
by

John W. Grandy*

TABLE OF CONTENTS

Abstract ........................................... 2
Introduction ....................................... 3
Materials and Methods .............................. 5
Acknowledgments .................................... 6
Results and Discussion ............................ 6
Cause of the Population Decline ................. 6
Hunting ........................................... 6
Other Potential Causes ............................ 10
Relationships with Mallards ....................... 13
Hunting: The One Factor Managers Control ..... 15
FWS Failure to Act: Chronology of Events ....... 16
Reasons for FWS Failure to Take Action ........ 26
Conclusion ......................................... 32
Literature Cited .................................... 32

*Dr. John W. Grandy is Vice President, Wildlife and Environment at The Humane Society of the United States. He has spent much of his life studying the black duck and completed his doctoral dissertation on the subject in 1972. He has worked for the Virginia Commission of Game and Inland Fisheries, the U.S. Fish and Wildlife Service, the National Parks and Conservation Association, the President's Council on Environmental Quality, and Defenders of Wildlife; and has served on advisory committees to the Secretary of Interior and the Director of the U.S. Fish and Wildlife Service. Reprints are available from the author at The Humane Society of the United States, 2100 L Street, N.W., Washington, D.C. 20037.
Abstract

A scientific and technical analysis is presented of the factors which may have been primarily responsible for an estimated 60% decline in the black duck (Anas rubripes) population since 1955. The analyses presented show that the United States Fish and Wildlife Service (FWS), the management agency responsible for waterfowl management in the United States, has recognized the population decline, that the FWS's own experts have consistently recognized that hunting is the most likely cause of the population decline, and that hunting is the only mortality factor which wildlife managers can control in the practical sense. Using FWS information, the author shows, however, that from 1967 to 1982, regulations permitting killing of black ducks have in net effect only been made more permissive, while, since the early 1970's, the numbers of hunters and hunter days (hunter effort) have remained relatively high and hunting has accounted for 50% to 60% of total mortality. The author terms the consistent failure of the FWS to take effective regulatory action to stop the decline and to attempt to restore the black duck population a failure of modern-day wildlife management. Using a series of quotations from knowledgeable individuals, the author presents an analysis of why this failure has occurred.

Introduction

The black duck (Anas rubripes) population has been declining for many years, since at least 1955 (Fig. 1). This change has been chronicled by, most particularly, the winter inventory (depicted in Fig. 1), but also by the observations of hunters, bird watchers, U.S. and Canadian biologists, officials from private conservation organizations, and others. Verification of the decline has taken a variety of forms: deductive reasoning based on underutilized breeding and wintering habitats, marked declines in hunter success based on kill per thousand hunter days and kill per successful hunter, measured declines in breeding populations, high reproductive rates (characteristic of a population at a level substantially below carrying capacity), and declines in indirect population estimates based on analyses of banding data (see: Barske, 1966; Munro, 1968; Benson, 1966; Reed, 1968; Addy, 1968; Geis et al., 1971; Blandin, 1975, 1982; Anon., 1976, 1980, 1983; Crissey, 1976; Williams, 1976; Hunt, 1978; Newell and Boyd, 1978; Spencer, 1979, 1982, 1982a; Longcore, 1981; Maine, 1982; Hagar, 1982; Heusmann, 1982; Smith, 1983; Connor, 1983). Using the winter inventory as a measure, the average rate of decline has been about 2% per year (since 1955) and the population has declined about 60%. The decline has been...

John W. Grandy

Abstract

A scientific and technical analysis is presented of the factors which may have been primarily responsible for an estimated 60% decline in the black duck (Anas rubripes) population since 1955. The analyses presented show that the U.S. Fish and Wildlife Service (FWS), the management agency responsible for waterfowl management in the United States, has recognized the population decline, that the FWS’s own experts have consistently recognized that hunting is the most likely cause of the population decline, and that hunting is the only mortality factor which wildlife managers can control in the practical sense. Using FWS information, the author shows, however, that from 1967 to 1982, regulations permitting killing of black ducks have in net effect only been made more permissive, while, since the early 1970’s, the numbers of hunters and hunter days (hunter effort) have remained relatively high and hunting has accounted for 50% to 60% of total mortality. The author terms the consistent failure of the FWS to take effective regulatory action to stop the decline and to attempt to restore the black duck population a failure of modern-day wildlife management. Using a series of quotations from knowledgeable individuals, the author presents an analysis of why this failure has occurred.

Introduction

The black duck (Anas rubripes) population has been declining for many years, since at least 1955 (Fig. 1). This change has been chronicled by, most particularly, the winter inventory (depicted in Fig. 1), but also by the observations of hunters, bird watchers, U.S. and Canadian biologists, officials from private conservation organizations, and others. Verification of the decline has taken a variety of forms: deductive reasoning based on underutilized breeding and wintering habitats, marked declines in hunter success based on kill per thousand hunter days and kill per successful hunter, measured declines in breeding populations, high reproductive rates (characteristic of a population at a level substantially below carrying capacity), and declines in indirect population estimates based on analyses of banding data (see: Barske, 1968; Munro, 1968; Benson, 1966; Reed, 1968; Addy, 1968; Geis et al., 1971; Blandin, 1975, 1982; Anon., 1976, 1980, 1983; Crissey, 1976; Williams, 1976; Hunt, 1978; Newell and Boyd, 1978; Spencer, 1979, 1982, 1982a; Longcore, 1981; Maine, 1982; Hagar, 1982; Heusmann, 1982; Smith, 1983; Connor, 1983). Using the winter inventory as a measure, the average rate of decline has been about 2% per year (since 1955) and the population has declined about 60%. The decline has been

\[ \text{FIGURE 1 Black duck Winter Inventory, 1955-1983} \] (Courtesy U.S. FWS (Anon., 1983)).
essentially rangewide (Fig. 2), being most pronounced in the U.S. and western portions of the Canadian breeding range (see, for example, Stotts and Davis' 1960 study of what was then a major breeding population in the Chesapeake Bay area). However, despite the decline, acknowledged repeatedly by the U.S. Fish and Wildlife Service (FWS), the Canadian Wildlife Service (CWS), and by the relevant State conservation (or fish and wildlife agencies, regulations governing black duck hunting have, in sum, only been liberalized since 1968 (Table 1). Indeed, since 1970, hunting seasons have, each year, been more permissive than in 1968, and the status of the black duck population has continued to deteriorate (Fig. 1). Furthermore, the negative effect of liberalized seasons has been compounded because the numbers of hunters and hunter days increased sharply between 1968 and the early 1970's, and have remained relatively high since then (Administrative Reports; files; Office of Migratory Bird Management; Patuxent Wildlife Research Center; Martin and Carney, 1977). And, 1968 was, significantly, the year that Black Duck Symposium participants (Barske, 1968; Addy and Martinson, 1968:183-188; Addy, 1968a) concluded that the black duck population was at its lowest point in about 20 years and that major restrictions on black duck kill were necessary to allow the population to rebuild.

In 1982, continued failure of the FWS to take action (Table 1) to protect the black duck and the continuing deterioration of the black duck's status (Maine, 1982; Blandin, 1982; Spencer, 1982; Heusmann, 1982, Fig. 1) caused The Humane Society of the United States (HSUS), the Maine Audubon Society, and one HSUS member from Maine to sue the FWS for a closed season. The suit was unsuccessful (Green, 1982). However, all agree that the decline of the black duck is real. Indeed, the Judge began his legal decision by noting that there had been a sharp decline in the black duck population (Green, 1982:3).

The question remains for wildlife biologists, wildlife administrators, and the interested lay public: what happened to the system of wildlife management in the United States (and to some extent, Canada) that caused it to so consistently fail to take necessary protective action on behalf of the black duck?

To that end, this paper examines, in some detail, the potential reasons for the black duck population decline, the failure of the FWS and the States to take necessary corrective action, and the reasons for that failure, in the hope that recognition of the factors involved will help prevent future failures and simultaneously help insure the welfare of wildlife.

Materials and Methods

Literature on black ducks has been systematically reviewed. Primary sources of this literature were the files of the

---

**TABLE 1 Atlantic Flyway Hunting Regulations—1953-1982***

<table>
<thead>
<tr>
<th>Year</th>
<th>Bag Season Length</th>
<th>Bag Season Length</th>
<th>Bag Season Length</th>
<th>Bag Season Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Black Duck</td>
<td>Black Duck</td>
<td>Black Duck</td>
<td>Black Duck</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
<td>Total</td>
</tr>
<tr>
<td>1962</td>
<td>60</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1964</td>
<td>60</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1966</td>
<td>70</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1968</td>
<td>70</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1970</td>
<td>60</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1972</td>
<td>50</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1974</td>
<td>45</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1976</td>
<td>45</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1978</td>
<td>45</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1980</td>
<td>50</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1982</td>
<td>50</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1984</td>
<td>50</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>1986</td>
<td>50</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

*Possession limit is double the daily bag in all instances. Split season allowed with 10% penalty through 1969 and no penalty thereafter. Table 1 was provided by the U.S. Fish and Wildlife Service, 1982.

**50 Days, with Wednesday noon opening.

155 Days, with Wednesday noon opening.

INT J STUD ANIM PROB 43(4) 1983
essentially rangewide (Fig. 2), being most pronounced in the U.S. and western portions of the Canadian breeding range (see, for example, Stotts and Davis (1960) study of what was then a major breeding population in the Chesapeake Bay area).

However, despite the decline, acknowledged repeatedly by the U.S. Fish and Wildlife Service (FWS), the Canadian Wildlife Service (CW), and by the relevant State conservation (or fish and wildlife) agencies, regulations governing black duck hunting have, in sum, only been liberalized since 1968 (Table 1). Indeed, since 1970, hunting seasons have, each year, been more permissive than in 1968, and the status of the black duck population has continued to deteriorate (Fig. 1). Furthermore, the negative effect of liberalized seasons has been compounded because the numbers of hunters and hunter days increased sharply between 1968 and the early 1970's, and have remained relatively high since then (Administrative Reports, files, Office of Migratory Bird Management, Patuxent Wildlife Research Center; Martin and Carney, 1977). And, 1968 was, significantly, the year that Black Duck Symposium participants (Barske, 1966; Addy and Martinson, 1968) concluded that the black duck population was at its lowest point in about 20 years and that major restrictions on black duck kill were necessary to allow the population to rebuild.

In 1982, continued failure of the FWS to take action (Table 1) to protect the black duck and the continuing deterioration of the black duck's status (Maine, 1982; Blandin, 1982; Spencer, 1982; Heusmann, 1982; Fig. 1) caused the Humane Society of the United States (HSUS), the Maine Audubon Society, and one HSUS member from Maine to sue the FWS for a closed season. The suit was unsuccessful (Green, 1982). However, all agree that the decline of the black duck is real. Indeed, the Judge began his legal decision by noting that there had been a sharp decline in the black duck population (Green, 1982:3).

The question remains for wildlife biologists, wildlife administrators, and the interested lay public: what happened to the system of wildlife management in the United States (and to some extent, Canada) that caused it to so consistently fail to take necessary protective action on behalf of the black duck?

To that end, this paper examines, in some detail, the potential reasons for the black duck population decline, the failure of the FWS and the States to take necessary corrective action, and the reasons for that failure, in the hope that recognition of the factors involved will help prevent future failures and simultaneously help insure the welfare of wildlife.

Materials and Methods

Literature on black ducks has been systematically reviewed. Primary sources of this literature were the files of the

| TABLE 1 Atlantic Flyway Hunting Regulations — 1953-1982* |
|-------------|----------|----------|----------|----------|
| **Year**    | **Bag**  | **Season** | **Black** | **Length** | **Total** |
| 1953        | 40       | 4         | 40        | 25        | 80       |
| 1954        | 60       | 4         | 60        | 25        | 140      |
| 1955        | 70       | 4         | 70        | 25        | 175      |
| 1956        | 70       | 4         | 70        | 25        | 175      |
| 1957        | 70       | 4         | 70        | 25        | 175      |
| 1958        | 70       | 4         | 70        | 25        | 175      |
| 1959        | 70       | 4         | 70        | 25        | 175      |
| 1960        | 70       | 4         | 70        | 25        | 175      |
| 1961        | 70       | 4         | 70        | 25        | 175      |
| 1962        | 70       | 4         | 70        | 25        | 175      |
| 1963        | 70       | 4         | 70        | 25        | 175      |
| 1964        | 70       | 4         | 70        | 25        | 175      |
| 1965        | 70       | 4         | 70        | 25        | 175      |
| 1966        | 70       | 4         | 70        | 25        | 175      |
| 1967        | 70       | 4         | 70        | 25        | 175      |
| 1968        | 70       | 4         | 70        | 25        | 175      |
| 1969        | 70       | 4         | 70        | 25        | 175      |
| 1970        | 70       | 4         | 70        | 25        | 175      |
| 1971        | 70       | 4         | 70        | 25        | 175      |
| 1972        | 70       | 4         | 70        | 25        | 175      |
| 1973        | 70       | 4         | 70        | 25        | 175      |
| 1974        | 70       | 4         | 70        | 25        | 175      |
| 1975        | 70       | 4         | 70        | 25        | 175      |
| 1976        | 70       | 4         | 70        | 25        | 175      |
| 1977        | 70       | 4         | 70        | 25        | 175      |
| 1978        | 70       | 4         | 70        | 25        | 175      |
| 1979        | 70       | 4         | 70        | 25        | 175      |
| 1980        | 70       | 4         | 70        | 25        | 175      |
| 1981        | 70       | 4         | 70        | 25        | 175      |
| 1982        | 70       | 4         | 70        | 25        | 175      |

*Possession limit is double the daily bag in all instances. Split season allowed with 10% penalty through 1969 and no penalty thereafter. Table 1 was provided by the U.S. Fish and Wildlife Service, 1982.

**50 Days, Wednesday noon opening.
155 Days, with Wednesday noon opening.

INT J STUD ANIM PROB 4(3) 1983
I acknowledge and appreciate the help of the late Dr. Warren W. Blandin, former Atlantic Flyway Representative (biologist), Patuxent Wildlife Research Center, in assembling most of the information discussed herein. Henry M. Reeves, formerly of the Office of Migratory Bird Management, FWS, provided legally permitted access to the files in Washington, D.C., and critically commented on the manuscript. Dr. Stephen Kellogg, Yale University; Dr. Warren B. King, Chairman, U.S. Section of the International Council for Bird Preservation; and Howard Spencer, Wildlife Research Supervisor, Maine Department of Inland Fisheries and Wildlife provided helpful comments, as did Joseph A. Hagar, former Massachusetts State Ornithologist, and John W. Lanier, Chief Biologist, White Mountain National Forest in New Hampshire. Despite this help, I alone am responsible for the content and conclusions of this paper.

Results and Discussion

Cause of Population Decline

The cause of the population decline must be, and must have been, total annual mortality that exceeds total annual production (Anon., 1980:16) or the ability of the population to replenish itself. For the purposes of this discussion, however, causes of the decline are divided into hunting mortality and other potential causes of the population decline. Additional discussion is provided on the role of competition and/or hybridization with the mallard (Anas platyrhynchos), because this has been mentioned often by the FWS as a cause of the black duck population decline.

Hunting

Results of major investigations into the cause or causes of the black duck population decline were not widely published during the late 1950's and early 1960's. Rather, it appears that much research was underway during this period but was not reported until the Black Duck Symposium in 1968 (Barske, 1968).

Indeed, the Black Duck Symposium convened most of those then interested in or acknowledged as experts on black ducks. Sixty-nine participants registered: 20 from the U.S. Bureau of Sport Fisheries and Wildlife (hereinafter referred to as the U.S. Fish and Wildlife Service (FWS)), the Federal agency responsible for migratory bird conservation and management in the U.S.; 27 from State conservation (or fish and wildlife) agencies in the United States; 6 from the Canadian Wildlife Service (CWS), Canadian equivalent of the FWS; 3 from Provincial conservation agencies in Canada; 6 from Canadian or U.S. universities; and 5 from private organizations. The purpose of the Symposium, in recognition of the declining status of the black duck, was to bring "together most of the known information on this species and to focus attention on its future needs." (Anon., 1968:1).

The 1968 Symposium on black ducks provided substantial evidence of a causal link between hunting and the population decline, as the following excerpts show:

C. E. Addy, then Atlantic Flyway Representative (biologist) for the FWS, stated:

"The evidence indicates that harvest has been excessive in relation to production. Kill has been the primary factor responsible for holding the population down to the level that it is." (Addy, 1968:4).

William T. Munro, Wildlife Biologist, Eastern Region, Canadian Wildlife Service stated:

"Most field workers in Canada believe that the major cause of this [black duck] decline is over-harvest." (Munro, 1968:7).

Austin Reed, biologist with the Quebec Wildlife Service, stated:

"The consensus of opinion [among Canadian biologists] is that the size of the hunting kill is the most likely explanation [for the population decline]. A close correlation has been observed between Mid-Winter Survey counts of black ducks in the Atlantic Flyway and the breeding population on Île aux Pommers the following spring (Figure V). This suggests the likelihood that population level is being regulated between late summer and mid-January [a period which corresponds closely with the hunting season]." (Reed, 1968:82).

R. K. Martinson, A. D. Geis, and R. I. Smith, all FWS employees responsible for waterfowl investigations at Patuxent Wildlife Research Center, reported that hunting caused 50% to 60% of total mortality and concluded:

"At that time [mid 1950's], hunting regulations were then relaxed and large kills were made. Despite a high population, the rate of kill was sufficient to boost total mortality higher than productivity, and the black duck population began to decline. By 1959, the black duck population was obviously at a low level and hunting regulations were made very restrictive. The resulting annual kills were small compared to earlier years but still large enough, with the much reduced size of the black duck population, to result in a kill rate of a magnitude that appears to have prevented an increase in the population." (Martinson et al., 1968:43, 50).

C. E. Addy and R. K. Martinson in presenting the final paper at the Symposium stated:

"Speakers at this symposium generally share the opinion that the black duck population is low and that wise management dictates that we do something to increase the size of the population. Most speakers also felt that hunting regulations effect the size and rate of kill and, thus, the survival of black ducks." (Addy and Martinson, 1968:183).

After the Symposium, Addy summarized the proceedings for his superiors at FWS, stating:

"It was the consensus of the group that while surveys were unreliable..."
U.S. Fish and Wildlife Service's Office of Migratory Bird Management in Washington, D.C., 20240, and related files at the FWS's Patuxent Wildlife Research Center in Laurel, Maryland 20708.

