U.S. Fish & Wildlife Service

Webless Migratory Game Bird Research Program

Project Abstracts – 2005

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Mourning Doves and White-winged Doves

History and Administration of the Webless Migratory Game Bird Research Program, 1995-2005

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HISTORY

Introduction

The Webless Migratory Game Bird Research (WMGBR) Program was established in December 1994 with the first projects being funded in 1995. It was designed to provide cooperative funding from the U.S. Fish and Wildlife Service (USFWS), state wildlife agencies, and other sources for research on migratory game birds other than waterfowl (e.g., doves, pigeons, cranes, woodcock, snipe, and rails). Information from these studies will be used to more effectively manage these "webless" species.

Formation of the program was not easy and what follows is an attempt to document the events and the individuals associated with it's evolution. This historical overview was derived primarily through use of unpublished minutes from meetings between 1984 and 1995 of the Migratory Shore and Upland Game Bird (MSUGB) Subcommittee (named Committee between 1991-1996) of the International Association of Fish and Wildlife Agencies (IAFWA). The WMGBR Program is similar to the preceding Accelerated Research Program which was discontinued in 1982. After its formation in 1984, the MSUGB Subcommittee worked for 9 years to reinstate a research program for migratory shore and upland game birds. These efforts were realized finally when H. Ronald Pulliam, Director of the National Biological Survey (NBS; now U.S. Geological Survey-Biological Resources Division), contributed $300,000 for the program for FY1995/96. Subsequently, John G. Rogers, Deputy Director of the USFWS, authorized the Division of Federal Aid to allocate $150,000 per year as an annual funding item for the program beginning in FY1996. In FY1998, the USFWS contributed $300,000 for the WMGBR Program, thanks to the efforts of Paul R. Schmidt and Robert Blohm (USFWS) who worked to get an additional $150,000 for the Program in the budget for the Office [now Division] of Migratory Bird Management (DMBM)]. Beginning in FY1999, however, only $150,000 from the DMBM budget was available. In 2003 and 2004, funding was suspended due to budget limitations. Funding was reinstated in 2005 at a level of $250,000, $30,000 of which will go towards cooperative funding of an early succession habitat biologist in the Northeast for the next 3 years.

The Accelerated Research Program, 1967-82

The history of the Accelerated Research Program (ARP) was documented by MacDonald and Evans (1970). In July 1967, Congress appropriated $250,000 for the program. Support for this appropriation came from the Southeastern Association of Game and Fish Commissioners and the International Association of Game, Fish, and Conservation Commissioners (predecessor to the IAFWA). Also, Leonard E. Foote (Wildlife Management Institute) was instrumental in development of and gaining support for the program (R.E. Tomlinson, USFWS, personal communication). Internal support within the USFWS (then Bureau of Sport Fisheries and Wildlife) came principally from Walter F. Crissey, Director of the Migratory Bird Population Station (MBPS); significant input for justifying the program was provided by Aelred D. Geis, William H. Goudy, Howard M. Wight, and Roy E. Tomlinson (H.M. Reeves, USFWS, personal communication). Subsequent to the appropriation, the International Association created a National Program Planning Committee for Shore and Upland Game Birds (later known as the National Program Planning Group [NPPG]). The ARP was designed to provide funding for migratory shore and upland game bird research. The NPPG was formed to solicit, screen, and select projects for funding under the program (Sanderson 1977).

Congressional funding of the ARP was $250,000 annually. Of this total, $175,000 was contracted to states; $50,000 was used directly by the USFWS to support 2 field stations—one in Maine to study American woodcock and one in South Carolina to study mourning doves; and, $25,000 was retained by the USFWS to

administer the program. William Russell was the first biologist at the Maine woodcock station followed by William Krohn. Spencer Amend initiated the dove study in South Carolina, followed by George Haas. The dove study site was later moved to Georgia. Henry M. Reeves administered the program until March 1968 when Duncan MacDonald was hired for this purpose. In 1971, Fant Martin took over, followed in 1975 by Richard Coon and in 1980 by Thomas Dwyer.

In the 16 years the program was in operation (1967-82), 122 research projects were completed in 41 states. Over the years, funding for state projects amounted to about $2.5 million. The ARP ended in October 1982 when funding for the program was eliminated, primarily because of fiscal constraints upon the USFWS.

Formation of the Migratory Shore and Upland Game Bird Subcommittee

When the ARP was terminated, the NPPG, which served as an advisory group for the ARP, became inactive in 1982. Consequently, a new group was deemed necessary for focusing attention on MSUGB issues. Accordingly, and largely due to the efforts of Roy Tomlinson (USFWS), and Ronnie George and Ted Clark (Texas Parks and Wildlife Department), the MSUGB Subcommittee was established in 1984 by Mr. Clark, who was Chairman of the IAFWA's Migratory Wildlife Committee. The Subcommittee quickly became a force in migratory bird management.

Development of the Webless Migratory Game Bird Research Program

After its formation, the MSUGB Subcommittee sought to obtain information about the contributions made through the ARP and to determine whether or not the state wildlife agencies wanted to support Subcommittee efforts to have it reinstated. Clait Braun (Colorado Division of Wildlife) outlined 20 specific benefits of ARP to state wildlife agencies (letter attached to MSUGB Subcommittee minutes, March 1985). In summary, he showed that ARP facilitated substantial interchange of ideas among individuals working within regions and different agencies, which greatly expanded our knowledge about this important group of birds.

In 1985, Ronnie George, Chairman of the MSUGB Subcommittee, conducted a survey of all state wildlife agency directors about current MSUGB research needs and the ARP; all 50 states responded to the questionnaire. Results were summarized in a March 1986 report by Mr. George, entitled *Results of the Accelerated Research Program Questionnaire*. All but 3 states indicated MSUGB needs that had not been addressed to date. Thirty-two states felt that [future] MSUGB research needs could best be undertaken through combined USFWS and state wildlife agency funding. Forty-seven states believed ARP served a useful purpose considering the cost, and 49 states favored reestablishment of ARP (or a similar program) as a Congressionally-funded *addition* to the USFWS budget. Only 17 states, however, gave unqualified approval to redirecting current USFWS funds to an ARP-type program.

In a second March 1986 report, entitled *Summary of Accelerated Research Program Publications by Region and State*, Mr. George listed references for 340 publications known to have directly resulted from ARP. One of the most significant contributions was the book, *Management of Migratory Shore and Upland Game Bird Species in North America* (Sanderson 1977). These publications detail the wealth of information that was learned through the research program.

