

A CONSERVATION PLAN FOR THE
FLORIDA MOTTLED DUCK
2004-2009



FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
WATERFOWL MANAGEMENT SECTION

APPROVED

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EXECUTIVE SUMMARY

This plan identifies specific actions to maintain the mottled duck population at a level that can sustain hunting and viewing opportunities over the long-term. To accomplish this, we establish objectives for population and habitat management, and public information and education. Strategies and tasks to achieve objectives are included.

Our population management objective is to maintain the breeding population at or above a density of 0.7 birds/km². This level represents the 1985-89 mean density. Population management will focus on (1) monitoring the status of the mottled duck population, (2) quantifying and controlling the feral mallard/mottled duck interbreeding problem, (3) gaining additional information on factors influencing survival and recruitment, and (4) monitoring recruitment.

Our habitat management objective is to maintain sufficient habitat to meet our population objective. Habitat management will focus on quantifying the current habitat base and maintaining or improving the quantity and quality of this base.

Our public information and education objective is to increase public awareness of and involvement in mottled duck related issues. Public information and education will focus on increasing understanding among constituents and increasing our constituency through an expanded array of informational and educational materials and programs.

More detailed action plans will be needed to complete some of the tasks identified in this plan. As information and resources change, so will the focus of mottled duck management. This plan should be updated periodically.

PREFACE

The mottled duck (*Anas fulvigula*) is a nonmigratory close relative of the mallard (*Anas platyrhynchos*). The Florida mottled duck (*Anas fulvigula fulvigula*), often called the Florida duck, is a unique subspecies only found in peninsular Florida (McCracken et al. 2001). This mottled brown duck commonly is seen using small prairie/pasture wetlands, floodplain marshes of the St. Johns and Kissimmee rivers, coastal impoundments, and urban/suburban ponds, ditches, and canals. Rapid changes in Florida's landscape, mostly resulting from agricultural and urban development within the mottled duck's range, raise concerns about the status of these habitats and the wildlife that depend on them. Moreover, the continued existence of the Florida mottled duck is threatened by feral mallards, with which mottled ducks are interbreeding.

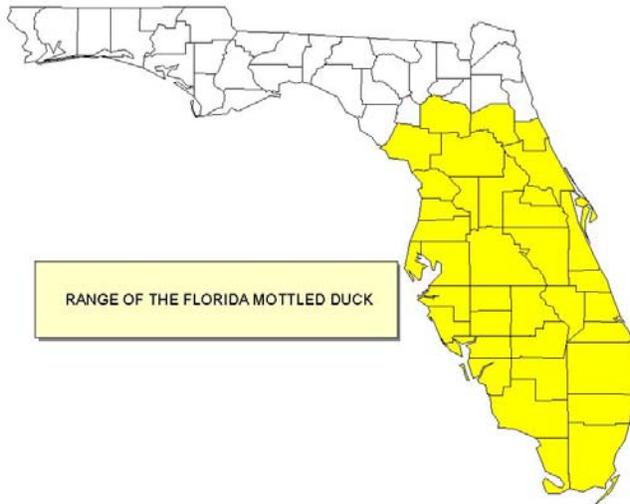
Mottled ducks have an intrinsic aesthetic value and are highly prized as game birds. They are a defining member of the unique suite of species characteristic of the south Florida ecosystem. This Mottled Duck Conservation Plan was prepared by the Waterfowl Management Section (WMS) of the Florida Fish and Wildlife Conservation Commission as stewards of Florida's wildlife, for the people of this state. However, it will take an effort by not only the Commission, but also the people of Florida, to ensure the continued existence of the Florida mottled duck.

This document is intended as a tool for the WMS and other organizations, agencies, and individuals who have an interest in the welfare of the Florida mottled duck. The Plan establishes objectives for population and habitat management, and public information and education. Outlined under these objectives are strategies and tasks to guide conservation of this subspecies. We believe these strategies and tasks will result in actions that work toward conserving a mottled duck population that Florida citizens can enjoy for generations.

BACKGROUND INFORMATION

Mottled Duck Ecology

Florida mottled ducks are non-migratory and inhabit inland (Beckwith and Hosford 1955, 1957, Lotter and Cornwell 1969, Fogarty and LaHart 1971) and coastal areas (Steiglitz and Wilson 1968, LaHart and Cornwell 1971, Johnson 1974) in peninsular Florida. Individual mottled ducks maintain a small home range relative to other waterfowl (Fogarty and LaHart



1971, Johnson et al. 1995).

Florida mottled ducks use freshwater emergent type wetlands within the Fisheating Creek, Kissimmee River, and St. Johns River basins, and the Everglades Agricultural Area (EAA) (Sincock 1957, Johnson et al. 1991, R. R. Bielefeld, Florida

Fish and Wildlife Conservation Commission, unpublished data). Like mottled ducks in Texas and Louisiana (*A. f. maculosa*), Florida mottled ducks use coastal habitats such as Tampa Bay, Charlotte Harbor, and the Mosquito and Indian River Lagoons, and impounded coastal areas such as Merritt Island and J. N. "Ding" Darling National Wildlife Refuges (Steiglitz and Wilson 1968; Fogarty and LaHart 1971; LaHart and Cornwell 1971; Johnson 1973; 1974; Thomas 1982). Field observations indicate that mottled ducks also frequently use wetlands in urban and suburban areas.