I should note here that this paper is a scientific and technical analysis of a situation which contains elements of science, politics, and other factors. For that reason, the literature cited is not always scientific literature; rather it is sometimes scientific, and sometimes consists of memos, letters, and unpublished reports (authored by acknowledged experts or officials in positions of responsibility) which often represented the best and only information on which to base black duck management decisions. In presenting the "Literature Cited" section, I have attempted to present enough information to allow the interested reader to locate, obtain, and evaluate the information which I have analyzed and which leads me to the conclusions I have reached.

Acknowledgments

I acknowledge and appreciate the help of the late Dr. Warren W. Blanding, former Atlantic Flyway Representative (biologist), Patuxent Wildlife Research Center, in assembling most of the information discussed herein. Henry M. Reeves, formerly of the Office of Migratory Bird Management, FWS, provided legal permission to use the files in Washington, D.C., and critically commented on the manuscript. Dr. Stephen Kellert, Yale University; Dr. Warren B. King, Chairman, U.S. Section of the International Council for Bird Preservation; and Howard Spencer, Wildlife Research Supervisor, Maine Department of Inland Fisheries and Wildlife provided helpful comments, as did Joseph A. Hagar, former Massachusetts State Ornithologist, and John W. Lanier, Chief Biologist, White Mountain National Forest in New Hampshire. Despite this help, I alone am responsible for the content and conclusions of this paper.

Results and Discussion

Cause of Population Decline

The cause of the population decline must be, and must have been, total annual mortality that exceeds total annual production (Anon., 1980:16) or the ability of the population to replenish itself. For the purposes of this discussion, however, causes of the decline are divided into hunting mortality and other potential causes of the population decline. Additional discussion is provided on the role of competition and/or hybridization with the mallard (Anas platyrhynchos), because this has been mentioned often by the FWS as a cause of the black duck population decline.

Hunting

Results of major investigations into the cause or causes of the black duck population decline were not widely published during the late 1950's and early 1960's. Rather, it appears that much research was underway during this period but was not reported until the Black Duck Symposium in 1968 (Barske, 1968)3. Indeed, the Black Duck Symposium convened most of those then interested in or acknowledged as experts on black ducks. Sixty-nine participants registered: 20 from the U.S. Bureau of Sport Fisheries and Wildlife (hereinafter referred to as the U.S. Fish and Wildlife Service (FWS), the Federal agency responsible for migratory bird conservation and management in the U.S.), 27 from State conservation (or fish and wildlife) agencies in the United States; 6 from the Canadian Wildlife Service (CCWS), Canadian equivalent of the FWS; 3 from Provincial conservation agencies in Canada; 6 from Canadian or U.S. universities; and 5 from private organizations. The purpose of the Symposium, in recognition of the declining status of the black duck, was to bring "together most of the known information on this species and to focus attention on its future needs." (Anon., 1968:1).

The 1968 Symposium on black duks provided substantial evidence of a causal link between hunting and the population decline, as the following excerpts show:

C. E. Addy, then Atlantic Flyway Representative (biologist) for the FWS, stated:

"The evidence indicates that harvest has been excessive in relation to production. Kill has been the primary factor responsible for holding the population down to the level that it is." (Addy, 1968:4).

William T. Munro, Wildlife Biologist, Eastern Region, Canadian Wildlife Service stated:

"Most field workers in Canada believe that the major cause of this [black duck] decline is over-harvest." (Munro, 1968:7).

Austen Reed, biologist with the Quebec Wildlife Service, stated:

"The consensus of opinion [among Canadian biologists] is that the size of the hunting kill is the most likely explanation for the population decline....A close correlation has been observed between Mid-Winter Survey counts of black ducks in the Atlantic Flyway and the breeding population on Ile aux Pommes the following spring (Figure V). This suggests the likelihood that population level is being regulated between late summer and mid-January (a period which corresponds closely with the hunting season)." (Reed, 1968:82).

R. K. Martinson, A. D. Geis, and R. I. Smith, all FWS employees responsible for waterfowl investigations at Patuxent Wildlife Research Center, reported that hunting caused 50% to 60% of total mortality and concluded:

"At that time [mid 1950's], hunting regulations were then relaxed and large kills were made. Despite a high population, the rate of kill was sufficient to boost total mortality higher than productivity, and the black duck population began to decline. By 1959, the black duck population was obviously at a low level and hunting regulations were made very restrictive. The resulting annual kills were small compared to earlier years but still large enough, with the much reduced size of the black duck population, to result in a kill rate of a magnitude that appears to have prevented an increase in the population." (Martinson et al., 1968:43,50).

C. E. Addy and R. K. Martinson in presenting the final paper at the Symposium stated:

"Speakers at this symposium generally shared the opinion that the black duck population is low and that wise management dictates that we do something to increase the size of the population. Most speakers also felt that hunting regulations affect the size and rate of kill and, thus, the survival of black ducks." (Addy and Martinson, 1968:183).

After the Symposium, Addy summarized the proceedings for his superiors at FWS, stating:

"It was the consensus of the group that while surveys were unreliable
In 1971, a Special Scientific Report by three FWS biologists (Aelreid D. Geis, Robert I. Smith (now in charge of black duck management, FWS) and John P. Rogers, (now and since 1972 the Chief of the FWS Migratory Bird Management program) analyzed all banding data from 1922 to 1968, and concluded, in part:

"In reviewing the material compiled herein and in re-reading the material in the black duck symposium held at Chestertown in 1968, I am struck by what appears to be an inescapable fact—the major amendable problem with the black duck is excessive harvest." (Emphasis in original) (McGillyver, 1974:1).

In 1976, Walter F. Crissey, formerly FWS Senior Scientist and for ten years Director of the FWS's Migratory Bird Population Station, wrote an authoritative report on black ducks in which he concluded:

"It seems to me that all of the available information favors the hypothesis that over-harvest has been the most likely cause of the decline." (Crissey 1976:6).

In 1976, Anderson and Burnham (1976) both FWS biostatisticians at Patuxent Wildlife Research Center, published part of a study on mallards in which they concluded that past regression analyses which had been used in Martinson et al. (1968) and Geis et al. (1971) to "prove" an additive relationship between hunting mortality and total mortality in black ducks, were invalid. Anderson and Burnham did not show that such a relationship does not exist. They simply used mathematical techniques to invalidate the regression analysis which biologists had previously used. Anderson and Burnham did not refute—or even discuss—all of the other points made at the Black Duck Symposium (Barske, 1968) and elsewhere (i.e., Geis et al., 1971) suggesting a definite causal relationship between hunting mortality and the black duck population decline.

Anderson and Burnham also did not show or even suggest that the program designed by Addy and Martinson (1968) to restore the black duck population would not have been successful. I.R.P. is the abbreviation for an "Important Resource Problem." Identification of such a problem provides a mechanism within the FWS for devising a strategy to combat the problem and for procuring funds to solve the problem. In 1980, the Service prepared an I.R.P. strategy paper to assess problems associated with declining populations of black ducks and designated the continuing decline of the black duck population the twentieth most pressing resource problem in the United States (Anon., 1980). As a result of the I.R.P. designation, in 1980 the FWS assembled a group of 19 waterfowl, coastal, and es-tuarine experts to examine the problems facing black ducks. These experts concluded:

"The declining numbers of black ducks are primarily the result of annual mortality that exceeds production. Most of that mortality is directly related to hunting." (Anon., 1980:16).

In 1982, H.W. Heusmann, water-fowl biologist for Massachusetts stated when discussing the decline of the continental black duck population:

"Hunting is responsible for further reducing the [black duck] population." (Heusmann, 1982:17). In 1982, Dr. Warren W. Blandin, based on the extensive analyses in his dissertation and his many years of experience as the Atlantic Flyway water-fowl biologist, FWS, concluded that kill of black ducks, particularly immatures, had been excessive throughout the principal breeding range of the species. He further concluded that such kill would ensure a declining population (Blandin 1982:122). In reaching his conclusion, Blandin (1982:89; 1982a:2) presented data comparing hunting mortality for the black duck and the mallard. (See below.)

These figures show that hunting is a far more important mortality factor for the black duck than for the mallard. Furthermore, the detrimental effect of hunting for black ducks is compounded by the fact that total mortality for immature black ducks is 7% higher than for immature mallards (Blandin 1982:2).

In 1982, Joseph A. Hagar, former Massachusetts State Ornithologist and a respected authority on black ducks, concluded on the basis of available data and his knowledge, that hunting is a significant contributing cause of the black duck decline. Hagar also noted "that black ducks are under heavy gunning pressure and that many hunters in the northeast try to shoot black ducks above all other species." (Hagar, 1982).

In 1982, the Black Duck Management Plan, developed by professional waterfowl biologists working for U.S. States and Canadian Provinces in the Atlantic Flyway, together with CWS and FWS officials, explicitly acknowledged a link between hunting and population decline and stated:

"Present levels of sport hunting are depressing black duck populations by reducing the survival of immature birds." (Spencer, 1982:15).

The FWS agreed with this assessment in a publication dated September 17, 1982 (Potter, 1982:41253).

<table>
<thead>
<tr>
<th>HUNTING MORTALITY AS A PROPORTION OF TOTAL MORTALITY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Black Duck</strong></td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>ADULT MALES</td>
</tr>
<tr>
<td>57%</td>
</tr>
<tr>
<td>55%</td>
</tr>
</tbody>
</table>
indicators of population status and that no surveys gave an accurate current population figure, the overall Flyway population had been declining and was probably at its lowest level of the past 20 years. Papers were presented on the various factors which tend to reduce the population or lower its productivity such as predation, loss of habitat, pollution, pesticides and others. However, with these factors in operation it was generally agreed that hunting kill was too great for the population to maintain itself at a high level. In fact, it was generally acknowledged that hunting kill is the only major mortality factor we can do anything about at the present time.” (Addy, 1968a).

In 1971, a Special Scientific Report by three FWS biologists (Aelred D. Geis, Robert I. Smith (now in charge of black duck management, FWS) and John P. Rogers, (now and since 1972 the Chief of the FWS Migratory Bird Management program) analyzed all banding data from 1922 to 1970. The report noted that about 50% of total mortality was caused by hunting and concluded, in part:

“According to the winter survey, the continental black duck population declined greatly between 1952 and 1962. It is believed that the survey data correctly reflect the population trend during these years. Although the population was at a lower level, and the kill much smaller in 1959-1962 than in 1952-1954, band recovery data show that kill rates were equally high in the two periods. The population decline was probably due to a high rate of kill associated with 70-day seasons and 4-bird bag limits during 1953-1958. Failure of the black duck population to recover in recent years despite a lower kill is apparently due to a continued high kill rate.” (Geis et al., 1971:49, 63).

In 1974, Frank B. McGilvery, a FWS waterfowl biologist then stationed at Patuxent Wildlife Research Center, was asked to evaluate the black duck winter inventories over the preceding ten years. He reported to his superiors:

“In reviewing the material compiled herein and in re-reading the material in the black duck symposium held at Chestertown in 1968, I am struck by what appears to be an inescapable fact—the major amendable problem with the black duck is excessive harvest.” (Emphasis in original) (McGilvery, 1974:1).

In 1976, Walter F. Crissey, formerly FWS Senior Scientist and for ten years Director of the FWS’s Migratory Bird Population Station, wrote an authoritative report on black ducks in which he concluded:

"It seems to me that all of the available information favors the hypothesis that over-harvest has been the most likely cause of the decline." (Crissey 1976:6).

In 1976, Anderson and Burnham (1976) both FWS biostatisticians at Patuxent Wildlife Research Center, published part of a study on mallards in which they concluded that past regression analyses which had been used in Martinson et al. (1968) and Geis et al. (1971) to "prove" an additive relationship between hunting mortality and total mortality in black ducks, were invalid. Anderson and Burnham did not show that such a relationship does not exist. They simply used mathematical techniques to invalidate the regression analysis which biologists had previously used. Anderson and Burnham did not refute—or even discuss—all of the other points made at the Black Duck Symposium (Barsek, 1968) and elsewhere (i.e., Geis et al., 1971) suggesting a definite causal relationship between hunting mortality and the black duck population decline. Anderson and Burnham also did not show or even suggest that the program designed by Addy and Martinson (1968) to restore the black duck population would not have been successful.

I.R.P. is the abbreviation for an "Important Resource Problem." Identification of such a problem provides a mechanism within the FWS for devising a strategy to combat the problem and for securing funds to solve the problem. In 1980, the Service prepared an I.R.P. strategy paper to assess problems associated with declining populations of black ducks and designated the continuing decline of the black duck population the twentieth most pressing resource problem in the United States (Anon., 1980). As a result of the I.R.P. designation, in 1980 the FWS assembled a group of 19 waterfowl, coastal, and es- tuarine experts to examine the problems facing black ducks. These experts concluded:

"The declining numbers of black ducks are primarily the result of annual mortality that exceeds production. Most of that mortality is directly related to hunting." (Anon., 1980:16).

In 1982, H.W. Heusmann, waterfowl biologist for Massachusetts stated when discussing the decline of the continental black duck population:

"Hunting is responsible for further reducing the [black duck] population." (Heusmann, 1982:17).

In 1982, Dr. Warren W. Blandin, based on the extensive analyses in his dissertation and his many years of experience as the Atlantic Flyway waterfowl biologist, FWS, concluded that kill of black ducks, particularly immatures, had been excessive throughout the principal breeding range of the species. He further concluded that such kill would ensure a declining population (Blandin 1982:122). In reaching his conclusion, Blandin (1982:89; 1982a:2) presented data comparing hunting mortality for the black duck and the mallard. (See below.)

These figures show that hunting is a far more important mortality factor for the black duck than for the mallard. Furthermore, the detrimental effect of hunting for black ducks is compounded by the fact that total mortality for immature black ducks is 7% higher than for immature mallards (Blandin, 1982a:2).

In 1982, Joseph A. Hagar, former Massachusetts State Ornithologist and a respected authority on black ducks, concluded on the basis of available data and his knowledge, that hunting is a significant contributing cause of the black duck decline. Hagar also noted "that black ducks are under heavy gunning pressure and that many hunters in the northeast try to shoot black ducks above all other species." (Hagar, 1982).

In 1982, the Black Duck Management Plan, developed by professional waterfowl biologists working for U.S. States and Canadian Provinces in the Atlantic Flyway, together with CWS and FWS officials, explicitly acknowledged a link between hunting and population decline and stated:

“Present levels of sport hunting are depressing black duck populations by reducing the survival of immature birds.” (Spencer, 1982a:15).

The FWS agreed with this assessment in a publication dated September 17, 1982 (Potter, 1982:41253).

## Hunting Mortality as a Proportion of Total Mortality

<table>
<thead>
<tr>
<th>Species</th>
<th>Adult Males</th>
<th>Adult Females</th>
<th>Young Males</th>
<th>Young Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black Duck</td>
<td>57%</td>
<td>47%</td>
<td>66%</td>
<td>64%</td>
</tr>
<tr>
<td>Mallard</td>
<td>55%</td>
<td>42%</td>
<td>66%</td>
<td>51%</td>
</tr>
</tbody>
</table>

*Note: The hunting mortality percentages for black duck and mallard were calculated based on the data presented by the FWS and other authorities.*

**Source:** Supplement to Int. J. Stud. Anim. Prob. 4(4) 1983
The implication, or easily drawn inference, that the population is declining only because of the death of immature black ducks seems questionable at best. The assertion is apparently based on Blanding's (1982:2) comparative mortality figures which show substantially higher juvenile mortality rates from hunting for black ducks than for juvenile mallards. This fact is certainly cause for concern; however, when a population declines by about 60%, as the black duck population has, "the loss of adults from the breeding population due to hunting must have a negative impact on the population" (Hagar 1982). In addition, as wildlife managers have long recognized, since adults are presumably experienced breeders, they are probably more successful in producing young than are ducks breeding for the first time. Therefore, the loss of adults to the population is probably more debilitating to the population (per duck killed) than is the loss of immatures, and any suggestion or hypothesis that the population is declining only because of hunting mortality of immatures should be rejected.

Other Potential Causes

The FWS, officially, and others such as New Jersey officials have consistently stated that "other" factors are "major" causes of the population decline. Among those consistently cited are deterioration or loss of habitat, and in the case of New Jersey, severe winter mortality. While some losses certainly are attributable to these causes, the data suggest that they are not in any sense "major", when compared with hunting.

The quantity and quality of black duck wintering habitat has no doubt decreased since 1965; however, the available evidence suggests that wintering habitat and winter mortality are not limiting factors for the black duck. Indeed, the FWS I.R.P. paper essentially concluded (in 1980) that wintering habitat was sufficient for black duck populations (Anon., 1980:13).

The 1971 FWS Special Scientific Report concluded that "[T]here was no evidence of unusual mortality of black ducks during the late winter and early spring," and that "[I]t appears that after the close of the hunting season black ducks survived at a relatively high rate." Thus, winter and early spring non-hunting mortality is not serious when viewed on a continent-wide scale." (Geis et al., 1971:66).

My doctoral research (concluded in 1972) suggests that more than adequate food exists for black ducks in major wintering areas, except under extremely severe winter conditions (Grandy, 1972:25). Indeed, for few black ducks are using important coastal wintering grounds, as compared with 10 to 15 years ago, and their habitat has not been occupied by other species, it seems logical to conclude that there must be adequate winter food and habitat. For example, no one has suggested that the 52% decline (Avg. 1972-76 compared with Avg. 1977-1981) in the wintering population in Maine (Spencer, 1982: App. A) has been associated with a comparable decline in quantity or quality of available habitat. Indeed, the contrary is more likely true of the entire Atlantic Flyway: still-suitable areas of habitat are unused or underutilized by black ducks in comparison to carrying capacity and to past use levels.

Crissley (1976:6) concluded that "I know of nothing that supports" the contention that deterioration of wintering habitat is a possible cause of the black duck decline.

Local winter mortality may sometimes be substantial during severe winters (Hagar, 1948, 1950; Grandy, 1972; Ferrigno (New Jersey Fish and Game), 1982, pers. comm.; Anon., 1980:13). The I.R.P. analysis noted that severe winter mortality may occur about one year in ten (Anon., 1980:13). My analysis of weather patterns in New England suggested a somewhat greater potential frequency (Grandy, 1972:25), as did Hagar's (1948, 1950) experience. However, even if severe winter mortality occurs somewhat more frequently than once every ten years, it is a natural mortality factor with which black ducks have always contended and to which they have presumably adapted, and over which managers have no practical control because of the unpredictable and localized nature of such mortality.