After confirming that state agencies had been pleased with the program and desired a similar program to be organized, the MSUGB Subcommittee passed a resolution in March 1986 asking the IAFWA to support reestablishment of ARP (or a similar program) as a Congressionally-funded $350,000 annual addition to the USFWS budget. The IAFWA also passed the resolution, but did not take further action because they did not feel the timing was right. At the March 1988 MSUGB Subcommittee meeting, a USFWS representative stated that the need exists for such a program, but that the USFWS was faced with rather severe budget limitations and there was a reluctance by the current administration to initiate new funding activities. He also stated that to effect such a resumption, enthusiasm and pressure from the Subcommittee was necessary. Consequently, another motion was made for the current Chairman, Kenneth Babcock, to reiterate the need for immediate study on several declining populations and ask the IAFWA Budget Committee to address those concerns when they testified before Congress on budget considerations. Once again, the IAFWA voiced support of their efforts but decided it was not the appropriate time to make a request before Congress.

In March 1990, a different strategy was undertaken by the Subcommittee, whereby Chairman Babcock was asked to write directly to Director John Turner of the USFWS, pointing out the success of the past program, the current needs, and requesting the addition of a $350,000 line item by the USFWS. Two letters eventually were written. In the telephone reply to the second letter, Deputy Director Richard Smith indicated that the USFWS would consider the request in its 1992 budget deliberations.

At the March 1991 MSUGB Committee (new name) meeting, Mr. Babcock reported that Max Peterson, Executive Vice President of the IAFWA, acted on their past recommendations and provided testimony before the House Appropriations Committee for the FY1992 budget. In this testimony, the IAFWA strongly recommended addition of $350,000 to the USFWS budget for the development of a research program to address existing data deficiencies on webless migratory game birds. Subsequent to the meeting, Chairman Babcock contacted directors of all state wildlife agencies to urge their congressional delegations to support the add-on to the budget. Many state agencies did contact their delegations. Mr. Peterson then testified before the USFWS Appropriations Subcommittee and asked that they add an item to the budget specifically for this work. Unfortunately, these efforts failed.

In 1992, the MSUGB Committee decided to change direction and develop a proposal for an entirely new program that would be submitted to the USFWS. Chairman Babcock (personal communication) then asked John H. Schulz (Missouri Department of Conservation) to take the lead in formulating a proposal for a fresh type of research effort. Although his name did not appear on the document, Mr. Schulz prepared the first draft of a proposal, entitled *Proposal for a Webless Game Bird Research Program,* with input from others. According to Schulz (personal communication), Roy Tomlinson (USFWS) provided the most detailed and lengthy comments, while substantive comments were also provided by Clait Braun, Richard Jachowski (NBS), Thomas Tacha (Texas A&M University-Kingsville), and Ronnie George. The proposal was distributed to MSUGB Committee members for review in August 1992. In the package, the USFWS was asked to establish an annual, line-item-funded research program for migratory shore and upland game bird species. One significant difference from earlier efforts was a request of $750,000 that would fund cooperative state-federal studies. These monies were envisioned to be matched at some level with state or other funding. It was suggested that 12.5% of the funds allocated for such a program be retained by the USFWS for administrative costs. The proposal package included a detailed screening process utilizing committees to review and prioritize submitted proposals. The MSUGB Committee would then review the lists and recommend studies to the USFWS for funding. A suggestion was made to give greater weight to studies supported by population management plans. After input from MSUGB Committee members, a revised proposal was sent to all state wildlife agency directors and USFWS Director Turner on 10 December 1992. The USFWS replied favorably to the plan on 18 March 1993, but several concerns were expressed in an attached review of the proposal by the Office of Migratory Bird Management. Chairman Babcock expressed his appreciation to the USFWS in a letter dated 28 May 1993, and offered suggestions for resolving the concerns raised.

The MSUGB Committee decided in September 1993 to recommend that an ad hoc Task Force, consisting of 2-3 committee members and an equal number from the USFWS, be formed to work out the details of a final joint proposal. The USFWS concurred. Subsequently, Ronnie George was named Chairman of the Task Force with the following members: Duane Shroufe (Arizona Game and Fish Commission), Cal DuBrock (Pennsylvania Game Commission), Roy Tomlinson [David Dolton replaced Roy after his retirement in June 1994] and Robert Blohm (USFWS), and Russell Hall (NBS). This group met to finalize the proposal for a webless research program, and developed details for a review process and evaluation criteria for research proposals under the program.

In August of 1994, Kenneth Babcock met with USFWS Director Mollie Beattie to urge her support for the webless research program. Also, he met with Ronald Pulliam and F. Eugene Hester (NBS) to enlist their support (K. M. Babcock, personal communication). The effort was successful. Mr. Babcock stated that Noreen Clough (who worked in the Director's Office at the time) helped arrange the meeting and that Paul Schmidt (Chief, MBM) helped set the stage by briefing the Director beforehand.

On 13 September 1994, Ronnie George transmitted the final version of *Recommendations for a Webless Migratory Game Bird Research Program,* prepared by the Webless Migratory Game Bird Research Task Force,

to MSUGB Committee Chairman Kenneth Babcock. Key recommendations included the designation of 4 Technical Committees to evaluate proposals, a WMGBR Review Committee appointed by the MSUGB Committee to make the final project selection, the designation of a Project Officer within MBM to coordinate this activity, a USFWS budget line item of $750,000 annually, and that the United States Congress be urged to pass a budget, including a Webless Migratory Game Bird Research Program.

The efforts and persistence of the MSUGB Committee finally came to fruition in the fall of 1994 when funding became available, as stated in the Introduction. One stipulation was that 1/3 of the project cost must come from non-federal dollars. Also, funds were to be given for the life of the project rather than for just one year, as was done under the ARP.

Even though the amount of funding was not at the level recommended in the original proposal, the WMGBR Program has been successful thus far. MBM absorbed the administrative cost of the program without taking any of the research funds and designated David Dolton as Project Officer and program coordinator.

Another key contribution made by the MSUGB Committee was the publication of the book entitled *Migratory Shore and Upland Game Bird Management in North America* (Tacha and Braun 1994). This was a revised and updated version of the book edited by Sanderson (1977). As stated in the Preface to the book, key individuals responsible for planning, authorship selection, and other aspects of the publishing process included the editors and ad hoc committee members T. C. Tacha, C. E. Braun, J. M. Anderson, R. R. George, and R. E. Tomlinson. Authors of individual chapters were recognized authorities in their field. Immediately after publication, the book began to serve as a guide for research on species described therein.