Florida mottled ducks maintain a mating system similar to migratory North American Anatini (dabbling ducks, Gray 1993). Courtship and pair bonding occur from October through January, with most individuals being paired by early winter. Pairs stay in small flocks until late December or early January, when they establish breeding territories. The

majority of breeding appears to occur during February through June, but copulations have been observed as early as the beginning of December. Females nest predominately in upland grass areas near wetlands; however, females also have been found nesting in dry marsh, citrus groves, pine flatwoods, and urban areas (R. R. Bielefeld, Florida Fish and Wildlife Conservation Commission, unpublished data). Moreover, nest sites may be greater than 1 km from suitable brood habitat, and broods may move as far as 5 km (Gray 1993, R. R. Bielefeld, Florida Fish and Wildlife Conservation Commission, unpublished data). Some pairs, especially those using small wetland types such as ponds, defend a loafing/feeding territory through the egg-laying period, with males leaving hens sometime during incubation. Florida mottled ducks exhibit uniparental care, with females being the care provider. Mottled ducks commonly congregate on large wetlands for the flightless period associated with wing molt; however, birds also molt in small groups on wetlands of less than 1 hectare (R. R. Bielefeld, Florida Fish and Wildlife Conservation Commission, unpublished data). Males usually undergo wing molt in July. Wing molt in females is delayed until after brood-rearing, and usually occurs in August and September. Mottled ducks usually complete wing molt and brood-rearing by mid-September, and courtship activities for the next breeding cycle begin shortly thereafter.

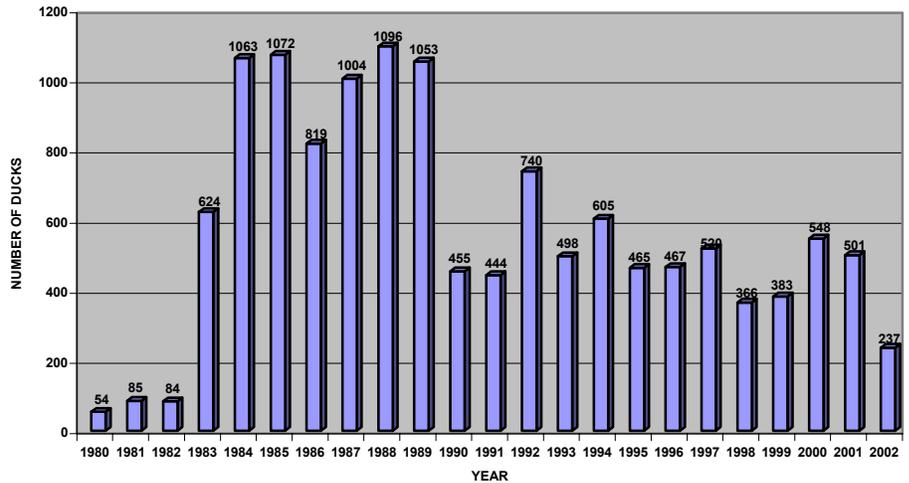
Monitoring and Management

A precise estimate of Florida mottled duck population size does not exist; available estimates suggest spring populations are between 28,000 and 49,000 birds (P. N. Gray, Florida Audubon Society, unpublished data; Johnson et al. 1991). The WMS has conducted an annual aerial survey of the mottled duck breeding population since 1984 to obtain a density estimate for a core area of their range (Johnson et al. 1991). Periodic improvements to this survey have increased precision, giving us greater ability to detect changes in bird density within the surveyed area. However, the current survey design does

not provide information on the mottled duck population outside the survey area, which likely contains more than half of the population.