As an aside, however, even if severe winter mortality occurs somewhat more frequently than once every ten years, such a situation provides no rationale or justification for encouraging a high level of black duck hunting kill (as New Jersey officials have suggested) on the expectation that severe winter weather may sometimes follow. Indeed, wildlife managers typically have never managed on the lower the possible carrying capacity, as caused by unpredictable and nearly random catastrophic events such as severe winter weather. For example, neither deer (Odocoileus virginianus) nor waterfowl have ever been managed to the lowest possible pre-winter population based on an analysis of the lowest possible carrying capacity, as caused by occasional severe winters. Rather, managers typically attempt to manage for a high over-winter recruitment of young birds into the population that is well below the population that is well below the carrying capacity of its breeding habitat. (Grandy, 1972:7).

In this respect, lack of either quantity or quality of breeding habitat does not appear to be a limiting factor at present population levels. Rather, the high rate of reproduction associated with black ducks in recent years is characteristic of a population that is well below the carrying capacity of its breeding habitat. (Crissley, 1977:6).

Blanding, in his 1982 doctoral dissertation, reaffirmed this conclusion:

"The implication for black ducks is that although annual production may be high in some non-breeding populations, the recruitment of young birds into the..."
The implication, or easily drawn inference, that the population is declining only because of the death of immature black ducks seems questionable at best. The assertion is apparently based on Blandin's (1982a:2) comparative mortality figures which show substantially higher juvenile mortality rates from hunting for black ducks than for juvenile mallards. This fact is certainly cause for concern: however, when a population declines by about 60%, as the black duck population has, "the loss of adults from the breeding population due to hunting must have a negative impact on the population" (Hagar 1982). In addition, as wildlife managers have long recognized, since adults are presumably experienced breeders, they are probably more successful in producing young than are ducks breeding for the first time. Therefore, the loss of adults to the population is probably more debilitating to the population (per duck killed) than is the loss of immatures, and any suggestion or hypothesis that the population is declining only because of hunting mortality of immatures should be rejected.

Other Potential Causes

The FWS, officially, and others such as New Jersey officials have consistently stated that "other" factors are "major" causes of the population decline. Among those consistently cited are deterioration or loss of habitat, and in the case of New Jersey, severe winter mortality. While some losses certainly are attributable to these causes, the data suggest that they are not in any sense "major", when compared with hunting.

The quantity and quality of black duck wintering habitat has no doubt decreased since 1955; however, the available evidence suggests that wintering habitat and winter mortality are not limiting factors for the black duck. Indeed, the FWS I.R.P. paper essentially concluded (in 1980) that wintering habitat was sufficient for black duck populations (Anon., 1980:13).

The 1971 FWS Special Scientific Report concluded that "There was no evidence of unusual mortality of black ducks during the late winter and early spring:"; and that "It appears that after the close of the hunting season black ducks survived at a relatively high rate." Hence winter and early spring non-hunting mortality is not serious when viewed on a continent-wide scale." (Geis et al., 1971:66).

My doctoral research (concluded in 1972) suggests that more than adequate food exists for black ducks in major wintering areas, except under extremely severe winter conditions (Grandy, 1972: 25). Indeed, since far fewer black ducks are using important coastal wintering grounds, as compared with 10 to 15 years ago, and their habitat has not been occupied by other species, it seems logical to conclude that there must be adequate winter food and habitat. For example, no one has suggested that the 52% decline (Avg. 1972-76 compared with Avg. 1977-1981) in the wintering population in Maine (Spencer, 1982: App. A) has been associated with a comparable decline in quantity or quality of available habitat. Indeed, the contrary is more likely true of the entire Atlantic Flyway: still-suitable areas of habitat are unused or underutilized by black ducks in comparison to carrying capacity and to past use levels.

Crissey (1976:6) concluded that "I know of nothing that supports" the contention that deterioration of wintering habitat is a possible cause of the black duck decline.

Local winter mortality may sometimes be substantial during severe winters (Hagar, 1948, 1950; Grandy, 1972; Ferrigno (New Jersey Fish and Game), 1982, pers. comm.; Anon., 1980:13). The I.R.P. analysis noted that severe winter mortality may occur about one year in ten (Anon., 1980:13). My analysis of weather patterns in New England suggested a somewhat greater potential frequency (Grandy, 1972:25), as did Hagar's (1948, 1950) experience. However, even if severe winter mortality occurs somewhat more frequently than once every ten years, it is a natural mortality factor with which black ducks have always contended and to which they have presumably adapted, and over which managers have no practical control because of the unpredictable and localized nature of such mortality.

As an aside, however, even if severe winter mortality occurs somewhat more frequently than once every ten years, such a situation provides no rational or justification for encouraging a high level of black duck hunting kill (as New Jersey officials have suggested) on the expectation that severe winter weather may sometimes follow. Indeed, wildlife managers typically have never managed on the basis of the lowest possible carrying capacity, as caused by unpredictable and nearly random catastrophic events such as severe winter weather. For example, neither deer (Odocoileus virginianus) nor waterfowl have ever been managed on the basis of the lowest possible pre-winter population based on an analysis of the lowest possible carrying capacity, as caused by occasional severe winters. Rather, managers typically attempt to manage for a high over-winter population, so as to maximize reproduction. To do otherwise would completely remove the beneficial effects on wildlife populations of genetic selection caused by events such as winter mortality induced by food shortage, would reduce the "margin for error" in traditional wildlife management, and would necessitate extremely low wildlife populations.

The situation with respect to the quantity and quality of available breeding habitat is quite similar to that for wintering habitat. The black duck breeding range in eastern Canada is more than 1,000,000 square miles (Reed, 1978; Spencer, 1979). It includes the eastern Canadian boreal forest, the Maritime Provinces, Quebec, and much of Ontario. Substantial additional potential breeding range is found in the Eastern United States (Fig. 2).

Breeding populations have declined substantially or disappeared in major parts of the historic breeding range, including areas of the mid-Atlantic States, New England, New York, Quebec, and Ontario. These declines are not, except in a few instances, demonstrably associated with habitat changes. For example, Canadian officials have consistently concluded, beginning at the 1968 Black Duck Symposium, that breeding habitat is not a limiting factor in Canada (Munro 1968:7; Reed 1968:82; Spencer, 1976). New York State biologist Dick Benson reported a similar, and increasing, trend of vacant breeding habitat in the United States (Benson, 1968:14). Participants attending the two-day Black Duck Workshop in Calais, Maine, in July 1976 (including FWS, CWS, State and Provincial officials) concluded that the available information indicated that Canadian breeding habitat for the black duck is not a limiting factor (Spencer, 1976:6, App.10).

Crissey, in his 1976 black duck report, concluded:

"In this respect, lack of either quantity or quality of breeding habitat does not appear to be a limiting factor at present population levels. Rather, the high rate of reproduction associated with black ducks in recent years is characteristic of a population that is well below the carrying capacity of its breeding habitat." (Crissey, 1976:7).

Blandin, in his 1982 doctoral dissertation, reaffirmed this conclusion:

"The implication for black ducks is that although annual production may be high in some non-breeding breeding population, the recruitment of young birds into the
breeding population is insufficient to attain the rate of growth inherent in the population and attainable relative to the carrying capacity of its habitat.” (Blandin, 1982:119).

Thus, Blandin and Crissey independently concluded that breeding habitat is not a limiting factor.

Additional support for the suggestion that breeding habitat is not limiting is found in recent data from Maine and Massachusetts. Surveys of the same marsh areas in Maine “suggest a 76% decline in production of [young black ducks] from 1956-1981” (Spencer, 1982:App. B). Furthermore, “none of the data revealed any changing trends in the average brood size” (Spencer, 1982:App. B). Maine biologists (Spencer, 1983, pers. comm.) also report that there has not been any major influx of mallards into traditional black duck nesting areas and that measured declines in breeding black ducks have not been correlated with a concomitant increase in mallards or any other species. Thus, the drastic decline in black duck production is caused by a lack of breeders, not by some factor which might be causing a decrease in the number of ducklings per brood. Further, high quality nesting areas are still available; there are not enough black ducks to occupy them. This conclusion is buttressed by the results of Jerry R. Longcore, a FWS waterfowl research biologist studying black ducks in Maine. The preliminary results of Longcore’s work show:

“[T]hat habitat quantity and quality have improved substantially [in south-central Maine] but without a corresponding increase in black duck numbers.” (Longcore, 1981:7).

The inescapable conclusion is that black duck production in Maine is down because there are fewer black ducks present to produce, not because of a loss of habitat.

In Massachusetts, in 1967, 276 black ducks and 216 mallards were banded by state employees. In 1981, only 51 black ducks and 293 mallards were banded using comparable techniques, relatively constant effort, and in essentially the same habitat (Hagar, 1982:4; Heusmann (Mass. State Waterfowl biologist), 1982, pers. comm.). These data indicate that habitat is still available, and the relatively small increase in mallards (as compared to the relatively large decrease in black ducks) cannot be the chief cause of the black duck decline. The salient points are that breeding black ducks are present in far smaller numbers than previously and that suitable breeding habitat is apparently still available.

Taken together, these data indicate the availability of large amounts of unused or underutilized breeding habitat in New York, 1981, 1982, 1983. Thus, the conclusion is inescapable that breeding habitat is not a limiting factor.

If environmental contaminants such as DDT are a serious cause of the black duck decline, one would expect productivity to be lower in breeding areas where DDT is reduc-ed. This apparently has not been the case. Howard Spencer, the Migratory Bird Research Leader in Maine and Chairman of the Atlantic Flyway Black Duck Committee, reported the results of a study of brood size and production from 1956 to 1981, and concluded that “none of the data revealed any changing trends in brood size…” (Spencer, 1982). Crissey (1976) and Blandin (1982:212) likewise reported that the production rate in individual black ducks is high (1.49 immature per adult as estimated from wing samples: Crissey, 1976:4) when compared with other species. Also, in the

I.R.P. analysis the assembled experts suggested that, while black duck productivity may have been decreased by DDt-induced eggshell thinning, this influence was gone after 1978 (Anon., 1980:12). This evidence strongly suggests that black duck productivity is not being depressed (at least below levels found in other species) by environmental contaminants.

Finally, it is important to put the problem of these other potentially limiting factors in perspective. The 19 FWS prairie pothole research biologists and experts who compiled the 1980 I.R.P. analysis concluded that only 15% of the problem of annual mortality of black ducks wintering on the Atlantic Coast was caused by the following seven factors taken together: disease, predation, accidents, oil spills, contaminants, weather and climate, and mallard hybridization and competition (Anon., 1980:4). Hybridization and competition are discussed in the following section. Of the remainder, predation, most accidents, weather and climate, and most diseases are natural processes which cannot be controlled. Oil spills and contaminants may certainly be important and should be controlled to the extent possible; however, based on the IRP analysis and logic they cumulatively represent at most a small contributing factor in the decline of the black duck population.

Relationships with Mallards

The FWS in its recent official publications suggests that another “major factor” in the black duck decline is “competition with mallards, and hybridization with mallards” (Annet, 1982:36581). While some hybridization with mallards has always occurred on the edges of the breeding range, there is no reason to conclude that either hybridization or competition with the mallard could be the “major” cause of the continuing decline of the black duck population, for the reasons which follow.

Among ducks, competition in the biological sense seldom involves physical competition. To be sure, two male ducks of different species (i.e., mallard and black duck) may fight over a given nest site or territory. However, this would be an exceptional case. Typically, the black duck or the mallard finds a particular area already occupied. In such a case, the bird not occupying the area would almost certainly be displaced but no competition, in the physical sense, would have occurred. In either circumstance (displacement or physical competition), the male and his mate would simply try to find a suitable alternative territory and nest site.

Therein lies the essential fallacy in the view that competition for nesting sites or territory, as suggested in official publications of the FWS, is a cause of black duck decline. Much suitable high quality breeding habitat is underutilized throughout the range of the black duck and has been for many years (see pages 11 to 12). Hence, while competition for or displacement from a suitable territory most occasionally occurs, there are numerous remaining areas suitable and available in high quality habitat. Thus, this type of competition cannot be a cause of the continuing black duck population decline.

The word “competition” can also be applied to the process of mate selection in ducks. Closely related species such as the black duck and mallard interbreed occasionally and must, on occasion, compete for mates. This permits hybridization which has always occurred on the margins of the black duck breeding range, where mallards and black ducks intermingle.

Hybridization of black ducks and mallards, which has now reached 13% as measured in Atlantic Flyway wing samples (Anon., 1980:13), has certainly been exacerbated by the practice of various State conservation (or fish and wildlife) agencies, as well as private
breeding population is insufficient to attain the rate of growth inherent in the population and attainable relative to the carrying capacity of its habitat." (Blandin, 1982:119).

Thus, Blandin and Crissey independently concluded that breeding habitat is not a limiting factor.

Additional support for the suggestion that breeding habitat is not limiting is found in recent data from Maine and Massachusetts. Surveys of the same marsh areas in Maine "suggest a 76% decline in production [of young black ducks] from 1956-1981" (Spencer, 1982:App. B). Furthermore, "none of the data revealed any changing trends in the average brood size" (Spencer, 1982:App. B). Maine biologists (Spencer, 1983, pers. comm.) also report that there has not been any major influx of mallards into traditional black duck nesting areas and that measured declines in breeding black ducks have not been correlated with a concomitant increase in mallards or any other species. Thus, the drastic decline in black duck production is caused by a lack of breeders, not by some factor which might be causing a decrease in the number of ducklings per brood. Further, high quality nesting areas are still available; there are not enough black ducks to occupy them. This conclusion is buttressed by the results of Jerry R. Longcore, a FWS waterfowl research biologist studying black ducks in Maine. The preliminary results of Longcore's work show:

"[That] habitat quantity and quality have improved substantially [in south-central Maine] but without a corresponding increase in black duck numbers." (Longcore, 1981:7).

The inescapable conclusion is that black duck production in Maine is down because there are fewer black ducks present to produce, not because of a loss of habitat.

In Massachusetts, in 1967, 276 black ducks and 216 mallards were banded by state employees. In 1981, only 51 black ducks and 293 mallards were banded using comparable techniques, relatively constant effort, and in essentially the same habitat (Hagar, 1982:4; Heussman (Mass. State Waterfowl biologist), 1982, pers. comm.). These data indicate that habitat is still available, and the relatively small increase in mallards (as compared to the relatively large decrease in black ducks) cannot be the chief cause of the black duck decline. The salient points are that breeding black ducks are present in far smaller numbers than previously and that suitable breeding habitat is apparently still available.

Taken together, these data indicate the availability of large amounts of unused or underutilized breeding habitat in Canada, New York, Maine, Massachusetts, and probably other areas as well. While some local decreases in potential black duck production have undoubtedly occurred due to habitat degradation and destruction, essentially all of the actual decreased production may be attributed to the insufficient number of breeders to occupy available habitat.

If environmental contaminants such as DDT are a serious cause of the black duck decline, one would expect productivity in terms of number of young produced per breeding female to be reduced. This apparently has not been the case. Howard Spencer, the Migratory Bird Research Leader in Maine and Chairman of the Atlantic Flyway Black Duck Committee, reported the results of a study of brood size and production from 1956 to 1981, and concluded that "none of the data revealed any changing trends in brood size...." (Spencer, 1982). Crissey (1976) and Blandin (1982:121) likewise reported that the production rate in individual black ducks is high ([1.49 immatures per adult as estimated from wing samples: Crissey, 1976:4] when compared with other species. Also, in the}

I.R.P. analysis the assembled experts suggested that, while black duck productivity may once have been decreased by DDT-induced eggshell thinning, this influence was gone after 1978 (Anon., 1980:12). This evidence strongly suggests that black duck productivity is not being depressed (at least below levels found in other species) by environmental contaminants.

Finally, it is important to put the problem of these other potentially limiting factors in perspective. The 19 FWS prairie biologists and experts who compiled the 1980 I.R.P. analysis concluded that only 15% of the problem of annual mortality of black ducks wintering on the Atlantic Coast was caused by the following seven factors taken together: disease, predation, accidents, oil spills, contaminants, weather and climate, and mallard hybridization and competition (Anon., 1980:4). Hybridization and competition are discussed in the following section. Of the remainder, predation, most accidents, weather and climate, and most diseases are natural processes which cannot be controlled. Oil spills and contaminants may certainly be important and should be controlled to the extent possible; however, based on the I.R.P. analysis and logic they cumulatively represent at most a small contributing factor in the decline of the black duck population.

Relationships with Mallards

The FWS in its recent official publications suggests that another "major factor" in the black duck decline is "competition with mallards, and hybridization with mallards" (Arnett, 1982:36581). While some hybridization with mallards has always occurred on the edges of the breeding range, there is no reason to conclude that either hybridization or competition with the mallard could be the "major" cause of the continuing decline of the black duck population, for the reasons which follow.

Among ducks, competition in the biological sense seldom involves physical competition. To be sure, two male ducks of different species (i.e., mallard and black duck) may fight over a given nest site or territory. However, this would be the exception rather than the rule. The black duck or the mallard finds a particular area already occupied. In such a case, the bird not occupying the area would almost certainly be displaced but no competition, in the physical sense, would have occurred. In either circumstance (displacement or physical competition), the male and his mate would simply try to find a suitable alternative territory and nest site.

In Maine, the lateral fallacy in the view that competition for nesting sites or territory, as suggested in official publications of the FWS, is a cause of black duck decline. Much suitable high quality breeding habitat is underutilized throughout the range of the black duck and has been for many years (see pages 11 to 12). Hence, while competition for or displacement from a suitable territory must occasionally occur, there are numerous unoccupied areas available in high quality habitat. Thus, this type of competition cannot be a cause of the continuing black duck population decline.

The word "competition" can also be applied to the process of mate selection in ducks. Closely related species such as the black duck and mallard interbreed occasionally and must, on occasion, compete for mates. This permits hybridization which has always occurred on the margins of the black duck breeding range, where mallards and black ducks intermingle.

Hybridization of black ducks and mallards, which has now reached 13% as measured in Atlantic Flyway wing samples (Anon., 1980:13), has certainly been exacerbated by the practice of various State conservation (or fish and wildlife) agencies, as well as private
organizations, of releasing tame or "game farm" mallards. Programs such as these have been conducted by the Pennsylvania Game Commission, the Maryland Fish and Wildlife Agency, and groups along the Mississippi Flyway.

