

WATERFOWL MANAGEMENT SYSTEM  
AND DATABASE

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PART I. WATERFOWL MANAGEMENT SYSTEM

## INTRODUCTION

The primary purpose of this document is to describe the system used by Maine Department of Inland Fisheries and Wildlife (MDIFW) biologists to make waterfowl management recommendations. Included are the processes to translate data into management decisions (Part I) and techniques for estimating various metrics of waterfowl populations used in the decision process (Part II).

Management direction for waterfowl in Maine is accomplished through a strategic planning process. At intervals of 15 years, population status, habitat, management, and public use of waterfowl resources are assessed and reviewed by a public process involving representative stakeholders. Following review, stakeholders recommend specific goals and objectives for waterfowl populations and associated resources. The Commissioner and his/her Advisory Council provide final authorization of recommended goals and objectives after internal review. Once approved, these goals and objectives provide guidance for waterfowl management for the next 15 years. The following waterfowl assessment, goals and objectives, and resulting management system cover 2006 – 2021.

## REGULATORY AUTHORITY

Waterfowl harvest management includes changing hunting regulations within limits established by the United States Fish and Wildlife Service (USFWS) and annually published in the Federal Register. Several international treaties and Congressional Acts govern issuance of migratory bird hunting regulations in the United States. The ultimate authority for establishing migratory bird hunting regulations in the United States lies with the Secretary of the Interior. In Maine, the Commissioner of Maine's Department of Inland Fisheries and Wildlife (MDIFW), establishes annual migratory bird hunting regulations within frameworks determined by the USFWS.

In addition to promulgating annual regulations for the sport harvest of waterfowl in Maine, the Commissioner of MDIFW, through enforcement and resource management Divisions, protects and enhances waterfowl populations within the State. Wildlife and environmental law enforcement, combined with habitat management on MDIFW lands, protects and improves Maine's waterfowl production, migration and wintering areas.

The Maine Department of Environmental Protection monitors water quality and enforces environmental laws protecting wetlands. Their efforts further protect waterfowl habitats throughout Maine.

### Migratory Bird Laws and Regulations

#### *Federal*

Regulations governing USFWS activity are specified by the code of Federal Regulations (CFR), Title 50 (Wildlife and Fisheries), Chapter One – parts 1-100 U.S. Fish and Wildlife Service (Appendix I-A, I-B). Annual changes to Title 50, occur through

well established administrative procedures, which involve public notice of intended changes, public hearings, and publication of these changes in the Federal Register (Appendix I-C) The 1988 Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (USFWS - SEIS 1988) prepared by the USFWS provides a detailed account of procedures used to change Title 50, CFR- Part 20, Hunting Regulations.

### *State*

Parallel migratory bird laws and rules are established by Maine regulations to ensure that state and federal laws are not in conflict. Maine Migratory bird laws and rules are contained in Chapters 701-721 of Title 12, Maine Revised Statutes and Amendments, part 10, Inland Fisheries and Wildlife (Appendix II).

## MANAGEMENT GOALS AND OBJECTIVES

Goals and objectives for waterfowl were established in 2006 to guide the management of waterfowl through 2021. The goals and objectives were defined through recommendations made to MDIFW by a waterfowl working group comprised of representative stakeholders from various interest groups.

### POPULATION AND PRODUCTIVITY GOAL

Maintain or increase waterfowl populations in Maine.

#### **Barrow's Goldeneyes**

Barrow's Goldeneyes Population Objective: Until 2021, maintain at 2006 population level or increase the wintering population of Barrow's Goldeneyes in Maine.

#### **Black Duck**

Black Duck Population Objective: By 2021, increase the Maine breeding population of Black Ducks by at least 15% over the 2006 population level.

#### **Canada Goose (Resident)**

##### ***Northern Zone***

Resident Canada Goose Population Objective: Maintain Maine's resident goose population in the Northern Zone at the 2006 level until 2021.

##### ***Southern Zone***

Resident Canada Goose Nuisance Objective: Develop and implement specific strategies that reduce Canada Geese nuisance complaints in the Southern Zone to at least 50% below 2005 levels by 2011.

#### **Mallard**

Mallard Population Objective: Maintain the Maine breeding population of Mallards at the 2006 level to 2021.

Mallard Harvest Objective: Manage Mallard at maximum sustained yield (MSY) to 2021 (see page 28 for detailed description of MSY)

## **Wood Duck**

Wood Duck Population Objective: Until 2021, maintain at the 2006 level or increase Maine's breeding Wood Duck population levels.

Wood Duck Harvest Objective: Manage Maine's Wood Duck population at MSY to 2021.

## **Ring-necked Duck**

Ring-necked Duck Population Objective: Until 2021, maintain at the 2006 level or increase Maine's breeding population of Ring-necked Ducks.

Ring-necked Duck Harvest Objective: Maintain Maine's Ring-necked Duck harvest at 2006 levels.

## **Hooded Merganser**

Hooded Merganser Population Objective: By 2021, decrease Maine's breeding population of Hooded Mergansers by at least 10% below 2006 levels<sup>1</sup>.

Hooded Merganser Harvest Objective: Increase Maine's harvest of Hooded Mergansers by 20% above 2006 levels.

## **Other Dabblers**

Population Objective for Other Dabblers: Until 2021, maintain at 2006 levels or increase Maine's breeding populations of other dabblers.

## **Other Divers**

Population Objective 1 for Other Divers: Until 2021, maintain at 2006 levels or increase Maine's breeding populations of other divers.

Population Objective 2 for Other Divers: Until 2021, maintain at 2006 levels or increase Maine's wintering populations of divers.

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<sup>1</sup> To increase nesting opportunity for Wood Ducks and other cavity nesters



## **HABITAT GOAL**

Maintain or increase the quantity and quality of breeding, staging, and wintering habitat for waterfowl in Maine.

Habitat Objective 1: Based on 2006 levels, maintain or increase the quantity and quality of breeding, staging, and wintering habitat for waterfowl in Maine by 2021.

Habitat Objective 2: By 2010, develop and maintain a list of the top ten waterfowl habitats for conservation in urban and coastal areas that are at risk of being compromised by development.

Habitat Objective 3: By 2021, increase by 10% the number of private landowners that actively manage or maintain their lands for waterfowl.

Habitat Objective 4: By 2021, increase active management of all appropriate MDIFW lands for breeding, staging, and wintering waterfowl by developing 15 major projects.

## **ACCESS GOAL**

Increase access to waterfowl habitats for hunters and other waterfowl resource users.

Access Objective 1: By 2011, increase boat and other types of access to waterfowl sites by 10%.

Access Objective 2: By 2008, develop an effective landowner/sportsman relations program by county.

## **OUTREACH GOAL**

Reverse the astounding decline in the number of waterfowl hunters in Maine.

Outreach Objective 1: By 2010, increase the number of waterfowl hunters in Maine by 10% over 2005 levels.

Outreach Objective 2: By 2010, in cooperation with the Maine Office of Tourism and other partners, develop an effective marketing effort for waterfowl viewing and hunting.

## SPECIAL CONSIDERATIONS

The management system developed for migratory waterfowl is significantly different from those used for resident Maine species. Management decisions for migratory birds involve regional (state and provincial), national, and international laws and treaties. The most unique aspect is the overriding Federal authority for establishing methods and limits for taking migratory birds.

The Federal role was established through international treaties with Great Britain (1916), Mexico (1936), Japan (1972), and Russia (1976). The Congress of the United States, through the Migratory Bird Treaty Act (1918), delegated responsibility for implementation of the provisions of these treaties to the Secretary of Agriculture. Today, that responsibility lies with the Secretary of the Interior who acts through the Director of the U.S. Fish and Wildlife Service (USFWS).

In practice, the USFWS works closely with regional Canadian, Mexican, and United States wildlife agencies to achieve this mandate. State input to migratory bird management is coordinated through four administrative Flyway Councils established to review affects of federal regulations on flyway populations (Figure 1).

Federal authority provides for coordinated examination of migratory bird management strategies, preventing individual states from acting independently to the detriment of migratory bird populations. Formal and informal review procedures must be met prior to the establishment of annual harvest regulations. During this process, many agencies and organizations must interact in order to establish valid management strategies for waterfowl (Appendix III-A).

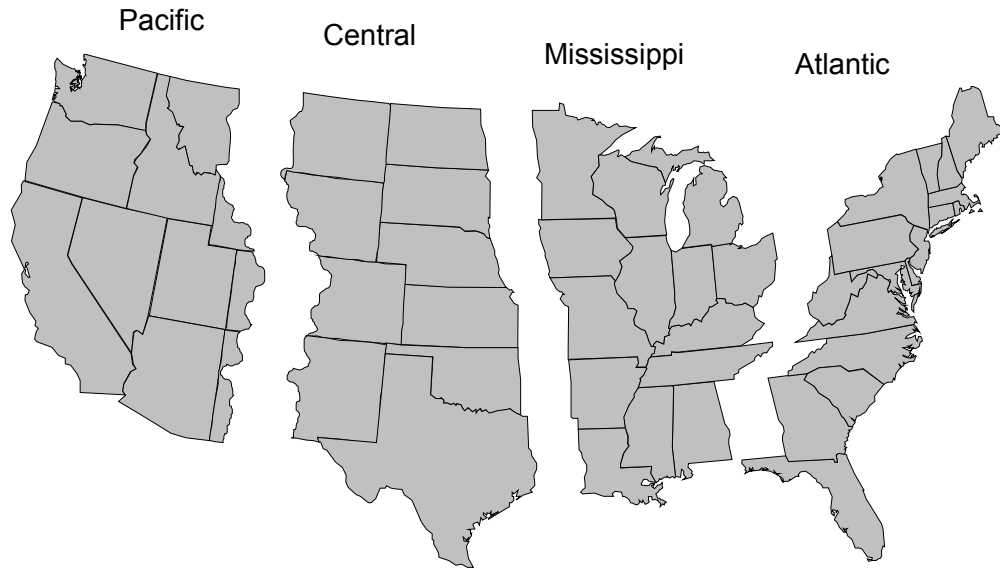


Figure 1. Administrative Flyways used to establish annual migratory bird hunting regulations in the U.S.A.

## MANAGEMENT DECISION PROCESS

### Overview

Current Maine waterfowl management decisions relate primarily to, 1) enforcement of environmental laws protecting wetland habitats (Maine Department of Environmental Protection, [DEP]) , 2) wetland acquisition, 3) water level management on MDIFW-owned properties, 4) waterfowl surveys, banding and research, and 5) selection of annual hunting season regulations. Season length, dates, and species bag limits must be selected from options presented by the USFWS in their final frameworks for migratory bird hunting regulations. A significant revision of the Waterfowl Management System includes a first attempt at addressing public access and outreach goals and objectives.

State level management decisions made to achieve the goal and objectives selected for waterfowl may be classified as habitat, population, access and outreach related.

### Habitat

Habitat decisions may be characterized as those covering acquisition of property or easements for water level management authority; support enforcement of existing DEP laws designed to prevent loss or degradation of wetland habitats; and establishing zoning or other land use restrictions that perpetuate the existence and quality of wetlands. Habitat enhancement decisions are made regarding wetland development, water level management, and nesting, feeding and resting sites for waterfowl. Decisions addressing the habitat objective relate to wetland protection and/or

enhancement. Department actions in this area will affect population objectives indirectly.

Population

Management decisions regarding waterfowl populations occur at the Federal and state level. In 1995, the USFWS adopted the concept of adaptive harvest management (AHM) for regulating duck harvests (Williams and Johnson 1995). The adaptive approach to resource management recognizes that results of hunting season regulations cannot be predicted with certainty, and provides a framework for objective decision-making. Post hoc analyses of hunting seasons enable population models to be improved in an annual, iterative process. Current season length and bag limit options under AHM models in the Atlantic Flyway are:

<u>Alternative:</u>	<u>Season length:</u>	<u>bag limit (total/mallard/female mallard):</u>
Closed		
Restrictive	30 days	3 / 3 / 1
Moderate	45 days	6 / 4 / 2
Liberal	60 days	6 / 4 / 2

Early versions of the AHM approach used models based on the population dynamics of mallards from the mid-continent region. More recently, models were developed for the Atlantic Flyway, based on eastern mallard populations. Based on the Eastern Mallard AHM models, the expected frequency of liberal regulations in the Atlantic Flyway is >99%. Maine’s breeding populations for key species must also be evaluated prior to

selection of annual hunting regulations. Data used in the Federal process are often not pertinent, or directly applicable, at the state level. This is especially true in Maine, where a smaller percentage of the total duck harvest is comprised of mallards relative to other Atlantic Flyway states. Furthermore, because of Maine's location in the Atlantic Flyway, waterfowl that breed and are produced in Maine are potentially subject to harvest throughout fall migration and into winter across multiple states to the south. Therefore, Maine must often make management decisions that are both unique within the Atlantic Flyway and contradictory to Federal frameworks or recommendations.

Maine's waterfowl harvest management strategy has historically been the selection of season length, bag limits, and optimum opening and/or closing dates that provide maximum harvest opportunity for Maine waterfowl hunters. More recently Maine waterfowl harvest strategies have been conservative relative to Federal framework. This most recent proposed system attempts to produce the maximum amount of hunting opportunity in the given year without compromising the sustainability of the resource and hunting opportunity over the long-term.

#### Access and Outreach

A significant revision of the Waterfowl Management System includes a first attempt at addressing public access and outreach goals and objectives. The Waterfowl Working Group expressed concern not only for the potential influence of shoreline development on waterfowl populations but also on the accessibility of waterfowl users (hunting and recreational waterfowl watchers) to gain access to waterfowl habitats. Although access and outreach materials are often developed within the Wildlife Resource Assessment

Section, final decisions regarding access and outreach type activities are resolved at the Bureau and Division level.

### Decision Making

Migratory bird harvest regulation decisions are made on two levels, Federal and State. Decisions at the Federal level are based on the status of continental and flyway level waterfowl populations. These decisions are governed by an extensive and well-developed system of data inputs designed to assess the status of North American waterfowl populations and production.

State management decisions are made separately from, but not independently of, Federal decisions. State decisions are often based on concern for a small segment of the North American breeding population and harvests. Final conclusions derived by the state decision making process may either support or contradict those made by the Federal process. However, in all cases, state waterfowl hunting regulations must not exceed federal hunting season and bag limit frameworks.

Only the MDIFW decision process will be addressed by this management system. Decision making should be a series of yes and no questions related to waterfowl population and habitat status. Responses to questions are based on evaluation of all input criteria and the flow chart guides the manager to the appropriate management option. Federal decisions and/or actions that result in a potential change in state migratory bird regulations cause a review of pertinent state and federal data in attempts to either support or refute the Federal mandates. Review of data by state and federal biologists occurs during bi-annual Atlantic Flyway Technical Section and Council meetings (Appendix I – C).

Goals and objectives have recently been established to guide MDIFW waterfowl management. More important, however, is the Department's decision to actively manage toward attainment of these stated goals.

Annual waterfowl research and data inputs have allowed wildlife managers to move away from a system of establishing annual hunting regulations based on social and/or personal opinions towards a more objective decision-making process using very specific guiding criteria based on waterfowl harvest dynamics and population ecology. In recent years, waterfowl hunting regulations have become more species-specific and selection of season dates and bag limits attempted to maximize hunting opportunity allowed by Federal regulations without jeopardizing the attainment of population objectives. Adaptive harvest management (AHM) is currently the guiding criteria for regulating waterfowl harvest frameworks on the Federal level (Appendix III – C).

Figures 2-16 are the framework for a management system that will be used to achieve the newly established goals and objectives of the Waterfowl Working Group. Based on input data and developed criteria, the responses to questions are determined and flow charts guide the decision maker to appropriate management options.



## SYSTEM CRITERION FOR DECISION MAKING

Answering the Waterfowl Management System Criterion questions dictated by the stated objectives identified by the Waterfowl Working Group produce specified management options. The answers, including accepted uncertainties and assumptions, are derived from the following criteria.

### EVALUATION OF SYSTEM CRITERION

#### A. SPECIES LEVEL DECISION CRITERION

Duck Population Objectives – FIGURE 2 - (includes Black Duck, Wood Duck, Ring-necked Duck, and other dabbling ducks and diving ducks)

**Criterion A – Breeding population size – Is the breeding population stable-increasing?**

Estimates of waterfowl breeding pairs are generated annual during the USFWS Eastern Waterfowl Survey Area. The Eastern Survey Area (strata 51- 72) includes parts of Ontario, Quebec, Labrador, Newfoundland, Nova Scotia, Prince Edward Island, New Brunswick, New York, and Maine, covering an area of approximately 0.7 million square miles. Estimates are more reliable when looking at populations throughout the total survey area rather than at the strata level. For the purposes of Maine’s decision-making process only numbers of breeding pairs from Maine (stratum 62) will be considered.

*Special considerations by species:*

*Wood ducks: Wood ducks are not counted during the annual Eastern Survey Area because of poor detection rates. Therefore, criteria for Breeding Population Size will be the annual number of wood duck hens/nest box derived from the Waterfowl Nest Box Production Data. An initial goal of 300 nest box checks/*

*year will help ensure a representative sample. However, to maximize efficiency and effectiveness of data collection regarding the nest box program a power analysis will be conducted following 5-years of data collection to determine the optimal number of nest boxes to check on a yearly basis. The power analysis should use the following (or similar) equation (Shiver and Borders 1996):*

$$n = 4N(CV)^2 / (AE)^2 N + 4(CV)^2$$

*where:*

*AE = allowable error (use 5% to represent 95% Confidence Interval)*

*CV = coefficient of variation among samples (expressed as a percentage)*

*Where CV = Standard Deviation/Mean x 100*

*N = number of units in the sample population*

*n = estimated number of box check necessary on an annual basis*

*An example of this equation exists in Appendix IV - A.*

Assumptions:

- 1) Aerial surveys are representative of the breeding waterfowl populations of Maine.
- 2) Changes in the number of wood duck hens/nest box are representative of breeding wood duck numbers throughout Maine.
- 3) Nest sites for wood ducks are not a limiting factor.
- 4) The baseline number of wood duck hens/nest box, calculated as three-year average (2004, 2005 and 2006), was 0.309 hens/nest box checked.

**EVALUATION:** If the number of birds counted in Stratum 62 (for wood ducks use Waterfowl Nest Box Production Data, hens/nest box) for the current period (3-year running average) is greater than the long-term average (+/-10%, 2000 – present) then the breeding population will be considered on target. Data will be analyzed every three (3) years starting in 2009 and the 3-year running average (i.e., 2007, 2008, 2009) will be compared against the long-term average (2000 – present) to make this determination. The answer to the criteria question can only be ‘yes’ for black ducks if the 3-year running average is greater than the long-term average. For all other waterfowl the answer to the criteria question is ‘yes’ when the 3-year running average is equal to or greater than the long-term average.

**Criterion B – Production Index – Is productivity increasing, stable or decreasing?**

Brood counts have been conducted in Maine since the mid-1950s on a sub-set of representative wetlands. They provide long-term productivity trend information for inland breeding waterfowl. Hens that successfully raise a brood to fledging are more likely to return to the same nesting location in subsequent years and hens are more likely to return to natal areas to breed than settle and nest in other locations (Majewski and Beszterda 1990). Therefore, an increase in local productivity (ducklings:hen) is likely to increase Maine’s breeding population of waterfowl.

The statistical program in Appendix IV-B represents a refinement of previous methodology and takes into account changes in timing of brood surveys, duckling age classes, and wetland type, whereby producing a corrected productivity index with reduced bias.

Assumptions:

- 1) Waterfowl production indices and changes to production indices resulting from wetland succession are representative of conditions throughout Maine.

EVALUATION: The slope of the regression line of the production index [production index = corrected number of ducklings per hen (From Appendix IV – B) multiplied by the number of broods observed on the 39 index wetlands] will be used to indicate current trends in productivity. A significant, positive slope will indicate increasing productivity; a significant, negative slope will indicate decreasing productivity, and a slope that does not differ from zero will be considered stable productivity. The regression line will be analyzed for the most recent five (5) years to make this judgment. A p-value of 0.10 will be used to determine significance. Re-evaluation (and potentially testing) of the each species-specific model is necessary every five (5) years to ensure that all statistically significant metrics are included in models.

#### Mallard Population Objectives - FIGURE 3

#### **Criterion C – Mallard breeding population size – Is the breeding population of mallards in Maine on a trajectory to remain the same as in 2006?**

Background information & assumptions are the same as noted above in Criterion A.

EVALUATION: If regression line of the number of birds counted in Stratum 62 is stable the current population is considered on target. A significant, positive slope will indicate an increasing population; a significant, negative slope will indicate a decreasing population, and a slope that does not differ from zero will be considered a stable, on target population. The regression line will be analyzed every three (3) years, including data points from 2000 through present, to make this judgment.

## Hooded Merganser Population and Harvest Objectives – FIGURE 4

### **Criterion D – Hooded Merganser Population Size – Is the breeding population 10% lower than in 2006?**

The Eastern Waterfowl Survey does not provide accurate estimates of hooded mergansers. Furthermore, the objective of reducing the breeding population of hooded mergansers was aimed at increasing nest availability for wood ducks. Therefore, estimates of breeding population size will be derived from the Waterfowl Nest Box Production Data.

Assumption:

- 1) The baseline number of hooded merganser hens/nest box, calculated as a three-year average (2004, 2005 and 2006), was 0.396 hens/nest box checked.

**EVALUATION:** If the numbers of hens/nest box for the current period (3-year average) is 10% less than in 2004, 2005, 2006 average the population objective will be considered achieved. Data will be analyzed every three (3) years starting in 2009 and the current 3-year average (i.e., 2007, 2008, 2009) will be compared against the baseline population (2004, 2005 and 2006) average noted above) to make this determination.

### **Criterion E – Hooded Merganser Harvest – Has harvest of Hooded Mergansers increased by 20% over 2006 levels?**

Harvest will be derived from the Harvest Information Program (HIP) data.

Assumptions:

- 1) Harvest data derived from HIP is representative of hooded merganser harvest throughout Maine.

2) Baseline harvest for hooded mergansers, calculated as the three-year average (2004, 2005 and 2006), was 703.

EVALUATION: If the numbers of hooded mergansers harvested for the current period (3-year running average) is 20% greater than the 2004, 2005, 2006 average objective is considered achieved. Data will be analyzed every three (3) years starting in 2009 and the current 3-year average (i.e., 2007, 2008, 2009) will be compared against the baseline harvest (2004, 2005 and 2006 average noted above) to make this determination.

#### Barrow's Goldeneye Population Objectives – FIGURE 5

**CRITERION F – Factors Limiting Barrow's Goldeneye Abundance in Maine - Do we currently understand what limits the number of Barrow's Goldeneye that winter in Maine?** Before developing management strategies aimed at maintaining or increasing the number of Barrow's Goldeneye wintering in Maine we must understand factors that influence annual population levels.