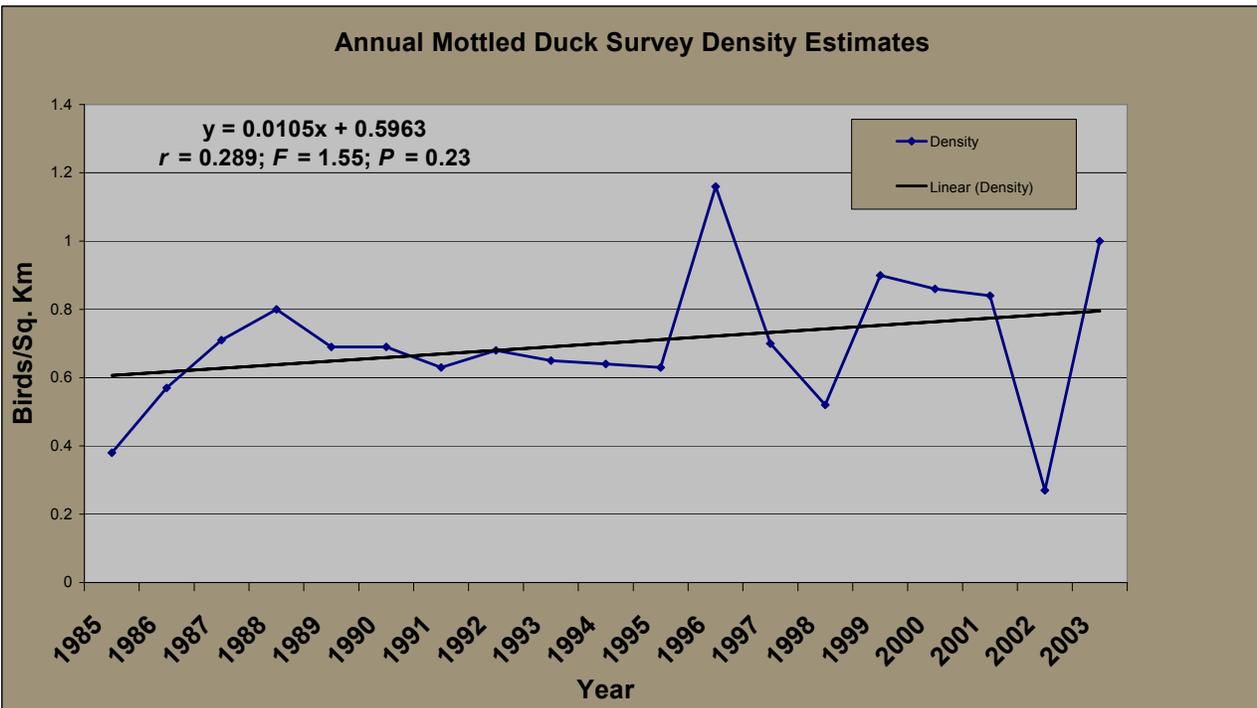
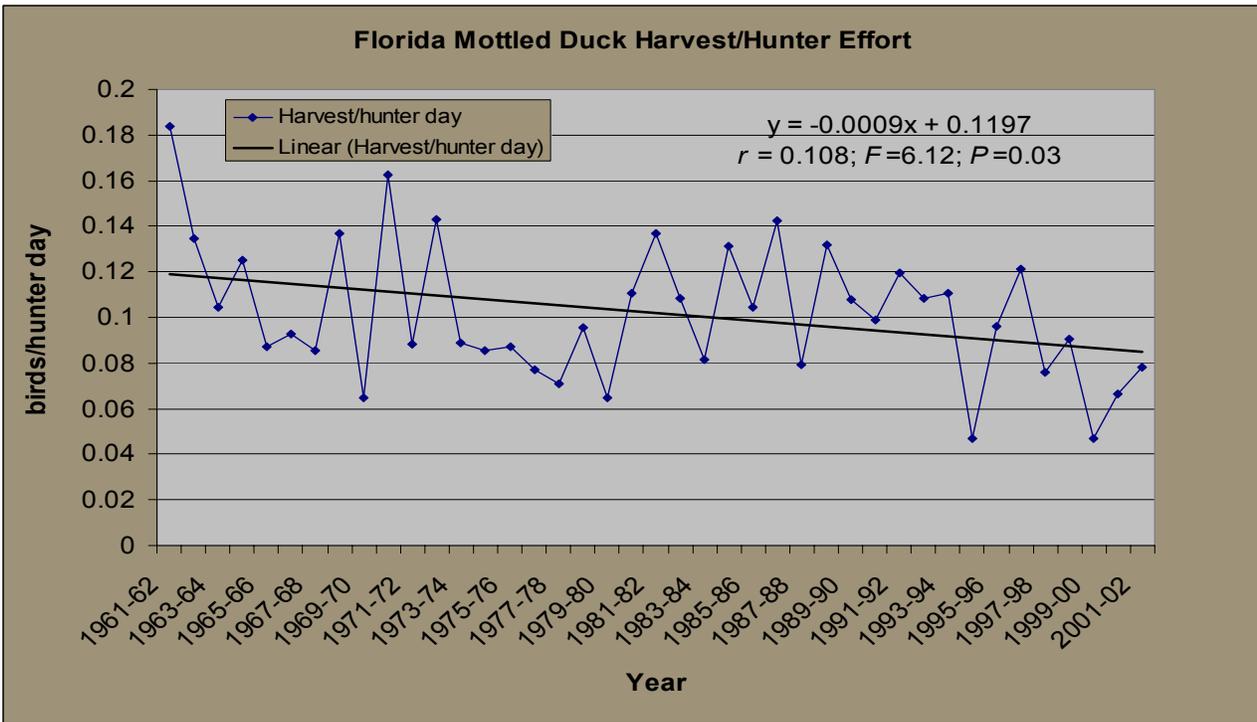
Large numbers of mottled ducks have been marked with leg bands since 1983. Band-recovery data have allowed us to calculate estimates of annual survival and direct recovery rates. Band recovery rates, when corrected for reporting rate; indicate the proportion of the mottled duck population annually harvested by hunters. Inability to obtain enough band recovery data and evidence of geographic heterogeneity in the population (Johnson et al. 1995) limit our ability to use these data. We have been unable to associate changes in hunting regulations with changes in harvest rates or survival. Moreover, we have been unable to interpret whether estimated survival rates are adequate to sustain the population because we have no reliable measure of recruitment. Parameter estimates derived from past banding and harvest survey statistics have suggested a declining population (Johnson et al. 1984). Estimates of harvest/hunter day for the period 1961-62 through 2001-02 suggest a weak declining trend, while spring breeding survey density estimates (1989-2003) indicate a slightly increasing population.