Hybridization along the margins of the black duck range must, however, be viewed in context. The increasing percentage of hybrids in the population is caused by the decline of the black duck population as much as by an absolute increase in hybrids. When the availability of mates for prospective breeders has been reduced, black ducks may tend to breed with the more available and numerous mallard (where the two occur together). Also, the number of hybrids, when tallied, will be divided by a smaller black duck population to achieve the percentage. Under this circumstance the percentage of hybrids cannot help but show an increase. When pioneering into traditional black duck habitat, mallards are finding much of the suitable habitat available and unoccupied by black ducks (see pages 11 to 12). Thus, the mallard will be recorded as spreading and, in the terminology of some, the black duck will have been "displaced." But the cause of the increase in hybridization and displacement may not, under these circumstances, properly be attributed to the mallard; rather it must be attributed to the substantial mortality of the black duck, which has resulted in much underutilized breeding habitat.

This conclusion is not new. Crissy concluded in his 1976 report that:

"Much has been said lately about the increase in mallards in the east and the possibility that mallards are pushing blacks out of portions of their breeding range. However, it seems evident that within the black duck population as a whole the reproductive rate is very high. This suggests to me that although mallards are nesting now in portions of the black duck breeding range where they were not present before, that there is no evidence as yet that the presence of the question is: in what direction will the overall black duck breeding range be as capable of producing birds as it was before the mallards moved in. I suggest the only answer to questions like these is to manage so as to allow the black duck breeding population to increase and then see what happens." (Crissy, 1976:9).

Blandin, in his 1982 doctoral dissertation, came to much the same conclusion:

"Recruitment to the breeding population probably has been depressed by the removal of too many young birds. Not only does this ensure a declining population, but in areas where the black duck must compete with the mallard, a numerically depressed breeding population is a decided disadvantage." (Blandin, 1982:122-123).

It is also important to put the present status of this problem into perspective. The FWS, in its official announcements, has described the problem of competition and hybridization with mallards as "major." However, the FWS's I.R.P. strategy paper compiled by 19 experts concluded that only 15% of the current problem could be attributed to seven factors, only one of which was hybridization and competition with mallards (Anon., 1980:9). Thus, hybridization and competition with the mallard must currently represent a substantially smaller portion of the problem of declining black ducks than 15%.

Finally, it is important to note that, if I and the others are wrong about the present impact of mallard competition and hybridization (i.e., they are serious causes of the decline), the appropriate management strategy is to eliminate hunter kill and allow the black duck breeding population to increase to the extent possible (presumably to carrying capacity) (see: Crissy 1976:9; Smith 1979). Thus, the effect of hybridization and at least give black ducks the greatest competitive chance.

Hunting: The One Factor Managers Cannot Control

Clearly, the possibility exists that the analysis and the quoted or cited analyses of others may be in error. After all, one may never know with absolute certainty which, among many, mortality factors would have killed the ducks that otherwise would have nested. However, it is only reasonable to assume that hunting is the likely cause of a population decline (and is preventing population recovery) when, as in the case of the black duck, hunting is the known cause of 50 to 60 percent of total annual mortality (Martinson et al., 1968; Cesi et al., 1971; Blandin, 1982, 1982a) and other mortality causes have been examined and found to be within "reasonable," "normal" limits.

Moreover, it is nearly axiomatic in wildlife management that hunting is the only mortality factor that managers can control, in a practical sense. For example, Gabrielson (1941) emphasized the importance of limiting hunter kill as the primary tool for insuring the preservation of adequate "breeding stock." This point was again made by Trippensee (1953) in Volume II of his textbook on wildlife management. Specifically in reference to the black duck, the point has been made, implicitly and explicitly, time and again that hunting kill is the only mortality factor that can be controlled in the short run (see particularly Addy, 1968, 1968a; Anon., 1980:16-17; Heussmann, 1982; Spencer, 1982; Connor (quot. FWS Director Robert A. Jantzen), 1982).

And, this guiding principle of wildlife and black duck management is deeply imbedded in the principles which presumably guide black duck and all waterfowl management by the FWS. For example, then FWS Director Greenwalt (1976) stated in approving "stabilized regulations" that they were "designed to protect the resource base." In the environmental assessment of the stabilized regulations program for black ducks, FWS stated that the "[I]ntegrity of the resource base will be maintained." (Anon., 1976:11). Finally, the FWS, in its "Objectives of the Migratory Bird Hunting Regulations" published each year (with the regulations) states an objective:

"To limit harvest of migratory game birds to levels compatible with their ability to maintain their populations." (Annett, 1982a:167-20).

Yet, as Table 1 and the analyses presented in this paper show, making adequate and effective reduction in the kill is the one action which nearly all of the managers or administrators responsible for the black duck have consistently failed to take to reverse the population decline, or even maintain the population.

In 1976, Anderson and Burnham (1976) showed that, in some mallard populations which are subject to hunting, the phenomenon of compensatory mortality occurs, that is: at some level of resources and population pressure, and below a certain (threshold) level of exploitation (kill), as the rate of hunting mortality increases, the rate of non-hunting mortality decreases, thereby "compensating." Anderson and Burnham also noted that it may be easy for kill rates to exceed these threshold levels, particularly in areas where, at times when, ducks are especially vulnerable.
organizations, of releasing tame or "game farm" mallards. Programs such as these have been conducted by the Pennsylvania Game Commission, the Maryland Fish and Wildlife Agency, and groups along the Mississippi Flyway.

Hybridization along the margins of the black duck range must, however, be viewed in context. The increasing percentage of hybrids in the population is caused by the decline of the black duck population as much as by an absolute increase in hybrids. When the availability of mates for prospective breeders has been reduced, black ducks may tend to breed with the more available and numerous mallard (where the two occur together). Also, the number of hybrids, when tallied, will be divided by a smaller black duck population to achieve the percentage. Under this circumstance the percentage of hybrids cannot help but show an increase. When pioneering into traditional black duck habitat, mallards are finding much of the suitable habitat available and unoccupied by black ducks (see pages 11 to 12). Thus, the mallard will be recorded as spreading and, in the terminology of some, the black duck will have been "displaced." But the cause of the increase in hybridization and displacement may not, under these circumstances, properly be attributed to the mallard; rather it must be attributed to the substantial mortality of the black duck, which has resulted in much underutilized breeding habitat.

This conclusion is not new. Crissey concluded in his 1976 report that:

"Much has been said lately about the increase in mallards in the east and the possibility that mallards are pushing blacks out of portions of their breeding range. However, it seems evident that within the black duck population as a whole the reproductive rate is very high. This suggests to me that although mallards are nesting now in portions of

Finally, it is important to note that, if I and the others are wrong about the current impact of mallard competition and hybridization (i.e., they are serious causes of the decline), the appropriate management strategy is to eliminate hunter kill and allow the black duck breeding population to increase to the extent possible (presumably to carrying capacity) (see: Crissey 1976:9). Smith 1982, for example, could illustrate the effect of hybridization and at least give black ducks the greatest competitive chance.

Hunting: The One Factor Managers Can Control

Clearly, the possibility exists that my analysis and the quoted or cited analyses of others may be in error. After all, one may never know with absolute certainty which, among many, mortality factors would have killed the ducks that otherwise would have nested.

However, it is only reasonable to assume that hunting is the likely cause of a population decline (and is preventing population recovery) when, as in the case of the black duck, hunting is the known cause of 30 to 60 percent of total annual mortality (Martinson et al., 1968; Cesi et al., 1971; Blandin, 1982, 1982a) and other mortality causes have been examined and found to be within "reasonable," "normal" limits.

Moreover, it is nearly axiomatic in wildlife management that hunting is the only mortality factor that managers can control, in a practical sense. For example, Gabrielson (1941) emphasized the importance of limiting hunter kill as the primary tool for insuring the preservation of adequate "breeding stock." This point was again made by Trippensee (1953) in Volume II of his textbook on wildlife management. Specifically in reference to the black duck, the point has been made, implicitly and explicitly, time and again that hunting kill is the only mortality factor that can be controlled in the short run (see particularly Addy, 1968, 1968a; Anon., 1980:16-17; Heussmann, 1982; Spencer, 1982; Connor (quot-}
Interestingly, from 1976 onward, the FWS used the findings by Anderson and Burnham (1976) of some compensatory mortality in mallards as a rationale or partial justification for failing to take action to restrict or close the season on black ducks. Paraphrased, the FWS position has been: "that Anderson and Burnham found some compensatory mortality in mallards, and no one has been able to prove conclusively that total mortality is increased in black ducks because of hunting. In short, there is no guarantee that the population will increase if hunting is stopped." (see: FWS comments in refusing to close the 1976 black duck season (Anon., 1976:19)).

The such use of Anderson and Burnham's work is, in my opinion, a misuse of valid scientific research. The results of Anderson and Burnham, showing a compensatory relationship between some hunting and non-hunting mortality in mallards at certain times and in certain areas does not absolve wildlife managers, and others responsible for migratory birds, of using their one major management tool (limiting or eliminating kill) in an effort to restore a declining population. After all, Anderson and Burnham's work could not in any manner be used as strong support for a hypothesis that the black duck population decline (averaging about 2% per year) could not be reversed if the FWS and CWS were to eliminate the 50 to 60 percent (Blandin, 1982a:2) of total mortality currently caused by hunting. And even if someone were to seriously make such a hypothesis, the only way to test it with certainty would be to close the black duck hunting season and monitor the population response.

Moreover, there is substantial reason to conclude that the findings of Anderson and Burnham regarding the compensatory nature of hunting and non-hunting mortality would not be applicable to a seriously declining population like the black duck. The phenomenon of compensatory mortality includes "concepts of carrying capacity, resource limitation, and population regulation through density dependent feedback processes" (Anderson and Burnham, 1976:7). In short, the phenomenon of compensation is based on resource limitation (i.e., if an animal dies of something, more resources will remain for those left, thereby increasing their chances of survival). However, in a population, such as the black duck's, which has declined by about 60%, and in which there is no evidence of resource limitation on breeding areas or wintering areas (except temporarily during extremely severe winters), there is essentially no resource limitation on which the compensation can be based. Inferential support for this conclusion may be provided by the fact that Blandin (1982:113), after an exhaustive analysis of black duck banding data, could find no evidence of compensatory mortality in wintering black ducks.

FWS Failure to Act: Chronology of Events

As noted, the decline of the black duck is widely recognized among knowledgeable wildlife biologists. During the years since 1968, the evidence has changed in character and in response to changes in methodology; however, the basic conclusions over the years have remained remarkably consistent. The population is declining and in trouble (Addy, 1968; Addy and Martinson, 1968; Geis et al., 1971; Crissie, 1976, Anon., 1976, 1980; Blandin, 1982: Fig. 1). In spite of this acknowledgment, however, during the period since even before 1968, there has been a lack of effective regulatory restriction to protect black ducks. Officials and managers responsible for black ducks demonstrated a strong adherence to the status quo, while the black duck population continued to decline (Fig. 1, Table 1).

The magnitude of the failure of the regulatory system for North American migratory birds may be seen by comparing significant chronicled events with Table 1 (regulations), Figure 1 (winter inventory record), and Table 2 (kill record).

In 1959, after the high U.S. black duck kills (averaging 523,375 per year; Table 2) that were recorded in the four years from 1955 through 1958, the FWS restricted the black duck season from 70 days to 40 days, and kill dropped sharply. In 1960, kill rose again significantly, and FWS again limited kill. In 1964, the FWS began liberalizing regulations, and kill of black ducks increased significantly (Martinson et al., 1968:23, Table 2: Table 2 Estimated Retrieved Kill of Black Ducks in Canada and the United States, 1953-1980.1

<table>
<thead>
<tr>
<th>Year</th>
<th>Atlantic Flyway</th>
<th>Mississippi Flyway</th>
<th>Total U.S.2</th>
<th>Total Canada3</th>
<th>Total N.A.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953</td>
<td>321,500</td>
<td>188,200</td>
<td>522,700</td>
<td>644,800</td>
<td>765,900</td>
</tr>
<tr>
<td>1954</td>
<td>324,600</td>
<td>197,500</td>
<td>522,000</td>
<td>676,100</td>
<td>798,200</td>
</tr>
<tr>
<td>1955</td>
<td>387,900</td>
<td>230,800</td>
<td>618,700</td>
<td>750,600</td>
<td>873,300</td>
</tr>
<tr>
<td>1956</td>
<td>315,900</td>
<td>185,700</td>
<td>461,600</td>
<td>546,600</td>
<td>671,300</td>
</tr>
<tr>
<td>1957</td>
<td>318,200</td>
<td>202,100</td>
<td>520,300</td>
<td>632,400</td>
<td>754,700</td>
</tr>
<tr>
<td>1958</td>
<td>276,100</td>
<td>168,500</td>
<td>447,600</td>
<td>554,600</td>
<td>676,200</td>
</tr>
<tr>
<td>1959</td>
<td>181,400</td>
<td>123,000</td>
<td>304,400</td>
<td>383,400</td>
<td>466,800</td>
</tr>
<tr>
<td>1960</td>
<td>258,100</td>
<td>135,200</td>
<td>393,300</td>
<td>481,500</td>
<td>564,800</td>
</tr>
<tr>
<td>1961</td>
<td>204,900</td>
<td>62,900</td>
<td>267,800</td>
<td>327,800</td>
<td>395,700</td>
</tr>
<tr>
<td>1962</td>
<td>214,500</td>
<td>47,900</td>
<td>262,900</td>
<td>309,400</td>
<td>378,300</td>
</tr>
<tr>
<td>1963</td>
<td>215,800</td>
<td>70,400</td>
<td>286,200</td>
<td>356,200</td>
<td>432,600</td>
</tr>
<tr>
<td>1964</td>
<td>234,400</td>
<td>96,800</td>
<td>331,200</td>
<td>428,000</td>
<td>514,800</td>
</tr>
<tr>
<td>1965</td>
<td>217,100</td>
<td>97,600</td>
<td>314,700</td>
<td>399,700</td>
<td>479,400</td>
</tr>
<tr>
<td>1966</td>
<td>281,400</td>
<td>116,400</td>
<td>397,700</td>
<td>497,100</td>
<td>584,800</td>
</tr>
<tr>
<td>1967</td>
<td>265,400</td>
<td>113,100</td>
<td>381,500</td>
<td>478,500</td>
<td>569,000</td>
</tr>
<tr>
<td>1968</td>
<td>301,500</td>
<td>68,300</td>
<td>370,800</td>
<td>444,800</td>
<td>527,100</td>
</tr>
<tr>
<td>1969</td>
<td>307,400</td>
<td>88,100</td>
<td>395,500</td>
<td>500,500</td>
<td>575,000</td>
</tr>
<tr>
<td>1970</td>
<td>297,400</td>
<td>119,700</td>
<td>417,100</td>
<td>506,800</td>
<td>603,900</td>
</tr>
<tr>
<td>1971</td>
<td>293,100</td>
<td>96,000</td>
<td>389,100</td>
<td>481,100</td>
<td>569,200</td>
</tr>
<tr>
<td>1972</td>
<td>236,300</td>
<td>117,900</td>
<td>355,600</td>
<td>441,500</td>
<td>527,100</td>
</tr>
<tr>
<td>1973</td>
<td>262,700</td>
<td>110,900</td>
<td>374,600</td>
<td>455,600</td>
<td>539,200</td>
</tr>
<tr>
<td>1974</td>
<td>294,600</td>
<td>93,300</td>
<td>388,900</td>
<td>491,700</td>
<td>580,600</td>
</tr>
<tr>
<td>1975</td>
<td>274,900</td>
<td>81,000</td>
<td>355,900</td>
<td>403,900</td>
<td>497,800</td>
</tr>
<tr>
<td>1976</td>
<td>327,400</td>
<td>98,000</td>
<td>425,400</td>
<td>503,400</td>
<td>596,800</td>
</tr>
<tr>
<td>1977</td>
<td>319,000</td>
<td>78,900</td>
<td>397,900</td>
<td>476,900</td>
<td>554,800</td>
</tr>
<tr>
<td>1978</td>
<td>262,300</td>
<td>74,800</td>
<td>337,100</td>
<td>401,100</td>
<td>466,200</td>
</tr>
<tr>
<td>1979</td>
<td>218,700</td>
<td>66,500</td>
<td>285,200</td>
<td>351,400</td>
<td>402,700</td>
</tr>
<tr>
<td>1980</td>
<td>309,000</td>
<td>87,000</td>
<td>396,800</td>
<td>473,800</td>
<td>546,600</td>
</tr>
</tbody>
</table>


2Includes Central Flyway totals.

3Canadian kill estimates not available prior to 1968.
Interestingly, from 1976 onward, the FWS used the findings by Anderson and Burnham (1976) of some compensatory mortality in mallards as a rationale or partial justification for failing to take action to restrict or close the season on black ducks. Paraphrased, the FWS position has been: "that Anderson and Burnham found some compensatory mortality in mallards, and no one has been able to prove conclusively that total mortality is increased in black ducks because of hunting. In short, there is no guarantee that the population will increase if hunting is stopped." (see: FWS comments in refusing to close the 1976 black duck season (Anon., 1976:19)).

Such use of Anderson and Burnham's work is, in my opinion, a misuse of valid scientific research. The results of Anderson and Burnham, showing a compensatory relationship between some hunting and non-hunting mortality in mallards at certain times and in certain areas does not absolve wildlife managers, and others responsible for migratory birds, of using their one major management tool (limiting or eliminating kill) in an effort to restore a declining population. After all, Anderson and Burnham's work could not in any manner be used as strong support for a hypothesis that the black duck population decline (averaging about 2% per year) could not be reversed if the FWS and CWS were to eliminate the 50 to 60 percent (Blandin, 1982a:2) of total mortality currently caused by hunting. And even if someone were to seriously make such a hypothesis, the only way to test it with certainty would be to close the black duck hunting season and monitor the population response.

Moreover, there is substantial reason to conclude that the findings of Anderson and Burnham regarding the compensatory nature of hunting and non-hunting mortality would not be applicable to a seriously declining population like the black duck. The phenomenon of compensatory mortality includes "concepts of carrying capacity, resource limitation, and population regulation through density dependent feedback processes" (Anderson and Burnham, 1976:7). In short, the phenomenon of compensation is based on resource limitation (i.e., if an animal dies of something, more resources will remain for those left, thereby increasing their chances of survival). However, in a population, such as the black duck's, which has declined by about 60%, and in which there is no evidence of resource limitation on breeding areas or wintering areas (except temporarily during extremely severe winters), there is essentially no resource limitation on which the compensation can be based. Inferential support for this conclusion may be provided by the fact that Blandin (1982:113), after an exhaustive analysis of black duck banding data, could find no evidence of compensatory mortality in wintering black ducks.