There remains support to increase funding to the level originally recommended. On 26 July 1996, and again on 28 July 2000, the 4 Flyway Councils passed a Joint Recommendation requesting that the USFWS and the National Biological Service [USGS in 2000 version] seek additional revenue to fully fund the WMGBR Program at the recommended level of $750,000 per year. In December 1998, an IAFWA Ad Hoc Committee on Migratory Bird Funding met with USFWS personnel in Washington, D.C. to discuss funding needs for migratory birds. One of the recommendations was to fund the WMGBR Program at the full recommended level.

WMGBR PROGRAM ADMINISTRATION

At least 1/3 of the total project cost must be paid with non-federal dollars. In-kind services, such as salaries of state employees and vehicle expenses, are acceptable as matching funds. Study proposals may be on any webless migratory game bird topic identified as a research need in a national, regional, or state management plan or other document, or in the 1994 book entitled *Migratory Shore and Upland Game Bird Management in North America*. Additionally, a letter of support is required for each proposal from the state in which it originates.
A call for proposals is distributed by the USFWS Project Officer in July each year to USFWS Flyway Representatives and Migratory Bird Coordinators, and USGS-Biological Research Division (BRD) Regional Offices and the Cooperative Research Units office. Flyway Representatives are responsible for distributing the letter to biologists in their respective states. State biologists, in turn, are asked to send the information to other state personnel, universities, and any others who may be interested. Migratory Bird Coordinators forward the letter to National Wildlife Refuges and other federal offices. USGS-BRD Regional Offices are asked to forward the letter to all their respective Science and Technology Centers, while the Cooperative Research Units office distributes the call to all Cooperative Fish and Wildlife Research Units.

The review process is as follows. Proposals are sent by 15 November to the Project Officer for the program (David Dolton, USFWS/DMBM). He checks the proposals for budget and support letter compliance and sends these materials to 4 Regional Technical Committees (Appendix 1). These committees review all the proposals submitted within their respective region and provide David with an evaluation of each project. The evaluations are based upon criteria that have been developed for this program and also upon regional needs (Appendix 2). Additionally, the projects are ranked in priority order. A compilation of all evaluations and rankings, along with the proposals, are then sent to members of a WMGBR Review Committee for review. Ronnie George (Texas Parks and Wildlife Department) served as the first Chairman of the Review Committee from 1994-96. Current committee members include

Robert Boyd, Chairman, (Pennsylvania Game Commission) and David Dolton (USFWS), along with the 2005 Chairmen of the 4 Technical Committees: Western–Craig Mortimore (Nevada Division of Wildlife); Central–John H. Schulz (Missouri Department of Conservation); Northeastern–Ed Robinson (New Hampshire Fish and Game Department); and Southeastern–Billy Dukes (South Carolina Department of Natural Resources).

In February, the WMGBR Review Committee discusses the evaluations and rankings, and selects projects for funding. Funds become available as soon as contracts can be completed and signed.

To date, $1,671,219 in WMGBR Program funds has been expended to support 44 research projects and 1 workshop with a total value of $6,991,881 (Table 1). Proceedings of the Marshbird Monitoring Workshop are available from David Dolton. The uneven Grand Total for WMGBR funds is due to NBS contributing an additional $5,578 to the program in 1996 and an unused $395 in 1999. Although not reflected in the Grand Total, USGS-BRD (formerly NBS) provided additional support in 1997, 1998, and 1999 by contributing a total of $30,000 directly to 3 of the projects selected. In 2003, 2 projects were selected for funding prior to the suspension of funds. Later, however, the U.S. Fish and Wildlife Service committed to fund one of the projects for $119,000 (pilot reward banding study of mourning doves) using other funds. Additionally, in order for 2 USGS studies to be completed, the USGS-BRD funded the second project on sandhill cranes ($30,900) along with another one on band-tailed pigeons ($19,215). For 2005, 13 proposals with a total value of $3,305,664 were received, requesting $1,008,106 in WMGBR funds.

The WMGBR Program is invaluable in providing much-needed funding for webless species who receive considerably less attention than waterfowl. The current level of funding will not begin to meet the needs identified in the 1994 management book mentioned previously, but it is a start. This is a very cost-effective program and it is hoped that funding can be increased in the future.

Table 1. Projects funded through the Webless Migratory Game Bird Research (WMGBR) Program, 1995-05.

Species	Number of projects	WMGBR Program funds	Total project cost
Mourning dove	11	$528,820	$2,250,280
American woodcock	8	$276,739[a]	$1,421,071
Marsh game birds	9	$188,313	$1,146,017
Band-tailed pigeon	7	$385,670[b]	$909,345
Sandhill crane	9	$284,824[c]	$1,265,168
Marshbird Monitoring Workshop	–	$6,853[d]	—
GRAND TOTAL	44	$1,671,219[e]	$6,991,881

[a] An additional $13,000 was given to 1 project by the U.S. Geological Survey (Biological Resources Division) in 1997.

[b] An additional $11,000 was given to 1 project by the U.S. Geological Survey (Biological Resources Division) in 1998; $6,000 was given to 1 project in 1999; and, $19,215 was given to 1 project in 2003.

[c] An additional $30,900 was given to 1 project by the U.S. Geological Survey (Biological Resources Division) in 2003.

[d] An additional $6,046 was provided for the workshop by the the U.S. Geological Survey (Biological Resources Division) in 1998. Other funding support came from a variety of state and federal agencies, the Canadian Wildlife Service, and private organizations.

[e] The National Biological Service contributed $5,578 to the WMGBR Program in 1996.

ACKNOWLEDGMENTS

I am grateful for the comprehensive minutes prepared by R. E. Tomlinson for each meeting of the MSUGB Subcommittee between 1984 and 1994. Without them, a detailed historical account of events and programs would not have been possible. Additionally, I want to thank R. E. Tomlinson, J. H. Schulz, R. R. George, H.M. Reeves, R. J. Blohm, D. MacDonald, and K. M. Babcock for reviewing the first versions of this paper for the 1997 and 1998 reports, and providing information and suggestions for improvement.

LITERATURE CITED

Much of the information contained herein is from minutes and reports on file in the author's USFWS office. Additionally, all remaining copies of Tacha and Braun (1994) are being stored there. Copies of either the minutes or the book can be obtained upon request.

MacDonald, D. and T.R. Evans. 1970. Accelerated research on migratory webless game birds. Transactions of the Thirty-fifth North American Wildlife and Natural Resources Conference. Wildlife Management Institute, Washington, D.C. 35:149-156.

Sanderson, G.C., editor. 1977. Management of migratory shore and upland game birds in North America. International Association of Fish and Wildlife Agencies, Washington, D.C. 358 pp.