BANDING ACCOMPLISHMENTS



Mean annual estimates of band-recovery and survival rates of Florida mottled ducks (Johnson et al. 1995).

SEX	RECOVERY		SURVIVAL	
	ADULT	YOUNG	ADULT	YOUNG
MALE	0.05	0.09	0.55	0.91
FEMALE	0.03	0.06	0.50	0.47



Land Use Trends

Florida wetlands and grasslands are being destroyed or degraded at a rate of approximately 2,023 hectares per year (Dahl 2003). Since 1936, 56% of Florida's wetlands have been lost (Dahl 2003). Drainage, water-level stabilization, fire suppression, and nutrient deposition are the predominant factors causing these losses. During the period 1985-96, Florida lost approximately 260,000 acres of freshwater emergent wetlands, the largest loss of any wetland type (Dahl 2003). These shallow wetlands are the type most used by mottled ducks (R. R. Bielefeld, Florida Fish and Wildlife Conservation Commission, unpublished data). Drainage for rural and urban development was responsible for about 72% of this loss, and agriculture for about 28% (Dahl 2003). Florida has more wetlands with high or medium potential for agricultural development than any other state (Heimlich and Langer 1986); consequently, the potential for continued loss is high. Agricultural impacts have not been entirely negative, and some agricultural activities may benefit mottled ducks. For example, moderate grazing and burning can keep woody plants from encroaching into grasslands and emergent vegetation from completely over-taking wetlands, maintaining them as mottled duck habitat.

Extensive water management systems designed to prevent flooding and ensure water supply frequently have disrupted natural hydrology and hydroperiods, which formerly maintained healthy wetland ecosystems. Other significant factors degrading Florida's wetlands include nutrient pollution from agricultural and urban runoff and fire suppression, which allow excessive growth of emergent vegetation.

In addition to negatively affecting mottled ducks by contributing to the direct loss of habitat, urban development also may contribute to the introgression of mallard genes into the mottled duck population. Year-round, some mottled ducks use urban wetland habitats, which frequently support feral mallards. Consequently, continued urban development likely

will increase contact between mottled ducks and feral mallards resulting in increased hybridization.

Need for Action

Urbanization, agriculture, and feral mallards threaten the future of the Florida mottled duck. If we are to maintain a mottled duck population at historic levels, we must conserve critical mottled duck habitats and greatly reduce the feral mallard population. Knowledge of changes in population status and how factors such as hunting, population density, habitat conditions, predation, disease, and weather conditions influence Florida mottled duck populations is needed to effectively target management efforts. Implementation of this plan will ensure that appropriate harvest management and effective monitoring of the mottled duck population continues. Additionally, factors potentially depressing the mottled duck population will be examined and the information used to guide habitat and harvest management efforts.

MOTTLED DUCK CONSERVATION GOAL

MAINTAIN THE FLORIDA MOTTLED DUCK AS A FUNCTIONAL MEMBER OF THE SOUTH FLORIDA ECOSYSTEM AT A POPULATION LEVEL THAT CAN SUSTAIN HUNTING AND VIEWING OPPORTUNITIES OVER THE LONG-TERM.

CONSERVATION PLAN

This plan establishes a goal, objectives, strategies, and tasks for conserving the Florida mottled duck. Strategies and tasks are presented in priority order within objectives. Task prioritization within strategies is based on the overall importance of each task as presented in Appendix A. Strategy prioritization is based on the relative importance of the

tasks occurring under each strategy. Overall, conservation of the Florida mottled duck requires us to (1) obtain baseline information on population and habitat status to gauge the need for and effectiveness of conservation efforts and (2) take actions to maintain population status at or above our desired level. As information is gained, mottled duck management in Florida will undoubtedly change. Consequently, this plan should be reviewed and updated as new information warrants.

I. Population Management Objective: Maintain the most recent five-year average estimate of mottled duck breeding population density at or above 0.7 birds/km² within the currently surveyed area, or at or above the current level as determined by a revised survey.

Rationale - A spring mottled duck density of 0.7 birds/km² within the currently surveyed area represents a population that has sustained long-term hunting and viewing opportunities. Moreover, we believe this goal is achievable. As of 2003, the five-year mean density was 0.77 birds/km².

A. Strategy: Verify and periodically monitor the status of the mottled duck breeding population by conducting a spring survey.

Rationale - Information on the size and distribution of the mottled duck population is needed to guide management actions. This plan establishes the breeding population density estimate obtained from the spring Mottled Duck Breeding Population Survey as the population size objective. Consequently, we must continue a survey to periodically compare the current status of the population to the population management objective. With these comparisons, we can gauge the need for and effectiveness of conservation efforts.

- 1. task:** Annually conduct an aerial (helicopter) survey during March to obtain an index to mottled duck population status or an estimate of mottled duck population size.
- 2. task:** Improve the survey design to ensure data obtained are representative of the entire population.

Rationale - Currently, the survey is designed to obtain a density estimate for the central portion of the mottled duck range, which we use as an index to population status. However, because more than half of the mottled duck population likely occurs outside this area, the status as determined from these data may not depict the status of the entire population.

