroup for inclusion in the Joint Venture's efforts. Important criteria will be habitat values and areas subject to immediate development. The Chester and Choptank Rivers are two areas that will be considered.

- B. Promote the use of new and existing programs to protect and enhance habitats for waterfowl on private lands. Programs may include:
 - o Conservation Reserve Program under the Food Security Act.
 - o Financial or Tax Credit Incentives for leaving crops unharvested for waterfowl, and for leaving fallow fields adjacent to wetlands.
 - o Promote hardwood forest buffer strips along wetlands and streams.
 - o Financial or tax credit incentives for creation of waterfowl habitat.
 - o Develop "give-away" programs that provide private landowners with plants that benefit waterfowl.

Waterfowl Workgroup

July 1991 (Annual Progress Report)

Implementing Tasks	Lead Group or Agency	Schedule for Completion
<ul style="list-style-type: none"> o Preserve agricultural land via zoning or legislation. o Promote stream fencing programs similar to the program in Pennsylvania. o Encourage full use of best management practices on agricultural lands to benefit waterfowl. 	Wetlands Workgroup with WW Representative per Wetlands Plan	per Schedule of Wetlands Plan
<p>C. Determine the impacts of existing government programs that adversely affect waterfowl and wetlands, and summarize in a report the changes which might be beneficial or lessen the adverse affects on waterfowl. The determination should consider the full range of Federal and State cost-share and assistance programs that influence land use, and programs that regulate land use activities.</p>		

Objective 1. Action 5. Encourage programs to control the spread of plants that diminish the value of wetlands for waterfowl.

Background: Phragmites and purple loosestrife exhibit aggressive growth patterns which enable the species to displace valuable wetland plants. Both species can invade a marsh to the point of forming monotypic stands.

As with other wetland plants, phragmites and purple loosestrife provide resource values such as detrital production and export, pollutant filtration, and erosion control. However, neither species is valuable as wildlife habitat. Expanding ranges of the two species negatively impact waterfowl, waterbird, and furbearer habitats by decreasing the abundance of desirable food plants, habitat heterogeneity, and interspersions of open water. Phragmites may also present other problems such as being a serious fire hazard, restricting wildlife access to food items, and providing roosts for nuisance blackbird concentrations. Of the two species, phragmites is of serious concern within the Chesapeake watershed. Purple loosestrife is a significant problem in the New England states, and could present a future problem in the Bay region. The extent and rate of expansion of these plants is unknown.

Implementing Tasks

	Lead Group or Agency	Schedule for Completion
A. Develop a means to monitor invasive species; incorporate monitoring into a five year Status and Trends survey called for by Wetlands Implementation Plan.	Wetlands Workgroup and WW Representative	per Wetland's Plan
B. Determine which method or combination of methods will effectively control Phragmites in the Chesapeake Bay Region, while minimizing adverse effects on non-target species of plants and animals. Methods to be investigated include burning, herbicides, flooding, and further research into the life history dynamics of Phragmites.	USFWS	June 1991
C. Inform the public about negative habitat qualities of phragmites and recommend ways the public can reduce the spread of this plant. Two examples are to discourage the use of Phragmites as camouflage on duck blinds and to discourage its sale in local nurseries.	USFWS	May 1991

Objective 1. Action 6. Recommend measures to minimize the adverse effects on waterfowl from human disturbance and land development.

Background: The Chesapeake Bay Region has exhibited exponential growth since the 1950's. The trend is continuing, with projections of 2.6 million new residents in the region by the year 2020. This projected 20% growth in the human population will significantly alter the remaining undeveloped areas.

Both large-scale and small-scale alterations of wetland and adjacent upland habitats have occurred in the region due to past growth. Development has resulted in direct and indirect loss of waterfowl habitat, degradation of water quality, and a decrease in the value of many remaining waterfowl habitats due to human disturbance. Procedures currently used throughout the Bay region for managing growth and regulating development do not adequately address the needs of waterfowl.

Much of the habitat loss is the result of the regulatory or management approach. Historically, the approach has been to react to an individual proposal (e.g., wetland permit review), or optimize growth potential (e.g., local planning and zoning) without assessing the cumulative impacts and the overall effect on the "public interest." To improve Chesapeake Bay's waterfowl value, growth and land use must be directed.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Develop maps or reports that identify waterfowl habitats of concern and needing permanent protection. Use and expand technique of MFPWS to record waterfowl concentrations by latitude/longitude coordinates.	Waterfowl Workgroup (WW)	December 1991
B. Provide information and technical assistance to local governments and municipalities to direct population growth and land development away from valuable waterfowl habitat, or to reduce potential adverse effects of approved development.	WW	On-going
C. Assess the need for open water sanctuaries that would offer waterfowl protection from boating activities and/or hunting; summarize findings in a report.	WW	October 1991

CHESAPEAKE BAY WATERFOWL MANAGEMENT PLAN

OBJECTIVE 2: Support Responsible Waterfowl Management Programs to Restore Waterfowl Populations and Habitats to at Least 1970's Levels by the Year 2000.