EVALUATION: Given current knowledge regarding Barrow's Goldeneyes can we predict what limits the wintering population in Maine? If yes, have the predicted variables been tested in Maine? The management system will be considered on target if we understand what limits the number of Barrow's Goldeneyes in Maine and are capable of enacting management actions that would either maintain or increase the wintering population.

**CRITERION G – Location of Factors That Limit Barrow’s Goldeneye Abundance in Maine – Do the factors that limit Barrow’s Goldeneye abundance in Maine occur in or out-of-state?**

EVALUATION: If the preponderance of evidence suggests that limiting factors occur in Maine and changes to these limiting factors are biologically feasible then the conservation of Barrow’s Goldeneyes is feasible and, thus, conservation can be achieved. If through the best scientific data available it is found that factors limiting Barrow’s Goldeneye abundance occur outside of Maine and/or changes to these limiting factors are not biologically feasible, actions in Maine will not conserve Barrow’s Goldeneyes.

**CRITERION H - Barrow’s Goldeneye Winter Population – Are the number of Barrow’s Goldeneye that winter in Maine increasing, decreasing or stable?**

Using the estimating tool provided in Appendix IV - E the number of Barrow’s Goldeneyes wintering in Maine will be calculated annually.

EVALUATION: The slope of the regression line produced by the model in Appendix IV - E will be used to indicate current trends of the wintering Barrow’s Goldeneye population. A significant, positive slope will indicate an increasing population; a significant, negative slope will indicate a decreasing population, and a slope that does not differ from zero will be considered a stable population. The regression line will be analyzed every three (3) years, including data points from 2006 through present, to make this judgment. A p-value of 0.10 will be used to determine significance.

Canada Goose (Resident) Population Objective (Northern Zone) – FIGURE 6**CRITERION I – Resident Canada Goose Population Assessment – Is the population of Maine’s resident Canada Goose population in the Northern Zone increasing, decreasing, or stable?**

Population trajectory will be evaluated via banding studies and the resident Canada Goose population model in Appendix IV - C. An annual banding target of 5% of the resident Canada Goose population will help ensure that estimates produced by the population model in Appendix IV - C are reliable. Care should be taken to distribute banding effort relatively evenly throughout the state. The previous five (5) year mean number of Canada Geese counted in Stratum 62 during the Eastern Waterfowl Survey will be used as the base population. Example:

2001 – 2006 mean = 12,269

Therefore,  $12,269 \times 0.05 =$  banding goal of 613 birds

EVALUATION: The rate of population change ( $\lambda$ ) produced by the model in Appendix IV - C will be used to indicate current trends of the resident Canada Goose population. Rate of population change  $> 1.05$  will indicate an increasing population; a rate of population change  $< 0.95$  will indicate a decreasing population, and a rate of change from  $0.95 - 1.05$  will indicate a stable population. The rate of population change will be analyzed every three (3) years to make this judgment. Development of a resident Canada Goose population survey through the current planning period should be a priority. A resident Canada Goose population survey will allow managers to better understand compensatory components of the population model. Care should be taken in interpreting a resident Canada Goose survey because compensatory mechanisms



such as delayed breeding, reduced production and/or emigration of geese could mask model projections.

Canada Goose (Resident) Population Objective (Southern Zone) – FIGURE 7

**CRITERION J – Resident Canada Goose Nuisance Complaint Assessment – Are nuisance complaints regarding resident Canada Geese increasing, decreasing, or stable in the Southern Waterfowl Zone?**

The number of nuisance complaints will be evaluated via regional biologist reports, permit requests submitted to MDIFW, and USDA-APHIS/Wildlife Services reports. In 2006 a system for reporting Canada Goose nuisance complaints was developed (Appendix IV - D) and will be operational in 2007. Therefore, the original objective of using 2005 nuisance complaint levels as the baseline was not attainable, rather 2007 levels will be used to evaluate the performance of management options 20, 21 and 22.

EVALUATION: If the number of nuisance complaints in the Southern Waterfowl Zone decline annually the Canada Goose nuisance management system is on target. If the number of nuisance complaints in the Southern Waterfowl Zone are not declining annually then the Canada Goose nuisance management system is not on target. The number of complaints will be assessed annually (December-January) and necessary adjustments will be made to current nuisance abatement strategies the following spring.

**CRITERION K – Resident Canada Goose Nuisance Complaint Location – Is the complaint originating in an urban, suburban, or rural location?**

Locations of complaints regarding nuisance resident Canada Geese must be taken into account for proper management option select. If a large majority of complaints originate in urban environments, increasing harvest opportunity for resident Canada Geese will

likely not reduce future complaints. Conversely, this same management decision could reduce future nuisance complaints in agricultural areas where hunting is permissible and harvest rate is sufficient to reduce resident Canada Goose populations.

EVALUATION: Complaints regarding nuisance resident Canada Geese will be designated as rural/agricultural or urban/suburban within each region and regional decision-making will better address local issues regarding nuisance Canada Geese. Evaluation of the location and type of the majority of nuisance Canada Goose complaints will occur annually (December-January) and adjustments will be made to current nuisance abatement strategies the following spring.

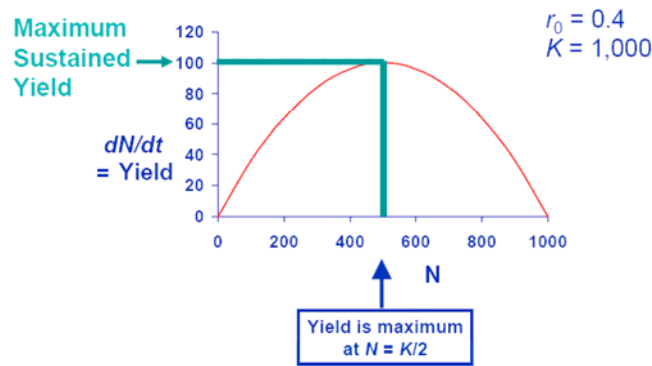
## **B. POPULATION AND HABITAT LEVEL DECISION CRITERION**

### Population and Harvest Objectives – FIGURES 8 -11

**CRITERION L – Score From Appendix IV - F** – Here species-specific outputs from management options 1- 8 are incorporated into a larger waterfowl community level decision-making model. Scores produced by the status of waterfowl (breeding population numbers and productivity trends) are further weighted by harvest levels of Black Ducks, Mallards, Wood Ducks and Ring-necked Ducks to calculate a final weighted score in Appendix IV - F. This score should be computed every three years to aid in decision-making regarding season frameworks and landscape (habitat) level management options. Scores produced by Appendix IV - F fall into three major categories used as decision making criterion, (1)  $\geq 2.33$  Liberal, (2) 1.66 -2.32 Moderate, and (3)  $< 1.66$  Restrictive.

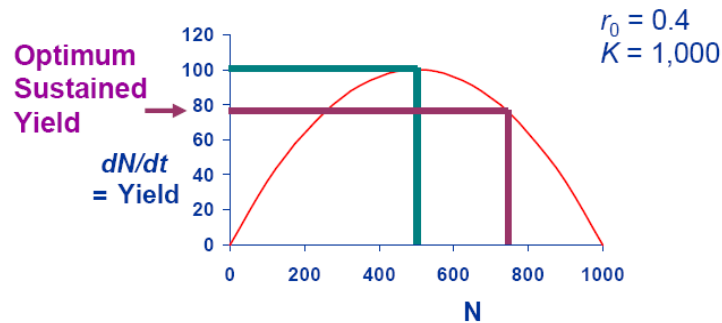
**CRITERION M – Mallard and Wood Duck Harvest Objectives (MSY) – Do population models predict that we are above, below or at MSY for mallards and/or wood ducks?**

Key to this approach is assessing and refining procedures by tracking model performance (Nichols et al. 1995). In simplest terms, this is achieved by comparing actual field data with model predictions of population. Therefore, model development is an adaptive process whereby feedbacks from field observations are incorporated into the refined model. In population ecology, maximum sustainable yield or MSY is, theoretically, the largest yield/harvest that can be taken from a species population (or stock) over an indefinite period. Under the assumption of logistic growth, MSY will be exactly half the carrying capacity of a species, as this is the stage when population growth should be greatest.



Uncertainty regarding inputs such as population size, population growth rate, relationships between population size and growth, and harvest levels makes managing at MSY less desirable. When managing at MSY, a population that starts to decline will continue to decline unless yield is changed. In short, errors in estimating the population dynamics of a species can lead to setting the maximum sustainable yield too high.

Therefore, it is best to take the “right-shoulder approach” of managing slightly below MSY to help reflect possible uncertainty. The maximum sustainable yield is usually higher than the optimum sustainable yield. Managing at optimum sustainable yield balances current duck harvest with long-term persistence of the population and social/economic factors to provide maximum benefit for society.



**EVALUATION:** Location on the yield curve produced by the population model will determine whether current harvest is above, below or at MSY. Given the background information provided above, mallard and wood duck harvest should be managed slightly below MSY at a point nearing optimum sustained yield. The model will be analyzed every three (3) years using the last five (5) years metrics to make a judgment regarding location of the population on the yield curve. A model has yet to be developed and this should be a priority through the next planning phase. If state level yield curves have not been developed, USFWS yield curves for eastern populations of mallards and wood ducks will be used as a surrogate. Currently (2007) the eastern Mallard harvest is at 83% of MSY (Fred Johnson, USFWS, *pers. comm.*). Therefore until state-level yield curves are developed, harvest regulations for Mallards should remain relatively liberal.

**CRITERION N – Waterfowl Habitat Quantity – Is the quantity of breeding, staging and wintering habitat for waterfowl remaining stable or increasing?**

Traditionally there has been no annual or periodic measure of habitat loss or gain for Maine wetlands. Because the 1973 National Wetland Inventory (NWI) has not been updated, a comparison with the current wetland trends in Maine cannot be made using these data. However, since the last Waterfowl Management System in 1988, models have been developed to identify high and moderate value Inland Waterfowl and Wading Bird Habitats (IWWH; Rustigian and Krohn 2002). Small, ephemeral wetlands and beaver flowages were often included in the IWWH model. Therefore, IWWH models could be periodically re-developed using current landscape attributes to assess changes to waterfowl habitat in Maine. Unfortunately, IWWH model comparisons cannot currently be developed because they are partially based on pre-1980's data produced by the last NWI.

Four duck species habitat models (Arnold and Schaller 2001) now enable us to assess quantity and quality of waterfowl habitats. A black duck model was used as an index to breeding and migrating habitat; a wood duck model was used as an index to breeding habitat; a scaup model was used as an index to migrating and wintering habitat; and a scoter model was used as an index to wintering habitat. Habitat areas were calculated for each model in the 2005 Waterfowl Assessment, and Wildlife Management Districts (WMDs) were ranked according to the area of moderate and high value habitats.

High and moderate value IWWHs amounted to 657,908 acres statewide, while area of medium and high value habitat from the black duck breeding and migrating

model was 962,941 acres, and the wood duck model yielded over 2.6 million acres of medium and high value breeding habitat. Among these three models there was considerable overlap in the rankings of WMDs. Wildlife Management District 18 was ranked highest in each model; the three top-ranked WMDs from the wood duck and black duck models were identical (WMDs 18, 17, and 23). Among 10 top-ranked WMDs, black duck had 8 in common each with the IWWH model and the wood duck model; the wood duck and IWWH models shared 7 of 10 top-ranked WMDs. Wood duck and black duck habitat each totaled nearly 3 million acres.

The migrating and wintering habitat estimates from the scaup model totaled 891,697 acres, of which only 23,955 acres were categorized as medium or high value. Not surprisingly, the highest ranked areas for scaup migrating and wintering habitat are coastal WMDs 30, 26, 24, and 27. Similarly, the scoter wintering habitat model indicated the majority of moderate and high value wintering habitat is in coastal WMDs.

EVALUATION: When the IWWH and four species-specific habitat models are re-assessed, changes in the quantity of breeding, staging and wintering habitat will be moderate and high value IWWH remains the same or increases and the amount of breeding, migrating, and wintering habitat remains the same or increases for all four species-specific habitat models. Unfortunately, until another NWI is conducted this determination is difficult to make during the next 15-year planning period. However, it is unlikely that major changes to wetland quantity will occur through the next planning period (Weik 2005). Therefore, all available habitat literature and data will be considered to make this decision.

**CRITERION O – Waterfowl Habitat Quality – Is the quality of breeding, staging and wintering habitat for waterfowl remaining stable or increasing?**

Because the IWWH model and four species-specific habitat models were developed with a ranking system, changes to the quality of breeding, staging, and wintering habitat can be assessed in the future. However, development of methodologies to assess more fine scale changes to wetland quality, as well as, testing and refinement of computer generated habitat models are also suggested. Unfortunately, IWWH model comparisons cannot currently be developed because they are partially based on pre-1980's data produced by the last NWI. Until another NWI is conducted, research aimed at understanding changes in wetland quality should be developed to meet the goals and objectives during the current 15-year planning period.

**EVALUATION:** When the IWWH and four species-specific habitat models are re-assessed, changes in the quality breeding, staging and wintering habitat will be determined. The management system will be considered on target if the ratios between low, medium and high value habitats remain unchanged for IWWH and the four species-specific models. The management system will also be considered on target if the described ratios are weighted more heavily towards high value habitats during future development of habitat models. Unfortunately, until another NWI is conducted this determination is difficult to make during the next 15-year planning period. Therefore, until new NWI data are available and IWWH model are re-assessed, short-term research (conducted by MDIFW), aimed at assessing changes to quality of wetlands, will be used to make this judgment.

### **C. ACCESS AND OUTREACH DECISION CRITERION**

**CRITERION P: Does a list of the top ten waterfowl habitats in need of conservation in urban and coastal areas that are at risk of being compromised by development exist?**

**EVALUATION:** Determine if a list of waterfowl habitats in need of conservation has been developed by various interest groups including (but not exclusive to), The Maine Wetlands Protection Coalition, various conservation trusts, Maine Department of Inland Fisheries and Wildlife (Land Acquisition Committee), Beginning with Habitat, and/ or the Atlantic Coast Joint Venture. This habitat section of the management system is considered on target if a list exists and the top ten waterfowl habitats in need of conservation in urban and coastal areas that are at risk of being compromised by development have been identified.

**CRITERION Q: Have the number of private landowners that actively manage or maintain their lands for waterfowl increased by 10% over 2006 levels?**

This objective aimed at private landowners is directly linked with the habitat objective of maintaining or increasing the quantity and quality of waterfowl habitat in Maine. Given that approximately 94% of the state's land area is privately owned, wetland habitat objective cannot be met solely via management of state owned lands.

**EVALUATION:** The management system will be considered on target if the number of private landowners that actively manage or maintain their lands for waterfowl increases by 10% over 2006 levels. This will be assessed annually in January via available databases (WHIP, WRP, CRP, etc.) regarding activities on private lands.



**CRITERION R: Has MDIFW developed 15 major projects aimed at increasing the active management of appropriate state lands for breeding, staging, and winter waterfowl since 2006?**

This objective aimed at the management of MDIFW lands is directly linked with the habitat objective of maintaining or increasing the quantity and quality of waterfowl habitat in Maine. Furthermore, meeting this objective may also help achieve some of the Access Goals outlined below. Meeting this objective is largely based on availability of resources to the Management Section. However, use of private and federal aid programs by other MDIFW personnel may also aid in meeting this objective. Major projects qualify as those that significantly increase the use of state lands by breeding, staging and/or wintering waterfowl and increase access for waterfowl viewing and hunting.

**EVALUATION:** If 15 projects as described above have been completed then the management system is considered on target. This will be assessed annually in January.

**CRITERION S: Has access to waterfowl hunting and viewing sites increased by 10% above 2006 levels?**

Declines in waterfowl hunting and other outdoor wildlife viewing activities have been attributed to decreases in access because of posting of lands and development of shorelines.

**EVALUATION:** Current databases likely do not adequately track levels of access to waterfowl hunting and viewing sites to make this determination. However, given current trends in land ownership and shoreline development it is assumed that such access

continues to decline annually. Therefore, a conservative approach will be taken and all management activities in this area will be aimed at increasing access through the next planning period.

**CRITERION T: Does an effective landowner/sportsman relations programs exist by county?**

Development of an effective landowner/sportsman relations programs is intimately linked to many Access, Outreach, Population, and Harvest Objectives outlined throughout this document. It may be most effective to develop landowner/sportsman relations programs based on successful models previously enacted by other jurisdictions (Federal, state, provincial).

EVALUATION: If an effective landowner/sportsman relations program exists by county the management system is considered on target. This assessment will be conducted annually in January. If a program does not exist the proper personnel will be contacted and reminded that this is one of the objectives set forth by the Public Waterfowl Working Group.

**CRITERION U: Have the number of waterfowl hunters in Maine increased by 10% over 2005 levels?**

Increasing the number of waterfowl hunters in Maine is intimately linked to many Access, Outreach, Population, and Harvest Objectives outlined throughout this document. The number active waterfowl hunters from the HIP survey will be the data used.

EVALUATION: If the number of active waterfowl hunters in Maine increases by 10% above 2005 levels and is maintained until 2010 the management system is considered on target.

**CRITERION V: Does the Maine Office of Tourism and/or other partners produce an effective marketing tool aimed at increasing waterfowl viewing and hunting in Maine?**

EVALUATION: If an effective marketing tool aimed at increasing waterfowl viewing and hunting in Maine is produced by the Maine Office of Tourism, MDIFW Division of Public Information and Education, and/or other cooperators the management system is considered on target.

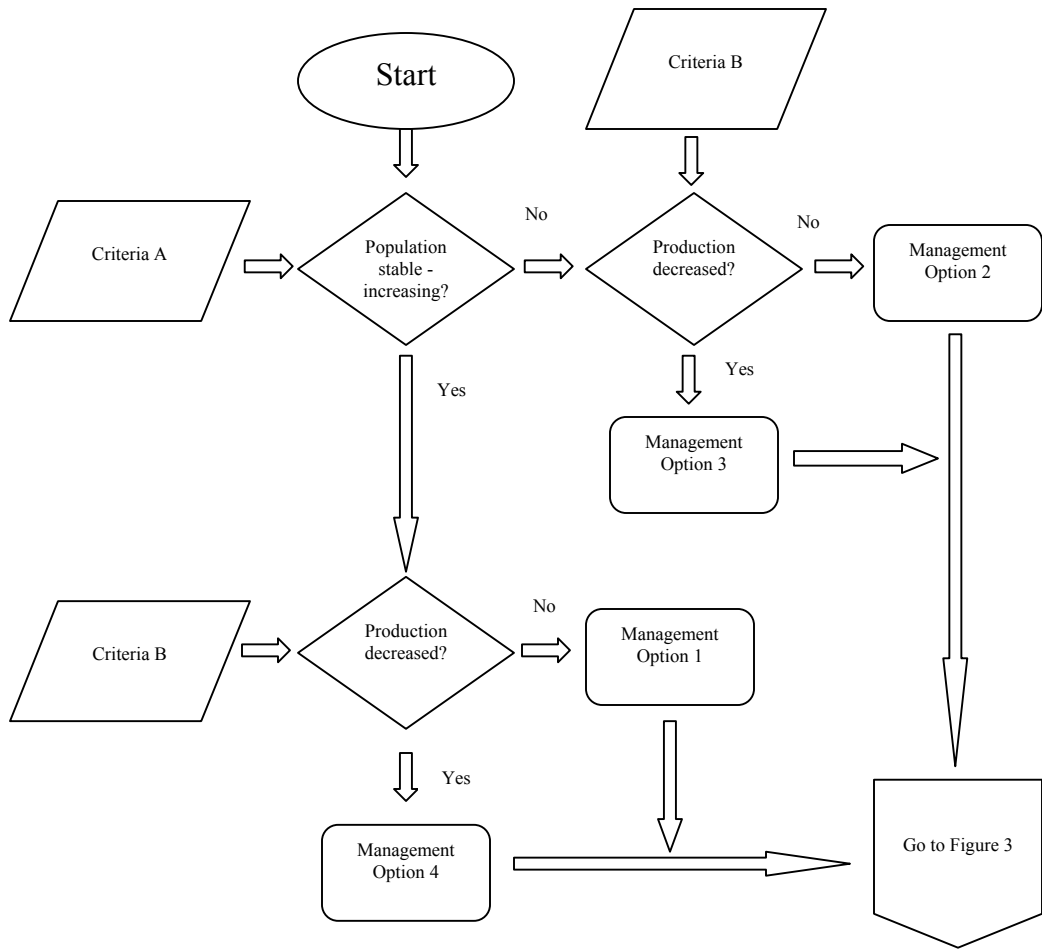


Figure 2. Species level decision chart for Black Duck, Wood Duck, Ring-necked Duck, other dabbling duck and other diving duck (run each species through the model separately)