Tacha, T.C., and C.E. Braun, editors. 1994. Migratory shore and upland game bird management in North America. International Association of Fish and Wildlife Agencies. Washington, D.C. 223 pp.

Appendix 1. Technical Committees for evaluating and prioritizing Webless Migratory Game Bird Research Program proposals.

Western	Central	Northeastern	Southeastern
Alaska	Arkansas	Connecticut	Alabama
Arizona	Colorado	Delaware	Florida
California	Iowa	Illinois	Georgia
Hawaii	Kansas	Indiana	Kentucky
Idaho	Minnesota	Maine	Louisiana
Oregon	Missouri	Massachusetts	Maryland
Utah	Montana	Michigan	Mississippi
Washington	Nebraska	New hampshire	North Carolina
	New Mexico	New Jersey	South Carolina
	North Dakota	New York	Tennessee
	Oklahoma	Ohio	Virginia
	South Dakota	Pennsylvania	West Virginia
	Texas	Rhode Island	
	Wyoming	Vermont	
		Wisconsin	

Appendix 2. Evaluation criteria for Webless Migratory Game Bird Research Program proposals (Revised July 20, 1998).

Possible points	Criteria
10	**I. Existing information data base related to the problem in question for this species/population** 10 pts. Little known 5 pts. Moderately known 2 pts. Extensive
20	**II. Information needs** 20 pts. Addresses an immediate need identified in a management plan (national, regional, or state), the 1994 book *Migratory Shore and Upland Game Bird Management in North America*, or a regional technical committee priority list. 10 pts. Addresses a future need identified in a management plan (national, regional, or state), the 1994 book *Migratory Shore and Upland Game Bird Management in North America*, or a regional technical committee priority list. 2 pts. Addresses a need identified only in the proposal.
30	**III. Status of the species/population** **A. Population** 15 pts. Decreasing 13 pts. Unknown 7 pts. Stable 2 pts. Increasing **B. Habitat** 15 pts. Decreasing 13 pts. Unknown 7 pts. Stable 2 pts. Increasing
20	**IV. Management applicability** **A. Range** 15 pts. Results applicable throughout 10 pts. Results applicable to > 50% of range 5 pts. Results applicable to < 50% of range **B. Applicability** 5 pts. Multi-species (Biodiversity approach) 3 pts. Single species
30	**V. Scientific merit** 30 pts. Objectives are clearly stated, procedures are well designed, results are attainable, quantifiable estimates will be statistically reliable and comparable to other studies, manpower and budget are adequate. 15 pts. Objectives are clearly stated, most procedures are well designed, important results are attainable, quantifiable estimates will be statistically reliable and comparable to other studies, manpower and budget are generally adequate. 0 pts. Objectives fuzzy, poor design or results not attainable, results will not be statistically reliable or will be difficult to compare, budget and manpower are inadequate (zero value automatically kills the proposal).
10	**VI. Funding** 10 pts. > 75% of funding from other sources 7 pts. 50-75% of funding from other sources 5 pts. 33-49% of funding from other sources 0 pts. <33% of funding from other sources (zero value automatically kills the proposal).
120	**TOTAL**

Webless Migratory Game Bird Research Program Projects
Progress to Date

Mourning Doves

Development and Evaluation of Mourning Dove Population Models for Optimizing Harvest Management Strategies in the Eastern, Central, and Western Management Units

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Expected completion: 2006

Introduction and Objectives

An informed harvest management process for mourning doves will require development of one or more population models that synthesize existing knowledge of basic life history parameters and how these parameters may be affected by intrinsic and extrinsic factors such as harvest rate, weather, and habitat conditions. Such models allow predictions of effects of different harvest prescriptions on long term population and harvest levels, and can ultimately be used to define decision criteria for implementing alternative harvest strategies. This modeling effort represents an initial step in a process to an improved decision making process for mourning doves, and strives to place mourning dove harvest management in an objective and quantitative framework.

Understanding the effects of harvest on mourning dove populations is a multi-faceted challenge, and this effort is only one of many steps in increasing our knowledge. Upon completion of the project, we expect to have advanced the process of developing an improved system of dove harvest management by 1) improving our understanding of dove population dynamics, 2) prioritizing population monitoring data needs within the context of a long term harvest management system, and 3) recommending surveys and studies to fill information gaps that constrain development of more useful and realistic population models.

Contemporary information about dove population demographics and the relationship of mortality and reproductive rates to extrinsic and intrinsic factors is clearly inadequate to support sophisticated modeling fitting or adaptive modeling efforts at this point in time. However, it is necessary to begin development and evaluation of rudimentary models that represent a first step toward a long term objective of improved dove harvest management strategies that are grounded in credible population models and that guide improved population monitoring programs that will be necessary to support management efforts.

Progress to Date

Re-analysis of the 1965-1975 banding studies in the EMU, CMU and WMU was completed, and a set of survival models for each management unit was constructed based primarily on these analyses. The models are distinguished by the functional form of the relationship between annual survival and harvest rate, which ranges from completely additive to totally compensatory. A manuscript based on this work has been published.

Estimates of annual recruitment, in terms of number of juveniles (HY) per adult (AHY) in the pre-harvest population, can be derived from age ratios observed in the harvest, corrected for differential harvest vulnerability of age classes. Harvest age ratios are usually from collection of wings from surveyed hunters, and long term surveys are conducted by the U.S. Fish and Wildlife Service for waterfowl species and woodcock (*Scolopex minor*). In the case of waterfowl, age ratio data from

wing surveys is a key component in development of reproductive models used in the adaptive harvest management program. However, no long term program has been instituted for mourning doves. Thus, no long-term, large-scale monitoring programs or datasets are available to serve as the basis for development of quantitative models that predict annual production as a function of weather, habitat, and/or population density. Based on a review of the dove literature and a more general review of relevant ornithological literature, I derived a predicted range of per capita reproductive rates for each of several large geographical subregions. These estimates are based on a simple model that is a function of breeding season length, nest success, and length of the nesting cycle of successful and unsuccessful nests. A manuscript based on this work has been published.

Survival and productivity models have been integrated into simple predictive models of population growth rate. Model predictions for are positively biased when compared to trends calculated from the Call Count Survey. It is unknown whether bias is due to poorly estimated vital rates or model structure inadequacy, and model improvement will depend on data generated from new research and monitoring programs.