B. Strategy: Minimize interbreeding between mottled ducks and mallards.

Rationale - Hybridization with mallards threatens the future of the mottled duck as a distinct species (Moorman and Gray 1994). Historically, mallards occurred

in Florida only as winter migrants (Bellrose 1976). However, released mallards have begun to breed in the wild. These feral mallards interbreed with mottled ducks, and observations of mottled duck x mallard hybrids are not uncommon. Genetic introgression from mallards into the mottled duck population is likely to continue and increase unless the release of mallards is stopped. Worldwide, mallard-type species have been partially or completely hybridized out of existence by released mallards (Frith 1967, Hubbard 1977, Haddon 1984, Gillespie 1985, Ankney et al. 1987, Conroy et al. 1989, Rusch et al. 1989, Browne et al. 1993). These similar situations illustrate the potentially devastating nature of this problem and accentuate the need for a comprehensive control strategy.

- 1. task:** Identify and implement mechanisms to reduce hybridization, including a strategic public information and education campaign describing the problem, why it is occurring, and how it can be reduced.
- 2. task:** Develop techniques to identify hybrids, including a phenotypic key.
- 3. task:** Periodically assess the proportion and distribution of hybrids in the population.

C. Strategy: Implement appropriate hunting regulations for mottled ducks

Rationale - We have a limited understanding of the effect of harvest and harvest regulation on this population. In response to this uncertainty we have had to institute conservative hunting regulations for mottled ducks. Experience suggests that mottled ducks can sustain current levels of harvest and maintain their population status. However, we need a better understanding of harvest effects to realize the recreational opportunities this resource may offer. Hunting regulations implemented for mottled ducks should reflect the current status of the population and our understanding of mottled duck population dynamics.

- 1. task:** Ensure hunting regulations are consistent with current population status and knowledge of mottled duck population dynamics.

Rationale - It is prudent to continue conservative hunting regulations until information is gained indicating more liberal regulations are appropriate.

- 2. task:** Develop and refine a harvest management strategy.

Rationale - A harvest management strategy will decrease subjectivity and increase efficiency of the regulation setting process. For example, population size thresholds should be established indicating when bag limits should be increased and decreased. Currently, we have a poor understanding of the effects of harvest on survival. Consequently, such a well-refined strategy is not possible at this time. As we gain pertinent information, such a strategy should be developed. To the extent possible, we will use the principles of Adaptive Harvest Management (Williams and Johnson 1995) to understand the effect of harvest on the population and optimize harvest management decisions.

- 3. task:** Determine the relative importance of harvest to survival of mottled ducks.

Rationale - Compared to other duck species, mottled ducks appear to be particularly vulnerable to harvest. Moreover, mottled ducks are nonmigratory and maintain small home ranges. Consequently, harvest has the potential to limit population growth, especially on a local or regional scale

D. Strategy: Estimate vital rates and model relationships.

Rationale - A better understanding of the population dynamics of mottled ducks will allow us to target our conservation efforts.

- 1. task:** Conduct band recovery analyses to estimate survival and harvest rates.
- 2. task:** Develop an indicator of recruitment

Rationale - An index to mottled duck recruitment will provide additional information on population status and will help us gauge the success of conservation efforts directed at recruitment. Moreover, in conjunction with survival estimates, a recruitment estimate may allow us to monitor population growth.

- 3. task:** Develop and evaluate alternative population models to describe mottled duck population dynamics.

Rationale - Using the principles of adaptive resource management (Williams and Johnson 1995), these models can be used as a tool to learn more about the underlying mechanisms affecting population growth, while making objective and informed management decisions

- 4. task** Annually band at least 500 mottled ducks.

Rationale - Band recovery data will allow us to annually estimate harvest rate, periodically estimate survival rates, and correct age ratios so we can estimate recruitment.

II. Habitat Management Objective: Maintain habitat quantity and quality to ensure adequate nesting, brood-rearing, molting, and wintering habitat to achieve or exceed the population management objective of 0.7 birds/km².

Rationale - Without adequate habitat, no other management action taken for mottled ducks can sustain the population at the objective level.

A. Strategy: Increase and/or enhance the habitat base.

- 1. task:** Pursue cooperative efforts that benefit mottled duck habitat.

Rationale- Numerous other organizations and agencies in Florida are involved in habitat conservation activities. Increasing partnerships and “piggybacking” mottled duck benefits onto projects with broader

ecosystem values will enhance our ability to conserve and improve habitat. Also, if we are to expand mottled duck conservation efforts, we must obtain new funding sources. Additional funds will create more leverage to obtain matching funds and other support through partnerships with other agencies and conservation groups

- 2. task:** Use the Mottled Duck Production Area to identify range management techniques mutually beneficial to mottled ducks and cattle grazing.

Rationale- Cattle grazing is a major land use over much of the mottled duck range. Consequently, development and use of range management practices conducive to mottled ducks and cattle production have the potential of improving large acreages of habitat. A demonstration area will provide a working example from which range managers learn management techniques beneficial to cattle and mottled ducks.

- 3. task:** Publish and distribute informational materials on grazing techniques beneficial to mottled ducks and cattle production. Use knowledge gained from the Mottled Duck Production Area and elsewhere to develop these informational materials.