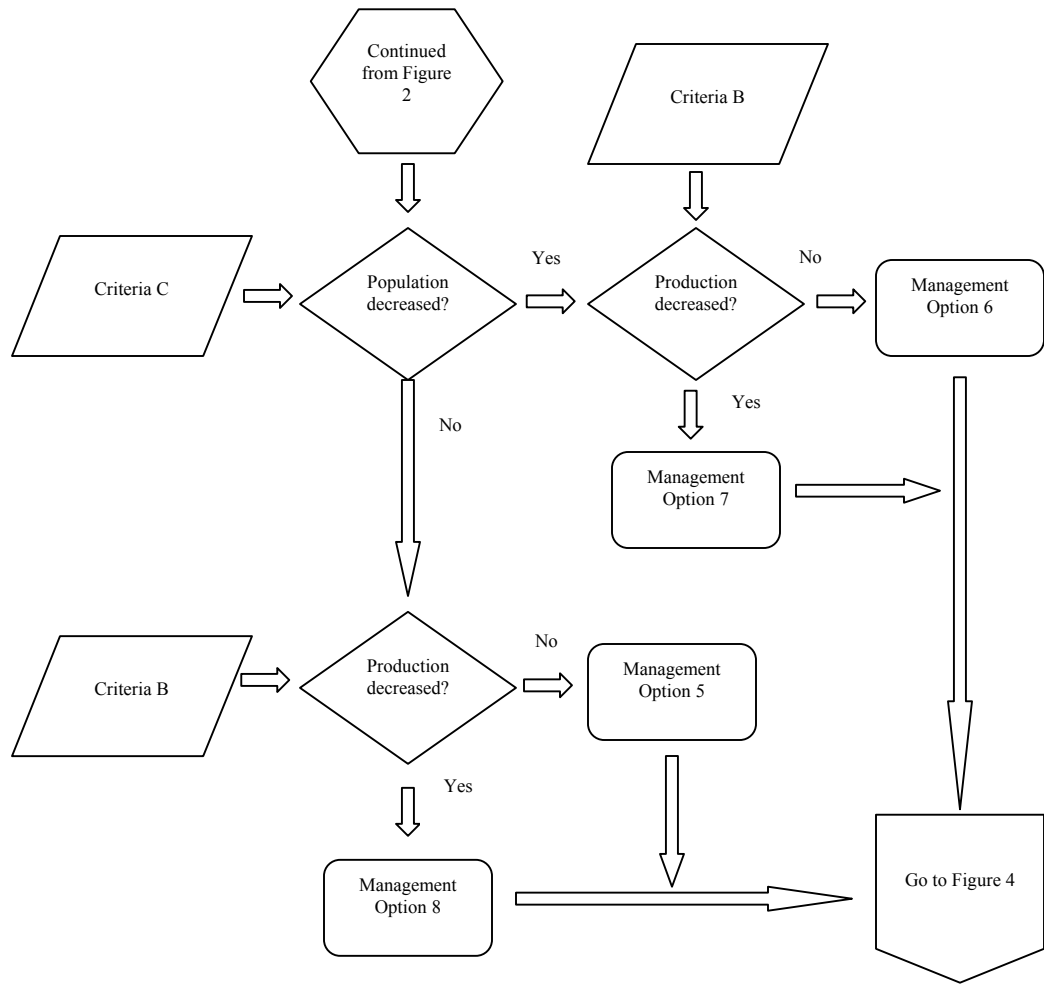


Figure 3. Species level decision chart for Mallard

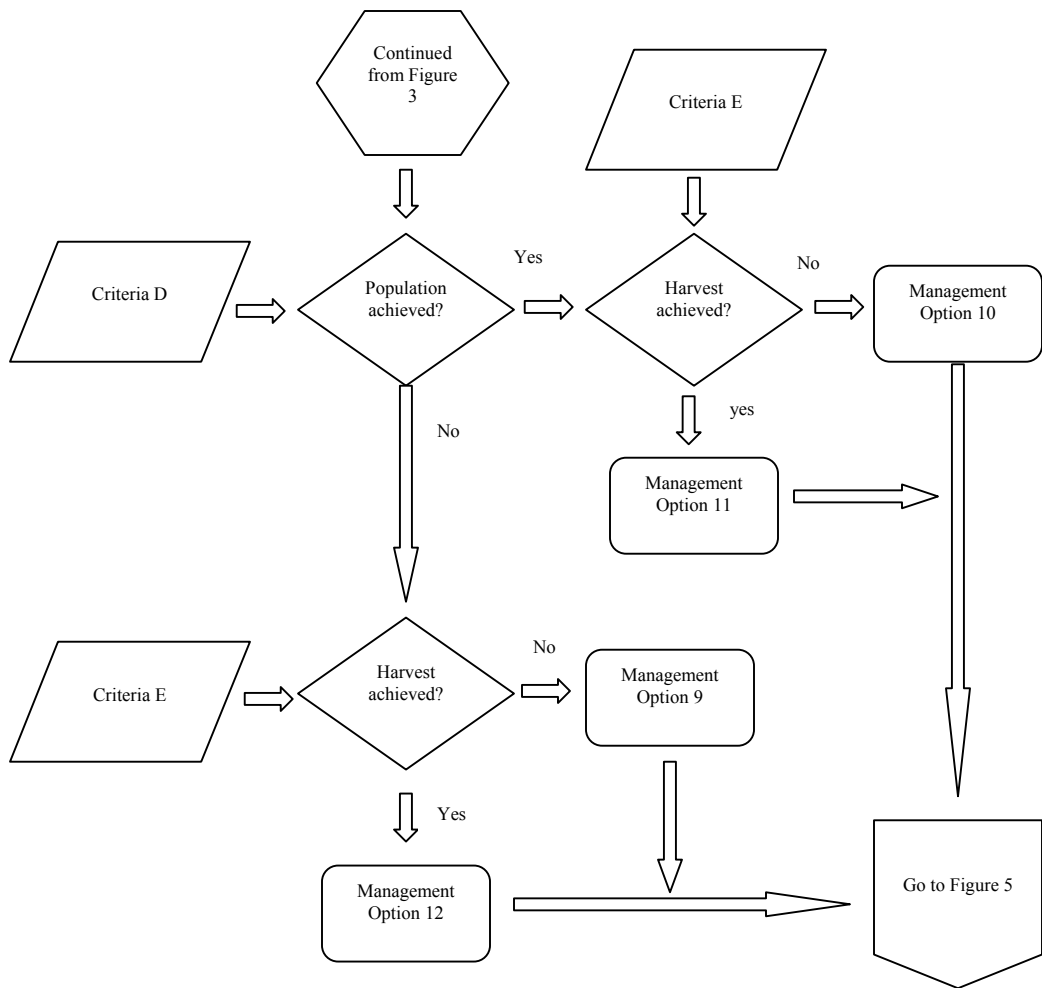


Figure 4. Species level decision chart for Hooded Merganser

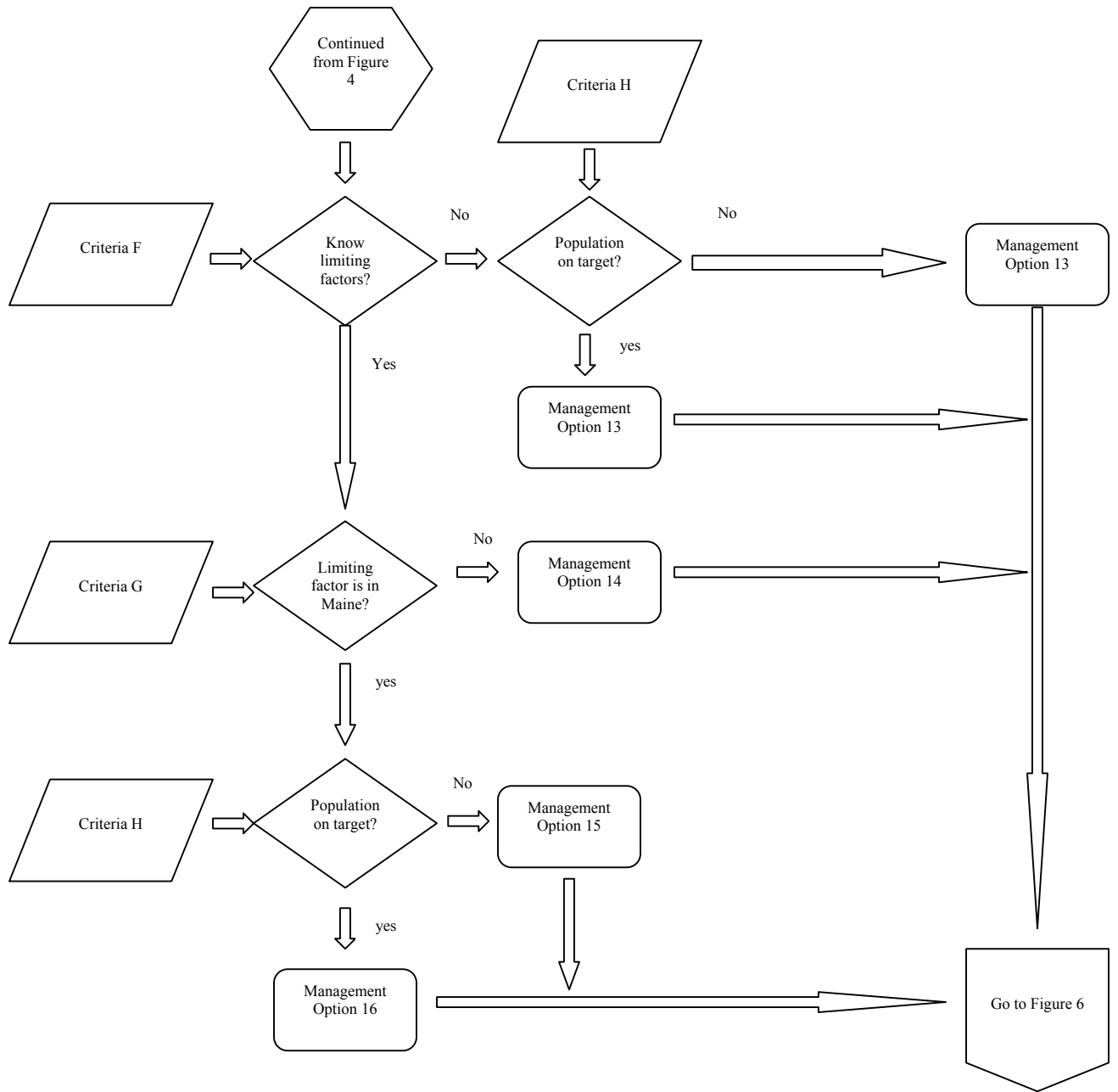


Figure 5. Species level decision chart for Barrow's Goldeneye

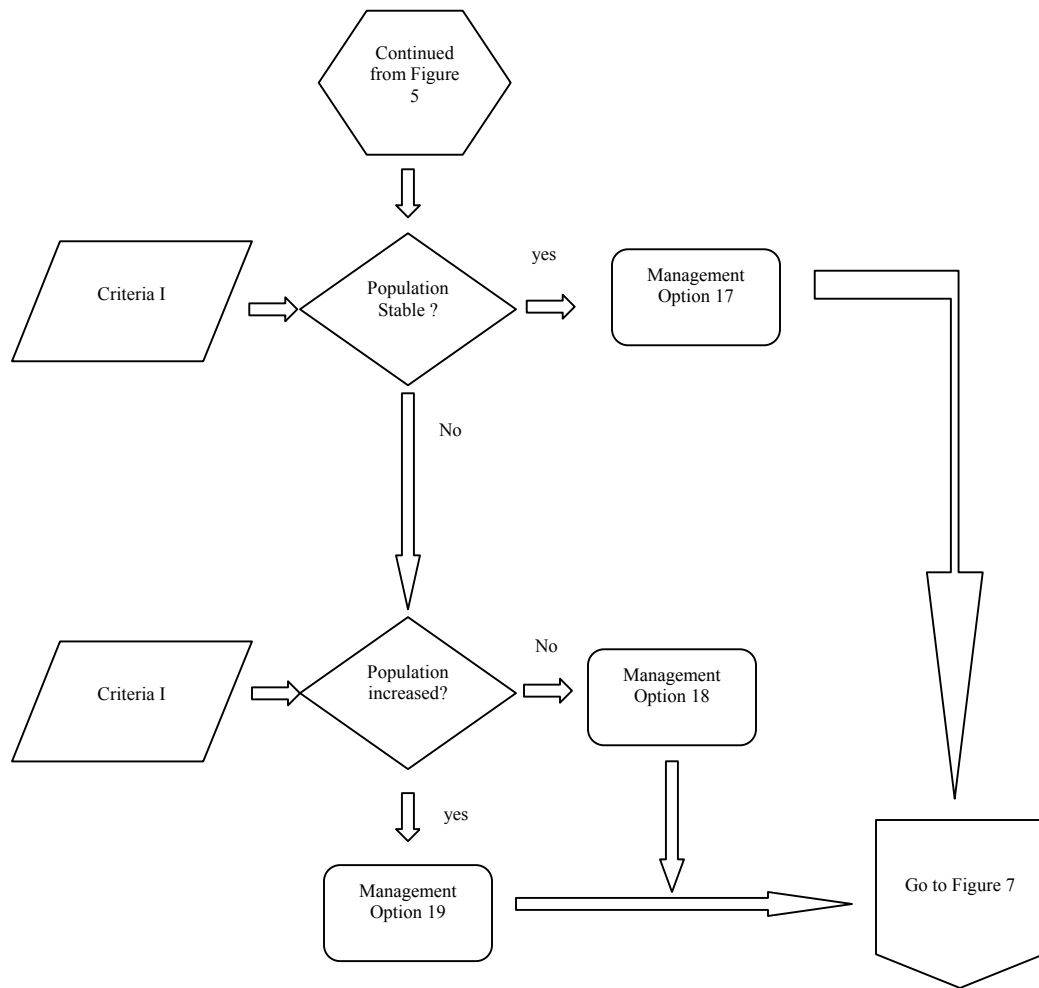


Figure 6. Species level decision chart for resident Canada Goose in the northern waterfowl hunting zone



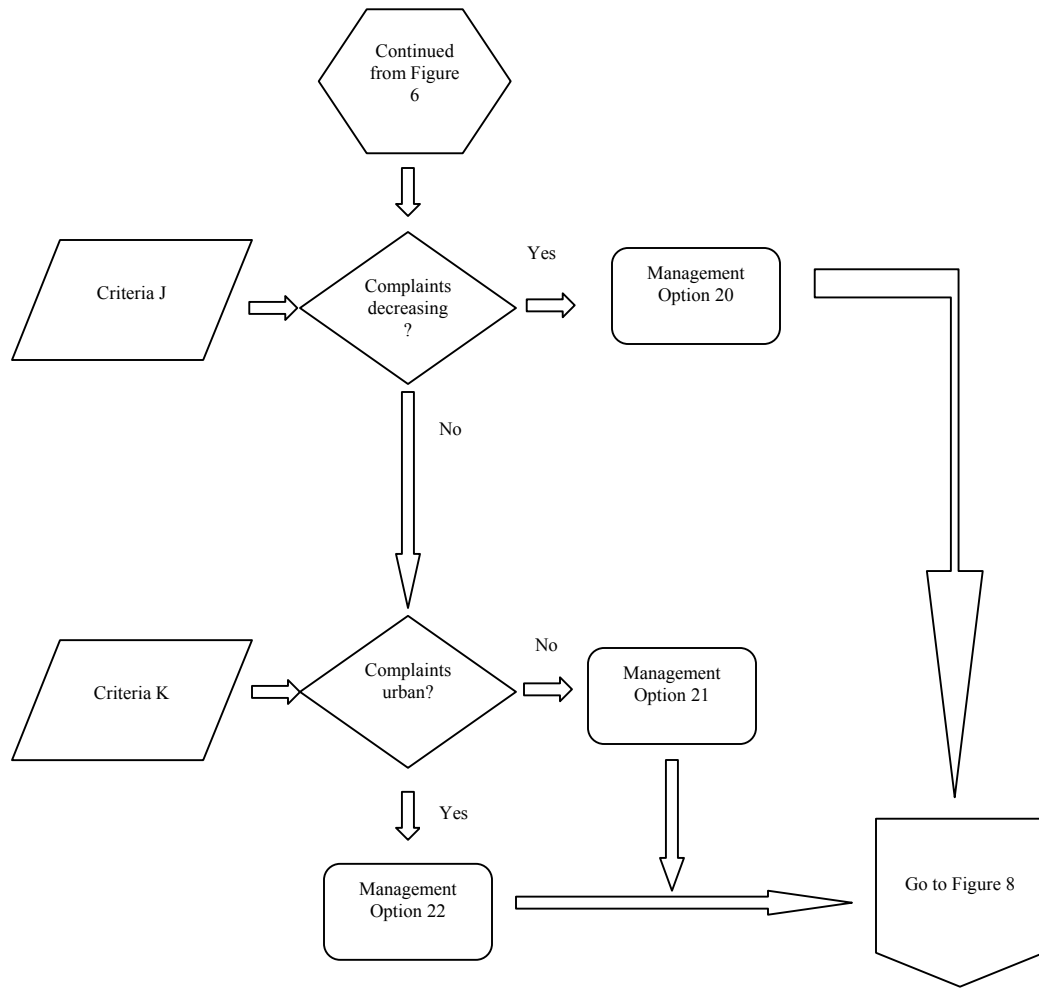


Figure 7. Species level decision chart for resident Canada Goose in the southern waterfowl hunting zone