In 2003, the U.S. Fish and Wildlife Service requested that the management unit technical committees develop interim harvest management strategies that could be implemented until adequately reliable population models and monitoring programs are in place. I provided technical assistance to these committees during the development of these interim strategies. A component of the final strategies adopted by the Eastern and Central Management Units was a technique that used population estimates derived from harvest estimates in the USFWS Harvest Information program and harvest rate estimates derived from an ongoing national banding program. These population estimates are used to calculate an estimated cumulative population growth rate. If the population is growing at a sufficiently high rate, then regulations are liberalized, and if the population is decreasing then regulations are restricted. Otherwise, regulations are unchanged. A manuscript describing the statistical derivation of the method and its performance has been accepted for publication.

Future Work

I will continue to provide technical assistance to the technical committees and USFWS as requested as they continue to work toward a long term harvest management strategy based on population models, monitoring programs, and a rigorous decision making process.

These are the cumulative results from a multi-year study funded by the USFWS Webless Migratory Game Bird Program and more than 25 cooperating state wildlife agencies.

A National Reward Banding Study to Estimate Reporting Rates and Associated Harvest Parameters of Mourning Dove Populations

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Expected completion: 2006

Introduction and Objectives

Efforts are underway to use the best available data to construct first generation population models that can be used as the basis for long term informed harvest management strategies. A critical component of these population models is the relationship between the annual survival rate and the harvest rate. Estimates of survival and harvest rates have been derived from band recovery data collected from 1965-1975, because no large-scale banding programs have been in place since that era. Models that assume additive, compensatory, and partially compensatory relationships between harvest and survival rate on a regional (subregion) scale have been developed, but new data will be required to begin to assess the relative weights of empirical support for the different models.

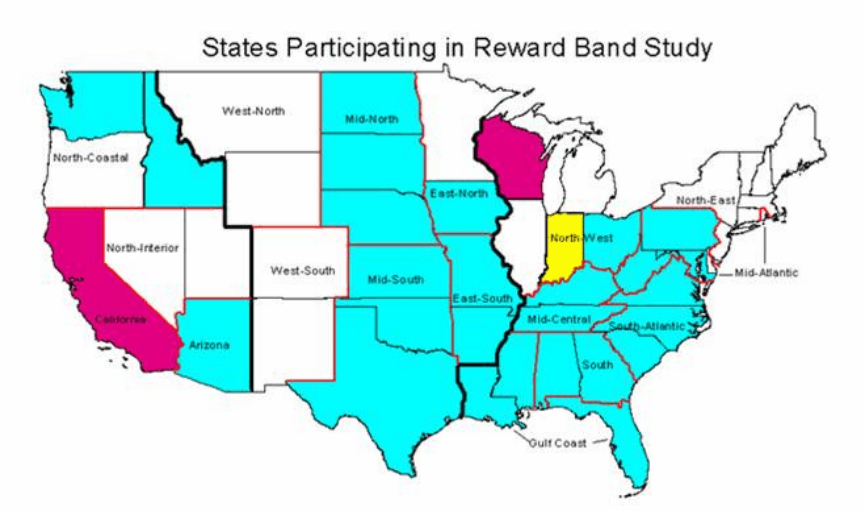
Given the lack of current information on survival and harvest rates, a logical first step toward is to conduct a reward banding study. The primary objectives of such a study are to produce estimates of band reporting rates that can be used to convert standard band recovery rates into harvest rates using well-established analysis techniques. Secondary objectives are to 1) establish protocols, training, and cost estimates for a future coordinated nationwide operational banding program designed to monitor harvest and survival rates, 2) provide information on geographical distribution of harvest, and 3) provide initial estimates of annual survival and breeding site fidelity. Information from this study will be used to update and improve population models developed to support harvest management strategies.

Progress to Date

Personnel and fiscal resources were constrained by available federal and state agency resources. Also, current population models are based on stratification of the 3 dove management units into multi-state subregions, based on past analyses of movement and demographic data from banding studies. Thus, banding quotas were developed on a subregion scale, with allocations to individual states determined by relative Mourning Dove Call-count Survey indices and geographic area. In 2003, 26 states volunteered to participate in the 3 year study, and participation grew to 29 states by 2005 (see figure below).

The initial banding study protocol specified that 2000 birds would be banded in each subregion with standard bands only in 2003 and 2005. Quotas increased to 3100 in 2004; 2400 of these bands would be put on juveniles and every third juvenile received a $100 reward band in addition to its standard band. Based on results from 2004 and availability of funding, supplemental reward banding was repeated in 2005 in 8 states in the Central and Western Management Units.

During the 3 year study approximately 52,000, 32,000, and 11,000 doves were banded in the Eastern, Central, and Western Management Units, respectively. Approximately 9,000 reward bands were deployed in 2004 and 2005. Hunters have reported about 3,500 recoveries of birds banded in 2003 and 2004. For all subregions except the mid-north subregion in the CMU, more than 80 percent of the recoveries were from birds banded in the same subregion.



Future Work

A comprehensive analysis of the 2003 - 2005 study will be completed in 2006, and these results will be used to develop, in cooperation with USFWS, a Banding Needs Document that will describe the structure of a long term operational banding program to be initiated in 2007. In the interim, cooperating states have been asked to continue standard banding at current quotas in 2006.

Trap site near Oklahoma City, OK. Photo by Mike O'Meilia.

Mourning dove with standard (near leg) and reward (far leg) bands. Photo by Mike O'Meilia.

Development and Evaluation of Methods for Regional Monitoring of Mourning Dove Recruitment

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Introduction and Objectives

Increased recognition of the importance of sustained recreational use and conservation of the mourning dove (dove; *Zenaida macroura*) has motivated a coordinated effort by state and federal agencies to improve the data sources and analytical tools necessary for informed harvest management. The 4 Flyway Councils and IAFWA recently approved a Mourning Dove National Strategic Harvest Management Plan. The Strategic Plan recognizes 1) the need to improve the knowledge base used for managing harvest of this important game bird and 2) the role of large-scale and long-term monitoring programs in meeting these information gaps. Recent efforts to monitor annual survival and harvest rates with a late summer banding program are an important first step in meeting the needs expressed in the strategic plan. However, the strategic plan also recognized a critical need for monitoring of annual recruitment of juveniles into the fall population, which is a necessary component in development of population models that will provide the foundation for improved management of doves.

A pilot harvest wing survey was initiated in the fall of 2005 with the cooperation of 17 state agencies in an effort to meet the need for recruitment monitoring expressed in the strategic plan. Parts collections are a traditional method for estimating fall age ratios for game bird species. However, before a reliable operational wing survey can be implemented for doves, a number of issues needed to be addressed. These include the need to calibrate harvest wing age ratios to produce an estimate of true age ratios, to evaluate the efficiency of different sampling protocols to meet the information needs for doves, and to validate the accuracy of age ratio estimates using independent data. Finally, there is a continuing need to increase our understanding of the basic breeding biology of the species, which will in turn assist with interpretation of recruitment estimates.