Action 1. Promote responsible use of the waterfowl resource by coordinating with the Atlantic Flyway Council and the U.S. Fish and Wildlife Service regarding harvest restrictions and provisions.

Background: Harvest of waterfowl for recreational purposes is a longstanding tradition in the United States and the Chesapeake Bay region. Establishing yearly harvest regulations is a laborious and complex procedure. Waterfowl harvest is regulated to assure sustained long-term reproduction and population stability. Federal regulations cannot always ensure full protection for local populations. States often must enforce more restrictive regulations to provide for their own waterfowl resource. There is a need for coordination of all of the governments in developing harvest regulations to ensure that population goals of the Chesapeake Bay Waterfowl Management Plan are fulfilled.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Inform the Atlantic Flyway Council and the U.S. Fish and Wildlife Service of priority concerns regarding harvest management proposals for species using the Bay.	Waterfowl Workgroup (WW)	On-going
B. Assess the need to impose greater restrictions on harvest of sea ducks (oldsquaw and scoters), including zoning restrictions designed to offer open water sanctuaries for sea ducks.	WW	June 1991

Objective 2. Action 2. Determine the effects of captive-raised mallards on wild waterfowl populations.

Background: Both the State of Maryland and the private sector release captive-raised mallards for recreational hunting. Releases occur on Regulated Shooting Areas (RSA), which are state licensed shooting preserves. At the present time, there are questions about how the release of these mallards may be affecting wild waterfowl populations, particularly black ducks. The number of RSAs has increased in Maryland from 34 in 1985 to more than 100 in 1988. In Dorchester County alone, approximately 180,000 captive-raised mallards were released for harvest during the 1988-89 hunting season. Federal regulations permit the taking of any number of captive-raised mallards on RSAs provided that the birds are properly marked. Little information exists on post hunting season survival of captive-raised mallards. Other questions requiring investigation include their competition with black ducks for nest sites, their hybridization with black ducks, their competition for food and habitat with other waterfowl, their potential role in relieving the hunting pressure on wild waterfowl, and the legal questions of wild birds being attracted to feed put out for captive raised birds. An assessment of these state and private release programs is essential.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Determine whether special migratory bird regulations for harvest of captive-raised mallards allowed by Federal Law (50 CFR 21.13) pose threats to wild populations in the Chesapeake area.	USFWS	June 1991
B. Determine if RSA's increase or decrease hunting pressure on wild populations at the local level (e.g. decoying wild birds or reduce pressure on wild birds). WW should ensure research efforts address this information need.	Waterfowl Workgroup (WW)	June 1992
C. Determine if and how released mallards affect migration and wintering habitat availability for wild birds. WW should ensure research efforts address this information need.	WW	June 1992
D. Determine the extent of hybridization between released mallards and wild black ducks, and other possible impacts to black duck reproductive potential. FWS and MFPWS should ensure research efforts address this need.	WW	June 1992
E. Determine if there is a disease threat to wild birds from interaction of captive-raised mallards with wild stock. WW should ensure that research efforts address this information need.	WW	June 1992
F. Determine the impact of released mallards on Atlantic Flyway winter surveys and U.S. Fish and Wildlife Service harvest estimates.	WW	June 1992
G. Based on research findings, the State of Maryland should assess the spending of funds from the sale of the State Duck Stamps to ensure an appropriate balance between the release program and habitat enhancement efforts.	State of Maryland	June 1992

Objective 2. Action 3. Identify management actions needed to reduce concentrations of waterfowl where they damage habitat or are exposed to an increased risk of disease.