FWS Failure to Act: Chronology of Events

As noted, the decline of the black duck is widely recognized among knowledgeable wildlife biologists. During the years since 1968, the evidence has changed in character and in response to changes in methodology; however, the basic conclusions over the years have remained remarkably consistent. The population is declining and in trouble (Addy, 1968; Addy and Martinson, 1968; Geis et al., 1971; Crissey, 1976; Anon., 1976, 1980; Blandin, 1982: Fig. 1). In spite of this acknowledgment, however, during the period since even before 1968, there has been a lack of effective regulatory protection to restrict black ducks. Officials and managers responsible for black ducks demonstrated a strong adherence to the status quo, while the black duck population continued to decline (Fig. 1, Table 1).

The magnitude of the failure of the regulatory system for North American migratory birds may be seen by comparing significant chronicled events with Table 1 (regulations), Figure 1 (winter inventory record), and Table 2 (kill record). In 1955-1956, in 1959, after the high U.S. black duck kills (averaging 523,375 per year; Table 2) that were recorded in the four years from 1955 through 1958, the FWS restricted the black duck season from 70 days to 40 days, and kill dropped sharply. In 1960, kill rose again significantly, and FWS again limited kill. In 1964, the FWS began liberalizing regulations, and kill of black ducks increased significantly (Martinson et al., 1968:23; Table 1: Table
2; Fig. 1p. In 1967, regulations were restricted slightly (Table 1).

1968.

In 1968, the Black Duck Symposium convened most of the then experts and officials knowledgeable and concerned about black ducks. The officials were deeply troubled, as demonstrated by the following excerpts:

“Recognizing the importance of the black duck to the Atlantic Flyway and recognizing that the species is not maintaining itself at population levels compared to those of a few years past, the Atlantic Waterfowl Council at its meeting of August 2 and 3, 1967, in Easton, Maryland, created a Black Duck Committee to give added emphasis to the needs of this species. The first action of the committee was to authorize a symposium on the black duck for the purpose of bringing together most of the known information on this species and to focus attention on its future needs.” (Anon., 1968:1).

“[T]he conclusion I arrive at is that here we have survey information for a span of more than ten years which indicates that the status of the black duck has deteriorated significantly. True, we are using the Winter Survey as a primary indicator... On the other hand, the long term trend, as portrayed by the survey, may be reasonably close to being true. In a general way, the trend in kill and number of hunters tend to give credence to the long term Winter Survey figures.” (Addy).

“If we can agree in this meeting that the black duck population is and has been at or near its historic low for the past several years, we should endeavor to determine why. In this regard, the evidence indicates that harvest has been excessive in relation to production. Kill has been the primary factor responsible for holding the population down to the level that it is.” (Addy).

“In the last analysis, however, black duck production is the end product resulting from the interaction of all the positive and negative natural and man-made forces operating in the environment and on the population. Whatever the production is, hunting can take only so much if the population is to remain stable or allowed to increase. In other words, if the productivity of the black duck is lower than what it used to be, hunter harvest has to be adjusted accordingly.” (Addy (Atlantic Flyway biologist and FWS employee), 1968:3-5).

“[T]he observed Canadian wintering population of black ducks decreased by 60 percent from the early 1950′s to the early 1960′s. Meanwhile, the U.S. wintering population decreased about 25 percent.” (Munro).

“Most field workers in Canada believe that the major cause of this [black duck’s] decline is over-harvest.” (Munro).

“Most Canadian biologists are of the opinion that not all available habitat is being used because there are not enough black ducks to occupy it.” (Munro (biologist, Canadian Wildlife Service), 1968:6, 7,9).

“Habitat outwardly suitable to the black duck is not always used.... It is not a new problem but perhaps occurs more frequently.” (Benson (biologist, N.Y. Department of Conservation), 1968:14).

“At that time [mid 1950′s] hunting regulations were then relaxed and large kills were made. Despite a high population, the rate of kill was sufficient to boost total mortality higher than productivity and the black duck population began to decline. By 1959, the black duck population was obviously at a low level and hunting regulations were made very restrictive. The resulting annual kills were small compared to earlier years but still large enough, with the much reduced size of the black duck population, to result in a kill rate of a magnitude that appears to have prevented an increase in the population.” (Martinson et al. (biologists, FWS), 1968:50).

“The thing that really emerges for me is that I cannot see where there is any need for more research on black ducks. It seems to me that what you have been showing is that the place where we need the effort is on the relation between hunting and the public we are dealing with. By continuing to press for studies on production, which seems to come from the data available to be essentially stable looking at the total picture, we are merely trying to put off the evil day when we have to make unpleasant decisions.” (Boyd (biologist, Canadian Wildlife Service), 1968:56).

“Although quantitative data is lacking, most biologists in eastern Canada feel that breeding populations are declining or are at least at a very low level (personal communications; Ontario, Blair Dawson; Nova Scotia, Edward. D. Bartlett, 1963).” (Addy and Martinson, 1968:56).

“Speakers at this symposium generally shared the opinion that the black duck population is low and that wise management dictates that we do something to increase the size of the population. Most speakers also felt that hunting regulations affect the size and rate of kill and thus the survival of black ducks. This paper outlines the regulatory measures needed in order to bring about an increase in the black duck population.” (Addy and Martinson, 1968:183).

Addy and Martinson (1968:184-188) went on to outline and recommend a detailed 5-year program to restore the black duck by increasing the population by 10 percent per year by reducing kill.

In his memorandum to the FWS summarizing the Symposium, Addy (1968a) stated:

“It was the consensus of the group that while surveys were unreliable indicators of population status and that no surveys gave an accurate current population figure, the
In 1968, the Black Duck Symposium convened most of the then experts and officials knowledgeable and concerned about black ducks. The officials were deeply troubled, as demonstrated by the following excerpts:

"Recognizing the importance of the black duck to the Atlantic Flyway and recognizing that the species is not maintaining itself at population levels compared to those of a few years past, the Atlantic Waterfowl Council at its meeting of August 2 and 3, 1967, in Easton, Maryland, created a Black Duck Committee to give added emphasis to the needs of this species. The first action of the committee was to authorize a symposium on the black duck for the purpose of bringing together most of the known information on this species and to focus attention on its future needs." (Anon., 1968:1).

"The conclusion I arrive at is that here we have survey information for a span of more than ten years which indicates that the status of the black duck has deteriorated significantly. True, we are using the Winter Survey as a primary indicator... On the other hand, the long term trend, as portrayed by the survey, may be reasonably close to being true. In a general way, the trend in kill and number of hunters tend to give credence to the long term Winter Survey figures." (Addy).

"If we can agree in this meeting that the black duck population is and has been at or near its historic low for the past several years, we should endeavor to determine why. In this regard, the evidence indicates that harvest has been excessive in relation to production. Kill has been the primary factor responsible for holding the population down to the level that it is." (Addy).

"In the last analysis, however, black duck production is the end product resulting from the interaction of all the positive and negative natural and man-made forces operating in the environment and on the population. Whatever the production is, hunting can take only so much if the population is to remain stable or allowed to increase. In other words, if the productivity of the black duck is lower than what it used to be, hunter harvest has to be adjusted accordingly." (Addy (Atlantic Flyway biologist and FWS employee), 1968:3-5).

"The observed Canadian wintering population of black ducks decreased by 60 percent from the early 1950's to the early 1960's. Meanwhile, the U.S. wintering population decreased about 25 percent." (Munro).

"Most field workers in Canada believe that the major cause of this [black duck's] decline is over-harvest." (Munro).

"Most Canadian biologists are of the opinion that not all available habitat is being used because there are not enough black ducks to occupy it." (Munro (biologist, Canadian Wildlife Service), 1968:6, 7, 9).

"Habitat outwardsly suitable to the black duck is not always used... It is not a new problem but perhaps occurs more frequently." (Benson (biologist, N.Y. Department of Conservation), 1968:14).

"At that time [mid 1950's] hunting regulations were then relaxed and large kills were made. Despite a high population, the rate of kill was sufficient to boost total mortality higher than productivity and the black duck population began to decline. By 1959, the black duck population was obviously at a low level and hunting regulations were made very restrictive. The resulting annual kills were small compared to earlier years but still large enough, with the much reduced size of the black duck population, to result in a kill rate of a magnitude that appears to have prevented an increase in the population." (Martinson et al. (biologists, FWS), 1968:50).

"The thing that really emerges for me is that I cannot see where there is any need for more research on black ducks. It seems to me that what you have been showing is that the place where we need the effort is on the relation between hunting and the public we are dealing with. By continuing to press for studies on production, which seems to me from the data available to be essentially stable looking at the total picture, we are merely trying to put off the evil day when we have to make unpalatable decisions." (Boyd (biologist, Canadian Wildlife Service), 1968:56).

"Although quantitative data is lacking, most biologists in eastern Canada feel that breeding populations are declining or are at least at a very low level (personal communications: Ontario, Blair Dawson; New Brunswick, Bruce Wright; Nova Scotia, Anthony Erskine and Fred Payne; Newfoundland, Doug Gillespie, Dave Pike and Jim Indee)." (Bartlett, 1963) recorded an apparent decrease in breeding population on Prince Edward Island between 1958 and 1961. None of the biologists mentioned above felt that the present situation could be explained by habitat loss, local pesticide use or other habitat factors. Many felt that available habitat was underpopulated (see also Bartlett, 1963). Competition with an expanding population of breeding mallards (Anas platyrhynchos) has been suggested as a cause of decline in Ontario (Cringan, 1960; see also Johnsgard, 1967). The consensus of opinion is that the size of the hunting kill is the most likely explanation." (Reed (biologist, Quebec Wildlife Service), 1968:82).

"Speakers at this symposium generally shared the opinion that the black duck population is low and that wise management dictates that we do something to increase the size of the population. Most speakers also felt that hunting regulations affect the size and rate of kill and thus the survival of black ducks. This paper outlines the regulatory measures needed in order to bring about an increase in the black duck population." (Addy and Martinson, 1968:183).

Addy and Martinson (1968:184-188) went on to outline and recommend a detailed 5-year program to restore the black duck by increasing the population by 10 percent per year by reducing kill.

In his memorandum to the FWS summarizing the Symposium, Addy (1968a) stated:

"It was the consensus of the group that while surveys were unreliable indicators of population status and that no surveys gave an accurate current population picture, the
overall Flyway population had been declining and was probably at its lowest level in 20 years. Papers were presented on the various factors which tend to reduce the population or lower its productivity such as predation, loss of habitat, pollution, pesticides, and others. However, with these factors in operation it was generally agreed that hunting kill was too great for the population to maintain itself at a high level. In fact, it was generally acknowledged that hunting kill is the only major mortality factor we can do anything about at the present time.

In 1968, despite the Symposium, the recommended kill restrictions, and Addy's memorandum, FWS took no regulatory action to restrict kill or to provide additional protection for the black duck (Table 1).

1969
In 1969, FWS took no regulatory action to further restrict kill or to provide additional protection for the black duck (Table 1).

1970
In 1970, FWS liberalized black duck hunting regulations allowing more opportunity for kill by hunters. U.S. kill rose to 417,400. This was the first time since 1960 that U.S. kill had been over 400,000 (Table 1, Table 2).

1971
In 1971, FWS permitted the same liberalized season restrictions which were in effect in 1970 (Table 1).

1972
In 1972, the Atlantic Waterfowl Council's Technical Section Black Duck sub-committee decided to encourage more banding "to determine the well being of black duck populations... and greater study of wetland habitat management, including pursuit of the suggestion for a "habitat management symposium." It recommended no hunting restrictions. (Report of the sub-committee to the 1972 Atlantic Waterfowl Council meeting, Files, Office of Migratory Bird Management, Patuxent Wildlife Research Center).

In 1972, FWS restricted black duck regulations slightly, but did not make regulations as restrictive as those that existed in 1968, the year the Black Duck Symposium called for major reductions in hunting mortality (Table 1).

1973
In 1973, again, FWS restricted black duck regulations slightly, but still did not even make them as restrictive as those that existed in 1968 (Table 1).

1974
In 1974, FWS restricted black duck regulations slightly, but still did not even make them as restrictive as those that existed in 1968 (Table 1).

In November of 1974, a biologist in the FWS Migratory Bird and Habitat Research Laboratory wrote to the Director of that Laboratory after being asked to evaluate the black duck winter inventories in the Atlantic Flyway in the past 10 years. He announced that he had also examined relevant kill figures. His memorandum to FWS concluded:

"In reviewing the material compiled herein and in rereading the material in the black duck symposium held at Chestertown in 1968, I am struck by what appears to be an inescapable fact—the major amendable problem with the black duck is excessive harvest." (emphasis in original).

"It seems to me that administrators are at a point where they can make one of three decisions: (1) they can recognize that the resource is in trouble and that a reduced harvest is necessary and opt for Martinson's solution [Addy and Martinson, 1968], (2) they can decide that realistically the hunter is too powerful a constituency to buck and continue the present regulations knowing that the population will remain permanently depressed, and (3) they can pass the buck by declaring the need for more research into all phases of black duck ecology and put off hard decisions for several years." (McGillivary, 1974:1,2).

1975
In 1975, the winter inventory count was at the lowest level that had ever been recorded (Fig. 1). In 1975, I addressed the Atlantic Waterfowl Council meeting in Atlantic City, New Jersey. I noted that the black duck population was at a 21-year low and asked for a moratorium on hunting to allow the population to rebuild to former levels. In 1975, Warren Blandin prepared a paper for the Atlantic Waterfowl Council and his FWS superiors in which he noted that the increasing numbers of hunters had nullified much of the effect of past reductions in season length and other regulatory restrictions. Blandin proposed various alternative types of regulatory restrictions which would (he hoped) reduce black duck kill substantially (Blandin, 1975). In 1975, the Atlantic Waterfowl Council voted to increase the black duck population, but failed to recommend to the FWS any regulatory or other action to accomplish the objective.

In 1975, the FWS approved a season with no more restrictions or protection for the black duck than had been in place the year before. The season was exactly the same as 1974 (Table 1).

1976
In March 1976, the Atlantic Waterfowl Council black duck subcommittee defined the goal: "To produce a rangewide species management plan for the black duck acceptable to the council." It proposed no restrictions on kill (files, Office of Migratory Bird Management, Patuxent Wildlife Research Center).

In June of 1976, the Director of the Migratory Bird Habitat and Research Laboratory, FWS, mailed to the "Black Duck Group" (subcommittee), of the Atlantic Waterfowl Council, a statement of suggested research topics (Martin, 1976).

In 1976, Crissery (former Director for 10 years) of the Migratory Bird
overall Flyway population had been declining and was probably at its lowest in the past 20 years. Papers were presented on the various factors which tend to reduce the population or lower its productivity such as predation, loss of habitat, pollution, pesticides, and others. However, with these factors in operation it was generally agreed that hunting kill was too great for the population to maintain itself at a high level. In fact, it was generally acknowledged that hunting kill is the only major mortality factor we can do anything about at the present time."

In 1968, despite the Symposium, the recommended kill restrictions, and Addy's memorandum, FWS took no regulatory action to restrict kill or to provide additional protection for the black duck (Table 1).

1969
In 1969, FWS took no regulatory action to further restrict kill or to provide additional protection for the black duck (Table 1).

1970
In 1970, FWS liberalized black duck hunting regulations allowing more opportunity for kill by hunters. U.S. kill rose to 417,400. This was the first time since 1960 that U.S. kill had been over 400,000 (Table 1, Table 2).

In 1971, FWS permitted the same liberalized season restrictions which were in effect in 1970 (Table 1).

1972
In 1972, the Atlantic Waterfowl Council's Technical Section Black Duck sub-committee decided to encourage more banding "to determine the well being of black duck populations," and greater study of wetland habitat management, including pursuit of the suggestion for a "habitat management symposium." It recommended no hunting restrictions. (Report of the sub-committee to the 1972 Atlantic Waterfowl Council meeting, files, Office of Migratory Bird Management, Patuxent Wildlife Research Center).

In 1972, FWS restricted black duck regulations slightly, but did not make regulations as restrictive as those that existed in 1968, the year the Black Duck Symposium called for major reductions in hunting mortality (Table 1).

1973
In 1973, again, FWS restricted black duck regulations slightly, but still did not even make them as restrictive as those that existed in 1968 (Table 1).

1974
In 1974, FWS restricted black duck regulations slightly, but still did not even make them as restrictive as those that existed in 1968 (Table 1).

In November of 1974, a biologist in the FWS Migratory Bird and Habitat Research Laboratory wrote to the Director of that Laboratory after being asked to evaluate the black duck winter inventories in the Atlantic Flyway in the past 10 years. He announced that he had also examined relevant kill figures. His memorandum to FWS concluded:

"In reviewing the material compiled herein and in rereading the material in the black duck symposium held at Chestertown in 1968, I am struck by what appears to be an inescapable fact—the major amendable problem with the black duck is excessive harvest." (emphasis in original).

"It seems to me that administrators are at a point where they can make one of three decisions: (1) they can recognize that the resource is in trouble and that a reduced harvest is necessary and opt for Martinson's solution [Addy and Martinson, 1968], (2) they can decide that realistically the hunter is too powerful a constituency to buck and continue the present regulations knowing that the population will remain permanently depressed, and (3) they can pass the buck by declaring the need for more research into all phases of black duck ecology and put off hard decisions for several years." (McGilvery, 1974:1,2).

In 1975, the winter inventory count was at the lowest level that had ever been recorded (Fig. 1).

In 1975, I addressed the Atlantic Waterfowl Council meeting in Atlantic City, New Jersey. I noted that the black duck population was at a 21-year low and asked for a moratorium on hunting to allow the population to rebuild to former levels. In 1975, Warren Blandin prepared a paper for the Atlantic Waterfowl Council and his FWS superiors in which he noted that the increasing numbers of hunters had nullified much of the effect of past reductions in season length and other regulatory restrictions. Blandin proposed various alternative types of regulatory restrictions which would (he hoped) reduce black duck kill substantially (Blandin, 1975). In 1975, the Atlantic Waterfowl Council voted to increase the black duck population, but failed to recommend to the FWS any regulatory or other action to accomplish the objective.