The goals of this study as expressed in the original proposal were to meet the following objectives, all of which are important steps in the implementation of a national demographic monitoring program for doves.

1. Calibrate juvenile to adult ratios of harvested doves in order to produce an unbiased estimate of annual recruitment of juveniles into the fall population from wing collections by:
    a. Estimation of regional primary molt rate of adult and juvenile doves and the age-specific proportion of molt completed birds obtained from a wing survey.
    b. Correcting harvest age ratios for differential harvest vulnerability of juveniles and adults.
2. Evaluate potential sampling designs and associated logistical and cost constraints for a national harvest wing survey for monitoring recruitment.
3. Determine the potential for employing recaptures from an intensive banding program to generate independent estimates of age ratios that can be used to validate wing survey estimates.
4. Improve understanding of intra-annual variation in reproductive output of breeding doves.

Progress to Date

During the fall of 2005, personnel in 17 states collected more than 30,000 wings from 46 unique degree blocks that are also used in the late summer banding program. In almost all cases, states were successful in meeting the goals of collecting 400 wings and banding 200 birds per block. Wings were collected primarily at hunter check stations and sent to USFWS Harvest Survey section in Laurel, MD where they were stored until they could be scored.

From November 14th to 18th of 2005, the first national mourning dove wing bee was held at the Reed Wildlife Area outside of Kansas City, MO. Nineteen participants representing 11 states, the USFWS, and the USGS processed all the collected wings in two and a half days of work. Some preliminary results have been compiled (Table 1). Overall, 58% of wings were scored as juveniles, 24% as adults, 16% as unknown molt, and 1%

of wings could not be aged due to damage. As expected, a significant percentage of wings could not be aged due to advanced molt stage.

In addition to data from wing collections, the project will depend heavily on data from the late summer banding program. Wing collections occurred in conjunction with banding efforts in the same blocks as the wing collections. Molt stages from the late summer birds will provide information on the distribution of molt stages which can be projected into September to assist in estimating the proportion of unknown birds in each age class that have completed molt at the time of wing collections. In addition, banding data will be used to estimate differential vulnerability to harvest of the age classes.

As a component of an effort to improve understanding of reproductive output of doves, field work was begun in central Iowa during the summer of 2005. From mid-April to early September more than 200 dove nests were found and monitored. More than 60 adults were trapped on nests, birds were measured and marked, and blood samples were taken. Current lab work is focused on measuring hormone levels from blood samples in an effort to better understand the physiological changes that occur in nesting birds throughout the summer. In addition, blood samples were taken from more than 200 squabs in order to determine their sex using PCR techniques. This information will help to determine whether there are sex specific patterns in growth and recruitment for the population. Additional field work was focused on measuring growth rates of squabs and observing behavior of adults.

Future Work

This study is still in the preliminary stages and work will continue in the coming years to meet the stated objectives. Wing collections for this study are planned for two additional years. Adjustments to the collection program will focus on increasing participation in under-represented regions. In addition, a USFWS proposal is in the planning stage to begin a mail survey collection program that can be compared to the current field-based sampling design.

Field work on basic reproductive questions will also continue to be expanded in the coming year. Work will likely focus on growth and development of squabs. The goal will be to determine factors that affect development and understand how this affects later fitness of these birds.

Table 1. Preliminary results from 2005 wing collections. Data is preliminary and has not been corrected for errors in data entry, differential vulnerability of the age classes, or for unknown birds that have completed molt.

State	HY	AHY	Unknown	Damaged	Age-Ratio (HY:AHY)
AL	0.527	0.199	0.268	0.007	2.654
AR	0.734	0.193	0.058	0.014	3.800
AZ	0.375	0.480	0.141	0.003	0.781
CA	0.552	0.329	0.106	0.012	1.677
FL	0.406	0.129	0.455	0.009	3.143
GA	0.523	0.273	0.198	0.006	1.912
IN	0.670	0.156	0.163	0.012	4.299
KS	0.582	0.344	0.060	0.014	1.694
KY	0.572	0.225	0.194	0.009	2.540
LA	0.559	0.285	0.145	0.011	1.964
MD	0.653	0.149	0.198	0.000	4.391
MO	0.662	0.174	0.153	0.011	3.793
NE	0.608	0.313	0.069	0.010	1.940
OH	0.584	0.248	0.159	0.008	2.355
OK	0.710	0.118	0.155	0.017	6.000
PA	0.665	0.156	0.174	0.005	4.248
SC	0.548	0.281	0.166	0.005	1.954
Total	0.586	0.242	0.163	0.009	2.420

Participants in the first annual Mourning Dove Wing Bee held at the Reed Area in Missouri. *Back row (left to right)*: Scott Taylor, NE; Lyle Fendrick, OH; Jim Pitman, IN; Paul Padding, USFWS; Thagard Colvin, AL; Julie Fleming, MO; Toby Barnes. MO. *Middle row*: Andy Tappmeyer, MO; Don McGowan, GA; Brent Evans, MD; Helen Hands, KS; Billy Dukes, SC; Mike Olinde, LA; David Dolton, USFWS; John Schulz, MO. *Front row*: Dave Otis, USGS; Tony Mong, MO; Jeff Neal, OK; Dennis Browning, MO; David Miller, Iowa State University.

Dave Otis, Dennis Browning and Don McGowan examining wings.

Dove wings were recorded according to age and molt progress.

Nesting adults were trapped using mist nets and tested for hormone levels.

Squabs were monitored to gain a better understanding of variation in growth and development of nestling doves.

Mourning Dove Demographics and Harvest Management in an Agroforestry Complex

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Expected completion: June 2011

Improvements associated with harvest management of mourning doves will rely on information that cannot be obtained from simple trend information. The National Mourning Dove Strategic Harvest Management Plan (National Plan) shows that future harvest management decisions will be based upon mechanistic population models, requiring modern estimates of demographic characteristics (e.g., recruitment, survival). Recruitment estimates obtained from radio marked HY individuals will become one of the critical elements used in the population models along with estimates of age-specific annual survival and harvest rates. These data will also be critical in understanding and interpreting data from surveys of wings from hunter-killed doves. Our objectives are (1) to estimate mourning dove population characteristics (e.g., recruitment, survival, and local harvest rates) and local harvest characteristics (e.g., harvest rates, crippling rates) during 2005-2010, and (2) evaluate agroforestry practices while determining the efficacy of associated number of sunflower fields and field size to attract mourning doves for harvest on James A. Reed Memorial Wildlife Area during 2005-2010. Knowledge generated from this project will also guide management decisions for private landowners combining agroforestry practices and managed dove hunting fields, provide information about relationships between observed recruitment from radio marked doves and fall age-ratios from hunter-killed doves, provide comparisons of actual and reported crippling rates during the hunting season, and provide information on harvest rates on a heavily harvested local population of mourning doves.