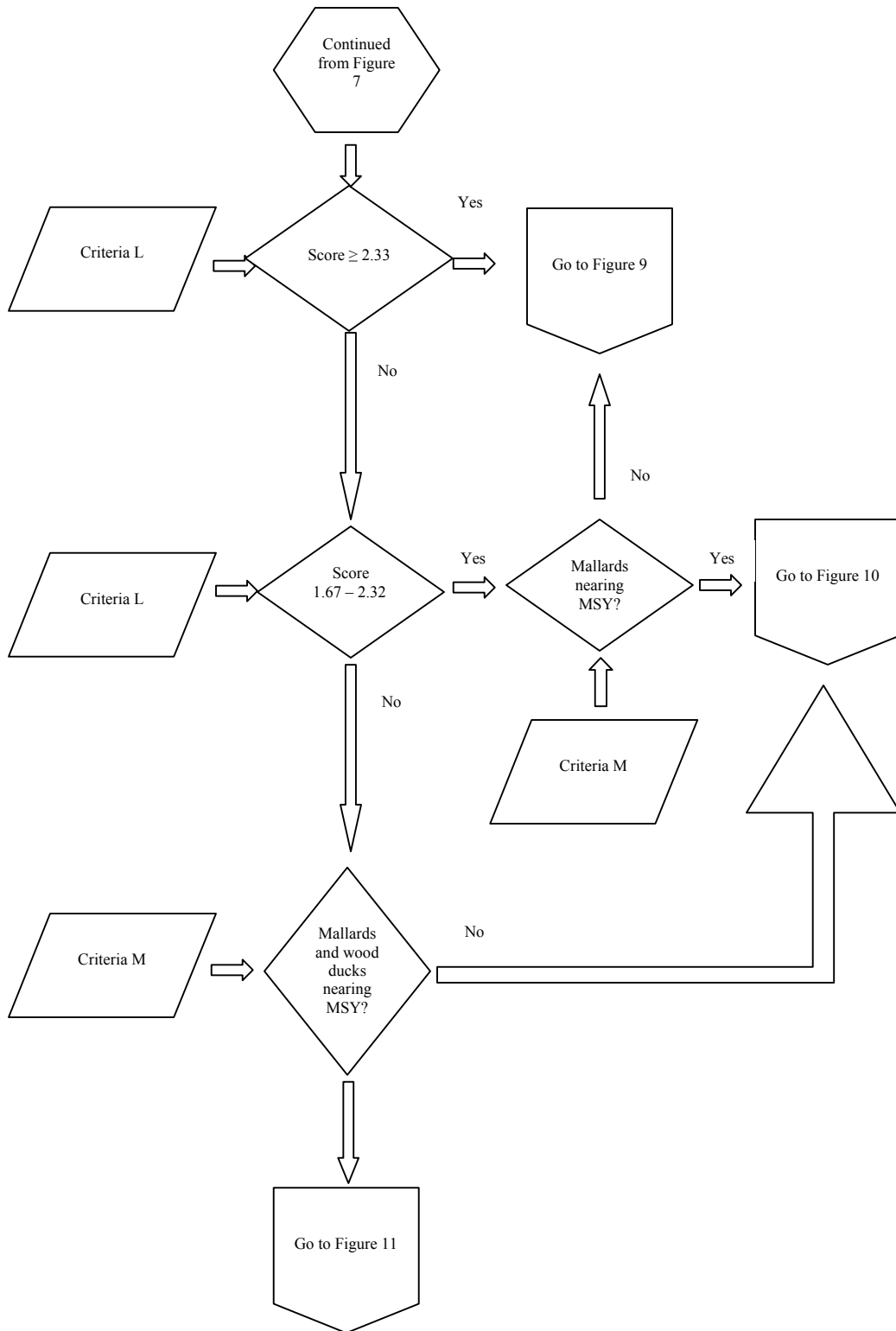


Figure 8. Population level decision chart for Maine breeding waterfowl

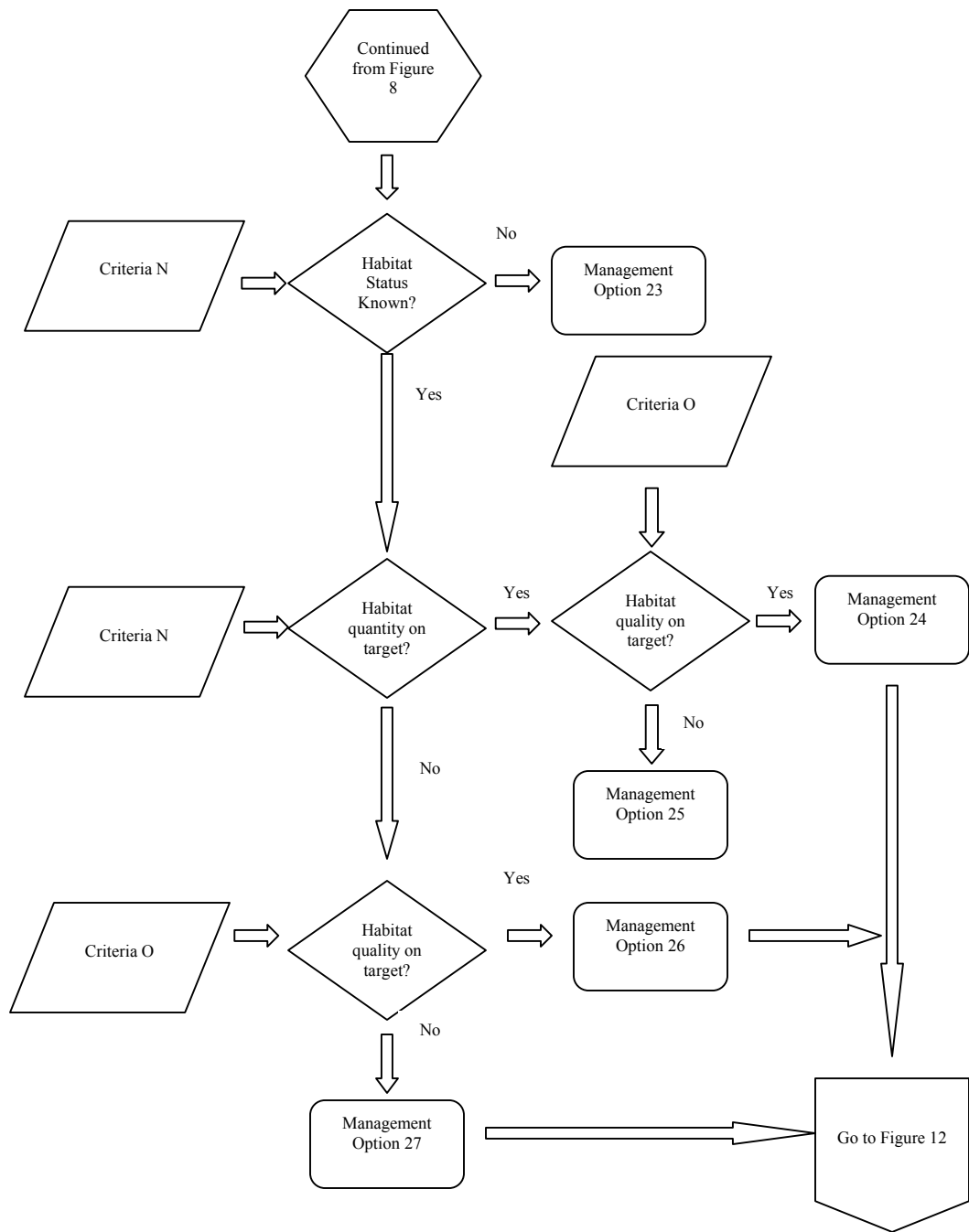


Figure 9. Habitat level decision chart using the Liberal Harvest Framework

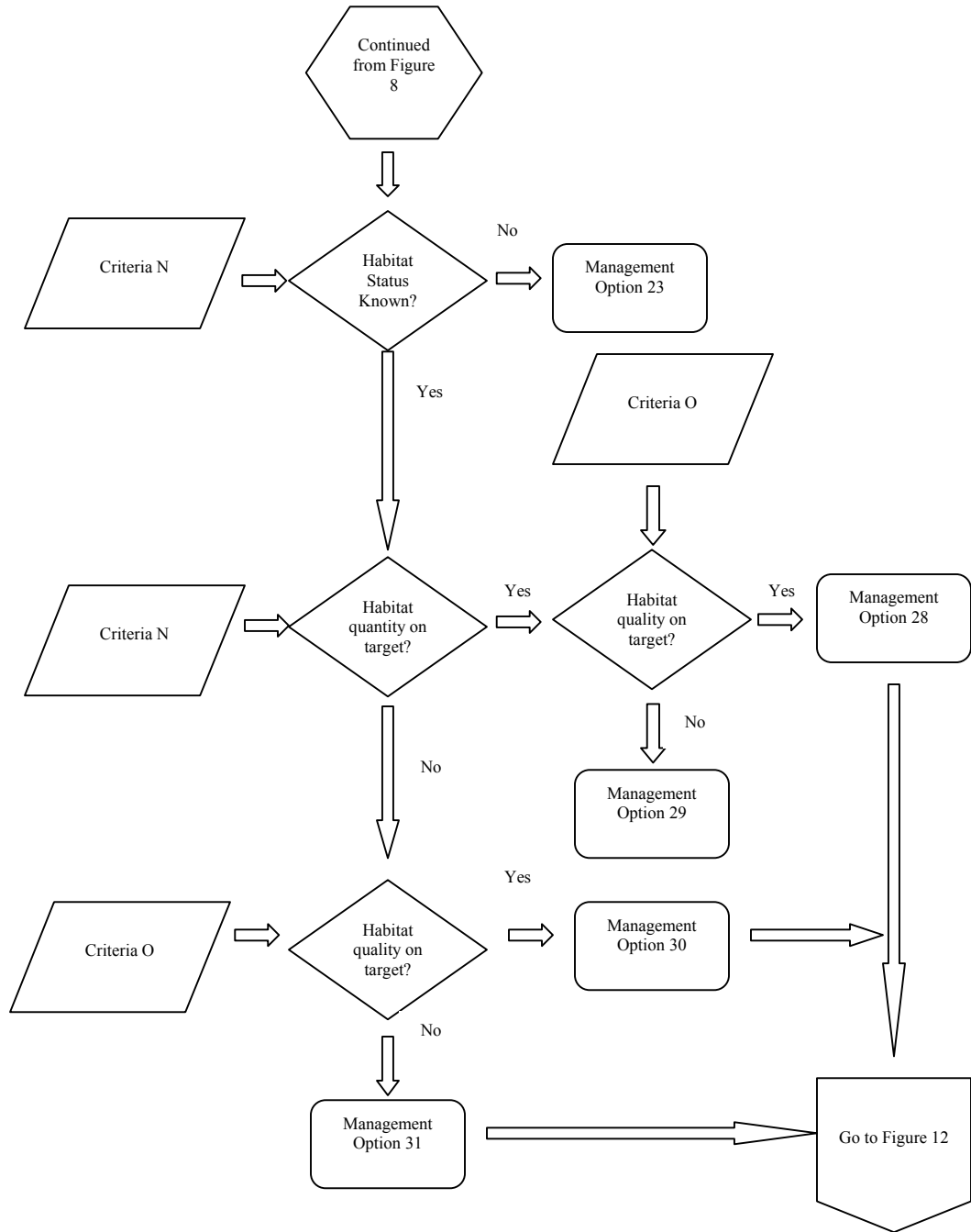


Figure 10. Habitat level decision chart using the Moderate Harvest Framework

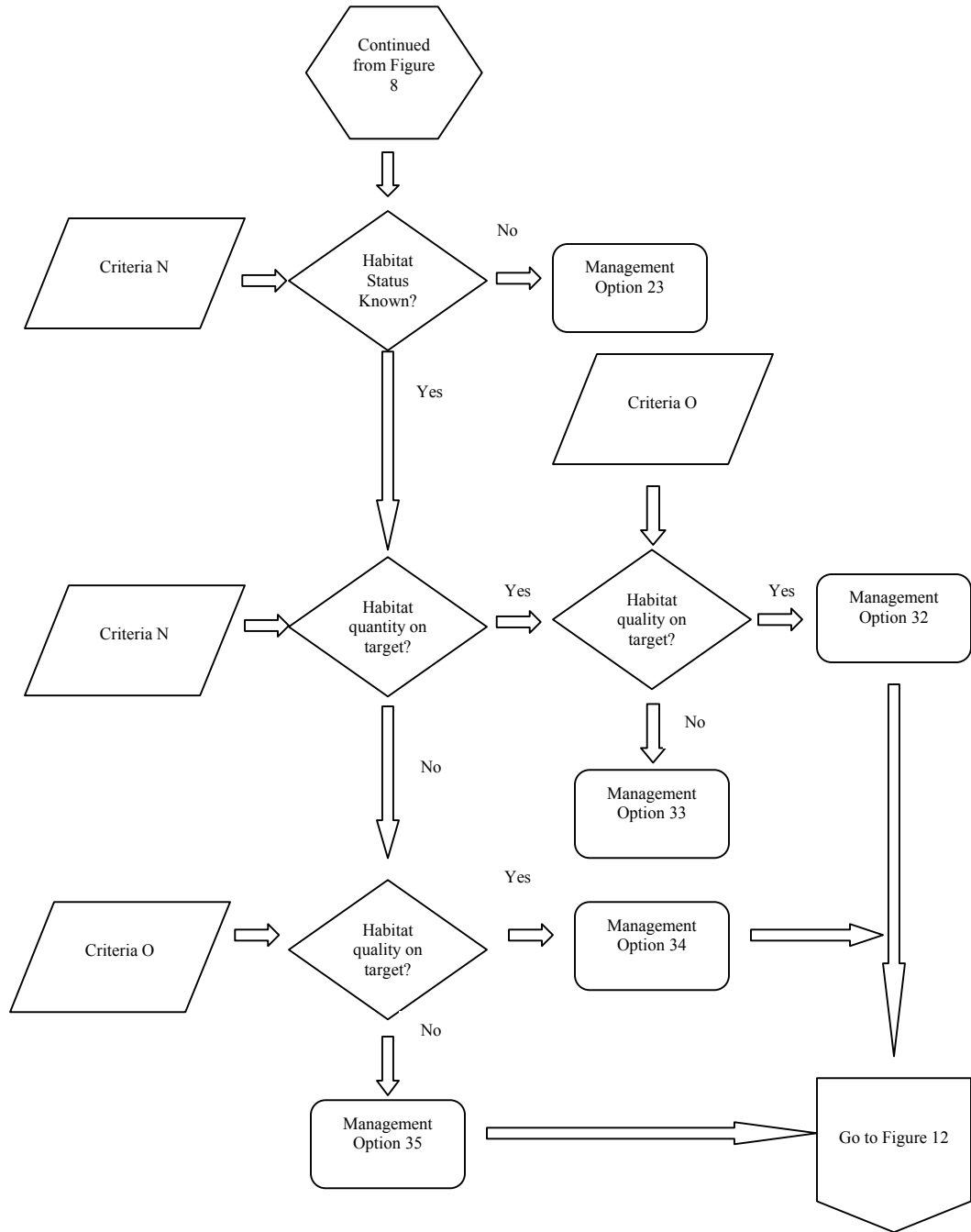


Figure 11. Habitat level decision chart using the Restrictive Harvest Framework

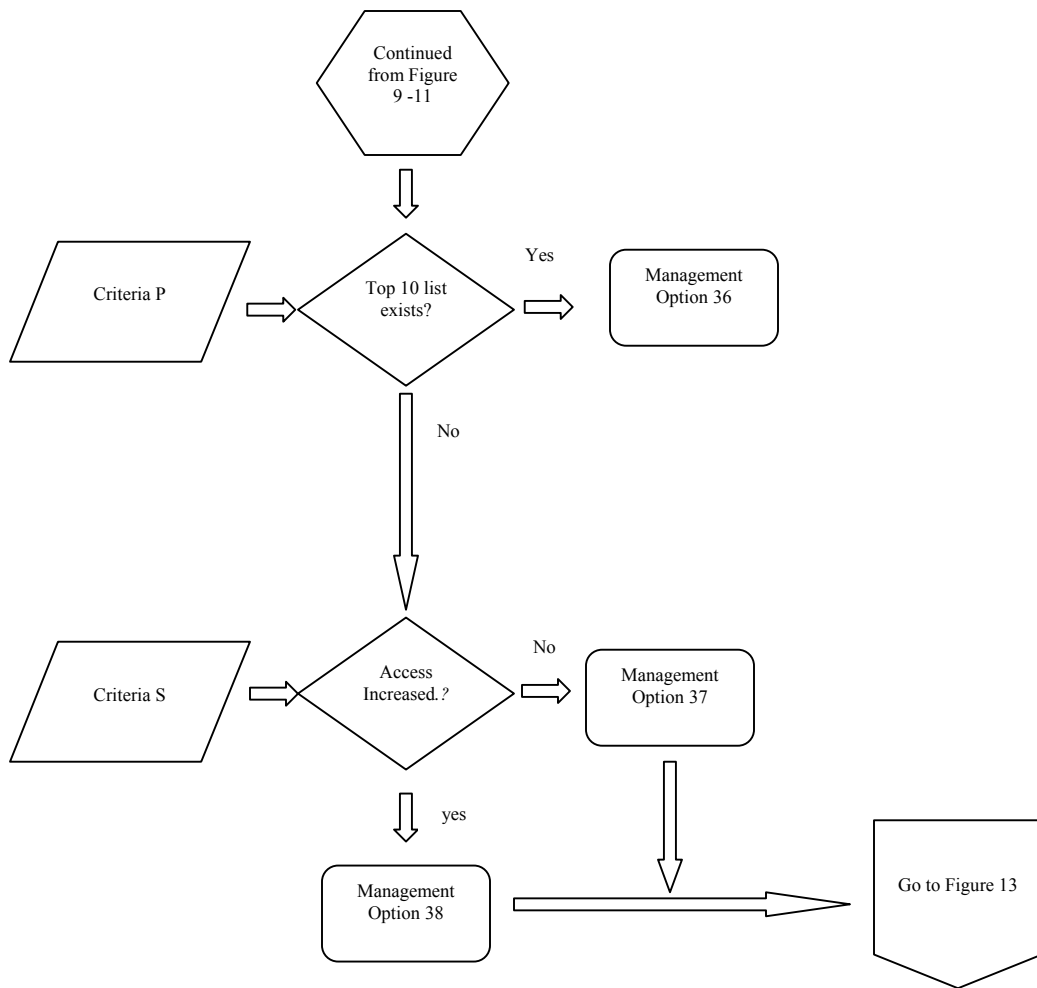


Figure 12. At risk habitat and access decision chart

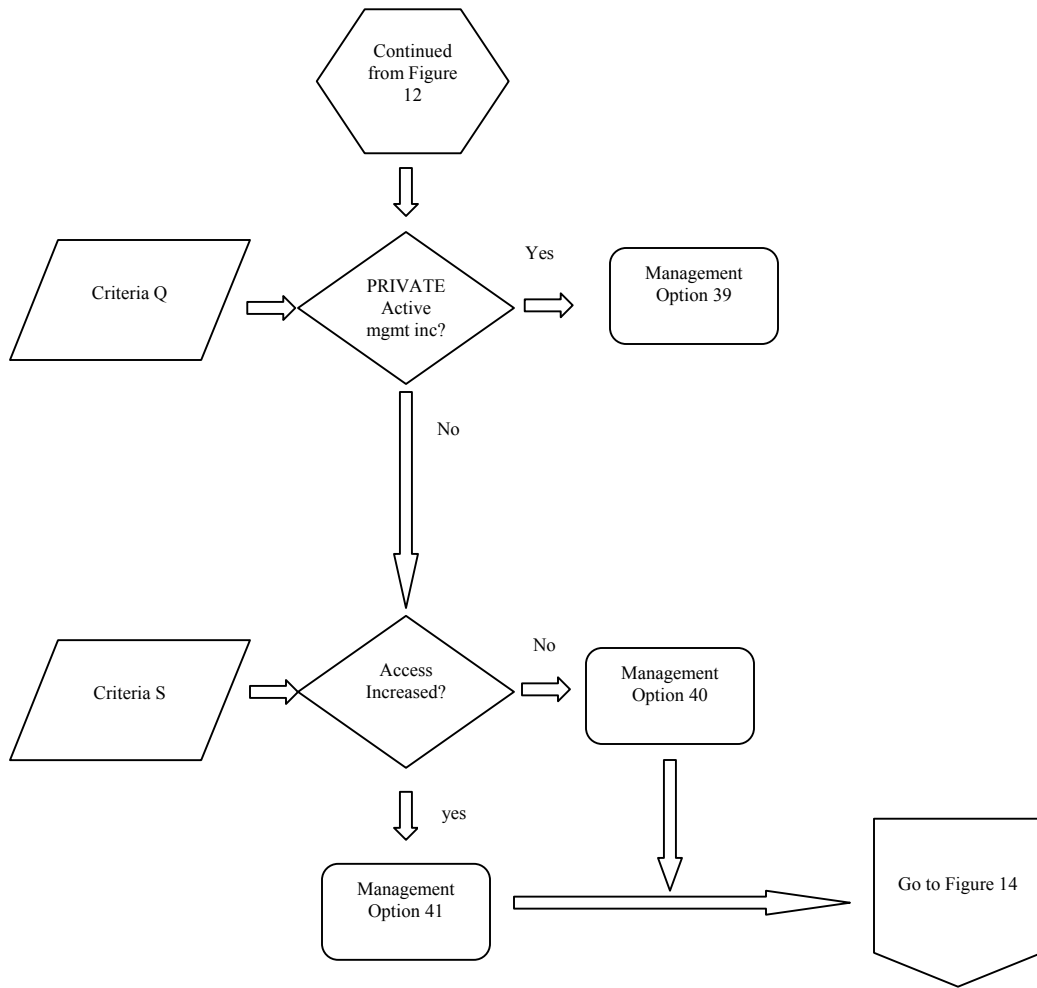


Figure 13. Private land management and access decision chart

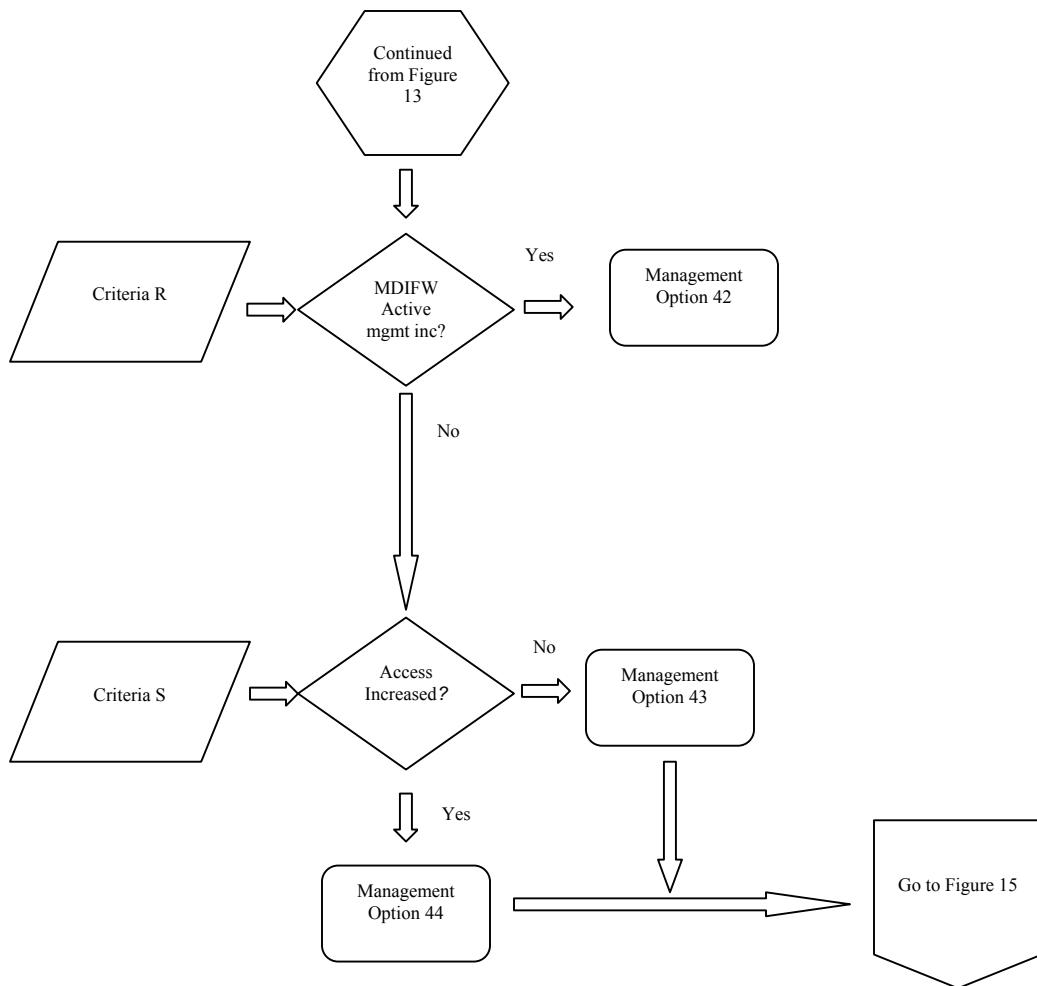


Figure 14. MDIFW active management and access decision chart



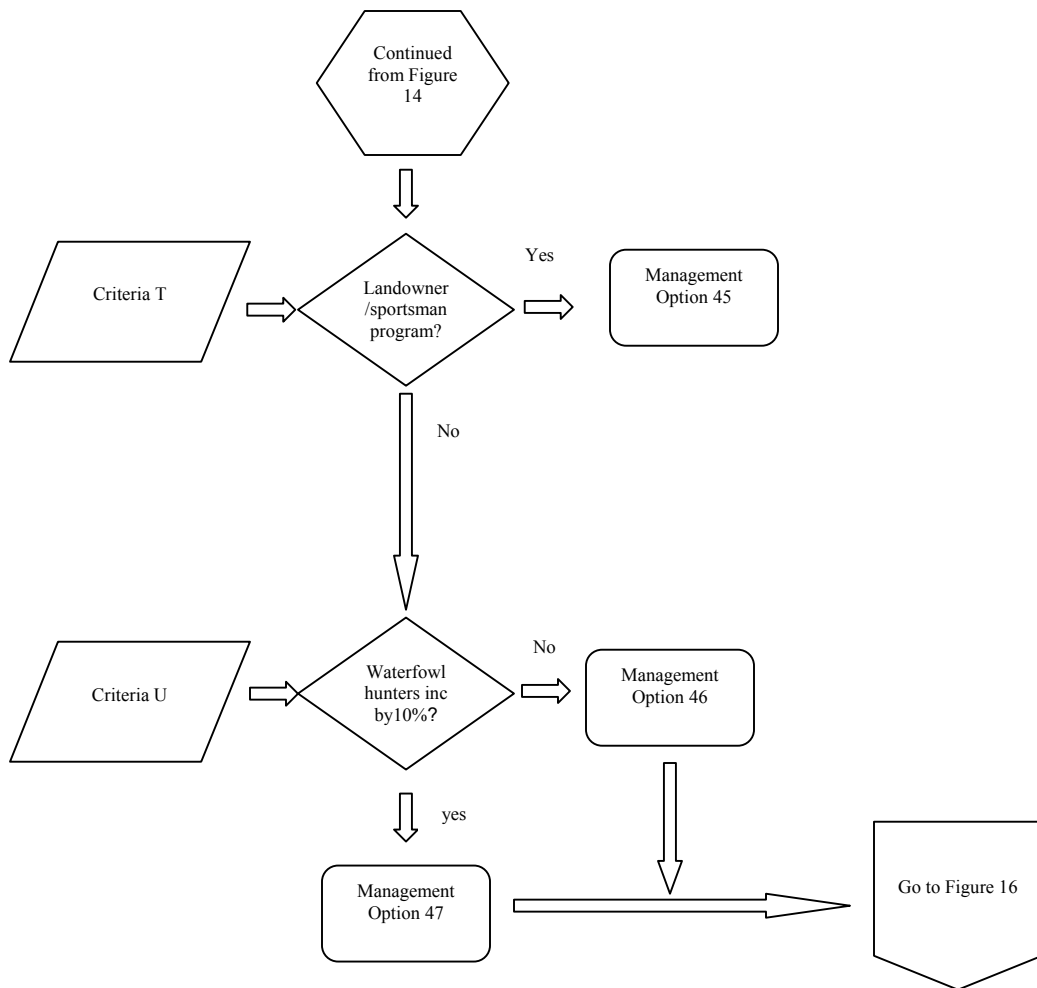


Figure 15. Landowner/sportsman relation's program and access decision chart

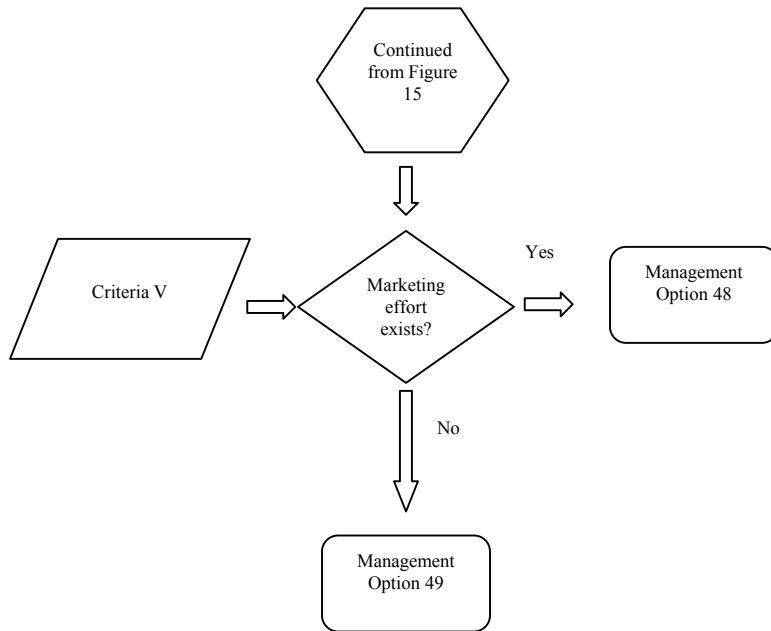


Figure 16. Maine Office of Tourism decision chart

## MANAGEMENT OPTIONS

### *Overview*

Management options for Maine occur at both the Federal and State level. Both systems have structured methodology and protocol for the accomplishment of tasks. Maine's management options at the Federal level will influence migratory bird management regulations prior to USFWS issuance of the annual final frameworks for migratory bird hunting regulations. Selections of Maine's state level management options are determined through the management system procedure previously documented.