Background: Waterfowl are gregarious by nature, particularly during migration and wintering periods when the largest numbers are in the Chesapeake Bay region. Large concentrations of waterfowl can result in adverse impacts to the habitat from intensive foraging, stressful intra and interspecific competition, damage to agricultural crops, higher susceptibility to disease (e.g., avian cholera, avian botulism, duck plague, etc.) and increased potential for bird/aircraft strikes near airports.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Support the creation and maintenance of habitat diversity by providing a wide spectrum of waterfowl habitats including natural wetlands, moist soil areas, impoundments, and a variety of buffer forest and agricultural areas. Present progress in WW annual report.	Waterfowl Workgroup (WW)	Ongoing
B. Distribute management activities over broad geographic areas through the acquisition of state/federal wildlife areas, cooperative/easement areas, and management on private lands. Present progress in WW annual report.	WW	Ongoing
C. Design waterfowl harvest management programs to disperse bird concentrations by adjusting season dates, season lengths, and bag limits; present progress in WW annual report.	WW	Ongoing
D. Discourage artificial feeding that is harmful to waterfowl through educational programs. Some feeding causes unnatural concentrations of waterfowl which can result in a dependency on people, the spread of disease, and poor nutrition. Investigate forms of feeding that may benefit waterfowl and inform the public of the proper foods and areas.	WW	Ongoing

Objective 2. Action 4. Survey waterfowl populations in the Chesapeake Bay region as needed to monitor their trends in relation to habitat conditions.

Background: The primary waterfowl survey of the Chesapeake Bay area is the nationwide Mid-winter Waterfowl Survey. This survey was initiated by the U.S. Fish and Wildlife Service in 1935 to monitor waterfowl populations and is currently conducted in all the states of the Chesapeake Bay region. It is held annually in the first full week of January. This survey is used by the various states and the Service to monitor the distribution of waterfowl, to determine habitat conditions, and for regulatory consideration. As useful as the survey is, however, it fails to satisfy all management needs. A more comprehensive waterfowl survey is needed. Currently, several smaller scale surveys are also conducted in the region. These include the Mid-November Canada Goose survey, Coordinated Canvasback survey, and the Atlantic Flyway Tundra Swan Survey.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Assess strengths and weaknesses of existing survey methods and summarize in a report; incorporate recommendations for improvement.	Waterfowl Workgroup (WW)	April 1991
B. Based on 4.A. report, design necessary new surveys and seek agency support to accomplish the surveys.	WW	December 1991
C. Promote acquisition of waterfowl concentration data from Mid-winter Survey, model approach after existing effort of MFPWS.	WW	December 1990

Objective 2. Action 5. Support development and implementation of new or improved waterfowl management techniques.

Background: In the face of increased human population pressure and a degraded Bay environment, the future of the waterfowl resource on Chesapeake Bay will depend on improved understanding of waterfowl/habitat relationships and on development and implementation of new and innovative management actions. New emphasis must be placed on improving both population and habitat management, in particular, assessing a wide variety of environmental influences on the waterfowl resource.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Summarize in a brief report research priorities that are aimed at enhancing management techniques. Submit to Scientific and Technical Advisory Committee via the Living Resources Subcommittee.	Waterfowl Workgroup (WW)	March 1991, Annually Thereafter
B. Determine the feasibility of artificial island creation using clean dredge spoil material for waterfowl habitat.	USFWS	March 1991
C. Locate and recommend former dredged or borrow areas (e.g. abandoned quarries) for restoration through the creation of waterfowl habitat by partially filling them with clean spoil from dredging of the Bay.	USFWS	March 1991
D. Host special conferences as necessary to solve general and specific waterfowl problems. Invite recognized experts and summarize findings.	WW	As Necessary

CHESAPEAKE BAY WATERFOWL MANAGEMENT PLAN

OBJECTIVE 3: Improve Public Understanding of the Waterfowl Resource and its Habitat Needs

Action 1. Identify opportunities to develop new educational programs and products.

Background: Informing the public about our valuable waterfowl resources is of critical importance in maintaining support for conservation and management. Waterfowl are one of the more visible forms of wildlife, and the public is generally aware of these birds, particularly hunters and nature enthusiasts. However, what waterfowl represent about the relative health of the Chesapeake Bay is little known or understood by the public. More information should be distributed emphasizing the various species that use the Bay, their preferred habitats, their behavior, and how their abundance is affected by the quality of habitats on the Bay.

Implementing Tasks	Lead Group or Agency	Schedule for Completion
A. Develop a plan identifying new ways to educate the public, including product descriptions, audience, time frames, equipment, and budget needs.	Waterfowl Workgroup (WW)	July 1991
B. Develop educational materials for use in agricultural extension programs to create or improve waterfowl habitat.	WW	December 1991
C. Generate public interest and support for conservation of waterfowl in Chesapeake Bay through production of posters, fact sheets, status and trends report, and other educational materials.	WW	July 1991
D. Produce educational materials to promote public support for measures to minimize disturbance of wintering waterfowl flocks, including support for marine sanctuaries.	WW	July 1991