Rationale- Knowledge gained from the Mottled Duck Production Area and elsewhere must be distributed and used if it is to enhance conditions for mottled ducks.

- 4. task:** Through appropriate channels, promote policy and legislation supporting beneficial land use, and oppose or attempt to modify policy and legislation that will be detrimental to mottled ducks.

Rationale - Legislative and government policy actions have had profound effects (both positive and negative) on the quantity and quality of habitat available to waterfowl. Therefore, we must monitor regulatory and policy issues at the local, state, and federal level that have the potential to affect mottled duck habitat.

- 5. task:** Develop a checklist that can be used to evaluate potential land acquisitions and management projects with respect to their value for mottled ducks.

Rationale - The Florida Fish and Wildlife Conservation Commission and other conservation agencies and groups have land available to them through mitigation, acquisition, and other sources. In many cases, these agencies and groups seek lands beneficial to multiple species of fish and wildlife. A checklist will facilitate a quick determination of whether a specific parcel or project will be valuable for mottled ducks.

- B. Strategy:** Identify and monitor habitats needed to achieve the Habitat Management Objective.

Rationale - To determine how habitat and population change are correlated we must first determine what habitats are important and their current status. This baseline data will provide a reference point to which future changes can be

compared. Without this reference point, we have no way to gauge the effectiveness of our habitat management strategies. Moreover, all areas that support mottled ducks cannot be protected and/or managed given personnel and monetary constraints. Consequently, we must identify areas particularly important to mottled ducks.

- 1. task:** Identify and describe habitats important to mottled ducks throughout their annual cycle.

Rationale - To determine how habitat and population change are related we must first determine what habitats are important and their current status.

- 2. task:** Develop a map that identifies the extent and habitat composition of the mottled duck range, and identifies and classifies important areas to be conserved or enhanced.

Rationale - This map can be used to focus habitat monitoring and conservation efforts on areas most likely to benefit mottled ducks. Classification should be based on current habitat type and the number of birds using the area (i.e., mean density of birds or population size).

- 3. task:** Develop and implement a system to monitor areas identified as important to mottled ducks, and establish a protocol for dealing with potential impacts to these areas.

Rationale - Once important areas are identified, they must be monitored to detect potential impacts as land use changes. If destructive activities occur or are planned a protocol is needed for reducing negative impacts. Moreover, a network of individuals, organizations, and agencies will be needed to conduct the monitoring.

- C. Strategy:** Determine impacts of specific agricultural practices on breeding and post-breeding mottled ducks.

Rationale - A large proportion of mottled ducks breed, raise broods, and molt on private agricultural lands. Consequently, it is important to understand how different agricultural practices influence mottled duck breeding success and post-breeding survival.

- 1. task:** Develop and conduct a study to evaluate recruitment and sources of mortality for mottled ducks that breed and molt within the EAA.

Rationale - A substantial proportion of the Florida mottled duck population breeds and molts within the EAA. Sugar cane is the predominant crop in the EAA, and field observations suggest a potential for high mortality associated with sugar cane farming, particularly management of water levels in fallow fields. If land use is significantly detrimental to mottled ducks, efforts can be made to influence land use practices.

- 2. task:** Develop and conduct a study to evaluate recruitment and sources of mortality for mottled ducks that breed and molt on grazed lands.

Rationale - A substantial proportion of the Florida mottled duck population breeds and molts on grazed lands. Currently, we know little about the influence current grazing practices have on recruitment and survival of mottled ducks that breed and molt on these areas. Determining how current grazing practices affect breeding and post-breeding mottled ducks is the first step toward improving the quality of grazed lands for these birds.

III. Public Information and Education Objective: Gain public support and engender action for mottled duck conservation.

Rationale - An informed and concerned public will promote and support mottled duck conservation.

A. Strategy: Educate the general public, private and public land managers, and regulators about the status and needs of the Florida mottled duck through the implementation of a comprehensive communications plan.

Rationale - By expanding our use of informational and educational materials we can contact a much larger proportion of the public.

- 1. task:** Develop and distribute informational materials targeted at the general public, which may include brochures, videos, magazine and newsletter articles, and information for the FWC internet site. Develop a system to alert news media about mottled duck related stories. Conduct or participate in events such as waterfowl hunting workshops, seminars on Florida waterfowl and wetlands, and the Becoming an Outdoors-Woman program.
- 2. task:** Distribute informational materials to aid public and private land managers in managing and conserving mottled duck habitat.
- 3. task:** Develop and distribute informational materials targeted at children, which may include videos and children's activities.

IMPLEMENTATION

Task implementation by Waterfowl Management Section staff will be scheduled annually based on the importance of this plan relative to competing objectives of the Waterfowl Management Section and on availability of funding and staff within the Section. Approval for task implementation will be obtained through the Commission's annual operational planning process.

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APPENDIX A

List of mottled duck conservation tasks in priority order with accomplishments made toward completing each task and estimated cost (not including current FTE salary) to complete the task. The relative importance of a task is based on the perceived value to mottled ducks of completing that task and the feasibility.