### Maine's Federal Level Options

*Direct Agency Interaction:* The Commissioner of MDIFW may officially contact individuals within the Department of the Interior (DI) or the USFWS relative to proposed alteration of migratory bird management policy. Direct contact with upper level management within these agencies may bring about action on important issues quickly.

*Congressional Delegation Contacts:* Occasionally on critical issues relating to migratory bird management, it may be desirable to seek the assistance of Maine's congressional delegation. As in direct agency contact, this method often will result in timely action on an issue.

*Atlantic Flyway Council (AFC):* In most cases related to migratory bird management it is appropriate to work through procedures established between the USFWS and the AFC. The AFC provides a forum for discussion and review of state and federal proposals

affecting the migratory bird resource. The AFC and AFCTS meet semi-annually to deliberate the effectiveness of regulations and review proposed changes to the federal frameworks for hunting regulations. After gaining the support of the AFC for a proposed alteration of the frameworks, the recommendation is presented to the USFWS Regulations Committee by two AFC Representatives elected by the membership.

*USFWS Regulations Committee (SRC):* The SRC has five voting members comprised of four Regional Directors representing the four administrative flyways and the Director of Research (Appendix III-B). This committee reviews recommendations and decides on the final regulations that are forwarded to the Director of the USFWS. After review and acceptance, the regulations are forwarded to the Secretary of Interior for final approval. Adjustments may be made at either of the last review stages based on political and/or biological considerations.

### Maine's State Level Options

As stated in previous Section, the overriding policy for selection of Maine's annual waterfowl hunting regulations is to provide maximum hunting opportunity, within annually established federal frameworks, that is commensurate with waterfowl population abundance.

The following "management procedures" are available to the Commissioner and provide mechanisms for protection of Maine's breeding populations while allowing maximum opportunity for waterfowl hunters in Maine.

Under advisement of the Maine Waterfowl Council and Commissioners Advisory Council the Commissioner may:

- Select either a zoned or statewide season (this is not an annual regulatory option, changing zones is only periodically offered by the USFWS)
- Specify general season length;
- Determine opening and closing dates for the waterfowl season within zones;
- Select general daily bag and possession limits;
- Establish special species specific regulations (season length, bag limits, and opening dates);
- And restrict opportunity to legally take waterfowl (equipment, technology, and methods).

Management Option 1:

- Status quo – Continue procedures and select species-specific bag limits allowed by federal frameworks.
- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to liberalize the species-specific federal framework to the extent allowed within developed harvest models and strategies.
- Refine (i.e. continue and monitor) management strategies and population models through the next planning period.
- SPECIES-SPECIFIC OPTIONS
  - Black duck, wood duck, or ring-necked duck

- Enter a raw score of 3 for said species in model in APPENDIX IV - F at Step 6
- Wood ducks
  - Develop a harvest strategy that maximizes the in-state harvest of wood ducks produced in Maine.

#### Management Option 2:

- Determine factors resulting in reduced breeding populations and initiate management actions that will improve recruitment into the breeding population
- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to determine if harvest mortality has resulted in population declines.
- Prioritize banding efforts towards said species in an attempt to develop better estimates of adult survival.
- SPECIES-SPECIFIC OPTIONS
  - Black duck, wood duck, or ring-necked duck
    - Enter a raw score of 2 for said species in model in APPENDIX IV - F at Step 6

#### Management Option 3:

- Determine factors resulting in reduced breeding populations and initiate management actions that will improve recruitment into the breeding population
- Select species-specific harvest regulations to decrease harvest rate exerted on ducks breeding in Maine.

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to reduce harvest rate of birds produced in Maine.
- Prioritize banding efforts towards this species in an attempt to develop better estimates of survival.
- SPECIES-SPECIFIC OPTIONS
  - Black duck, wood duck, or ring-necked duck
    - Enter a raw score of 1 for said species in model in APPENDIX IV - F at Step 6
  - Black Duck
    - Encourage expansion of the beaver population to provide quality breeding habitat
    - Reduce harvest rate exerted on local black duck populations via unilateral imposition of restrictive hunting regulations (i.e. season length 10 days shorter than federal frameworks for Black ducks and/or delayed opening date)
    - Protect and manage upland habitats for nesting Black ducks
    - Actively manage state Waterfowl Production Areas to mimic beaver activity
  - Wood Ducks
    - Encourage expansion of the beaver population to provide quality breeding habitat
    - Determine harvest derivation of Maine produced wood ducks and reduce their harvest rate by working through the AFTS/AFC (high

out of state harvest) or selecting restrictive in-state hunting regulations (high in-state harvest).

- Protect and manage upland habitats for cavities to encourage wood duck nesting
- Expand, where possible, the waterfowl nest box program within the Department and encourage conservation groups to participate.
- Ring-necked Ducks
  - Through banding, determine if harvest of Maine breeding and produced ring-necked ducks occurs in-state or out-of-state and make appropriate recommendations, either to the Commissioner or AFTS/AFC regarding harvest restrictions.

#### Management Option 4:

- Status quo - Continue procedures and harvest strategy
- Determine factors resulting in declining productivity and initiate habitat management actions (outlined in mgmt option 3 above) that will improve recruitment into the fall population.
- SPECIES-SPECIFIC OPTIONS
  - Black duck, wood duck, ring-necked duck
    - Enter a raw score of 2 for said species in model in APPENDIX IV - F at Step 6



Management Option 5:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to liberalize federal framework for mallards in an attempt to harvest Maine mallards at a point nearing maximum sustained yield.
- Investigate features of production habitat that favor waterfowl other than mallards.
- Enter a raw score of 3 for mallards in model in APPENDIX IV - F at Step 6

Management Option 6:

- Determine factors resulting in reduced breeding populations and initiate management actions that stabilize the breeding population.
- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to determine if harvest mortality has resulted in population declines.
- Prioritize banding efforts towards mallards in an attempt to develop better estimates of adult survival.
- Enter a raw score of 2 for mallards in model in APPENDIX IV - F at Step 6

Management Option 7:

- Determine factors resulting in reduced breeding populations and initiate management actions that will improve recruitment into the breeding population
- Select harvest regulations to increase survival of mallards breeding in Maine in an attempt to return the breeding population to 2006 levels.
- Prioritize banding efforts towards mallards in an attempt to develop better estimates of survival.

- Enter a raw score of 1 for mallards in model in APPENDIX IV - F at Step 6

#### Management Option 8:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to liberalize federal framework for mallards in an attempt to harvest Maine mallards at a point nearing maximum sustained yield.
- Investigate features of production habitat that favor waterfowl other than mallards.
- Using population models, determine if declining productivity and current harvest rates will eventually stabilize the population
- Enter a raw score of 2 for mallards in model in APPENDIX IV - F at Step 6

#### Management Option 9:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to liberalize federal framework in an attempt to increase harvest of Maine hooded mergansers.
- Select harvest strategies aimed at maximizing harvest of hooded mergansers.
- Determine factors resulting in stable/increased breeding populations
- Develop management strategies aimed at decreasing the use of nest boxes by hooded mergansers, while at the same time, increasing their use by wood ducks and common goldeneyes.

#### Management Option 10:

- Select a harvest strategy aimed at stabilizing the breeding population.
- Determine if harvest and population goals are compatible.
- Determine if population decline is harvest and/or habitat derived

Management Option 11:

- Status quo - Continue procedures and harvest strategy through next decision-making period.
- Closely monitor decreasing breeding populations and increasing harvest to ensure that population and harvest objectives are not exceeded

Management Option 12:

- Determine if harvest and population goals are compatible.
- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to liberalize federal framework in an attempt to increase harvest Maine hooded mergansers.
- Select harvest strategies aimed at maximizing harvest of hooded mergansers.
- Determine factors resulting in stable/increased breeding populations
- Develop management strategies aimed at decreasing the use of nest boxes by hooded mergansers, while at the same time, increasing their use by wood ducks and common goldeneyes.

Management Option 13:

- Develop research aimed at determining factors that limit the number of Barrow's Goldeneyes that winter in Maine.
- Develop a survey program to gather valuable information regarding Barrow's Goldeneye habitat use from hunters and recreational wildlife watchers.

Management Option 14:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to produce Federal and International management plans aimed at

reducing negative effects of factors that are known to limit Barrow's Goldeneye populations.

- Develop a survey program to gather valuable information regarding Barrow's Goldeneye habitat use from hunters and recreational wildlife watchers
- Use hunter and recreational wildlife watcher surveys as a tool to determine the influence of Federal and International management plans on the abundance of Barrow's Goldeneyes wintering in Maine.

Management Option 15:

- Develop management strategies aimed at reversing in-state factors that are known to limit the population of Barrow's Goldeneyes.
- Develop a survey program to gather valuable information regarding Barrow's Goldeneye habitat use from hunters and recreational wildlife watchers.
- Use hunter and recreational wildlife watcher surveys as a tool to determine the influence of State management plans on the abundance of Barrow's Goldeneyes wintering in Maine.

Management Option 16:

- Using known limiting factors, develop State level management strategies aimed at maintaining the current population level.
- Develop a survey program to gather valuable information regarding Barrow's Goldeneye habitat use from hunters and recreational wildlife watchers.
- Use hunter and recreational wildlife watcher surveys as a tool to determine the influence of State management plans on the abundance of Barrow's Goldeneyes wintering in Maine.

Management Option 17:

- Status quo - Continue procedures and harvest strategy through next decision-making period

Management Option 18:

- Determine resident Canada Goose model input(s) (i.e. survival, nest success, number of molt migrants) that resulted in a declining population and develop management strategies aimed at reversing negative population model projections.
- Select harvest regulations aimed at increasing survival of adult resident Canada Geese in the Northern Waterfowl Hunt Zone.

Management Option 19:

- Determine resident Canada Goose model input(s) (i.e. survival, nest success, number of molt migrants) that resulted in an increasing population and develop management strategies aimed at stabilizing population model projections. Select harvest regulations aimed at stabilizing the number of adult resident Canada Geese in the Northern Waterfowl Hunt Zone.

Management Option 20:

- Develop and implement strategies to ensure that resident Canada Goose nuisance complaints remain stable, including (but not exclusive to):
  - Continue to produce media that informs the public on how to reduce nuisance resident Canada Goose problems

- Monitor the resident Canada Goose population via population surveys (nest success, breeding pair, and brood surveys) and banding activities (survival)
- Develop harvest strategies aimed at maintaining the current population level and distribution
- Conduct research aimed at refining the resident Canada Goose population model in Appendix IV - C.

Management Option 21:

- Develop and implement strategies to reduce Canada Goose nuisance complaints, including (but not exclusive to):
  - Develop media on how to reduce resident Canada Goose nuisance issues on rural/agricultural properties
  - Develop methodology to better determine population levels, productivity and survival of resident Canada Geese in rural/agricultural areas
  - If the complaint occurs during molt, attempt to band the geese to better understand the susceptibility of the population to harvest
  - Increase harvest of resident Canada Geese in the Southern Waterfowl Zone via adjustment of season lengths, bag limits, and methods of harvest (within the limits of the USFWS federal framework) that will result in decreased nuisance complaints.
  - Resident Canada Geese occurring in rural/agricultural areas have been shown to be susceptible to harvest (Hovelinski et al. 2006) and provide hunting opportunity during September seasons for Canada Geese

compatible with Outreach and Access Goals set forth by the 2006 Waterfowl Working Group. Therefore, discourage the use of lethal removal and trap and transfer. However, if it is determined that trap and transfers or lethal removals are the only viable option(s) to reducing long-term nuisance complaint levels, work with APHIS-Wildlife Services to remediate the problem.

Management Option 22:

- Develop and implement strategies to reduce Canada Goose nuisance complaints, including (but not exclusive to):
  - Distribute media on how to reduce resident Canada Goose nuisance issues on urban/suburban properties.
  - Inform the land owner of options available including control programs addressing the nesting (egg addling, nest removal, etc.) and adult stages (lethal removal).
  - If the complaint occurs during molt, attempt to band the geese to better understand the susceptibility of the population to harvest
  - Develop methodology to better determine population levels, productivity and survival of resident Canada Geese in urban/suburban areas
  - When or if deemed appropriate (based on banding data), increase harvest of resident Canada Geese via adjustment of season lengths, bag limits, and methods of harvest (within the limits of the USFWS federal framework) that will result in decreased nuisance complaints.
  - Work with APHIS-Wildlife Service until the complaint is remediated

- Maintain a database of remediation techniques and results

#### Management Option 23:

- Develop and implement a survey to assess the status of wetland habitats in Maine.
- Continue to periodically assess the status of wetland quantity and quality through automated systems (see Rustigan and Krohn 2002), including adequate, on-the-ground determination of automated model accuracy and use of an adaptive model approach (i.e. monitoring, evaluating, and updating; see Walters 1986).
- Develop a system to specifically assess periodic changes in quantity and quality of habitat created by beaver activity and other small ephemeral wetlands (i.e. vernal pools).
- Develop programs through the Division of Public Information and Education that promote the benefits and value of wetlands habitats.
- Create, improve, and implement wetland legislation to promote state-wide wetland protection.
- Continue through Fig 9, 10 or 11, using all available literature, data and best judgment to navigate the decision-making process.

#### Management Option 24:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to liberalize federal framework to the extent allowed within developed harvest models and strategies.
- Select the most liberal federal framework available in an attempt to maximize hunting opportunity over the long-term.



- Continue with existing policies and practices which contribute to maintenance of habitat quantity and quality.
- Develop programs through the Division of Public Information and Education that continue to promote the benefits and value of wetlands habitats.

Management Option 25:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to liberalize federal framework to the extent allowed within developed harvest models and strategies.
- Select the most liberal federal framework available in an attempt to maximize hunting opportunity over the long-term.
- Continue with existing policies and practices which contribute to maintenance of habitat quantity while determining reasons for declines in wetland quality.
- Determine if declines in wetland quality have resulted in reductions in carrying capacity on breeding grounds.
- Create, improve, and implement wetland programs to promote wetland quality
- Work with Management Section to promote, enhance and restore wetland quality by managing water regimes to mimic historic beaver activity.
- Work with the Mammal Group to develop a Beaver Management System that considers the recommendations in McCall et al. (1996) and increases beaver created waterfowl habitat.
- Develop wetland management scenarios that increase Inland Shallow Fresh Marsh, Inland Deep Fresh Marsh, and Shallow Open Fresh Water habitats while

reducing areas of unconsolidated bottom based on criteria used in Rustigian and Krohn (2002) and findings of Ringleman et al. (1982).

- Develop programs through the Division of Public Information and Education that continue to promote the benefits and value of wetlands habitats.

Management Option 26:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to liberalize federal framework to the extent allowed within developed harvest models and strategies.
- Select the most liberal federal framework available in an attempt to maximize opportunity for Maine hunters.
- Monitor the influence of wetland quantity decline on waterfowl populations (i.e., carrying capacity)
- Create, improve, and implement wetland programs to promote wetland quantity
- Continue with existing policies and practices which contribute to maintenance of habitat quality while determining reasons for declines in wetland quality.

Management Option 27:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to liberalize federal framework to the extent allowed within developed harvest models and strategies.
- Select the most liberal federal framework available in an attempt to maximize opportunity for Maine hunters.
- Closely monitor effects of declining habitat quantity and quality on carrying capacity, harvest potential, and stability of waterfowl populations in Maine.

- Create, improve, and implement wetland programs to promote state-wide wetland protection.
- Work with Management Section to promote, enhance and restore wetland quality by managing water regimes to mimic historic beaver activity.
- Work with the Mammal Group to develop a Beaver Management System that considers the recommendations in McCall et al. (1996) and increases beaver created waterfowl habitat.
- Develop wetland management scenarios that increase Inland Shallow Fresh Marsh, Inland Deep Fresh Marsh, and Shallow Open Fresh Water habitats while reducing areas of unconsolidated bottom based on criteria used in Rustigian and Krohn (2002) and findings of Ringleman et al. (1982).

#### Management Option 28:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to reduce additive harvest mortality throughout the Flyway.
- Select a harvest strategy that maintains Mallard harvest near MSY and reduces early season harvest of other Maine breeding/produced ducks (i.e. delay season opening date by 10 days but retain 60 days season).
- Create, improve, and implement wetland programs to promote state-wide wetland protection and quality.

#### Management Option 29:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to reduce additive harvest mortality throughout the Flyway.
- Select a harvest strategy that maintains Mallard harvest near MSY.

- Continue with existing policies and practices which contribute to maintenance of habitat quantity while determining reasons for declines in wetland quality.
- Determine if declines in wetland quality have resulted in negative trends in waterfowl production and breeding populations.
- Create, improve, and implement wetland programs to promote wetland quality
- Work with Management Section to promote, enhance and restore wetland quality by managing water regimes to mimic historic beaver activity.
- Work with the Mammal Group to develop a Beaver Management System that considers the recommendations in McCall et al. (1996) and increases beaver created waterfowl habitat.
- Develop wetland management scenarios that increase Inland Shallow Fresh Marsh, Inland Deep Fresh Marsh, and Shallow Open Fresh Water habitats while reducing areas of unconsolidated bottom based on criteria used in Rustigian and Krohn (2002) and findings of Ringleman et al. (1982).
- Develop programs through the Division of Public Information and Education that continue to promote the benefits and value of wetlands habitats.

Management Option 30:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to reduce additive harvest mortality throughout the Flyway.
- Select a harvest strategy that maintains Mallard harvest near MSY.
- Continue with existing policies and practices which contribute to maintenance of habitat quality while enacting policy to stop declines in wetland quantity.

- Determine if declines in wetland quantity have resulted in negative trends in waterfowl production and breeding populations.
- Create, improve, and implement wetland programs to promote wetland quantity
- Develop programs through the Division of Public Information and Education that continue to promote the benefits and value of wetlands habitats.
- Incorporate reduction in wetland quantity into species-specific population models (i.e. logistical growth function).

#### Management Option 31:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to reduce additive harvest mortality throughout the Flyway.
- Select a harvest strategy that maintains Mallard harvest near MSY.
- Closely monitor effects of declining habitat quantity and quality on carrying capacity, harvest potential, and stability of waterfowl populations in Maine.
- Create, improve, and implement wetland programs to promote state-wide wetland protection.
- Work with Management Section to promote, enhance and restore wetland quality by managing water regimes to mimic historic beaver activity.
- Work with the Mammal Group to develop a Beaver Management System that considers the recommendations in McCall et al. (1996) and increases beaver created waterfowl habitat.
- Develop wetland management scenarios that increase Inland Shallow Fresh Marsh, Inland Deep Fresh Marsh, and Shallow Open Fresh Water habitats while

reducing areas of unconsolidated bottom based on criteria used in Rustigian and Krohn (2002) and findings of Ringleman et al. (1982).

- Work through DEP and legislature to ensure that wetland protection policy, laws and regulations ensure the long-term sustainability of waterfowl quantity and quality in Maine.
- Incorporate reduction in wetland quantity and quality into species-specific population models (i.e. logistical growth function, reduced harvest potential).

#### Management Option 32:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to reduce additive harvest mortality throughout the Flyway to allow waterfowl populations to increase.
- Select a harvest strategy that reduces additive harvest mortality of Maine breeding/produced ducks (i.e. delay season opening date by 10 days, reduce daily bag limit) to allow waterfowl populations to increase.
- Continue with existing policies and practices which contribute to maintenance of habitat quantity and quality.
- Develop programs through the Division of Public Information and Education that continue to promote the benefits and value of wetlands habitats.

#### Management Option 33:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to reduce additive harvest mortality throughout the Flyway to allow waterfowl populations to increase.

- Select a harvest strategy that reduces additive harvest mortality of Maine breeding/produced ducks (i.e. delay season opening date by 10 days, reduce daily bag limit) to allow waterfowl populations to increase.
- Continue with existing policies and practices which contribute to maintenance of habitat quantity while determining reasons for declines in wetland quality.
- Determine if declines in wetland quality have resulted in negative trends in waterfowl production and breeding populations.
- Create, improve, and implement wetland programs to promote wetland quality
- Work with Management Section to promote, enhance and restore wetland quality by managing water regimes to mimic historic beaver activity.
- Work with the Mammal Group to develop a Beaver Management System that considers the recommendations in McCall et al. (1996) and increases beaver created waterfowl habitat.
- Develop wetland management scenarios that increase Inland Shallow Fresh Marsh, Inland Deep Fresh Marsh, and Shallow Open Fresh Water habitats while reducing areas of unconsolidated bottom based on criteria used in Rustigian and Krohn (2002) and findings of Ringleman et al. (1982).
- Develop programs through the Division of Public Information and Education that continue to promote the benefits and value of wetlands habitats.

Management Option 34:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to reduce additive harvest mortality throughout the Flyway.

- Select a harvest strategy that reduces additive harvest mortality of Maine breeding/produced ducks (i.e. delay season opening date by 10 days, reduce daily bag limit).
- Update Mallard and Wood Duck population models to reflect current population trends and incorporates declines in habitat quantity.
- Create, improve, and implement wetland programs to promote state-wide wetland protection.
- Carefully monitor and research effects of wetland loss on waterfowl populations.
- If appropriate, incorporate habitat loss into species-specific population models.

#### Management Option 35:

- Work with the Atlantic Flyway Technical Section (AFTS) and Atlantic Flyway Council (AFC) to reduce additive harvest mortality throughout the Flyway.
- Select a harvest strategy that reduces additive harvest mortality of Maine breeding/produced ducks (i.e. delay season opening date by 10 days, reduce bag limit by 2 birds).
- Update Mallard and Wood Duck population models to reflect current population trends and incorporates declines in habitat quantity.
- Closely monitor effects of declining habitat quantity and quality on carrying capacity, harvest potential, and stability of waterfowl populations in Maine.
- Create, improve, and implement wetland programs to promote state-wide wetland protection.
- Work with Management Section to promote, enhance and restore wetland quality by managing water regimes to mimic historic beaver activity.



- Work with the Mammal Group to develop a Beaver Management System that considers the recommendations in McCall et al. (1996) and increases beaver created waterfowl habitat.
- Develop wetland management scenarios that increase Inland Shallow Fresh Marsh, Inland Deep Fresh Marsh, and Shallow Open Fresh Water habitats while reducing areas of unconsolidated bottom based on criteria used in Rustigian and Krohn (2002) and findings of Ringleman et al. (1982).
- Carefully monitor and research effects of wetland loss and degradation on waterfowl populations.
- If appropriate, incorporate habitat loss into species-specific population models.