In 1975, the FWS approved a season with no more restrictions or protection for the black duck than had been in place the year before. The season was exactly the same as 1974 (Table 1).

1976
In March 1976, the Atlantic Waterfowl Council black duck subcommittee defined the goal: "To produce a rangewide species management plan [for the black duck] acceptable to the council." It proposed no restrictions on kill (files, Office of Migratory Bird Management, Patuxent Wildlife Research Center).

In June of 1976, the Director of the Migratory Bird and Habitat Research Laboratory, FWS, mailed to the "Black Duck Group" (subcommittee), of the Atlantic Waterfowl Council, a statement of suggested research topics (Martin, 1976).

In 1976, Crissey (former Director for 10 years) of the Migratory Bird...
Population Station, FWS, and FWS Senior Scientist) concluded that the black duck population in a serious decline was largely caused by hunting mortality:

"Some people would like to believe that the decrease in black duck numbers since the 1950's has been due to environmental factors other than shooting, and that little would be accomplished by reducing the harvest. Specifically, a finger has been pointed at a deterioration of wintering habitat as a possible cause. I know of nothing which supports such a contention. Rather, it seems to me that all of the available information favors the hypothesis that over-harvest has been the most likely cause of the decline."

Crissey suggested two alternatives: seasonal reductions or substantial reductions in season length to severely limit black duck mortality.

In 1976, the FWS made the following statements of note:

"The upward trend in black duck harvest since 1961 is statistically significant at the .05 (95% confidence) level."

"However, the greatly increased number of active hunters has more than compensated for the present reduction in season length and bag limit."

In other words, the minor reduction in season length by five days (made in 1973, Table 1) and the option for a noon opening which was added in 1974 (neither of which were as restrictive as the season restrictions in the late or early 1960's) had been rendered ineffective by increases in the number of hunters.

In 1976, the Service approved a proposal to "stabilize" hunting regulations for the next four years, so as to gather basic line data for studying the impact of hunting on the black duck population (Anon., 1976:1). This program was designed to hold the kill constant at the level for previous years (Anon., 1976:13). Thus, in 1976, the Service approved the same regulations which had been in effect in 1974 and 1975, which were themselves more liberal than the regulations in effect when the 1968 Symposium called for major reductions in kill (Table 1).

In 1977, FWS employees Martin and Carney (1977) showed that hunters were spending more time hunting each year, thereby showing that even more hunting pressure was being put on black duck populations. In 1977, the Service approved the same regulations which had been in effect in 1974, 1975, and 1976 (Table 1).

In 1978, in spite of the four-year "stabilized regulations" program put into effect in 1976, the Service approved regulations which slightly liberalized the restrictions on killing of black ducks (i.e., the provision for a noon opening the day before opening was removed. Table 1).

In 1979, a draft of the black duck "species management plan" was provided for review to the Atlantic Waterfowl Council and the FWS. In commenting on the draft species management plan, Henry M. Reeves, biologist and Chief, Branch of Operations, Office of Migratory Bird Management, FWS, concluded:

"The bullet-biting time is upon us. I don't think that we can seriously consider the possibility that 30 years from now the black ducks will continue to decline. The public and our profession deserves better — even if some very difficult and unpopular decisions are required." (Reeves, 1979).

In 1979, the Service approved the same regulations which had been in effect in 1978 (Table 1).

In January 1980, the black duck winter inventory was at the lowest level that had ever been recorded (Fig. 1).

In June 1980, the Service published its official Migratory Bird Program Management Document in which it adopted an explicit goal:

"21.04 Achieve by 1982, a wintering black duck population index in the U.S. of 450,000 based on a 3-year moving average of winter surveys." (Anon., 1980a:11).

Unstated was the fact that the goal, adopted at the Black Duck Symposium in 1968 (Addy and Martinson, 1968), of reducing kill by 10 percent per year for five years to allow restoration of the species had now been unofficially abandoned. The goal of 450,000 is a winter inventory level last achieved in January, 1969, less than one year after the Black Duck Symposium recommended, to no avail, major reductions in kill (Fig. 1).

In September 1980, the Service published the I.R.P. analysis in which it concluded that most of the mortality causing the black duck population decline was caused by hunting (Anon., 1980:19).

On September 25, 1980, in response to another draft of the Atlantic Waterfowl Council's proposed species management plan for the black duck, Henry M. Reeves wrote:

"It appears that we're trying to avoid admitting that we have great concern about the status and trend of the species, and are reluctant to consider drastic but needed regulatory measures." (Reeves, 1980).

In the fall of 1980, the Service implemented its own proposal to extend the stabilized hunting regulations for black ducks for another five years (Anon., 1980:b) and approved the same regulations which had been in effect in 1978 and 1979 (Table 1).

In January 1981, the winter inventory count rose slightly from its all-time low.

On July 28-29, 1981, the Atlantic Waterfowl Council held its summer meeting. At the meeting, Black Duck Subcommittee Chairman Spencer (Maine's then Migratory Bird Research Leader) discussed the draft black duck management plan and stated:

"The current survival rate information indicates that the young birds are being harvested at a rate that doesn't allow the population to maintain itself."

In 1981, the Service adopted the same regulations on black duck numbers as it had used since 1978 (Table 1). These regulations were less restrictive than the regulations in effect in 1968.

In 1982, the Service produced the Black Duck Symposium plans for major reductions in hunting kill.
Population Station, FWS, and FWS Senior Scientist) concluded that the black duck population was in a serious decline that was largely caused by hunting mortality: “Some people would like to believe that the decrease in black duck numbers since the 1950’s has been due to environmental factors other than shooting, and that little would be accomplished by reducing the harvest. Specifically, a finger has been pointed at a deterioration of wintering habitat as a possible cause. I know of nothing which supports such a contention. Rather, it seems to me that all of the available information favors the hypothesis that over-harvest has been the most likely cause of the decline.” (Crissey, 1976).

Crissey suggested two alternatives: seasonal closures or substantial reductions in season length to severely limit black duck mortality. In 1976, the FWS made the following statements of note: “The upward trend in black duck harvest since 1961 is statistically significant at the .05 (95% confidence) level.”

“However, the greatly increased number of active hunters has more than compensated for the present reduction in season length and bag limit.” (Anon., 1976:3).

In other words, the minor reduction in season length by five days (made in 1973, Table 1) and the option for a “noon Wednesday opening” which was added in 1974 (neither of which were as restrictive as the season restrictions in the late or early 1960’s) had been rendered ineffective by increases in the number of hunters.

In 1976, the Service approved a proposal to “stabilize” hunting regulations for the next four years, so as to gather base line data for studying the impact of hunting on the black duck population (Anon., 1976:1). This program was designed to hold the kill constant at the level for previous years (Anon., 1976:3). Thus, in 1976, the FWS approved the same regulations which had been in effect in 1974 and 1975, which were themselves more liberal than the regulations in effect when the 1968 Symposium called for major reductions in kill (Table 1).

In 1977, FWS employees Martin and Carney (1977) showed that hunters were spending more time hunting each year, thereby showing that even more hunting pressure was being put on black duck populations. In 1977, the FWS approved the same regulations which had been in effect in 1974, 1975, and 1976 (Table 1).

In 1978, in spite of the four-year “stabilized regulations” program put into effect in 1976, the FWS approved regulations which slightly liberalized the restrictions on killing of black ducks (i.e., the provision for a noon Wednesday season opening, which was designed to reduce opening day hunting pressure, was removed; Table 1).

In 1979, a draft of the black duck “species management plan” was provided for review to the Atlantic Waterfowl Council and the FWS. In commenting on the draft species management plan, Henry M. Reeves, biologist and Chief, Branch of Operations, Office of Migratory Bird Management, FWS, concluded: “The bullet-biting time is upon us. I don’t think that we can seriously consider the possibility that 30 years from now the black ducks plight will be continuing ever downward. The public and our profession” deserves better—even if some very difficult and unpopular decisions are required” (Reeves, 1979).

In 1979, the FWS approved the same regulations which had been in effect in 1978 (Table 1).

In January 1980, the black duck winter inventory was at the lowest level that had ever been recorded (Fig. 1). In June 1980, the FWS published its official Migratory Bird Program Management Document in which it adopted an explicit goal: “21.04 Achieve by 1982, a wintering black duck population index in the U.S. of 450,000 based on a 3-year moving average of winter surveys.” (Anon., 1980a:11).

Unstated was the fact that the goal, adopted at the Black Duck Symposium in 1968 (Addy and Martinson, 1968), of reducing kill by 10 percent per year for five years to allow restoration of the species had now been unofficially abandoned. The goal of 450,000 is a winter inventory level last achieved in 1969, less than one year after the Black Duck Symposium recommended, to no avail, major reductions in kill (Fig. 1).

In September 1980, the FWS published the I.R.P. analysis in which it concluded that most of the mortality causing the black duck population decline was caused by hunting (Anon., 1980:16).

On September 25, 1980, in response to another draft of the Atlantic Waterfowl Council’s proposed species management plan for the black duck, Henry M. Reeves wrote: “It appears that we’re trying to avoid admitting that we have great concern about the status and trend of the species, and are reluctant to consider drastic but needed regulatory measures.” (Reeves, 1980).

In the fall of 1980, the FWS implemented its own proposal to extend the stabilized hunting regulations for black ducks for another five years (Anon., 1980b) and approved the same regulations which had been in effect in 1978 and 1979 (Table 1).

In January 1981, the winter inventory count rose slightly from its all-time low. On July 28-29, 1981, the Atlantic Waterfowl Council held its summer meeting. At the meeting, Black Duck Subcommittee Chairman Spencer (Maine’s then Migratory Bird Research Leader) discussed the draft black duck management plan and stated: “The current survival rate information indicates that the young birds are being harvested at a rate that doesn’t allow the population to maintain itself.” (Minutes of the Atlantic Waterfowl Council Technical Section, Summer Meeting 1981, files, Patuxent Wildlife Research Center).

In 1981, the FWS adopted the same regulations on killing of black ducks as had been used since 1978 (Table 1). These regulations were less restrictive than the regulations in effect in 1968, when the Black Duck Symposium called for major reductions in hunting kill.

In January 1982, the winter inventory went down again, this time by 6 percent, to a level of 309,600 (Fig. 1). In the years since the FWS produced the Migratory Bird Program Management Document, which adopted the objective of achieving a winter inventory count of 450,000, the FWS had taken not one regulatory action to achieve the objective (Table 1) and had tabulated winter inventory counts as follows: 1980:281,480; 1981:330,461; 1982:309,600. (Fig. 1).

In March 1982, the Service published the National Waterfowl Management Plan.
for the United States, in which it stated a new goal for the black duck:

“(3) Achieve an upward trend in black duck populations as measured by the winter survey.” (Anon., 1982:20)

Now gone from FWS planning was any suggestion that the Service would impose kill restrictions, such as those proposed at the Black Duck Symposium, to restore the black duck population. Gone even was the goal of raising the number of black ducks banded in preseason to 450,000. In the March 1982 plan, the FWS was apparently content to “achieve an upward trend in the black duck population as measured by the winter survey.”

On April 19, 1982, Howard Spencer, Migratory Bird Research Leader of Maine, published a memorandum entitled “Black Ducks: A Statement of Concern.” He noted that kill of black ducks in Maine had dropped substantially despite the fact that hunting pressure was essentially constant at about 100,000 hunter days. He also presented data showing for Maine that: the breeding black duck population had declined 76%; the wintering population had declined substantially; and fewer than 45% of young black ducks banded in Maine survive to breed. Spencer recommended that Maine close the black duck season (Spencer, 1982; Maine, 1982).

In early summer 1982, H. W. Heusmann, the waterfowl biologist for Massachusetts, reported continuing and serious declines of black ducks in Massachusetts (Heusmann, 1982:14-19). These and other relevant data were summarized by Joseph A. Hagar, former Massachusetts State Ornithologist and an acknowledged authority on black ducks. The data show a 45% decline between 1980 and 1981 in kill of black ducks by hunters, while the number of hunters declined by only 2%. Similarly, the number of black ducks banded in pre-season in essentially the same areas and with the same methods in Massachusetts by state personnel decreased from 276 in 1967 to 51 in 1981. In the same period, the number of mallards banded increased from 216 to 293. These figures suggest that the number of breeding black ducks has decreased alarmingly in Massachusetts (Hagar, 1982). Hagar concluded that hunting is a significant contributing cause of the black duck decline.

In the summer of 1982, Dr. Warren W. Blandin, Atlantic Flyway biologist, FWS, completed and made available to the FWS his doctoral dissertation. Based on his experience, years of FWS banding data, and modelling techniques, Dr. Blandin concluded that hunting throughout the principal breeding range of the species was causing the population decline (Blandin, 1982:122-123). Blandin recommended hunting restrictions (Blandin, 1982:160-161).

In summer 1982, Howard Spencer, Chairman of the Black Duck Subcommittee, submitted the Black Duck Management Plan (which had been six years in preparation) to the Atlantic Waterfowl Council members for consideration at their upcoming meeting. In the plan, the Subcommittee concluded:

“Hunting restrictions will be necessary and should be imposed for at least a five-year period beginning with the 1982 hunting season.” (emphasis in original) (Spencer, 1982a:13).

On July 29, 1982, the Black Duck Management Plan was presented to the Atlantic Waterfowl Council for approval. After discussion, the Council voted to accept the plan, but to put off consideration of any restrictions on kill until next year.

On September 17, 1982, the FWS announced the same regulations which had been in effect the previous year (Table 1). However, in response to the threat of a lawsuit from The Humane Society of the United States, the FWS stated (Potter, 1982:41253-41254) that it would take “necessary and desirable action” in 1983 “to effectively reduce hunting pressure”.

In 1982, biologists and administrators in Maine felt strongly about the decline of the black duck that even though overall U.S. waterfowl management is the responsibility of FWS, they recommended that Maine close the season unilaterally. Maine officials declined because they felt it would be unfair to Maine hunters unless the FWS closed the season in the other Atlantic Flyway States. As a compromise, Maine took action designed to reduce the kill in Maine by about 50%. Three other New England States also felt strongly enough about the black duck decline to take minimal restrictive action on their own.

In January of 1983, the winter inventory was at the lowest level ever recorded (Fig. 1).

In the spring of 1983, the FWS announced a new objective for black ducks: to stop the downward population trend as measured by the winter inventory (Smith, 1983:4). Now gone, and unacknowledged, were the objectives of 1982 achieving an upward trend, (1980) achieving a 450,000 winter index level, and (1968) restoring the population.

In the spring of 1983, the FWS announced plans to reduce kill of black ducks by 25% in each U.S. State of the Atlantic Flyway where annual kill currently exceeds 5,000 black ducks. This would amount to a reduction in kill of some 12 percent overall since only about 50 percent of total kill occurs in the United States (Table 2). Moreover, the 25 percent reduction in State kill was adopted solely for the following reasons:

(1) It is the minimum reduction in kill which biologists believe they can make and measure the reduction (Blandin [Atlantic Flyway biologist, FWS]; Spencer [Maine Migratory Bird Research Leader and Chairman, Black Duck Comm., Atlantic Waterfowl Council]; comments at the Atlantic Waterfowl Council meeting, Charleston, S.C., July 1982).

(2) It is the maximum reduction which State Fish and Game Directors in the Atlantic Flyway will accept (Statements made by Atlantic Flyway State Waterfowl biologists at the March 1983 meeting of Atlantic Waterfowl Council, Technical Section, Torrington, Conn.).

In other words, neither the FWS (Potter, 1983) nor any Atlantic Flyway state conservation agency has given any rationale (or data) suggesting that the 12% reduction in total kill was selected because it is a number designed to achieve restoration of the population. Indeed, the Maine Chapter of the Wildfowl Society (a North American organization representing many professional wildlife biologists) in a 1983 statement, noted that there is no biological reason for believing that such a reduction in total kill is sufficient to achieve restoration of the black duck population (Spencer, 1983, pers. comm.; see also J.W. Grandy 1982). The Maine Chapter went on to recommend a three year moratorium on all black duck hunting in the Atlantic Flyway.

Finally, with the spring 1983 announcement from FWS that black duck kill will be reduced by 25% in Atlantic Flyway States (12% overall) comes recognition that the FWS has now essentially reneged on the statement published in the March 1982 National Waterfowl Management plan:

“Current harvest regulations provide nearly all the regulatory safeguards possible for the species short of complete closure.” (Anon., 1982:8).

J.W. Grandy — Failure in American Wildlife Management monograph
for the United States, in which it stated a new goal for the black duck:

“(3) Achieve an upward trend in black duck populations as measured by the winter survey.” (Anon., 1982:20).

Now gone from FWS planning was any suggestion that the Service would impose kill restrictions, such as those proposed at the Black Duck Symposium, to restore the black duck population. Gone even was the goal of raising the winter inventory to 450,000. In the March 1982 plan, the FWS was apparently content to “achieve an upward trend in the black duck population as measured by the winter survey.”

On April 19, 1982, Howard Spencer, as Migratory Bird Research Leader of Maine, published a memorandum entitled “Black Ducks: A Statement of Concern.” He noted that kill of black ducks in Maine had dropped substantially despite the fact that hunting pressure was essentially constant at about 100,000 hunter days. He also presented data showing for Maine that: the breeding season (Spencer, 1982; Maine, 1982). The result was a new goal for the black duck:

“...achieve an upward trend, that the number of breeding black ducks has decreased alarmingly in Massachusetts (Hagar, 1982). Hagar concluded that hunting is a significant contributing cause of the black duck decline.

In the summer of 1982, Dr. Warren W. Blandin, Atlantic Flyway biologist, FWS, completed and made available to the FWS his doctoral dissertation. Based on his experience, years of FWS banding data, and modelling techniques, Dr. Blandin concluded that hunting throughout the principal breeding range of the species was causing the population decline (Blandin, 1982:122-123). Blandin recommended hunting restrictions (Blandin, 1982:160-161).

In summer 1982, Howard Spencer, Chairman of the Black Duck Subcommittee, submitted the Black Duck Management Plan (which had been six years in preparation) to the Atlantic Waterfowl Council members for consideration at their upcoming meeting. In the plan, the Subcommittee concluded:

Harvest restrictions will be necessary and should be imposed for at least a five-year period beginning with the 1982 hunting season.” (emphasis in original). (Spencer, 1982:15).