Task		Estimated Cost	Accomplishments
IB1	Develop and implement a mottled duck hybridization plan, which identifies mechanisms to reduce hybridization, including distributing public information materials describing the problem, why it is occurring, and how it can be reduced.	Unknown	Hybridization plan completed – see Appendix B
1A1	Annually conduct an aerial (helicopter) survey during March to obtain an index to mottled duck population status or an estimate of mottled duck population size.	\$25-40,000 per year	Survey is currently operational under original design
IA2	Improve the survey design to ensure data obtained are representative of the entire population.	\$60,000 to complete redesign	New survey design under development, planning meeting held, and initial work on redesign underway
IB2	Develop technique to identify hybrids.	\$35,750	Preliminary genetics work completed, 2 nd round of blood samples collected, samples sent to Boston University for analysis
IC1	Continue to implement hunting regulations consistent with current population status and knowledge of mottled duck population dynamics.	\$1,000	Operational – daily bag limit set at one
IIA1	Pursue cooperative efforts that benefit mottled duck habitat.	Unknown	Operational
IB3	Periodically assess proportion and distribution of hybrids in the population.	\$10-15,000 per assessment	Awaiting development of genetic technique to identify hybrids
ID1	Conduct band recovery analyses to estimate survival and harvest rates.	\$1,500	Preliminary analyses complete.

Appendix A Continued

Task		Estimated Cost	Accomplishments
ID2	Develop an indicator of recruitment.	Unknown	Initial carcass collection begun for work on using state of reproductive organ development to refine aging of wings. Refined aging process would be used to generate annual age ratios from the harvest. Age ratios would be used as an index to recruitment.
IIB1	Identify and describe habitats important to mottled ducks throughout annual cycle.	\$750,000 (three telemetry studies) also addresses IC3, IIC1, and IIC2	Three-year St. Johns River Basin telemetry project complete, preliminary data analyses complete. Relevant data obtained.
IC2	Develop and refine a harvest management strategy.	Coordinated by existing staff, no additional cost anticipated	Initial contacts made
IC3	Determine relative importance of harvest to survival of mottled ducks.	Covered by IIB1	Telemetry project data provides some relevant data about the relative importance of hunting mortality for adult female mottled ducks
ID3	Develop conceptual models to describe mottled duck population dynamics.	Coordinated by existing staff, no additional cost anticipated	Initial contacts made
ID4	Annually band at least 500 mottled ducks.	\$1,700 per year	Operational – efforts, improvements needed to increase success
IIIA1	Develop and distribute informational materials targeted at the general public.	\$42,250 for FY 2001-02 through 2003-04. Additional costs anticipated annually	Communications plan regarding hybridization complete.
IIC1	Develop and conduct a study to evaluate recruitment and sources of mortality for mottled ducks that breed and molt within the EAA.	Covered by IIB1	Grants being sought, potential from Delta Waterfowl, U.S. Sugar Corp., and SFWMD
IIA2	Use the mottled duck production area to identify range management techniques mutually beneficial to mottled ducks and cattle grazing.	\$25,000	Mottled Duck Production Area established, grazing begun March 2003, nest site selection data available from telemetry project

Appendix A Continued

Task	Estimated Cost	Accomplishments
IIC2 Develop and conduct a study to evaluate recruitment and sources of mortality for mottled ducks that breed and molt on grazed lands.	Covered by IIB1	Telemetry project on Upper Basin of St. Johns River completed relevant data obtained on recruitment and survival of adult females using grazed lands.
IIIA2 Distribute informational materials to aid public and private land managers in managing and conserving mottled duck habitat.	\$5,000	None
IIB2 Develop a map that identifies the extent and habitat composition of the mottled duck range, and identifies and classifies important areas to be conserved or enhanced.	Coordinated by existing staff, no additional cost anticipated	None
IIA3 Publish and distribute informational materials on grazing techniques beneficial to mottled ducks and cattle production. Use knowledge gained from the mottled duck production area and elsewhere to develop these information materials.	\$5,000	None
IIB3 Develop and implement a system to monitor areas identified as important to mottled ducks, and establish a protocol for dealing with potential impacts to these areas.	Coordinated by existing staff, no additional cost anticipated	None
IIA4 Through appropriate channels, promote policy and legislation supporting beneficial land use, and oppose or attempt to modify legislation that will be detrimental to mottled ducks.	Coordinated by existing staff, no additional cost anticipated	None
IIIA3 Develop and distribute informational materials targeted at children, which may include videos and children's activities.	\$42,250	None
IIA5 Develop a checklist that can be used to evaluate potential land acquisitions and management projects as their value for mottled ducks.	Coordinated by existing staff, no additional cost anticipated	None

APPENDIX B

PLAN FOR REDUCING MOTTLED DUCK X MALLARD HYBRIDIZATION

May 20, 2002

I. Background Information

A. Conservation Plan - The Conservation Plan for the Florida Mottled Duck (Florida Fish and Wildlife Conservation Commission 1999) sets forth a population management objective as follows: "Maintain the most recent five-year average estimate of mottled duck breeding population density at or above 0.7 birds/km² within the currently surveyed area, or at or above the current level as determined by a revised survey." One of the specified strategies for achieving this objective is to minimize interbreeding and hybridization between mottled ducks and mallards by (1) identifying and implementing mechanisms to reduce hybridization including distributing public information materials describing the problem, why it is occurring, and how it can be reduced, (2) evaluating or developing techniques to identify hybrids, and (3) periodically assessing the proportion and distribution of hybrids in the population. This plan functions as a sub-plan of The Conservation Plan for the Florida Mottled Duck and provides more detailed strategies and tasks for reducing hybridization.