Management Option 36:

- Use list to conserve habitats in urban and coastal areas that are at risk of being compromised by development.
- Encourage the incorporation of clauses that increase access to waterfowl habitats for hunters and other waterfowl resource users during the acquisition phase.

Management Option 37:

- Develop a list of habitats for conservation in urban and coastal areas that are at risk of being compromised by development
- Encourage the incorporation of clauses that increase access to waterfowl habitats for hunters and other waterfowl resource users during the acquisition phase.

- Promote legislation aimed at increased access to waterfowl hunting and viewing locations.

Management Option 38:

- Develop a list of habitats for conservation in urban and coastal areas that are at risk of being compromised by development and continue to promote the incorporation of clauses that increase access to waterfowl habitats for hunters and other waterfowl resource users during the acquisition phase.

Management Option 39:

- Through the Division of Public Information and Education and NGOs continue to develop media aimed at promoting federal, state, and private programs (i.e. WHIP, CRP, Ducks Unlimited easements and technical support) that can be used to increase the number of private landowners managing their property for waterfowl.
- Encourage and assist landowners to monitor and maintain their property as waterfowl habitat.
- Evaluate the effectiveness and efficiency of private landowner programs in an attempt to maximize future results.

Management Option 40:

- Through the Division of Public Information and Education and NGOs develop media aimed at promoting federal, state, and private programs (i.e. WHIP, CRP, Ducks Unlimited easements and technical support) that can be used to increase the number of private landowners managing their property for waterfowl.

- Encourage private landowners to allow access to waterfowl habitats for hunters and other waterfowl resource on areas they manage for waterfowl.
- Develop programs that provide incentive to private landowners who managing their property for waterfowl AND allow access to waterfowl habitats for hunters and other waterfowl resource users on areas they manage for waterfowl.

#### Management Option 41:

- Through the Division of Public Information and Education and NGOs develop media aimed at promoting federal, state, and private programs (i.e. WHIP, CRP, Ducks Unlimited easements and technical support) that can be used to increase the number of private landowners managing their property for waterfowl.

#### Management Option 42:

- Maintain currently level of active management and promote techniques used on MDIFW Waterfowl Production Areas as good management practices usable by private landowners interested in managing their land for waterfowl (Figure 13).

#### Management Option 43:

- Increase the active management of MDIFW Waterfowl Production Areas for the production of waterfowl and enhancement of fall migration habitat.
  - For example;
    - Develop management strategies that maximize brood production in spring (as a result of overhead cover and high densities of invertebrates) and duck use days during fall (a result of availability of carbohydrate dense wetland forage and optimal hunting pressure).

- Develop water regime management strategies that maximize both the long-term spring (brood production) and fall duck use(duck use days).
- Select management activities on MDIFW lands that increase the areas suitability for recreational bird watching, maximize hunting opportunity through increased access, and increase harvest capability of the area throughout the fall flight by increasing duck use days of MDIFW land during October – December.

Management Option 44:

- Increase the active management of MDIFW Waterfowl Production Areas for the production of waterfowl and enhancement of fall migration habitat.
- Maintain and promote management activities used on MDIFW lands that optimized brood production, increased the areas suitability for recreational bird watching, maximized hunting opportunity through increased access, and increased harvest capability of the area throughout the fall migration by increasing duck use days of MDIFW land during October – December.

Management Option 45:

- Promote and refine the landowner/sportsman programs that have been developed by county, tailored to the unique nature of local communities.
- Continue to build the landowner/sportsman program by using a step-down approach to more specific activities (i.e. waterfowl hunting) and smaller jurisdictions (i.e. town level programs).

Management Option 46:

- Develop landowner/sportsman relations programs by county, tailored to the unique nature of local communities.
- Promote the development of state and local waterfowl associations to aid in the incorporation of waterfowler needs into developing landowner/sportsman relations programs and encouraging conservation minded/ethical behavior by waterfowl hunters.
- Work through the Department of Information and Education and Maine Warden Service to promote landowner/waterfowler relations programs in an attempt to increase the number of waterfowl hunters in Maine by promoting continued conservation minded/ethical behavior by waterfowl hunters.
- Develop volunteer waterfowl conservation programs to help meet the Waterfowl Population Objectives and promote waterfowling.

Management Option 47:

- Develop a landowner/sportsman relations programs by county, tailored to the unique nature of local communities.
- Encourage new waterfowlers to develop state and local waterfowl associations and aid in the incorporation of waterfowler needs into developing landowner/sportsman relations programs.
- Develop volunteer waterfowl conservation programs to help meet the Waterfowl Population Objectives and promote waterfowling.

Management Option 48:

- Continue to refine and enhance the marketing effort of the Maine Office of Tourism to promote waterfowl related activities including hunting and recreational bird watching.

Management Option 49:

- Work with the Maine Office of Tourism to promote waterfowl related activities offered in Maine, including hunting and recreational bird watching.

## MANAGEMENT SYSTEM OUTPUTS

### Management Recommendations

General recommendations from this management system identify biologically sound criteria, data collection needs and/or research priorities which should direct future MDIFW efforts in waterfowl management. Gaps in our databases are identified and should guide future research, data collection and ultimately support management decisions (See page 89, Potential Studies and Data Collection Needs)

Harvest recommendations from the management system currently can result in establishing hunting season regulations that are equal to or more restrictive than those offered to Maine in the annual Federal Regulation Frameworks. These actions are associated with:

- Season type (zoned, statewide),
- Length of season (number of days),
- Time of season (dates),
- Bag and possession limits,
- Species restrictions, and
- Approved hunting methods and/or equipment.

Harvest recommendations that would result in establishing more liberal regulations must first be approved by the AFCTS and AFC. Maine's proposals with AFC sanction are then presented to the USFWS Regulations Committee for consideration. Generally, if a proposal is authorized by the USFWS Regulations Committee it is for a specified period during which an experimental evaluation is conducted. After evaluation, if no adverse consequences from the regulation are shown, it would then become an operational regulation which Maine could implement if desired.

## Chronology of Waterfowl Management Activities

### Month/Activity

#### January

- Midwinter Waterfowl Survey
- Analyses of waterfowl survey data
- Refinement of population models
- Research data analyses and publication
- Barrow's Goldeneye surveys, database management and annual population estimate

#### February

- Analyses of waterfowl survey data
- Refinement of population models
- Research data analyses and publication
- Work on AFTS committee assignments
- Determine budget, equipment and staffing needs for upcoming field season

#### March

- Work on AFTS committee assignments
- Attend AFTS winter meeting
- Analyses of waterfowl harvest data
- Analyses of waterfowl survey data
- Refinement of population models
- Research data analyses and publication
- Hire seasonal employee(s)

#### April

- Resident Canada Goose Nest Success survey
- Breeding waterfowl studies and surveys
- Work on AFTS committee assignments
- Analyses of waterfowl survey data
- Refinement of population models
- Prepare banding equipment



May

- Resident Canada Goose Nest Success survey
- Determine location of Canada Goose banding sites and coordinate volunteers/staff
- Breeding waterfowl studies and surveys
- Work on AFTS committee assignments
- Analyses of waterfowl survey data
- Refinement of population models
- Prepare banding equipment
- Nest box studies and banding

June

- Resident Canada Goose Nest Success survey
- Determine Canada Goose banding sites and coordinate volunteers/staff
- Breeding waterfowl studies and surveys
- Work on AFTS committee assignments
- Analyses of waterfowl survey data
- Refinement of population models
- Prepare banding equipment
- Nest box studies and banding

July

- Breeding waterfowl studies and surveys
- Work on AFTS committee assignments
- AFTS and AFC Summer Meeting
- Analyses of waterfowl survey data
- Refinement of population models
- Duck banding
- Advertise Migratory Bird Season

August

- Breeding waterfowl studies and surveys
- Work on AFTS committee assignments
- Analyses of waterfowl survey data and produce annual estimate of production

using brood survey and nest box data

- Refinement of population models
- Duck banding
- Waterfowl Public Hearing
- Maine Waterfowl Advisory Council selects Migratory Seasons

#### September

- Fall Population Surveys
- Duck banding
- Work on AFTS committee assignments
- Analyses of waterfowl survey data
- Refinement of population models

#### October

- Fall Population Surveys
- Work on AFTS committee assignments
- Analyses of waterfowl survey data
- Refinement of population models
- PR reports for waterfowl jobs

#### November

- Fall Population Surveys
- Barrow's Goldeneye surveys and database management
- Work on AFTS committee assignments
- Analyses of waterfowl survey data
- Refinement of population models

#### December

- Fall Population Surveys
- Barrow's Goldeneye surveys, database mgmt and annual population estimate
- Work on AFTS committee assignments
- Analyses of waterfowl survey data
- Refinement of population models

PART II. WATERFOWL MANAGEMENT DATABASE  
USED FOR DECISION MAKING

## WATERFOWL DATA COLLECTION SUMMARY

### Waterfowl Harvest Data

#### *Total Harvest and Species Composition*

The Federal Harvest Information Program (HIP) provides a measure of total duck and goose harvest by state and the Cooperative Parts Collection Survey is used to determine the percent of the harvest that each species comprises (also further reduced to ages and sexes; USFWS 2006). HIP is based on a voluntary survey of selected migratory bird hunters in the United States. State wildlife agencies collect the name, address, and some additional information from each migratory bird hunter in their state, and send that information to the USFWS. The USFWS then randomly selects a sample of those hunters and asks them to provide information on the kind and number of migratory birds they harvest during the hunting season. Those hunters' reports are then used to develop reliable estimates of the total harvest of all migratory birds by state. To estimate waterfowl harvest more precisely, the USFWS combines the total harvest estimated from the HIP surveys with the results from the Cooperative Parts Collection Survey.

#### *Age/sex-ratios*

The Cooperative Parts Collection Survey is also used to determine the age and sex ratios of the harvest. Age and sex ratios in the harvest should be monitored for large fluctuations, potentially indicating issues regarding harvest vulnerability, productivity and/or large-scale landscape change. Age/sex ratios should be compared with other data, such as, brood indices and pre-season banding age/sex ratios.

### *Wildlife Management Area Bag Checks*

Daily bag checks provide valuable trend information on local hunting pressure and migration patterns of waterfowl. Comparison between opening day bag checks and those conducted at later dates can provide valuable insight into the differential vulnerability of certain sex/age classes to the “opening day effect”. Bag checks are always encouraged, however, large-scale state-wide efforts are difficult because of the significant resources necessary.

### Waterfowl Production Data

#### *Maine Index Area Brood Counts*

These data provides an index to the size and productivity (ducklings/hen) of the breeding waterfowl population found on ~39 wetlands. Analysis of long -term brood data from index areas has provided a measure of change in size and productivity of Maine’s breeding waterfowl populations.

#### *Maine Resident Canada Goose Nest Success Survey*

The percentage of nests that successfully hatch (hereafter nest success) can greatly influence resident Canada Goose population trends and is a key variable included in the resident Canada Goose Population Model (Appendix IV - C). Furthermore, nest success may vary regionally. To estimate reproductive success, an attempt will be made to mark 50 nests each year (distributed evenly throughout Maine) during initiation or early incubation stages and followed until nest fate is determined.

#### *Maine Resident Canada Goose Production Survey*

Because too few goose broods are observed during the Maine Index Area Brood Counts, incidental counts of the number of goslings/goose are conducted for input into

population models. A survey conducted by MDIFW field personnel (wildlife division and district game wardens) and volunteers provide reports of observed goose broods.

Regional production will be tracked by this survey and used in conjunction with goose banding age ratios. These data will aid in attainment of the resident Canada Goose population and nuisance goals set forth by the 2006 Public Waterfowl Working Group.

#### *Waterfowl Nest Box Production Data*

Waterfowl production data from MDIFW nest box programs provide data from 1970 to the present. This information includes number of nest starts, nest success and hatching success. Nesting females have been banded when they have been captured. These data can provide survival estimates for Maine's breeding population of wood duck, hooded merganser, and common goldeneye that use artificial nesting structures. (See Banding Studies)

#### Habitat Surveys

##### *Maine's Wetland Inventory*

This database includes information on wetlands of ten acres or greater. Data collection for this inventory occurred in the 1960's and 1970's and has been aggregated by township and WMU. Many acres of habitat important to breeding waterfowl were not included in this survey (wetlands smaller than 10 acres).

##### *High and Moderate Inland Waterfowl and Wading Bird Habitats*

Rustigian and Krohn (2002) categorized high and moderate value waterfowl and wading bird habitats for inland sites and WMDs were ranked by total breeding, migrating, and wintering acreage in the most recent Waterfowl Assessment (Weik 2005).

## Mortality and Disease Studies

### *Avian Influenza (H5N1) Surveillance*

In 2005, MDIFW, in cooperation with the United States Department of Agriculture Animal and Plant Health Inspection Services (USDA-APHIS), began surveillance for Avian Influenza (H5N1) in wild birds.

### *Fowl Cholera*

Investigation of reports of cholera outbreaks on eider breeding colonies are carried out as needed. On occasion, attempts have been made to clean islands of dead birds and dispose of their carcasses by incineration. Visits to islands in subsequent years have permitted study of colony recovery after severe cholera outbreaks.

### *Contaminants: (pesticides, herbicides, chemicals)*

Investigation of reports of losses from these causes are made as needed. Pathology is provided by the University of Maine, Orono and the National Wildlife Health Laboratory, Madison, Wisconsin.

## Banding Studies

### *Banding Data: distribution*

These data provide information on the breeding ground origin and migration paths of waterfowl. Interesting longevity and movement records are obtained through recovery records maintained by the USFWS at the Bird Banding Laboratory, Laurel, MD.

### *Banding Data: survival*

These data provide information used to predict annual survival and mortality estimates for many species. Analysis of banding data may provide estimates of harvest rates for key populations.

### *Preseason Waterfowl Banding Age Ratios*

Age ratios of ducks and geese captured during preseason banding operations are used in conjunction with the Maine Index Area Brood Counts as another index of productivity (ducklings/hen). An age ratio based calculation of productivity may provide a more accurate index of fall recruitment as most fledged ducklings survive until hunting season.

### Population Surveys

#### *Maine's Mid-winter Waterfowl Inventory*

These data provide an index to population size for waterfowl observed within survey blocks during the first week of January. The survey is conducted during the same period each year and is an index to the total number of waterfowl present in the state. Weather factors affect waterfowl distribution; therefore, the number of birds present in Maine during a particular year. For many species this is the only annual index to population size available.

#### *Waterfowl Nest Box Production Data*

Waterfowl production data from MDIFW nest box programs provide data from 1970 to the present. While this information provides information on duck production, it also helps detect trends in the number of hens/nest box as an estimate of cavity nesting waterfowl.

#### *Eastern Waterfowl Survey Unit*

Since 1990 the U.S. Fish and Wildlife Service (USFWS) has conducted aerial transect surveys using fixed-wing aircraft in eastern Canada and the northeast U.S., similar to those used in the mid-continent, for estimating waterfowl abundance. Additionally, the



Canadian Wildlife Service (CWS) has conducted a helicopter-based aerial plot survey in core American black duck breeding regions of Ontario, Quebec, and the Atlantic Provinces. Historically, data from these surveys were analyzed separately, despite geographic overlap in survey coverage. In 2004, the USFWS and CWS agreed to integrate the two surveys, produce composite estimates from both sets of survey data, and expand the geographic scope of the survey in eastern North America. As a result, as of 2005, waterfowl population estimates for eastern North America are no longer produced solely on the basis of USFWS-collected data, but are based on both USFWS and CWS data. Estimates of populations in eastern North America (strata 51-72) are now derived as composite estimates based on data from the CWS and USFWS surveys. For strata containing both CWS and USFWS data (51, 52, 63, 64, 66, and 68), visibility-adjusted USFWS data were combined with plot data; single survey results were used as the estimates for strata containing only one source of information (53, 54, 55, 56, 57, 58, 59, 62, 65, and 69 for transects; 70, 71, and 72 for plots). In cases where the USFWS has traditionally not recorded observations to the species level (i.e., scoters [*Melanitta* spp.], mergansers, goldeneyes), only CWS plot survey data were used in estimation. While estimates were generated for all strata in the eastern survey area, survey-wide composite estimates for this region currently correspond only to strata 51, 52, 63, 64, 66, 67, 68, 70, 71, and 72. These strata are coincident with the geographic extent of the CWS helicopter plot survey. In future reports, survey-wide composite estimates will be derived for the entire region encompassed by the USFWS and CWS surveys (strata 51-72). For widely-distributed species, (American black ducks, mallards, green-winged teal, and ringnecked duck), composite estimates of population size were

constructed using a hierarchical model, in which change is modeled using a log-linear model that includes survey and transect/plot effects. Area weighted, exponentiated year effects were calculated using the log-linear model for each survey, then averaged between surveys to provide estimates of total indicated birds in each stratum. For all other species, which occur at lower densities and are more patchily distributed in the eastern survey area, this modeling approach was not suitable, and estimates for these species represent averages of visibility-adjusted FWS and CWS survey results. To produce a consistent index for American black ducks, total indicated birds were calculated using the CWS method of scaling observed pairs. Observed black duck pairs were scaled by 1.5 rather than the 1.0 scaling traditionally applied by the USFWS. The CWS scaling is based on sex-specific observations collected during the CWS survey in eastern Canada which indicate that approximately 50% of black duck pair observations are actually 2 drakes. For other species, the standard USFWS definition of total indicated birds was used. Changes in indices, procedures, geographic stratification, and in the area sampled by composite surveys, result in changes in the estimated population totals; therefore, survey results for eastern North America presented in this report are not directly comparable to results presented in previous reports. Additional refinements to the survey design and analysis for eastern North America are anticipated during the coming years, and composite estimates are subject to change in the future.

#### *Barrow's Goldeneye Database*

Current levels of Barrow's Goldeneye harvest in Maine are difficult to assess because of their relatively low abundance, little to no banding data, and misidentification as Common Goldeneyes (*Bucephala clangula*) by hunters (Palmer 1949). Therefore, a

database and standardized system for estimating the population of Barrow's Goldeneyes was developed in winter 2006 (Appendix IV - E). Audubon's Christmas Bird Count is the most comprehensive survey of Barrow's Goldeneye numbers and forms the basis for estimating the total statewide population of Barrow's Goldeneyes annually.

#### *Maine Breeding Waterfowl Census*

Although not conducted with regularity, breeding pair counts provide valuable information when combined with brood production surveys. A breeding waterfowl census produces total indicated pairs (TIP):

calculated as follows:

Indicated Pairs = Observed Pairs + Calculated Pairs

where

Calculated Pairs = Lone Males + (males in all-male groups of 4 or less). Note: A group of 2 males and one female was treated as a pair plus a lone male.

and

total indicated birds (TIB):

The total number of birds observed regardless of age or sex

Waterfowl Production surveys usually do not account for total brood loss. However, when combined with a previous knowledge of TIP inferences regarding breeding propensity and nest loss can be developed. Breeding waterfowl surveys are best conducted between mid-April through mid-May to measure Black Duck abundance and during the last 3 weeks of May for Ring-necked Ducks (Appendix IV – G).

### Potential Studies and Data Collection Needs

- *Factors influencing the utility of Maine wetlands as fall staging habitats for waterfowl*
- *Development of a roadside survey used to determine trends in the resident Canada Goose breeding population (for comparison with resident Canada Goose population model derived from banding)*
- *Factors influencing the utility of marine areas as wintering habitat for waterfowl*
- *Mallard and wood duck population models*
- *Waterfowl Nuisance Complaint database and abatement strategies*
- *Survival estimates for common goldeneyes, hooded mergansers, and ring-necked ducks breeding and produced in Maine*
- *Factors influencing, breeding propensity, nest success and/or whole brood loss of Maine Breeding Waterfowl*
- *Long-term influence of beaver populations on waterfowl habitat in Maine*
- *Effects of aquaculture on food availability for waterfowl*
- *Influence of density dependence on production of waterfowl in Maine*
- *Effects of opening date on direct recovery rates of waterfowl in Maine.*

APPENDIX I

- A. Summary of Federal Laws
  
- B. Code of Federal Regulations (CFR), Title 50: Wildlife and Fisheries, Contents  
Chapter 1, Parts 1-199: U.S. Fish and Wildlife Services
  
- C. Schedule of Annual Regulations Hearings

## APPENDIX I - A.

Migratory Birds are Protected by Federal Law

Treaties: Implementing treaties with Great Britain (for Canada), Mexico, Japan and Soviet Union, the Migratory Bird Treaty Act (16 USC 703-711; 40 Stat. 755) now provides Federal protection for all wild birds in the United States, except the resident game birds; i.e. grouse, pheasant, quail, etc. , which are managed by the respective States, and the English sparrow, starling, feral mute swan, and feral rock dove.

Recognizing the value of migratory birds for recreation, through hunting, and for scientific, educational, and other valid purposes by individuals, the Department of Interior by regulation and permit has provided controlled take and other utilization of certain species, in certain areas at specified times.

Utilization without a specific permit: Annual migratory bird hunting regulations allow the taking of some migratory game birds at specified times and places (50 CFR 20). Limited additional controlled activity and use of certain migratory birds is permitted by Federal regulation (see CFR 21.2, 21.12, 21.13, 21.14, 21.43, 21.44 and 21.45), providing state laws also permit such activities. With these few exceptions, it is unlawful, for anyone to kill, capture, collect, possess, buy, sell, trade, ship, import or export, any migratory bird or part, or nest or egg thereof, unless they first obtain an appropriate Federal permit issued pursuant to the Migratory Bird Treaty Act regulations, authorizing such activity. In most cases, a State permit is also required.

Import and Export of Migratory Birds (50 CFR 21.21):

(a) Permit requirement. (1) Except for migratory game birds imported in accordance with the provisions of subpart G of part 20 of this subchapter B, an import permit is required before any migratory birds, their parts, nests, or eggs may be imported.

(2) An export permit is required before any migratory birds, their parts, nests, or eggs may be exported: Provided, that captive-reared migratory game birds that are marked in compliance with the provisions of Sec. 21.13(b) may be exported to Canada or Mexico without a permit. Provided further, that raptors lawfully possessed under a falconry permit issued pursuant to Sec. 21.28 of this part may be exported to or imported from Canada or Mexico without a permit for the purposes of attending bona fide falconry meets, as long as the person importing or exporting the birds returns the same bird(s) to the country of export following any such meet. Nothing in this paragraph, however, exempts any person from the permit requirements of parts 17, 22, and 23 of this subchapter. The preceding is also subject to procedures and restrictions as outlined in 50 CFR 21.21 (b – d).