On July 29, 1982, the Black Duck Management Plan was presented to the Atlantic Waterfowl Council for approval. After discussion, the Council voted to accept the plan, but to put off consideration of any restrictions on kill until next year.

On September 17, 1982, the FWS announced the same regulations which had been in effect the previous year (Table 1). However, in response to the threat of a lawsuit from The Humane Society of the United States, the FWS stated (Potter, 1982:41253-41254) that it would take “necessary and desirable action” in 1983 “to effectively reduce hunting pressure”.

In 1982, biologists and administrators in Maine felt so strongly about the decline of the black duck that even though overall U.S. waterfowl management is the responsibility of FWS, they recommended that Maine close the season unilaterally. Maine officials declined because they felt it would be unfair to Maine hunters unless the FWS closed the season in the other Atlantic Flyway States. As a compromise, Maine took action designed to reduce the kill in Maine by about 50%. Three other New England States also felt strongly enough about the black duck decline to take minimal restrictive action on their own. 1983

In January of 1983, the winter inventory was at the lowest level ever recorded (Fig. 1). In the spring of 1983, the FWS announced a new objective for black ducks: to stop the downward population trend as measured by the winter inventory (Smith, 1982:4). Now gone, and unacknowledged are the objectives of (1982) achieving an upward trend, (1980) achieving a 450,000 winter index level, and (1968) restoring the population.

In the spring of 1983, the FWS announced plans to reduce kill of black ducks by 25% in each U.S. State of the Atlantic Flyway where annual kill currently exceeds 5,000 black ducks. This would amount to a reduction in kill of some 12 percent overall since only about 50 percent of total kill occurs in the United States (Table 2). Moreover, the 25 percent reduction in State kill was adopted solely for the following reasons:

(1) It is the minimum reduction in kill which biologists believe they can make and measure the reduction (Blanding [Atlantic Flyway biologist, FWS]; Spencer [Maine Migratory Bird Research Leader and Chairman, Black Duck Comm.]. Atlantic Waterfowl Council; Comments at the Atlantic Waterfowl Council meeting, Charleston, S.C., July 1982).

(2) It is the maximum reduction which State Fish and Game Directors in the Atlantic Flyway will accept (Statements made by Atlantic Flyway State Waterfowl biologists at the March 1982 meeting of Atlantic Waterfowl Council, Technical Section, Torrington, Conn.).

In other words, neither the FWS (Potter, 1983) nor any Atlantic Flyway state conservation agency has given any rationale (or data) suggesting that the 12% reduction in total kill was selected because it is a number designed to achieve restoration of the population. Indeed, the Maine Chapter of the Wildfowl Society (a North American organization representing many professional waterfowl biologists) in a 1983 statement, noted that there is no biological reason for believing that such a reduction in total kill is sufficient to achieve restoration of the black duck population (Spencer, 1983, pers. comm.; see also Anon., 1983a). The Maine Chapter went on to recommend a three year moratorium on all black duck hunting in the Atlantic Flyway.

Finally, with the spring 1983 announcement from FWS that black duck kill will be reduced by 25% in Atlantic Flyway States (12% overall) comes recognition that the FWS has now essentially reneged on the statement published in the March 1982 National Waterfowl Management plan: “Current harvest regulations provide nearly all the regulatory safeguards possible for the species short of complete closure.” (Anon, 1982:8).
Thus throughout the period of the 60% black duck decline, the FWS consistently: (1) ignored its own self-expressed duty (see p. 15) and black duck population goals, (2) failed to follow the advice of its own officials and experts, and (3) failed to take sufficient protective action to reverse the population decline and restore the species.

Reasons for FWS Failure to Take Action

The question remains, WHY? Why has the FWS allowed this situation to develop without taking corrective action? Why has FWS ignored the guiding tenet of wildlife management that the first duty is to preserve and protect the population base? Why has FWS consistently ignored the principle that mortality due to sport hunting is the one form of mortality that wildlife managers can control? Why has FWS consistently ignored the best recommendations and suggestions of its own experts that hunting be severely limited to allow the population to rebuild to the extent possible? After all, the annual kill of black ducks is about 700,000; hunting causes between 50 and 60 percent of the total annual mortality; and the population has continued its gradual decline and will undoubtedly never be able to recover its population (even if hunting mortality ends immediately) in some portions of its former range from which it has been eliminated. With all this evidence, the question remains: why has this been allowed to happen? And the answer, while it is perhaps best exemplified by the case of the black duck, is also important for many other species of American wildlife, because this case is not an anomaly.

And, even if the FWS and other officials reconsider in 1983, and close the black duck season, the record of inaction will still have been a classic as a failure of modern day wildlife management—a failure which should never be repeated.

Reasons for the failure of the FWS and officials responsible for the black duck to “bite the bullet” and provide necessary protection for the black duck can only be inferred from the official literature of those involved. Obviously, no employees, no state officials, inside a governmental agency can spend much time criticizing the official position of their employer and still be employed. And, most potential employers in the wildlife management field are linked directly or indirectly through contributions of funds, cooperative working relationships, professional societies, and other similar “ties that bind.” While these ties are essential for the timely transfer of information among professionals and interest groups, they also tend, in my experience, to inhibit critical analyses of the management actions of one’s associates. Yet, some candid and revealing remarks bear repeating for illustrative value.

“The thing that really emerges for me is that I cannot see where there is any need for more research on black ducks. It seems to me that what you have been showing is that the place where we need the effort is on the relation between hunting and the public we are dealing with. By continuing to press for studies on production, which seems to me from the data available to be essentially stable looking at the total picture...”

“The question, it should be noted, is not whether the information available in any year noted in the chronology was later proven to be accurate in every respect or was the best that could ever have been obtained. The fact is that at essentially each year, the best information available at the time and the expert opinion of FWS personnel and others indicated that the black duck population was declining and in trouble; yet the FWS and other officials failed and often refused to take effective regulatory action to protect the black duck. The question is: why did the failure occur?”

The above quotes from experienced FWS biologists indicate that one reason for the failure of the management community to take effective protective action for the black duck is the necessity for making “hard” or “unpalatable” or “difficult” decisions. This reference is primarily to the fact that the black duck is a species highly desired by hunters. Decisions described as “hard” or “unpalatable” mean decisions which hunters would find hard to accept or unpalatable. Hunters, being the primary influential constituency of State fish and wildlife agencies and the FWS, have an inordinate influence over decisions, and if administrators believe that many hunters will find a prospective decision unpalatable, there will be—as there has been in the case of the black duck—an aversion to making such decisions.

In the case of the black duck, this unpalatability would be heightened by the fact that even though the black duck population has declined markedly, it is still very important in the average “hunter’s bag” (and is one of a relatively small number of ducks to shoot) throughout the New England states. In other words, even though the black duck population has declined by about 60%, hunters in New England and as far south as New Jersey still “see a lot.” Hunters would, it has been widely perceived, be “upset” if they “see a lot” of black ducks and cannot shoot them. Thus as the Blandin quote makes clear, one reason for failing to take action, and defending the status quo, has been the desire to “keep the sportsman happy.”

“Sixth, there is a question about how a reduction in harvest should be accomplished, and at this point the politics rears its ugly head.” (Crissey (former FWS Chief of Migratory Bird Management), 1976:8).
Thus throughout the period of the 60% black duck decline, the FWS consistently: (1) ignored its own self-expressed duty (see p. 15) and black duck population goals, (2) failed to follow the advice of its own officials and experts, and (3) failed to take sufficient protective action to reverse the population decline and restore the species.

Reasons for FWS Failure to Take Action

The question remains, WHY? Why has the FWS allowed this situation to develop without taking corrective action? Why has FWS ignored the guiding tenet of wildlife management that the first duty is to preserve and protect the population base? Why has FWS consistently ignored the principle that mortality due to sport hunting is the one form of mortality that wildlife managers can control? Why has FWS consistently ignored the best recommendations and suggestions of its own experts that hunting be severely limited to allow the population to rebuild to the extent possible? After all, the annual kill of black ducks is about 700,000; hunting causes between 50 and 60 percent of the total annual mortality; and the population has continued its gradual decline and will undoubtedly never be able to recover its population (even if hunting mortality ends immediately) in some portions of its former range from which it has been eliminated. With all this evidence, the question remains: why has this been allowed to happen? And the answer, while it is perhaps best exemplified by the case of the black duck, is also important for many other species of American wildlife, because this case is not an anomaly.

And, even if the FWS and other officials reconsider in 1983, and close the black duck season, the record of inaction will still have been a classic as a failure of modern day wildlife management—a failure which should never be repeated.

Reasons for the failure of the FWS and officials responsible for the black duck to “bite the bullet” and provide necessary protection for the black duck can only be inferred from the official literature of those involved. Obviously, no employees, even mavricks, inside a governmental agency can spend much time criticizing the official position of their employer and still be employed. And, most potential employers in the wildlife management field are linked directly or indirectly through contributions of funds, cooperative working relationships, professional societies, and other similar “ties that bind.” While these ties are essential for the timely transfer of information among professionals and interest groups, they also tend, in my experience, to inhibit critical analyses of the management actions of one’s associates. Yet, some candid and revealing remarks bear repeating for their illustrative value.

“The thing that really emerges for me is that I cannot see where there is any need for more research on black ducks. It seems to me that what you have been showing is that the place where we need the effort is on the relation between hunting and the public we are dealing with. By continuing to press for studies on production, which seems to me from the data available to be essentially stable looking at the total picture...

“The question, it should be noted, is not whether the information available in any year noted in the chronology was later proven to be accurate in every respect or was the best that could ever have been obtained. The fact is that at essentially each year, the best information available at the time and the expert opinion of FWS personnel and others indicated that the black duck population was declining and in trouble; yet the FWS and other officials failed and often refused to take effective regulatory action to protect the black duck. The question is: why did the failure occur?

“The bullet-biting time is upon us. I don’t think that we can seriously consider the possibility that 30 years from now the black ducks plight will be continuing ever downward. The public and our profession deserves better— even if some very difficult and unpopular decisions are required.” (McGilvery, biologist, FWS, 1974).

“We should consider the hunter and the species collectively. We say we want to improve the status of the black duck and if we do, we are not going to do it by defending the current status to keep the sportsman happy because we are progressively taking it away from them by doing so.” (Blandin (Atlantic Flyway Biologist), comments in the Minutes of the Atlantic Waterfowl Council Technical Session Summer Meeting (1981), files, Office of Mitigation Bird Management, Patuxent Wildlife Research Center).

The above quotes from experienced FWS biologists indicate that one reason for the failure of the management community to take effective protective action for the black duck is the necessity for making “hard” or “unpalatable” or “difficult” decisions. This reference is primarily to the fact that the black duck is a species highly desired by hunters. Decisions described as “hard” or “unpalatable” mean decisions which hunters would find hard to accept or unpalatable. Hunters, being the primary influential constituency of State fish and wildlife agencies and the FWS, have an inordinate influence over decisions, and if administrators believe that many hunters will find a prospective decision unpalatable, there will be— as there has been in the case of the black duck—an aversion to making such decisions.

In the case of the black duck, this unpalatability would be heightened by the fact that even though the black duck population has declined markedly, it is still very important in the average “hunter’s bag” (and is one of a relatively small number of ducks to shoot) throughout the New England states. In other words, even though the black duck population has declined by about 60%, hunters in New England and as far south as New Jersey still “see a lot.” Hunters would, it has been widely perceived, be “upset” if they “see a lot” of black ducks and cannot shoot them. Thus as the Blandin quote makes clear, one reason for failing to take action, and defending the status quo, has been the desire to “keep the sportsman happy.”

“Sixth, there is a question about how a reduction in harvest should be accomplished, and at this point politics rears its ugly head.” (Crissey (former FWS Chief of Migratory Bird Management), 1976:8).

The question remains, WHY? Why has the FWS allowed this situation to develop without taking corrective action? Why has FWS ignored the guiding tenet of wildlife management that the first duty is to preserve and protect the population base? Why has FWS consistently ignored the principle that mortality due to sport hunting is the one form of mortality that wildlife managers can control? Why has FWS consistently ignored the best recommendations and suggestions of its own experts that hunting be severely limited to allow the population to rebuild to the extent possible? After all, the annual kill of black ducks is about 700,000; hunting causes between 50 and 60 percent of the total annual mortality; and the population has continued its gradual decline and will undoubtedly never be able to recover its population (even if hunting mortality ends immediately) in some portions of its former range from which it has been eliminated. With all this evidence, the question remains: why has this been allowed to happen? And the answer, while it is perhaps best exemplified by the case of the black duck, is also important for many other species of American wildlife, because this case is not an anomaly.

And, even if the FWS and other officials reconsider in 1983, and close the black duck season, the record of inaction will still have been a classic as a failure of modern day wildlife manage-
Crissey’s quote brings up another reason for failing to act: politics. In the
case of setting regulations, political influence can take a wide variety of forms.
The most basic one is the one to which Crissey alludes: perceived political equity.
Each state and indeed each country in the Atlantic Flyway wants to be treated
equally, politically. One state does not want to take action that will make its
hunters unhappy and will benefit the other states, unless the other states take a similar action. The same analogy applies somewhat less rigidly to actions of the U.S. and Canada.

This reaction, which is fully understandable as a matter perceived political
equity, is a major deterrent to having the individual states in the Atlantic
Flyway agree on a common plan of action. The problem with this political equity
often does not comport with biological necessity or management needs.

As an hypothetical example, some states may not wish to reduce kill of black ducks, because (inter alia) they do not have many black ducks and their hunters cannot distinguish them from other ducks, or because they “plenty” want their hunters to shoot them regardless of the overall status of the population. In such circumstances, the easiest and most common reaction is for the states to maintain the status quo or adopt a solution which represents the lowest common denominator*. And the detrimental impact of this phenomenon is compounded since, for whatever reasons, the FWS consistently fails to exert “leadership” on any group of state fish and wildlife agencies unless it obtains unanimous or nearly unanimous agreement beforehand.

For example, consider what occurred in setting the 1982-83 black duck season in the Atlantic Flyway. Maine biologists believed that the black duck season should be closed throughout the Flyway and in Maine, and so recommended (Spencer, 1982; Maine, 1982; Discussions at Atlantic Waterfowl Council meeting, Summer, 1982). Atlantic Flyway waterfowl biologists could all agree that at least some restrictions on kill were necessary beginning in 1983 and so recommended (Spencer, 1982a:15). However, at the Atlantic Waterfowl Council summer meeting (where all states in the Atlantic Flyway met to “agree” on seasons to be recommended to FWS), some states (most notably New Jersey) objected to any restrictions in 1982. The FWS did not want to force restrictions without agreement from the states and some protective action from Canada. The result was that the Atlantic Waterfowl Council voted (the lowest common denominator) to put off any restrictions until at least 1983.

Subsequently, Maine refused to close the season in 1982 because political
officials in Maine believed it would be “unfair” to Maine’s hunters unless the other Atlantic flyway states also closed the season (see newspaper article quoting Maine Fish and Wildlife Commissioner Manuel by Brian Thayer, Maine Sunday Telegram, August 15, 1982, page 7B, (files, Office of Migratory Bird Management, FWS, Washington D.C.)).

Maine’s “compromise” was to adopt regulations designed to reduce the kill by about 50%. The regulations they adopted were designed to avoid, as much as possible, shooting black ducks that bred or were hatched in Maine, while allowing hunters to kill migrants from Canada. Such a decision made perfect political sense for Maine, but largely ignored the needs of the black duck. Indeed, throughout the process, the needs of the black duck had been consistently relegated to a lower status than preserving the status quo and attaining the lowest common denominator.

“I am pleased with the way you show that the apparent decline in numbers may not be a reality (i.e., comments on quality of winter survey on p. 8-9) and that hunting may not be preventing population increase (p. 10). Those two points will be our main defense against external pressures for closure and other attacks which could prevent us from implementing the plan.” (Reed (biologist, Canadian Wildlife Service), 1980: comments in a letter to Spencer concerning a draft of the black duck management plan).

This quote elucidates another reason for failing to protect the black duck which is particularly ironic. My analysis of the quote, based on my experience, is that the author is thanking Spencer (as Black Duck Committee Chairman of the Atlantic Waterfowl Council) for not emphasizing the decline portrayed by the winter inventory and not emphasizing the negative impact which hunting kill (50 to 60 percent of total mortality) was almost certainly having on the population. The author notes that these two points will be the main defense against efforts to close the black duck hunting season (so that Canada can implement “the plan”, which called for relatively modest reductions in black duck kill (Spencer, 1982a)).

In my view, the reason for the author’s concern is an increasingly apparent fear in much of the wildlife management community of closing hunting seasons. In the black duck situation, the fear of many officials of closing the season is that the season may never be re-opened, the “anti-hunting element” may be credited with a victory, and/or the agencies affected will lose support and/or revenues (since hunter constituencies and/or license fees are very important to FWS, CWS, and State and Provincial agencies).

The point is, however, that all arguments about hunting and anti-hunting aside, wildlife biologists have always maintained that their first duty was to protect and preserve viable wildlife populations, presumably throughout their ranges. Yet, the resistance to making necessary restrictions engendered by this fear is tantamount to putting the welfare of hunters and hunting above the real need of the species. As individuals, biologists object to this deterioration (Reed, 1982a:8).

Ironically, in a case like the black duck where the population has declined markedly, such fear-engendered action (or inaction) only gives anti-hunters and non-hunters more reasons to be against hunting.

There is, in my view, another reason for the FWS failure to act which is apparent from the information at hand. The black duck decline occurred slowly, except in the late 1950’s (Fig. 1). FWS personnel and others, as scientists, did not want to “overreact”, particularly in light of political pressures and group pressure to maintain the status quo or adopt the “lowest common denominator” (see page 28). For that reason, beginning with the serious advocacy of major restrictions on black duck hunting (as represented by the 1968 Black Duck Symposium), cautious and politically aware officials resisted making the recommended restrictions, and they were not made. Officials began to rationalize, in spite of the continuing population decline, and to develop “reasons” for not taking regulatory action to protect black ducks and stop the population decline (see: for example, Anon., 1975; 1976; Potter, 1982, 1983; Arnett, 1982).
Crissey's quote brings up another reason for failing to act: politics. In the case of setting regulations, political influence can take a wide variety of forms. The most basic one is the one to which Crissey alludes: perceived political equity. Each state and indeed each country in the Atlantic Flyway wants to be treated equally, politically. One state does not want to take action that will make its hunters unhappy and will benefit the other states, unless the other states take a similar action. The same analogy applies somewhat less rigidly to actions of the U.S. and Canada.