During the first field season, agroforestry study plots were established by planting 1448 trees on 2 different study sites on the James A. Reed Memorial Wildlife Area (JARMWA) near Kansas City, MO. During the spring and summer 152 adult (AHY) and hatching-year (HY) subcutaneous transmitter implant surgeries were

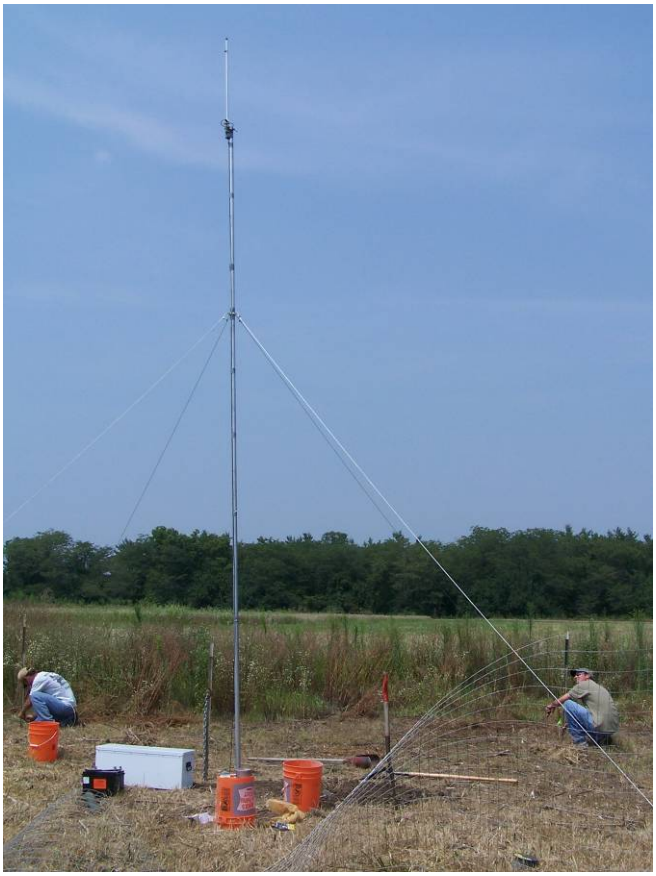
conducted allowing us to locate 25 nests. We also implanted 10 nestlings with subcutaneous radio transmitters. We recorded 57 mortalities or dropped transmitters (not including birds killed during first 3 days of the hunting season). We obtained >2000 locations from triangulation and "walk-ups" from radio marked doves. We banded 738 mourning doves and had 212 recaptures. We installed an automatic telemetry data collection system to monitor the presence/absence of radio marked doves prior to and during the hunting season using 4 semi-permanent towers and data-logger telemetry receivers.

During the hunting season 39 birds with subcutaneous radio transmitters were detected on JARMWA on opening day of the hunting season; 10 were shot and recovered and 2 crippled and recovered the next day; 26 radioed doves were killed during the first 3 days of the season. Daily survival probabilities prior to the hunting was 0.99009 (SE = 0.00240, n = 66) for AHY doves, and 0.98040 (SE = 0.00374, n = 81) for HY doves. Daily survival probabilities during the first 30-days of the hunting season were 0.96220 (SE = 0.01120, n = 24) for AHY doves, and 0.83287 (SE = 0.03296, n = 31) for HY doves. Using implanted birds with >18 locations throughout the entire field season, we found that AHY doves had an average home range size of 278.48 ha (SD = 247.69 ha, range = 4.77 to 884.86 ha, n = 20) and HY had 595.29 ha (SD = 486.73 ha, range = 17.74 to 1314.73 ha, n = 5); there were no significant differences between AHY and HY doves. In future field seasons we hope to have 100 radioed marked females early in the nesting season to help with estimating overall recruitment per AHY female, and hope to have 250-300 radio-marked doves going into the hunting season.

These preliminary results are from the initial field season; the project is expected to last 5-6 years. The project is a cooperative venture including the Webless Migratory Game Bird Research Program (U.S. Fish and Wildlife Service), University of Missouri's Center for Agroforestry, University of Missouri School of Fisheries and Wildlife Sciences, U.S. Forest Service - North Central Forest Experiment Station, and Resource Science Division of the Missouri Department of Conservation.

Pictured is an aerial view of one of the two agroforestry study plots. Rows of trees (bottom of picture) are located along one side of a managed sunflower field (middle of picture) used to attract feeding mourning doves during the hunting season.

Pictured is 1 of 4 mobile telemetry units used simultaneously to obtain locations of the radio-marked doves. The background shows the study habitats consisting agricultural and fallow fields interspersed with linear brushy/woody cover.



Pictured above is one of four semi-permanent dipole (unidirectional) antenna stations equipped with automatic data-loggers. The four towers provide complete coverage of the study area 24/7 to determine presence/absence of radio-marked birds during the hunting season.

Nestling mourning dove is shown with the radio transmitter prior to the subcutaneous surgical implant procedure. Nestlings have transmitters implanted with the birds are 10-12 days of age.

Tony Mong (left), scientist in charge of the project, is shown conducting a subcutaneous transmitter implant surgery on a nestling mourning dove.

Pictured is a nestling mourning dove recovering from anesthesia after a radio transmitter was subcutaneously implanted in the thoracic inlet. The feathers are wetted-down with an anti-septic solution that dries quickly after surgery and does not remove the natural oils on the feathers. The transmitter antenna can be seen exiting the skin just anterior to the oil gland.

Effects of Eurasian Collared-doves on Populations of Mourning Doves and Other Species in the Southeastern U.S.