Banding and Marking (50 CFR 21.22): A banding or marking permit is required before any person may capture migratory birds for banding or marking purposes or use official bands issued by the Service for banding or marking any migratory bird. Permits for such activities are issued on proper justification, by the Service's Bird Banding Laboratory, as explained in Sec. 21.22 (b).

Scientific Collecting (50 CFR 21.23): A scientific collecting permit is required before any person may take, transport, or possess migratory birds, their parts, nests, or eggs for scientific research or educational purposes and is subject to procedures and restrictions outlined in 50 CFR 21.23 (b – d).

Taxidermist (50 CFR 21.24): A taxidermist permit is required before any person may perform taxidermy services on migratory birds or their parts, nests, or eggs for any person other than himself and is subject to procedures and restrictions outlined in 50 CFR 21.24 (b – e).

Waterfowl Sale and Disposal (50 CFR 21.25): A waterfowl sale and disposal permit is required before any person may lawfully sell, trade, donate, or otherwise dispose of, to another person, any species of captive-reared and properly marked migratory waterfowl or their eggs, except that such a permit is not required for such sales or disposals of captive-reared and properly marked mallard ducks or their eggs and is subject to procedures and restrictions outlined in 50 CFR 21.25 (b-d).

Special Purpose Permits (50 CFR 21.27): Permits may be issued for special purpose activities related to migratory birds, their parts, nests, or eggs, which are otherwise outside the scope of the standard form permits of this part. A special purpose permit for migratory bird related activities not otherwise provided for in this part may be issued to an applicant who submits a written application containing the general information and certification required by part 13 and makes a sufficient showing of benefit to the migratory bird resource, important research reasons, reasons of human concern for individual birds, or other compelling justification.

#### State Jurisdiction and Regulation

It is emphasized that all States have identical or similar protective provisions for most migratory birds. In most cases, they likewise require State permission to take, possess, buy or sell, etc. and in no circumstance is a Federal permit valid without a corresponding State permit, if required. Therefore, it is important to check with State conservation authorities regarding potential restrictions before applying for a Federal permit.

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Copies of any of the cited regulations and a complete list of Birds Protected by Federal Law (50 CFR 10) are available on request from the United States Fish and Wildlife Service.

## APPENDIX I-B.

## Title 50--Wildlife and Fisheries

## CHAPTER I--UNITED STATES FISH AND WILDLIFE SERVICE, DEPARTMENT OF THE INTERIOR

Part	Title
1	Definitions
2	Field Organization
3	Nondiscrimination—contracts, permits, and use of facilities
10	General provisions
11	Civil procedures
12	Seizure and forfeiture procedures
13	General permit procedures
14	Importation, exportation, and transportation of wildlife
15	Wild Bird Conservation Act
16	Injurious wildlife
17	Endangered and threatened wildlife and plants
18	Marine mammals
19	Airborne hunting
20	Migratory bird hunting
21	Migratory bird permits
22	Eagle permits
23	Endangered species convention
24	Importation and exportation of plants
25	Administrative provisions
26	Public entry and use
27	Prohibited acts
28	Enforcement, penalty, and procedural requirements for violations of parts 25, 26 and 27
29	Land use management
30	Range and feral animal management
31	Wildlife species management
32	Hunting and fishing
34	Refuge revenues sharing with counties
35	Wilderness preservation and management
36	Alaska National Wildlife Refuges
37	Geological and geophysical exploration of the coastal plain, Artic National Wildlife Refuge
38	Midway Atoll National Wildlife Refuge
70	National Fish Hatcheries
71	Hunting and fishing on national fish hatchery areas
80	Administrative requirements, Federal Aid in Fish and Federal Aid in Wildlife Restoration Acts
81	Conservation of endangered and threatened species of fish, wildlife, and plants—cooperation with the States
82	Administrative procedures for grants-in-aid (Marine Mammal Protection Act of 1972)
83	Rules for implementing the Fish and Wildlife Conservation Act of 1980
84	National Coastal Wetlands Conservation Grant Program
85	Clean Vessel Act Grant Program
86	Boating Infrastructure Grant (BIG) Program
90	Feeding depredating migratory waterfowl
91	Migratory bird hunting and conservation stamp contest
92	Migratory bird subsistence harvest in Alaska
96-99	[Reserved]
100	Subsistence management regulations for public lands in Alaska
101-199	[Reserved]



## APPENDIX 1-C.

### 723 FW 3, REGULATIONS DEVELOPMENT PROCESS

**3.1 Purpose.** This chapter describes the annual process of developing regulations that provide open hunting seasons for migratory birds.

**3.2 Responsibility.** The Office of Migratory Bird Management is responsible for the conduct of the regulations development process, including the compilation of data, fulfillment of administrative requirements, preparation of Federal Register documents, and coordination of the various participants in the process.

**3.3 Resource Data.** Data regarding the condition and status of game bird populations, the condition of major habitat areas, the anticipated effect of the regulations, the relative size and distribution of the harvest, as well as the level of hunter participation is collected and compiled in order to develop the migratory bird hunting regulations. In this regard, the Service annually conducts population, production, and harvest surveys for most migratory game birds. These activities are described in Part 722 FW.

#### **3.4 Regulatory Requirements.**

**A.** The process of developing these regulations must follow the requirements contained in Title 50, Code of Federal Regulations, Part 20, Subpart N, which specifies/dictates the extent of notice necessary for certain meetings and the opportunities available for public observation, participation, and comment during those meetings. Subpart N also provides requirements for items which should be contained in a public file.

**B.** The rulemaking process described in Part 202 FW (to be published) must be followed.

**3.5 Consultation and Coordination.** In addition, the Service is responsible for ensuring that the regulations are developed in full cooperation with the States and that the process is open to comment by the States, either individually or collectively through Flyway Councils, and the public. The Service attempts to complete the process in an open and cooperative forum, giving full consideration to public comments received.

#### **3.6 Procedures.**

**A.** The process of developing these regulations begins in January with a meeting of the Service Regulations Committee and other Service personnel. Preliminary regulatory proposals are developed for the coming year and published in the Federal Register as a notice of proposed rulemaking. At this time, comment periods are established for both early-season and late-season regulations. The Flyway Councils and their Technical Committees, as well as individual States and the public, then have an opportunity to respond to these proposals as well as to forward their own recommendations and suggestions to the Service. A supplemental proposed rulemaking document is prepared

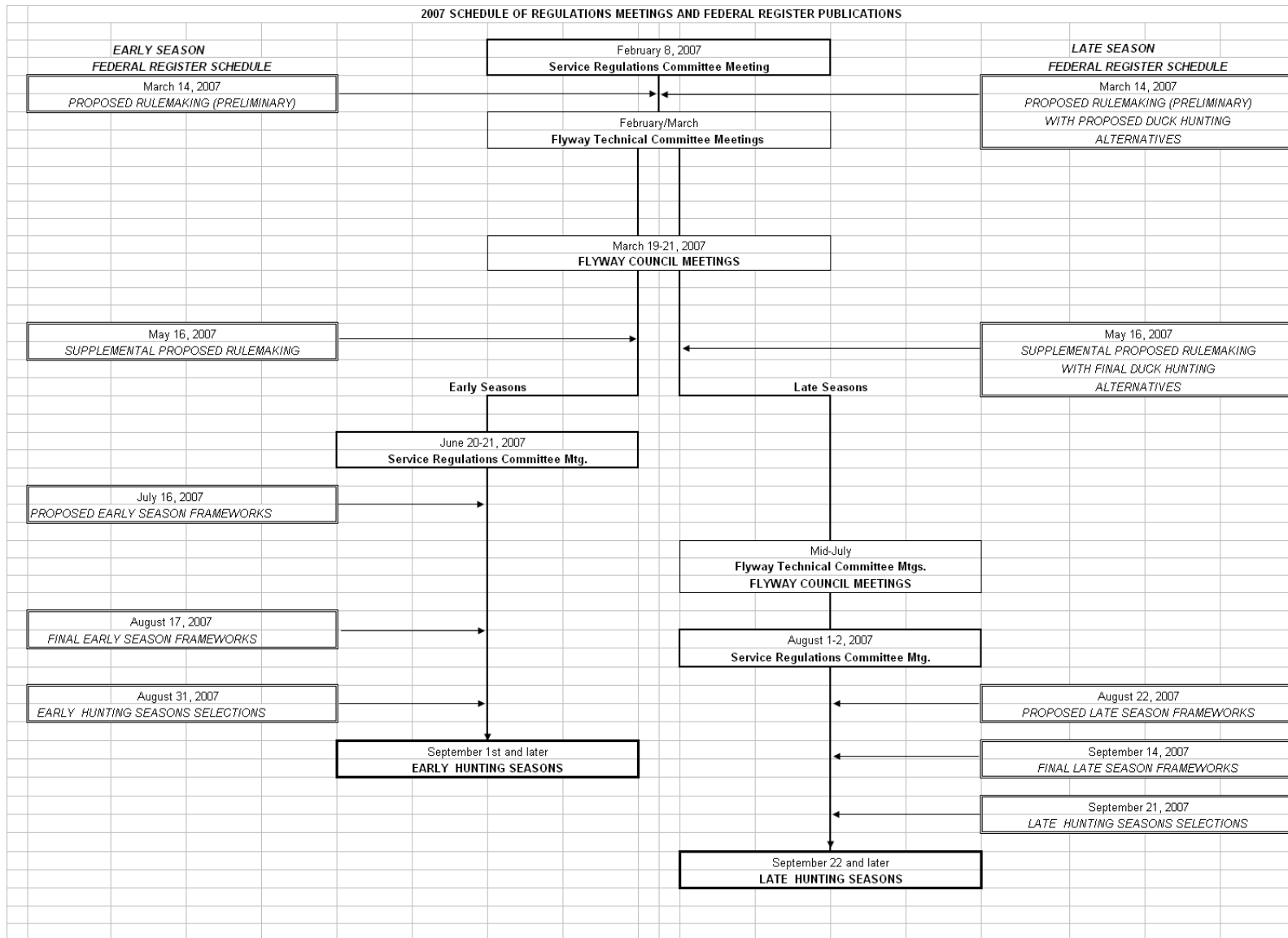
and published that contains Flyway Council recommendations and suggestions from the public that vary from the original proposals.

**B.** The remainder of the process is divided into two phases: the early-season and late-season phases. In each phase, the Service Regulations Committee meets with Flyway Consultants; public hearings are held; proposed frameworks are developed and published in the Federal Register; and an abbreviated open comment period is established. Following this comment period, final frameworks are established and published in the Federal Register; season options are selected by States and Territories from within the frameworks; and, finally, these selections are published in the Federal Register. Both phases follow a rigid schedule to ensure that the appropriate population information can be considered and all administrative requirements of both the Service and States can be met.

**(1) Early-Season Regulations.** Flyway Consultants and the Service meet in Washington, D.C., in late June. The Service Regulations Committee considers the status of the resource and weighs recommendations from the Flyway Councils and the Service prior to forwarding its own recommendations for action to the Director. Next, a public hearing is held to solicit the views of the public. Proposed regulation frameworks are then published in the Federal Register according to a schedule that ensures adequate public notification of the regulatory intent and time for public comment. Following the comment period, the Service finalizes the frameworks. Each State and Territory selects its seasons, usually following its own schedule of public hearings and other deliberations. States and Territories must make their selections from within the Federal frameworks. After the selections are completed, the Service verifies that they are in compliance with the frameworks and then publishes them in the Federal Register. The States and Territories, in turn, publish their selections together with pertinent parts of the Federal basic regulations in their regulations leaflets.

**(2) Late-Season Regulations.** In late July, Technical Committees and Flyway Councils meet and develop late-season recommendations. The remainder of the late-season phase of the regulations development process is the same as that for the early-season phase.

**3.7 Publication of Seasons.** Because the Code of Federal Regulations is not available until March (after the seasons have closed), the State selections, representing the hunting seasons and limits for that year, are not published in Title 50 Code of Federal Regulations Part 20, Subpart K. Instead, the Federal Register final rule containing the State's season selections represents the final product of the regulations development process. In addition, the Federal Register final rule containing the final frameworks addresses and summarizes the public comments and the council recommendations, and represents a record of that year's regulations development process.



APPENDIX II

Maine Department of Inland Fisheries and Wildlife Laws and Rules

## APPENDIX II.

Maine Statutes – TITLE 12 PART 10 – INLAND FISHERIES AND WILDLIFE  
(including hyperlinks)

Part 10: INLAND FISHERIES AND WILDLIFE (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff))

**Chapter 701: GENERAL PROVISIONS (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7001 - §7003**

**Chapter 702: DEPARTMENT OF INLAND FISHERIES AND WILDLIFE (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7011 - §7020**

**Chapter 702-A: DEPARTMENT OF INLAND FISHERIES AND WILDLIFE (HEADING: PL 1983, c. 862, §37 (rp)) §7021 - §7027**

**Chapter 703: COMMISSIONER (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7031 - §7038**

**Chapter 705: LAW ENFORCEMENT OFFICERS (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7051 - §7064**

**Chapter 707: LICENSES AND PERMITS (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7071 - §7377**

**Chapter 709: HUNTING AND TRAPPING (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7401 - §7535**

**Chapter 710: HARASSMENT OF HUNTERS, TRAPPERS AND FISHERMEN (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7541 - §7542**

**Chapter 711: FISHING (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7551 - §7630**

**Chapter 713: WILDLIFE AND FISHERIES MANAGEMENT (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7651 - §7780**

**Chapter 714: MAINE OUTDOOR HERITAGE FUND (HEADING: PL 1995, c. 494, §6 (new); 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7781 - §7789**

**Chapter 715: WATERCRAFT, SNOWMOBILES, AIRMOBILES AND ALL-TERRAIN VEHICLES (HEADING: PL 2001, c. 294, §5 (rpr); 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7791 - §7860**

**Chapter 717: TRAINING OF DOGS (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7861 - §7863**

**Chapter 719: LIABILITY OF LANDOWNERS (HEADING: PL 1979, c. 543, §82 (rp)) §7881 - §7881**

**Chapter 721: ENFORCEMENT (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff)) §7901 - §7954**

## Part 11: FORESTRY

**Chapter 801: BUREAU OF FORESTRY §8001 - §8005**

**Chapter 801-A: FOREST CERTIFICATION INCENTIVE COST-SHARE FUND (HEADING: PL 2001, c. 439, Pt. KKKK, §1 (new); 2005, c. 513, §1 (rpr)) §8011 - §8014**

**Chapter 803: FOREST HEALTH AND MONITORING (HEADING: PL 1999, c. 790, Pt. A, §17 (rpr)) §8101 - §8518**

**Chapter 805: COOPERATIVE FORESTRY MANAGEMENT §8601 - §8888**

**Chapter 807: FOREST FIRE CONTROL §8901 - §9621**

**Chapter 809: JURISDICTION AND PENALTIES §9701 - §9707**

Part 12: ATLANTIC SALMON COMMISSION (HEADING: PL 1995, c. 406, §12 (new); 1999, c. 401, Pt. BB, §7 (rpr))

**Chapter 811: GENERAL PROVISIONS (HEADING: PL 1995, c. 406, §12 (new)) §9901 - §9908**

Part 13: INLAND FISHERIES AND WILDLIFE (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff))

Subpart 1: GENERAL DEFINITIONS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff))

**Chapter 901: DEFINITIONS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §10001 - §10001**

Subpart 2: DEPARTMENT ORGANIZATION (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff))

**Chapter 903: DEPARTMENT OF INLAND FISHERIES AND WILDLIFE (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §10051 - §10326**

Subpart 3: LAW ENFORCEMENT AND GENERAL OFFENSES (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff))

**Chapter 905: ENFORCEMENT OFFICERS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §10351 - §10404**

**Chapter 907: ENFORCEMENT PROCEDURES (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §10451 - §10608**

**Chapter 909: GENERAL OFFENSES (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §10650 - §10656**

**Chapter 911: HUNTING AND OPERATING UNDER THE INFLUENCE (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §10701 - §10703**

Subpart 4: FISH AND WILDLIFE (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff))

**Chapter 913: GENERAL LICENSE AND PERMIT PROVISIONS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §10751 - §10910**

**Chapter 915: HUNTING: SEASONS, REQUIREMENTS AND RESTRICTIONS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §10951 - §12159**

**Chapter 917: TRAPPING (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §12201 - §12260**

**Chapter 919: REGISTRATION AND TRANSPORT OF HARVESTED ANIMALS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §12301 - §12356**

**Chapter 921: WILDLIFE CAUSING DAMAGE OR NUISANCE (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §12401 - §12404**

**Chapter 923: FISH: FISHING SEASONS AND RESTRICTIONS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §12451 - §12663-A**

**Chapter 925: FISH AND WILDLIFE MANAGEMENT AND RESEARCH (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §12701 - §12809**

Subpart 5: GUIDES, OUTFITTERS AND TAXIDERMISTS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff))

**Chapter 927: GUIDES AND TRIP LEADERS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §12851 - §12860**

**Chapter 929: WHITEWATER RAFTING (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §12901 - §12913**

**Chapter 931: TAXIDERMISTS AND HIDE DEALERS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §12951 - §12955**

Subpart 6: RECREATIONAL VEHICLES (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff))

**Chapter 933: GENERAL RECREATIONAL VEHICLE PROVISIONS (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §13001 - §13006**

**Chapter 935: WATERCRAFT AND AIRMOBILES (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §13051 - §13073**

**Chapter 937: SNOWMOBILES (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §13101 - §13113**

**Chapter 939: ATVs (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §13151 - §13161**

Subpart 7: LOCAL REGULATION (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff))

**Chapter 941: LOCAL REGULATION (HEADING: PL 2003, c. 414, Pt. A, §2 (new); Pt. D, §7 (aff); c. 614, §9 (aff)) §13201 - §13201**

Subchapter 1: HUNTING (HEADING: PL 2003, c. 414, Pt. A, §1 (rp); Pt. D, §7 (aff); c. 614, §9 (aff))

**§7401. Open and closed season (REPEALED)**

**§7402. Archery hunting (REPEALED)**

**§7403. Falconry (REPEALED)**

**§7404. Commercial shooting areas (REPEALED)**

**§7405. Pheasant hunting (REPEALED)**

**§7405-A. Pheasant hunting (REPEALED)**

**§7406. Prohibited acts (REPEALED)**

**§7406-A. Target identification while hunting (REPEALED)**

**§7407. Migratory waterfowl hunting (REPEALED)**

**§7408. Implied consent to chemical tests (REPEALED)**

### APPENDIX III

- A. Agencies and organizations involved with establishing annual migratory bird hunting regulations
  
- B. Composition of USFWS Regulations Committee
  
- C. Overview of Adaptive Harvest Management



APPENDIX III – A.

AGENCIES AND ORGANIZATIONS CONCERNED WITH ESTABLISHING ANNUAL MIGRATORY BIRD HUNTING REGULATIONS (NOT A COMPLETE LIST)

Governmental – Regulatory

Federal: United States

Department of Interior (USDOI)  
 Fish and Wildlife Service (USFWS)  
 Office of Migratory Birds

Canada

Environment Canada  
 Canadian Wildlife Service (CWS)

State/Provincial: Maine Department of Inland Fisheries and Wildlife (MDIFW)  
 (Atlantic Flyway) New Hampshire, Vermont, Massachusetts, Connecticut, New York, Pennsylvania, Maryland, New Jersey, Delaware, Rhode Island, Virginia, North Carolina, South Carolina, West Virginia, Georgia, Florida, Puerto Rico, Prince Edward Island, Labrador, New Brunswick, Nova Scotia, Ontario, Quebec

Governmental – Advisory

Atlantic Flyway Council – State Directors  
 Atlantic Flyway Technical Section – Biologists  
 Maine Fish and Wildlife Advisory Council – private citizens appointed by the Governor of Maine  
 Maine Waterfowl Advisory Council – private citizens appointed by the Commissioner of MDIFW

Private – National

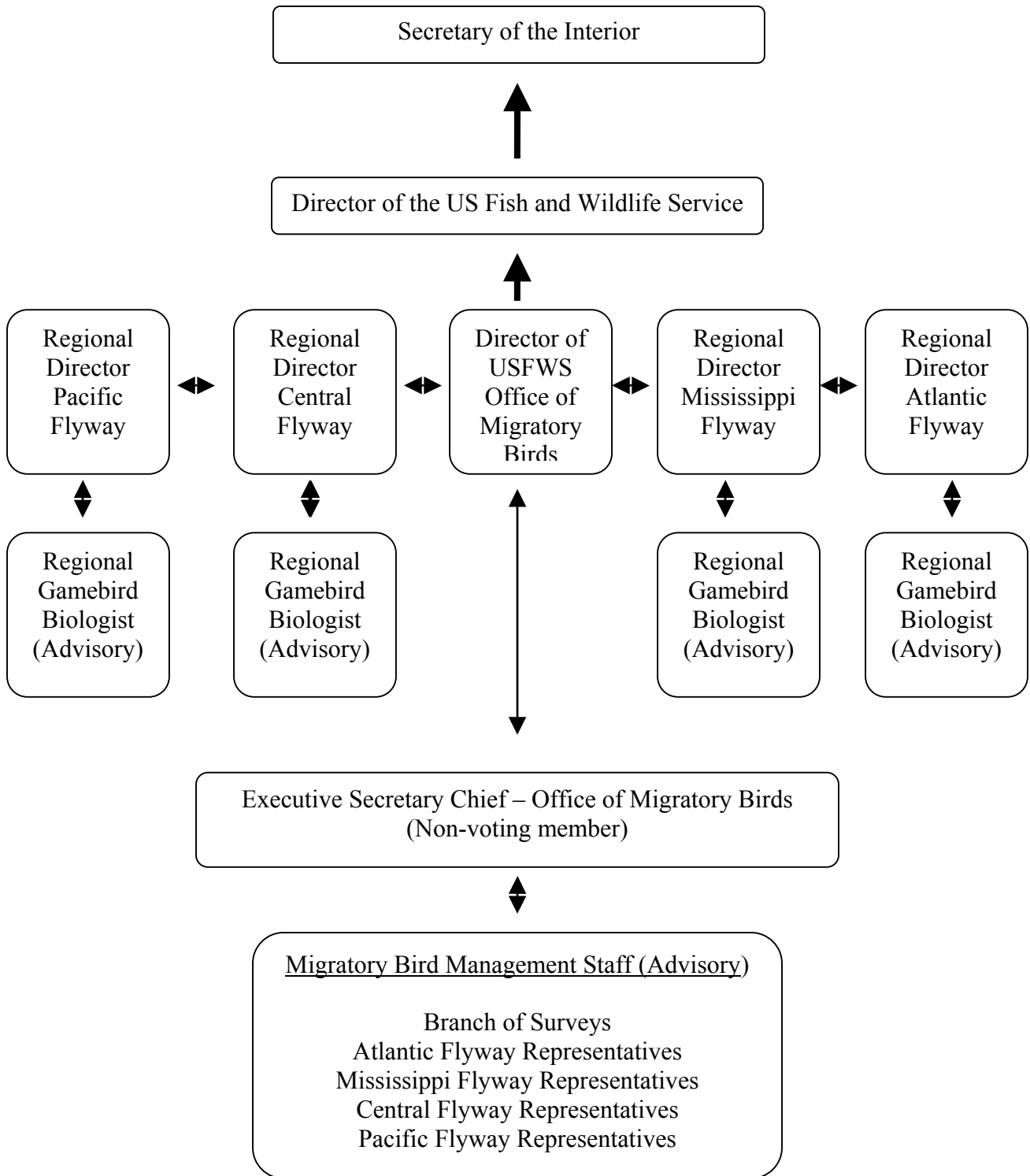
National Audubon Society  
 National Wildlife Federation  
 The Nature Conservancy  
 The National Humane Society  
 The Wildlife Society  
 Safari Club International  
 US Sportsmen’s Alliance  
 Ducks Unlimited  
 Delta Waterfowl Foundation  
 Izaak Walton League of America

Private Local

Maine Audubon Society  
 Maine Chapter of the Wildlife Society  
 Sportsmen’s Alliance of Maine  
 Maine Chapter of Ducks Unlimited  
 Maine Guide Association  
 Local fish and game clubs

APPENDIX III – B.