This reaction, which is fully understandable as a matter perceived political equity, is a major deterrent to having the individual states in the Atlantic Flyway agree on a common plan of action. The problem that political equity or equality often does not comport with biological necessity or management needs.

As an hypothetical example, some states may not wish to reduce kill of black ducks, because (inter alia) they do not have many black ducks and their hunters cannot distinguish them from other ducks, or because they have "plenty" and want their hunters to shoot them regardless of the overall status of the population. In such circumstances, the easiest and most common reaction is for the states to maintain the status quo or adopt a solution which represents the "lowest common denominator". And the detrimental impact of this phenomenon is compounded since, for whatever reasons, the FWS consistently fails to exert "leadership" on any group of state fish and wildlife agencies unless it obtains unanimous or nearly unanimous agreement beforehand.

For example, consider what occurred in setting the 1982-83 black duck season in the Atlantic flyway. Maine biologists believed that the black duck season should be closed throughout the flyway and in Maine, and so recommended (Spencer, 1982; Maine, 1982: Discussions at Atlantic Waterfowl Council meeting, Summer, 1982) Atlantic Flyway waterfowl biologists could all agree that at least some restrictions on kill were necessary beginning in 1983 and so recommended (Spencer, 1982a:15). However, at the Atlantic Waterfowl Council summer meeting (where all states in the Atlantic Flyway met to "agree" on seasons to be recommended to FWS), some states (most notably New Jersey) objected to any restrictions in 1982. The FWS did not want to force restrictions without agreement from the states and some protective action from Canada. The result was that the Atlantic Waterfowl Council voted (the lowest common denominator) to put off any restrictions until at least 1983.

Subsequently, Maine refused to close the season in 1982 because political officials in Maine believed it would be "unfair" to Maine's hunters unless the other Atlantic flyway states also closed the season (see: newspaper article quoting Maine Fish and Wildlife Commissioner Manuel by Brian Thayer, Maine Sunday Telegram, August 15, 1982, page 7B, (files, Office of Migratory Bird Management, FWS, Washington D.C.)).

Maine's "compromise" was to adopt regulations designed to reduce the kill by about 50%. The regulations they adopted were designed to avoid, as much as possible, shooting black ducks that bred or were hatched in Maine, while allowing hunters to kill migrants from Canada. Such a decision made perfect political sense for Maine, but largely ignored the needs of the black duck. Indeed, throughout the process, the needs of the black duck had been consistently relegated to a lower status than preserving the status quo and attaining the lowest common denominator.

"I am pleased with the way you show that the apparent decline in numbers may not be a reality (i.e., comments on quality of winter survey on p. 8-9) and that hunting may not be preventing population increase (p. 18). Those two points will be our main defense against external pressures for closure and other attacks which could prevent us from implementing the plan." (Reed (biologist, Canadian Wildlife Service), 1980: comments in a letter to Spencer concerning a draft of the black duck management plan).

This quote elucidates another reason for failing to protect the black duck which is particularly ironic. My analysis of the quote, based on my experience, is that the author is thanking Spencer (as Black Duck Committee Chairman of the Atlantic Waterfowl Council) for not emphasizing the decline portrayed by the winter inventory and not emphasizing the negative impact which hunting kill (50 to 60 percent of total mortality) was almost certainly having on the population. The author notes that these two points will be the main defense against efforts to close the black duck hunting season (so that Canada can implement "the plan", which called for relatively modest reductions in black duck kill (Spencer, 1982a)).

In my view, the reason for the author's concern is an increasingly apparent fear in much of the wildlife management community of closing hunting seasons. In the black duck situation, the fear of many officials of closing the season is that the season may never be reopened, the "anti-hunting element" may be credited with a victory, and/or the agencies affected will lose support and/or revenues (since hunter constituencies and/or license fees are very important to FWS, CWS, and state and provincial agencies).

The point is, however, that all arguments about hunting and anti-hunting aside, wildlife biologists have always maintained that their first duty was to protect and preserve viable wildlife populations, presumably throughout their ranges. Yet, the resistance to making necessary restrictions engendered by this fear is tantamount to putting the welfare of hunters and hunting above the welfare of the black duck population in question. For example, this fear is, in my opinion, a major reason why the FWS in 1983 is suggesting an admittedly minimum reduction (12%) in total kill (see page 25) in spite of the March 1982 National Waterfowl Management Plan statement that:

"Current harvest regulations provide nearly all the regulatory safeguards possible for the species short of complete closure." (Anon., 1982:8).

Ironically, in a case like the black duck where the population has declined markedly, such fear-engendered action (or inaction) only gives anti-hunters and non-hunters more reasons to be against hunting.

There is, in my view, another reason for the FWS failure to act which is apparent from the information at hand. The black duck decline occurred slowly, except in the late 1950's (Fig. 1). FWS personnel and others, as scientists, did not want to "overreact", particularly in light of political pressures and group pressure to maintain the status quo or adopt the "lowest common denominator" (see page 28). For that reason, beginning with the serious advocacy of major restrictions on black duck hunting (as represented by the 1968 Black Duck Symposium), cautious and politically aware officials resisted making the recommended restrictions, and they were not made. Officials began to rationalize, in spite of the continuing population decline, and to develop "reasons" for not taking regulatory action to protect black ducks and stop the population decline (see: for example, Anon., 1975; 1976; Potter, 1982, 1983; Arnett, 1982).
Eventually, having these rationalizations continue to be accepted and believed became, in my view, a matter on which those involved felt that their professional integrity or credibility depended. For example, to finally admit that the population was declining or in trouble would have been to "lose face" or lose professional credibility. At that point, the arguments became nearly self-generating. Each rationalization for not taking action began another rationalization for example, to finally admit that the population was declining or in trouble would have been to "lose face" or lose professional credibility. At that point, the arguments became nearly self-generating. Each rationalization for not taking action began another rationalization for not taking action.

These rationalizations have now reversed the wildlife manager's duty, as expressed by Gabrielson (1941) and numerous others, to take action to limit the major technique to preserve populations. And, the concepts of Gabrielson and the others are fully imbedded in the FWS principles guiding migratory bird management:

"To limit harvest of migratory game birds to levels compatible with their ability to maintain their populations." (Arnett, 1982a:16720).

Yet, the FWS now supports its decision not to close the 1983 black duck season by stating:

"There is no demonstrable cause and effect relationship between harvest level and the size of the continental black duck population." (Potter, 1983:27802).

An analysis of the final, and overriding, reason for the failure of the FWS regulatory system with respect to the black duck was conducted in 1976 by Ted Williams (former editor of the Massachusetts Fish and Wildlife Agency magazine, Massachusetts Wildlife) in the prestigious hunting journal Gray's Sporting Journal. Williams concluded:

"And indeed, it appears that the management complex has permitted the black to be sorely overshot. Since the peak in the mid-litties, hunters have annually accounted for between 15 and 25 percent of the population, certainly a significant chunk when you consider the other pressures on the species. Furthermore, in the current black duck population there is an abnormally high percentage of juveniles—a solid indication in any species of heavy mortality among adults. Although the daily bag limit was cut from four to two quite a while after it became evident that the black duck was in serious trouble, the number of black duck hunters has since doubled. Thus despite the attempted cutback, the rate of harvest has essentially remained constant. As one courageous federal waterfowl biologist publicly declared... "Increased hunting pressure has nullified much of the management effort. Administrators must decide on a program objective for the black duck. If they sanction a program of population increase, they must recognize that the measures necessary to achieve that objective will hurt!"

"Sadly, however, the management bosses who dictate fish and wildlife policy lack self-discipline. The problem is that they are funded almost entirely by sportsmen—the very party they are obligated to regulate and educate. Imagine the curriculum at a school where the children signed the teachers' paychecks. The current set-up is as unfair to sportsmen—whose long-term best interests are not being served—as it is to non-sporting conservationists who are denied representation in conservation decision making.

"Managers have traditionally employed winter counts as a tool for setting waterfowl seasons. Yet, last year when a group of conservation organizations, calling themselves The Friends of the Black Duck, argued for a brief moratorium on black duck hunting, citing 21 years of dwindling winter counts as evidence of the need, they were informed by the managers that the counts were unreliable. Managers can't have it both ways. Winter counts can't be effective tools for modern game management when they want to sell licenses, and worthless guesses when someone wants to limit immediate hunting opportunity."

"When the conservation group communicated their concern over the black duck's plight to some of the fish and game departments in the Atlantic Flyway they received the most curious responses—the effect that the black was such a popular game species that hunters couldn't be asked to refrain from shooting out the resource. Typical of this doublethink was the astonishing declaration of the Migratory Bird Research Leader of Maine. 'I'm sure you're aware,' said he, 'that the black duck is the only significant puddle duck in most of the North and to deprive Maine hunters of any chance to harvest some would create very serious sociological problems.' (Emphasis added.)

"The trouble with fish and game departments these days is that they don't manage fish and game, they manage sportsmen; and they aren't staffed by biologists, they're staffed by sociologists. The concern is not for the problems of the black duck hunter of 1980. It is for the appetites of the vociferous, a typical black duck hunter of the moment—the one breathing down the manager's neck. Such is the effect of special-interest funding on professional principles." (Williams, 1976:34-35).

Although Williams utilizes rhetoric and broad generalizations which rely, in this quotation, on some points which are technically inaccurate, his broad conclusions are, in my view, compelling and essentially accurate. Unfortunately, Williams omits, probably because of his familiarity with the regulatory process, substantial and critical portions of the analysis. First, the black duck is valuable: even in reduced numbers, it is still the prize duck for hunters in New England states. Put another way, many hunters prize the black duck above all other species (Hagar, 1982), because it is wary and reputedly difficult to kill. Furthermore, many hunters seek success in killing a black duck as an indication of their skill as hunters. Thus, the black duck is valuable, beyond any monetary value, to the individual hunter who esteem the black duck as a trophy, prize, or symbol of excellence. For avid hunters who do not know or do not care about the decline of the black duck, there is a powerful lobby for continued or increased hunting of black ducks; even hunters who do know and do care will be intimidated from taking on their fellow hunters and changing the status quo.

Furthermore, the black duck is of critical value—or is thought to be of critical value—to the State fish and wildlife (or conservation) agencies of the individual states in New England. License fees largely support the operations of these agencies. It is widely believed in much of New England that if hunters could not hunt black ducks, many would not hunt, thus substantially reducing the revenues that pay for salaries and programs of the agencies. And inevitably in the Atlantic Waterfowl Council, there is the feeling that "I'll help you with your seasons (and license fees), if you help me with mine."
Eventually, having these rationalizations continue to be accepted and believed became, in my view, a matter on which those involved felt that their professional integrity or credibility depended. For example, to finally admit that the population was declining or in trouble would have been to "lose face" or lose professional credibility. At that point, the arguments became nearly self-generating. Each rationalization for not taking action begat another rationalization for not taking regulatory action.

These rationalizations have now reversed the wildlife manager's duty, as expressed by Gabrielson (1941) and numerous others, to take action to prevent the destruction of fish and wildlife resources necessary to achieve that objective. [1982a:16720].

Yet, the FWS now supports its decision not to close the 1983 black duck season by stating:

"There is no demonstrable cause and effect relationship between harvest level and the size of the continental black duck population." [Potter, 1983:27802].

An analysis of the final, and overriding, reason for the failure of the FWS regulatory system with respect to the black duck was conducted in 1976 by Ted Williams (former editor of the Massachusetts Fish and Wildlife Agency magazine, Massachusetts Wildlife) in the prestigious hunting journal Gray's Sporting Journal. Williams concluded:

"And indeed, it appears that the management complex has permitted the black to be sorely overshot. Since the peak in the mid-sixties, hunters have annually accounted for between 15 to 25 percent of the population, certainly a significant chunk when you consider the other pressures on the species. Furthermore, in the current black duck population there is an abnormally high percentage of juveniles—a solid indication in any species of heavy mortality among adults. Although the daily bag limit was cut from four to two quite a while after it became evident that the black duck was in serious trouble, the number of black duck hunters has since doubled. Thus despite the attempted cutback, the rate of harvest has essentially remained constant. As one courageous federal waterfowl biologist publicly declared....Increased hunting pressure has nullified much of the management effort. Administrators must decide on a program of population increase, they must recognize that the measures necessary to achieve that objective will fail!"

"Sadly, however, the management bosses who dictate fish and wildlife policy lack self-discipline. The problem is that they are funded almost entirely by sportsmen—the very party they are obligated to regulate and educate. Imagine the curriculum at a school where the children signed the teachers' paychecks. The current set-up is as unfair to sportsmen—whose long-term best interests are not being served—as it is to non-sporting conservationists who are denied representation in conservation decision making.

"Managers have traditionally emphasized winter counts as a tool for setting waterfowl seasons. Yet, last year when a group of conservation organizations, calling themselves The Friends of the Black Duck, argued for a brief moratorium on black duck hunting, citing 21 years of dwindling winter counts as evidence of the need, they were informed by the management complex that the counts were unreliable. Managers can't have it both ways. Winter counts can't be effective tools for modern game management when they want to sell licenses, and worthless guesses when someone wants to limit immediate hunting opportunity."

"When the conservation group communicated their concern over the black duck's plight to some of the fish and game departments in the Atlantic Flyway they received the most curious responses—to the effect that the black was such a popular game species that hunters couldn't be asked to refrain from shooting out the resource. Typical of this doublethink was the astonishing declaration of the Migratory Bird Research Leader of Maine, 'I'm sure you're aware,' said he, 'that the black duck is the only significant puddle duck in most of the North and to deprive Maine hunters of any chance to harvest some would create very serious sociological problems.' (Emphasis added.)"

"The trouble with fish and game departments these days is that they don't manage fish and game, they manage sportsmen; and they aren't staffed by biologists, they're staffed by sociologists. The concern is not for the problems of the black duck hunter of 1980. It is for the appetites of the vociferous, a typical black duck hunter of the moment—the one breathing down the manager's neck. Such is the effect of special-interest funding on professional principles." [Williams, 1976:34-35].

Although Williams utilizes rhetoric and broad generalizations which rely, in this quotation, on some points which are technically inaccurate, his broad conclusions are, in my view, compelling and essentially accurate. Unfortunately, Williams omits, probably because of his familiarity with the regulatory process, substantial and critical portions of the analysis. First, the black duck is valuable: even in reduced numbers, it is still the prize duck for hunters in New England states. Put another way, many hunters prize the black duck above all other species (Hagar, 1982), because it is wary and reputedly difficult to kill. Furthermore, many hunters view success in killing a black duck as an indication of their skill as hunters. Thus, the black duck is valuable, beyond any monetary value, to the individual hunter who esteem's black ducks, as a trophy, prize, or symbol of excellence. For avid hunters who do not know or do not care about the decline of the black duck, there is a powerful lobby for continued or increased hunting of black ducks; even hunters who do know and do care will be intimidated from taking on their fellow hunters and changing the status quo.

Furthermore, the black duck is of critical value—or is thought to be of critical value—to the State fish and wildlife (or conservation) agencies of the individual states in New England. License fees largely support the operations of these agencies. It is widely believed in much of New England that if hunters could not hunt black ducks, many would not hunt, thus substantially reducing the revenues that pay for salaries and programs of the agencies. And inevitably in the Atlantic Waterfowl Council, there is the feeling that "I'll help you with your seasons (and license fees), if you help me with mine."
Conclusion

The key to the failure of the regulatory system is, in my view, the real or perceived value of black ducks to the hunter or to the bureaucracy which is dependent upon hunting license fees and/or a hunter constituency. Without the value of license fees there would be little concern over closing a season. Without the value, there would not be an influential constituency composed almost solely of hunters. Without the value, the political pressure would not be for equity in opportunity, but rather for preserving the species. Without the value, politicians and others would not feel the same political pressures for preserving the status quo and building rationalizations.

In case after case, to varying degrees, this pattern of yielding to vocal consumptive interests (or just failing to take action) to the detriment of wildlife has become apparent wherever the wildlife species at issue is perceived as valuable for recreational, trophy or commercial purposes, or is perceived as having great significance for generating hunter interest and license fees; and wherever active demand exceeds the capacity of the species for regeneration.

This pattern has been apparent most recently with respect to bobcats (Lynx rufus) and the coast striped bass (Roccus saxatilis), and is becoming increasingly apparent with respect to regulations concerning highly sought-after species of waterfowl such as mallards, canvasbacks (Aythya valisineria), and pintails (Anas acuta acuta), all of which are currently at or near historic low population levels, and all of which have been subject to essentially the same regulations for many years.

Unless corrective action is taken, black duck-like regulatory failures will increase if waterfowl and other wildlife populations decline, while hunter pressure on and demand for the species remain high.

Literature Cited


Conclusion

The key to the failure of the regulatory system is, in my view, the real or perceived value of black ducks to the hunter or to the bureaucracy which is dependent upon hunting license fees and/or a hunter constituency. Without the value of license fees there would be little concern over closing a season. Without the value, there would not be an influential constituency composed almost solely of hunters. Without the value, the political pressure would not be for equity in opportunity, but rather for preserving the species. Without the value, politicians and others would not feel the same political pressures for preserving the status quo and building rationalizations.

In case after case, to varying degrees, this pattern of yielding to vocal, consumptive interests (or just failing to take action) to the detriment of wildlife has become apparent wherever the wildlife species at issue is perceived as valuable for recreational, trophy or commercial purposes, or is perceived as having great significance for generating hunter interest and license fees; and wherever active demand exceeds the capacity of the species for regeneration. This pattern has been apparent most recently with respect to bobcats (Lynx rufus) and the coast striped bass (Roccus saxatilis), and is becoming increasingly apparent with respect to regulations concerning highly sought-after species of waterfowl such as mallards, canvasbacks (Aythya valisineria), and pintails (Anas acuta acuta), all of which are currently at or near historic low population levels, and all of which have been subject to essentially the same regulations for many years.

Unless corrective action is taken, black duck-like regulatory failures will increase if waterfowl and other wildlife populations decline, while hunter pressure on and demand for the species remain high.

Literature Cited


Martin, F.W. (1976) Attachment to a memorandum: To, black duck group Atlantic flyway; From, Director, Migratory Bird & Habitat Research Laboratory; Subj., suggested black duck research topics at Moosehorn meeting (undated). Files, Office of Migratory Bird Management, FWS, Patuxent Wildl. Res. Cent., Laurel, Md. 20708. 3pp.