B. Need for Action - Feral mallards pose a major threat to the conservation of Florida's endemic mottled duck (*Anas fulvigula fulvigula*) because the two closely related species interbreed, resulting in fertile, hybrid offspring. Florida's mottled duck is nonmigratory, is genetically distinct from mottled ducks occurring elsewhere in the country, and occurs only in peninsular counties of the state. Their existence is threatened by interbreeding with feral mallards and by rapid changes in Florida's landscape, mostly resulting from agricultural and urban development. The mottled duck is a defining member of the unique suite of wildlife species characteristic of the prairie ecosystem of southern Florida. An estimated 5% of Florida's mottled duck population exhibits hybrid characteristics, based on wing plumage. This is a minimum estimate of the proportion of the population that is hybridized because many mallard genes are not expressed visibly. Worldwide, mallard-type species repeatedly have been partially or, perhaps in one case, completely hybridized out of existence by introduced mallards. As illustrated by the decline and loss of these other similar species, mallard x mottled duck hybridization can be a devastating problem, and a comprehensive strategy is needed to address it. Unless the release of mallards in Florida is stopped, mallard genetic introgression into the mottled duck population will continue to increase, possibly to the demise of Florida's mottled duck.

Appendix B Continued

II. Plan

A. Objective: Develop techniques to identify hybrids

1. **Strategy:** Develop technique to distinguish hybrids by genotype
 - a) **Task** - Collect additional tissue samples from mallards and hybrids
 - b) **Task** - Contract with genetics lab to develop technique
2. **Strategy:** Develop technique to distinguish hybrids by phenotypic characteristics
 - a) **Task** - Use genetic technique to identify known hybrids and identify plumage characteristics that distinguish hybrids from either species.
 - b) **Task** - Develop key or field guide to identifying hybrids by phenotypic characteristics for use during banding and at hunter check stations

B. Objective: Assess proportion and distribution of hybrids in population

1. **Strategy:** Obtain current estimate of proportion of population that are hybrids
2. **Strategy:** Identify geographic problem areas
3. **Strategy:** Implement periodic sampling of population to measure temporal change in hybridization rate
 - a) **Task** - Obtain tissue from museum specimens and compare to current genetic makeup of mottled duck population to measure any previous temporal change toward more mallard-type genes.
 - b) **Task** - Design sampling scheme
 - c) **Task** - Periodically sample population

C. Objective: Identify and implement mechanisms to reduce hybridization

1. **Strategy:** Learn about the sources of mallards being released

Appendix B Continued

a) **Task** - Conduct survey of farm-and-feed type of stores and pet stores

b) **Task** - Conduct informal survey of commercial mallard breeders

c) **Task** - Investigate possible databases and other sources of information concerning the number of mallards brought into the state, means of transport, and disposition

2. **Strategy:** Develop and implement communications plan (i.e., marketing and public relations strategy)

a) **Tasks** - (See Attachment C, Integrated Communications Plan)

3. **Strategy:** Recommended rule changes to curb mallard releases

a) **Task** - Prohibit release of mallards on private hunting preserves

b) **Task** - Review other potential regulatory mechanisms for addressing the problem

4. **Strategy:** Investigate animals to be purchased for pets and for ornamental purpose as alternatives to mallards

a) **Task** - Investigate feasibility of producing sterile mallards

b) **Task** - Investigate feasibility of developing a supply of captive-reared mottled ducks

5. **Strategy:** Facilitate direct control of mallard populations where feasible

a) **Task** - Obtain from U.S. Fish and Wildlife Service a permit to allow for lethal control

b) **Task** - Develop strategy for implementing permit

c) **Task** - Implement permit

6. **Strategy:** Provide for the release of captive-reared mottled ducks on private hunting preserves

a) **Task** - Recommend rule change to establish guidelines for release of mottled ducks from private hunting preserves

Appendix B Continued

- b) **Task** - Support industry efforts to have federal regulations changed that restrict release of captive-reared mottled ducks on private hunting preserves
- c) **Task** - Assess requirements for establishing a captive program
- d) **Task** - Permit the capture and keeping of wild mottled ducks or their eggs
- e) **Task** - Assist as necessary and feasible with taking wild mottled ducks or eggs to establish captive flock and, if necessary, obtain pertinent federal permit
- f) **Task** - Ensure genetic purity of brood stock through regulation and inspection
- g) **Task** - Ensure to the extent possible through regulation and enforcement that released birds are disease-free
- h) **Task** - Assess impact of captive-reared and released mottled ducks on wild mottled duck population and monitoring programs

(1) Require that preserves provide daily records of bird numbers released and harvested

(2) Estimate annual and seasonal (post-season until annual mottled duck population monitoring) survival rates of released birds

(3) Periodically estimate band reporting rates for wild mottled ducks to assess potential of mottled duck releases to bias band recovery data