COMPOSITION OF USFWS REGULATIONS COMMITTEE



## APPENDIX III – C.

## OVERVIEW OF ADAPTIVE HARVEST MANAGEMENT

The annual process of setting duck-hunting regulations in the United States is based on a system of resource monitoring, data analyses, and rule making. Each year, monitoring activities such as aerial surveys and hunter questionnaires provide information on harvest levels, population size, and habitat conditions. Data collected from this monitoring program are analyzed each year, and proposals for duck-hunting regulations are developed by the Flyway Councils, States, and the U.S. Fish & Wildlife Service (USFWS). After extensive public review, the USFWS announces a regulatory framework within which States can set their hunting seasons.

In 1995, the USFWS adopted the concept of adaptive resource management for regulating duck harvests in the United States. The adaptive approach explicitly recognizes that the consequences of hunting regulations cannot be predicted with certainty, and provides a framework for making objective decisions in the face of that uncertainty. Inherent in the adaptive approach is an awareness that management performance can be maximized only if regulatory effects can be predicted reliably. Thus, adaptive management relies on an iterative cycle of monitoring, assessment, and decision making to clarify the relationships among hunting regulations, harvests, and waterfowl abundance.

In regulating waterfowl harvests, managers face four fundamental sources of uncertainty:

- (1) environmental variation - the temporal and spatial variation in weather conditions and other key features of waterfowl habitat; an example is the annual change in the number of ponds in the Prairie Pothole Region, where water conditions influence duck reproductive success;
- (2) partial controllability - the ability of managers to control harvest only within limits; the harvest resulting from a particular set of hunting regulations cannot be predicted with certainty because of variation in weather conditions, timing of migration, hunter effort, and other factors;
- (3) partial observability - the ability to estimate key population attributes (e.g., population size, reproductive rate, harvest) only within the precision afforded by existing monitoring programs; and
- (4) structural uncertainty - an incomplete understanding of biological processes; a familiar example is the long-standing debate about whether harvest is additive to other sources of mortality or whether populations compensate for hunting losses through reduced natural mortality. Structural uncertainty increases contentiousness in the decision-making process and decreases the extent to which managers can meet long-term conservation goals.

Adaptive Harvest Management (AHM) was developed as a systematic process for dealing objectively with these uncertainties. The key components of AHM include:

- (1) a limited number of regulatory alternatives, which describe Flyway-specific season

lengths, bag limits, and framework dates;

(2) a set of population models describing various hypotheses about the effects of harvest and environmental factors on waterfowl abundance;

(3) a measure of reliability (probability or "weight") for each population model; and

(4) a mathematical description of the objective(s) of harvest management (i.e., an "objective function"), by which alternative regulatory strategies can be evaluated.

These components are used in a stochastic optimization procedure to derive a regulatory strategy, which specifies the appropriate regulatory alternative for each possible combination of breeding population size, environmental conditions, and model weights.

The setting of annual hunting regulations then involves an iterative process:

(1) each year, an optimal regulatory alternative is identified based on resource and environmental conditions, and on current model weights;

(2) after the regulatory decision is made, model-specific predictions for subsequent breeding population size are determined;

(3) when monitoring data become available, model weights are increased to the extent that observations of population size agree with predictions, and decreased to the extent that they disagree; and

(4) the new model weights are used to start another iteration of the process.

By iteratively updating model weights and optimizing regulatory choices, the process should eventually identify which model is most appropriate to describe the dynamics of the managed population. The process is optimal in the sense that it provides the regulatory choice each year necessary to maximize management performance. It is adaptive in the sense that the harvest strategy "evolves" to account for new knowledge generated by a comparison of predicted and observed population sizes.

APPENDIX IV

ANALYSES AND POPULATION ESTIMATION TOOLS USED IN THE  
WATERFOWL MANAGEMENT SYSTEM

- A. Power analysis for estimating the number of duck boxes to check annually
- B. SAS model used to determine brood sizes corrected for effects of survey date, age class, and wetland type
- C. Resident Canada Goose population model
- D. Standardized form for reporting nuisance resident Canada Goose complaints
- E. Methodology for estimating the annual number of Barrow's Goldeneyes wintering in Maine
- F. Calculations for determining the status of Maine Waterfowl

## APPENDIX IV – A.

## POWER ANALYSIS FOR ESTIMATING THE NUMBER OF DUCK BOXES TO CHECK ANNUALLY

*The power analysis should use the following (or similar) equation (Shiver and Borders 1996):*

$$n = 4N(CV)^2 / (AE)^2 N + 4(CV)^2$$

*where:*

*AE = allowable error (use 5% to represent 95% Confidence Interval)*

*CV = coefficient of variation among samples (expressed as a percentage)*

*Where CV = Standard Deviation/Mean x 100*

*N = number of units in the sample population*

*n = estimated number of box check necessary on an annual basis*

## APPENDIX IV – B.

## SAS MODEL USED TO DETERMINE BROOD SIZES CORRECTED FOR EFFECTS OF SURVEY DATE, AGE CLASS, AND WETLAND TYPE.

```

DATA brood;
input NAME$ ID$ TYPE$ VALUE$ ACRE MONTH$ DAY YEAR
AOU$ CTYTOWN$ REPEAT$ YOUNG AGE$ WATERSHD$;
IF REPEAT = "R" THEN DELETE;
IF TYPE = "0" THEN DELETE;
"USE BELOW DELETION CODE TO LOOK AT SPECIFIC SPECIES ONE AT
A TIME, MAKE SURE AOU IT IS NOT DELETED TO RUN ON ONLY ONE
SPECIES"
IF AOU = "172" THEN DELETE;
IF AOU = "150" THEN DELETE;
IF AOU = "144" THEN DELETE;
IF AOU = "151" THEN DELETE;
IF AOU = "140" THEN DELETE;
IF AOU = "131" THEN DELETE;
IF AOU = "129" THEN DELETE;
IF AOU = "139" THEN DELETE;
IF AOU = "132" THEN DELETE;
IF AOU = "153" THEN DELETE;
IF AOU = "149" THEN DELETE;
IF AOU = "142" THEN DELETE;
IF AOU = "132.6" THEN DELETE;
Datalines;
"LEFT HERE AS AN EXAMPLE OF DATA INPUT"

```

PIERCEPONDS	15.2584	5	H	1337	JUL	195	1970	129	25840
.	29	2		704					
MANUELWMA	7.0329	3	H	178	JUL	207	1986	151	3290
.	40	3		1310					

```

Proc sort data=brood;
by aou;
run;
PROC MIXED DATA = BROOD IC method = ML;
BY AOU;
CLASS AGE TYPE VALUE;
MODEL YOUNG =
TYPE
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APPENDIX IV – C.

AGE STRUCTURED RESIDENT CANADA GOOSE POPULATION MODEL

**Introduction:**

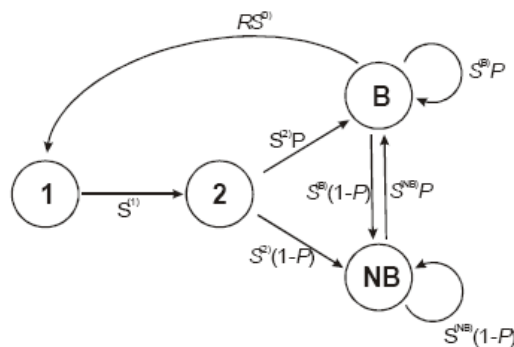
While simple scalar models are appropriate for more r-selected species (i.e. most puddle ducks), they are less applicable to more K-selected species such as long-lived species of geese. In Canada Geese (*Branta canadensis*) there is significant age structure by which breeding propensity is greatly affected.

Here an age-structured model is produced that accounts for differences in survival and breeding propensity dependent upon age. The model currently only takes into account four known classes, including, 1) hatch-year, 2) second-year, 3) breeders and 4) non-breeders (> 2 years old).

The information necessary for input into the model can be acquired during annual summer banding operations, given the following assumptions:

- 1) 10% of the Canada Geese banded during summer are molt migrants from locations outside of Maine (i.e. Massachusetts, Connecticut).
- 2) Non-hunting mortality and crippling rate (Chapman et al. 1969, Raveling and Lumsden 1977, Hestbeck and Malecki 1989) combined are:
  - a. Hatch-year = 15%
  - b. Second – year = 10%
  - c. Breeders = 10%
  - d. Non-breeders = 5%
- 3) Estimates of goslings/goose produced by statistical models in APPENDIX IV–B are representative of production statewide.

The life-cycle diagram showing state change and the corresponding projection matrix are shown below:



$$\mathbf{A} = \begin{bmatrix} 0 & 0 & R S^{(0)} & 0 \\ S^{(1)} & 0 & 0 & 0 \\ 0 & S^{(2)} P & S^{(B)} P & S^{(NB)} P \\ 0 & S^{(2)}(1-P) & S^{(B)}(1-P) & S^{(NB)}(1-P) \end{bmatrix}, \mathbf{n}_t = \begin{bmatrix} N_t^{(1)} \\ N_t^{(2)} \\ N_t^{(B)} \\ N_t^{(NB)} \end{bmatrix}$$

where node 1 refers to one-year-old birds, node 2 refers to two-year-old birds, node B refers to adult breeders, and node NB refers to adult non-breeders. One immediate extension of the base model is to remove the assumption of time-invariance, and express the parameters as time-dependent quantities:

$P_t$  = proportion of adult birds in population in year  $t$  which breed;

$R_t$  = basic breeding productivity in year  $t$  (per capita);

$S_t^{(0)}$  = annual survival rate of young from fledging in year  $t$  to the census point the next year;

$S_t^{(1)}$  = annual survival rate of one-year-old birds in year  $t$ ; etc.

The projection matrix, so extended, is equivalent to the following recursive balance equations:

$$N_{t+1}^{(1)} = N_t^{(B)} R_t S_t^{(0)}$$

$$N_{t+1}^{(2)} = N_t^{(1)} S_t^{(1)}$$

$$N_{t+1}^{(B)} = P_t [N_t^{(2)} S_t^{(2)} + N_t^{(B)} S_t^{(B)} + N_t^{(NB)} S_t^{(NB)}]$$

$$N_{t+1}^{(NB)} = (1 - P_t) [N_t^{(2)} S_t^{(2)} + N_t^{(B)} S_t^{(B)} + N_t^{(NB)} S_t^{(NB)}].$$

Note that we can write the number of young produced in year  $t$  as

$$N_t^{(0)} = N_t^{(B)} R_t$$

but strictly speaking, that is an intermediate variable in the model, not a state variable, because those young do not exist on the anniversary date of the model (mid-June census point).

APPENDIX IV – D.

STANDARDIZED FORM FOR REPORTING NUISANCE RESIDENT CANADA  
GOOSE COMPLAINTS

**Goose Complaint Report**

REGION	<input type="checkbox"/>	TOTAL NUMBER OF BIRDS	<input style="width: 150px; height: 25px;" type="text"/>
--------	--------------------------	-----------------------	--

DATE	<input type="checkbox"/>		
------	--------------------------	--	--

TOWN	<input type="checkbox"/>
------	--------------------------

TYPE OF COMPLAINT (PLACE x IN APPROPRIATE BOXES)

<b>AGRICULTURE</b>	<input type="checkbox"/>	<b>URBAN-SUBURBAN</b>	<input type="checkbox"/>
Crop damage (grains)	<input type="checkbox"/>	Goose droppings	<input type="checkbox"/>
Crop damage (blueberries)	<input type="checkbox"/>	Damaging landscaping	<input type="checkbox"/>
Goose droppings	<input type="checkbox"/>	Using bird feeders	<input type="checkbox"/>
	<input type="checkbox"/>	Standing in roadways	<input type="checkbox"/>
	<input type="checkbox"/>	Honking	<input type="checkbox"/>
	<input type="checkbox"/>	Aggressive birds	<input type="checkbox"/>
	<input type="checkbox"/>	Golf courses	<input type="checkbox"/>
	<input type="checkbox"/>	Public parks	<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>
	<input type="checkbox"/>		<input type="checkbox"/>
Other	<input type="checkbox"/>	Other	<input type="checkbox"/>

Comments:

## APPENDIX IV – E.

## METHODOLOGY FOR ESTIMATING THE ANNUAL NUMBER OF BARROW'S GOLDENEYES WINTERING IN MAINE

Counts

Two main types of databases are maintained to track abundance, locations and correction factors for Barrow's Goldeneyes (BAGOs) wintering in Maine. The two types are recreational birder and Audubon Christmas Bird Count databases. Data on sightings of BAGOs from recreational birders are compiled primarily from the Maine Birding Listserv but can also come via other reporting methods such as emails, word-of-mouth, MDIFW personnel, etc. The Maine CBC database can be queried from the Audubon CBC web site. Ultimately, determination of the accuracy of recreational birder reports is used as part of the correction to the Audubon CBC on an annual basis.

Correction for misidentification

Initial recreational birder database headings include date, time, specific location, number of adult male BAGOs, number of female and juvenile BAGOs combined, total number of BAGOs, number of COGOs, number of unidentified goldeneyes spp., and comments (usually including observer name(s)). To develop correction factors that are accurate and reflect yearly changes in recreational birder effort and abilities, observed BAGO sightings should be confirmed by trained MDIFW staff. Therefore, if at Freeport, 4 BAGO are observed on 15 December and MDIFW staff record 4 BAGO on 16 December then the correction factor would be zero. However, if at Freeport, 4 adult male BAGO are observed on 15 December and MDIFW staff record 4 adult male, 3 adult female, and 1 juvenile male on 16 December then the correction factor would be 2.0x. Accuracy of recreational birder observations should be determined at all sights until the end of December. A compilation of all correction factors should be used to correct the final Audubon CBC count of BAGO.



Correction for missed birds on the day of the CBC count

Because BAGO move within their habitat and the recent maximum number may not be seen on the day of the CBC a correction to the data may be necessary. Therefore, if at Freeport, 12 BAGO were observed the day prior to the CBC count, but on the day of the count only 10 BAGO were recorded, the proper number of birds to include in the final estimate is 12 BAGO. Although it is possible that the two remaining birds moved into another CBC circle and were subsequently counted, overlap in circles is limited and double counting in this manner is highly unlikely.

Correction for BAGO habitat not surveyed within the CBC count circle

Not all BAGO habitats are surveyed within CBC circles in Maine. While effort within circles may be based on where BAGO have been seen in the past a properly asked question should enable MDIFW staff to determine how much of the actual habitat is surveyed in any given year. Responses from CBC circle compilers to the following question will be used to assist in the determination of within CBC circle error,

"Dear CBC circle compiler,

In an attempt to continue to refine Maine IFWs ability to monitor Barrow's Goldeneye numbers and distribution I have one quick question for you regarding THIS YEARS COUNT.

1) Within your circle area, what percentage (to the nearest 10%) of the available Barrow's Goldeneye habitat do you estimate was surveyed?

For the purpose of this exercise,

Barrow's Goldeneye habitat only includes all coastal waters and Section of inland rivers that were ice-free

And

Surveyed, means that the area was actually observed.

Thank you for your assistance and feel free to contact me at any time."

Correction for BAGO habitat not covered by CBC count circles

CBC count circles can be a maximum of 15 miles in diameter and not enough circles exist to survey all open water areas of inland rivers and marine habitats in Maine. Therefore, to determine the amount of area covered by CBC count circles, a GIS-based correction estimate should be developed by December 2007.

Trends in numbers of BAGOs and changes in observer effort on CBC counts

Several methods should be used to determine changes in and influence of observer effort on CBC counts; 1) CBC hours should be regressed from 1950 – present to determine effort trends, 2) CBCs of BAGOs should be regressed, while correcting for observer effort (hours), against date from 1950 – present, and 3) from 1975 – present, BAGOs observed per hour should be regressed against year and the logistical regression line interpreted. The regression line should start in 1975 because of low observer effort prior to 1975 (less than 1,000 hours) and anomalous numbers of BAGO counted in the late 1960s, early 1970s. If effort has maximized and all areas that BAGOs occur in Maine are now counted, the logistical regression line should asymptote.

## APPENDIX IV – F.

## CALCULATIONS FOR DETERMINING THE STATUS OF MAINE WATERFOWL

**Introduction:** Here a system is described that scores the health of Maine’s breeding waterfowl population from 1 (POOR) through 3(EXCELLENT). This score is based on outputs from species-specific decision-making models for Black Ducks, Mallards, Wood Ducks and Ring-necked Ducks (Figures 2 & 3). The score is further weighted by importance of a species to harvest within Maine and harvest capability based on bag limits.

The scoring model, although complex, takes into account several key points:

- 1) Species-specific harvest strategies have already been addressed in Figures 2 and 3. Here, overall hunting season framework and large-scale habitat decision-making are based on the health of the total population.
- 2) The scoring model assumes that the combined health of Black Duck, Mallard, Wood Duck, and Ring-necked Duck populations are representative of all waterfowl in Maine.
- 3) The more a species contributes to harvest the more you are penalized (more restrictive seasons) when said species population and/or productivity declines. However, the more a species contributes to harvest the more you are rewarded (liberal seasons) when said species population and productivity are increasing. This model attribute allows for exploitation of populations in a compensatory manner when populations are stable or increasing but helps reduce the likelihood of over-harvest of local breed stocks when populations are in decline. This model attribute DOES NOT differentiate between habitat and harvest derived population declines. Refinements of this decision making model should incorporate habitat and harvest attributes (K, compensatory mortality, and additive mortality inputs) when available.
- 4) The scoring model acknowledges that increasing breeding populations and productivity of one species can have a buffering affect for other species with stable or declining populations. That is, if Mallards continue to comprise a large portion of the harvest and have stable to increasing populations, this can buffer harvest (through opportunity) of other species that may have declining populations.

## STEPS IN PRODUCING A SCORE

- 1) Obtain annual HIP estimates of harvest of Black Ducks, Mallards, Wood Ducks, and Ring-necked Ducks for Maine.
- 2) For each species divide harvest by the bag limit for the year of the harvest estimate, this becomes your Harvest Capability or **H cap**. Produce an **H cap** for each species for Maine and for the entire Atlantic Flyway.
  - a. EXAMPLE
    - i. Black Duck Harvest = 5765/ bag limit of 1 = 5765 (**H cap**)
    - ii. Mallard Harvest = 12218/bag limit of 4 = 3054.5 (**H cap**)
    - iii. Wood Duck Harvest = 4231/bag limit of 2 = 2115.5 (**H cap**)
    - iv. RN Duck Harvest = 529/bag limit of 4= 132.25 (**H cap**)

**This step standardizes the data by recognizing harvest increases as daily bag limit increases. The model currently assumes a linear relationship between harvest and daily bag limit.**

- 2) Add the **H cap** for Maine.

- a. EXAMPLE:

- i.

Species	Annual harvest in Maine	H cap MAINE
Black Duck	5387	5387
Wood Duck	5577	2788.5
Mallard	12231	3057.75
Ring-necked Duck	1331	332.75
TOTAL	24526	<b>11566</b>

- 3) Determine how much each species contributes to **H cap**, calculated as a percentage (**Species WGT**)

- a. EXAMPLE:

- i. Maine Black Duck =  $(5387/11566) = 46.58\%$

**This step gives a weight to each species dependent upon how much said species contributes to total harvest.**

- 4) Determine individual species raw scores of 1, 2 or 3 (called **RAW**) from Management Options 1-8 produced from the species-specific decision models in Figures 2 and 3. For each species multiple **SPECIES WGT.** by **RAW** to produce a Decision score (**D Scor**)
  - a. EXAMPLE:
    - i. Black Ducks = 46.58% \* 1 (this number will change based on population and productivity trends) = 0.4658

**Here the health of the population is included in the model, 1 tending towards poor population trends and productivity and 3 tending towards healthy population trends and productivity.**

- 5) Add all four species score together, this is your Waterfowl Status Score

a. EXAMPLE:

Species	RAW	Model wgt
Black Duck	1	0.465761715
Wood Duck	3	0.723283763
Mallard	3	0.793122082
Ring-necked Duck	1	0.02876967
<b>Waterfowl Status Score</b>		<b>2.01093723</b>

- 6) The Waterfowl Status Score can fluctuation between 1 and 3. Use this number in Figure 8.

**APPENDIX IV-G. MAINE BREEDING WATERFOWL CENSUS**

**MAINE BREEDING WATERFOWL CENSUS 20\_\_\_\_\_**

COUNTY \_\_\_\_\_

TOWN \_\_\_\_\_

DELORME PAGE & COORDINATES \_\_\_\_\_

AREA NAME \_\_\_\_\_

OBSERVER \_\_\_\_\_

GPS  
EASTING \_\_\_\_\_ NORTHING \_\_\_\_\_

		1st Survey			Flocks					
		DATE:			< 4 birds			> 4 birds		
		TIME:	Lone male	Lone female	all male	mixed M/F		all male	mixed M/F	
Species	AOU #	Pairs				M	F		M	F
Black Duck	133									
Wood Duck	144									
Ringneck	150									
Mallard	132									
Goldeneye	151									
GW Teal	139									
BW Teal	140									
Hooded merg	131									
Common merg	129									
Canada Goose	172									

		2nd Survey			Flocks					
		DATE:			< 4 birds			> 4 birds		
		TIME:	Lone male	Lone female	all male	mixed M/F		all male	mixed M/F	
Species	AOU #	Pairs				M	F		M	F
Black Duck	133									
Wood Duck	144									
Ringneck	150									
Mallard	132									
Goldeneye	151									
GW Teal	139									
BW Teal	140									
Hooded merg	131									
Common merg	129									
Canada Goose	172									

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