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Eurasian collared-doves (*Streptopelia decaocto*; hereafter "collared-doves") are recent invaders of North America. In recent years, concern has been raised about the potential effects of the collared-dove invasion of North America on indigenous species, particularly other species of doves and pigeons. Ecological similarity between collared doves and other columbids may lead to competition between the exotic invaders and their native relatives. Effective and cost-efficient management of collared-dove populations to benefit mourning doves and other native species requires an understanding of the population-level effects of collared-doves on these native species. The primary objectives of this study are to document trends in populations of mourning doves (*Zenaida macroura*) and other avian species in the newly-occupied range of Eurasian collared-doves using existing Breeding Bird Survey (BBS) and Christmas Bird Count (CBC) data, and to test the hypothesis that arrival and expansion of collared-dove populations in the southeastern U.S. have been associated with declines of mourning doves and other potential collared-dove competitors. Other objectives are to identify site-specific geographic or other variables affecting the relationship between collared-doves and native species, such as mourning doves, and to assess the usefulness of existing databases for evaluating the ecological, population-level effects of the Eurasian collared dove invasion of North America.

Compilation of BBS and CBC data, including observer identification (BBS) and counts of mourning doves, collared-doves, and other ecologically similar species for each survey route (BBS) and circle (CBC), began in September 2005. When compilation is complete (including 2005 CBC and 2006 BBS data), trends in populations of mourning doves and other native species prior to, and following, the arrival of collared-doves will be estimated using estimating equations. Collared-dove population trends following colonization on each route/circle will be estimated similarly. Trends in populations of mourning doves and other native species before and after the arrival of collared-doves will be compared separately by state and pooled across states, with routes as experimental units. Differences in native species population trends before and after the arrival of collared-doves will be modeled as a function of time since colonization and other route/circle-specific variables. Finally, results from BBS and CBC analyses will be compared to evaluate the consistency between data sets, as an initial step in evaluating the relative quality of information provided by these surveys with regard to ecological effects of the collared-dove invasion. Data analysis and final report preparation should be completed by August and December 2006, respectively, with manuscript preparation to follow. Funding and/or other support for this project are provided by the Webless Migratory Game Bird Research Program (U.S. Fish and Wildlife Service); the Tennessee Tech University Department of Biology; and the Center for Management, Utilization, and Protection of Water Resources (TTU).

Jessica Orr compiling BBS and CBC data for their inclusion in analyses of population-level effects of Eurasian collared-doves on mourning doves and other species.

Band-tailed Pigeons

Breeding Distribution and Migration Routes of Pacific Coast Band-tailed Pigeons

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Management of Pacific Coast band-tailed pigeons (*Patagioenas fasciata monilis*) has recently been enhanced by the development of a new population index which was fully implemented in 2004. This method, using mineral site counts to index band-tailed pigeon abundance, has much greater suitability than other methods to detect and monitor changes in populations. Validation of the survey method and survey coverage of the breeding range is important for results to accurately be extrapolated to the Pacific Coast band-tailed pigeon population as a whole. Historic declines in the band-tailed pigeon population may have stabilized in recent years, however, it remains unknown whether the population has actually stemmed the decline, or if it is slowly contracting to the region (Oregon) where the most accurate surveys are being conducted.

Satellite telemetry may provide answers to address this issue and others. Although transmitter costs are higher than traditional VHF telemetry studies, satellite tracking requires much less resources in terms of personnel time; especially for wide-ranging or migratory species. This project is a pilot effort to evaluate the effectiveness of using satellite tracking to describe the migration strategies and important breeding areas of Pacific Coast band-tailed pigeons and to validate the distribution of mineral sites included in the operational survey and determine if any alterations to the protocol will further improve the survey's precision. Developing a methodology to address breeding distribution and migration pathways of band-tailed pigeons will provide valuable insight for management of this species.

This project has two primary objectives: (1) Investigate the feasibility of using satellite telemetry to gain information on band-tailed pigeon migration, breeding distribution, and winter movements and (2) Document both spring and autumn band-tailed pigeon migration strategies.

Beginning in February of 2006 we will capture band-tailed pigeons in southern California using box traps baited with corn. Trapping locations will be selected within 3 of 5 mountainous regions of southern California: Santa Lucia Range, Southern Sierra Nevada, San Rafael/Ynez Mountains, San Gabriel/San Bernardino Mountains, and the Laguna Mountains. Five birds will be fitted with 12g solar PTT units (Microwave Telemetry Inc.). Transmitters will be attached using a backpack harnesses. Total weight of attached units will be less than 5% of the bird's body weight. PTTs will be programmed to transmit for 3 hours every 3 to 4 days. This period of "Off" time is needed to recharge the batteries of the solar units.

Important stopover locations during migration and potential mineral site locations will be analyzed and mapped using temporal and spatial statistics, location accuracy information, and the known distribution of mineral sites currently used by band-tailed pigeons. Ninety-nine percent of band-tailed pigeon locations are assumed to occur within 50Km of a mineral site. Most telemetry locations are much closer to mineral sites.

Band-tailed pigeons at mineral site.

Sixty-five percent of band-tailed pigeon locations occurred within 5Km and 90% within 9Km of the nearest mineral site in California. These trends will be incorporated into maps depicting mineral sites of high importance during migration or areas with high probability of mineral site occurrence.

If sufficient information has been gained during the pilot project, then recommendations will include specific regions where high probability of mineral site occurrence is suggested and descriptions of winter movement patterns will be included. The information provided by this project will result in more appropriate application of band-tailed pigeon survey protocol, address the need for a better inventory of breeding areas and mineral sites used by band-tailed pigeons, and inform wildlife managers on the status of hunting opportunities for band-tailed pigeons within their state. Primary support for this two-year project has been provided through a grant from the Webless Migratory Game Bird Research Program administered by the US Fish and Wildlife Service. Partners include the California, Oregon, and Washington state wildlife agencies, Quail Unlimited and the Canadian Wildlife Service.

Band-tailed pigeon found roosting in a tree before descending to minerals.

Band-tailed pigeons feed next to a mourning dove.

Sandhill Cranes

Developing a Survival Model for the Rocky Mountain Population of Greater Sandhill Cranes

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During 1969-94, 1,859 greater sandhill cranes (*Grus Canadensis tabida*) from the Rocky Mountain Population (RMP) were captured and marked on summer areas in Colorado, Idaho, Montana, Utah and Wyoming. Cranes were caught by personnel from the Idaho Cooperative Wildlife Research Unit and the Hornocker Wildlife Institute at the University of Idaho, Colorado Division of Wildlife Resources, Utah Division of Wildlife Resources, and the Wyoming Game and Fish Department. Capture methods included running down flightless young on the ground (58.1%), or from helicopter (27.0%), night-lighting (13.4%) and rocket-netting (1.5%); 200 adults and 1,659 juveniles were banded (Table 1). The most important capture location was Grays Lake Valley, in southeastern Idaho where 61.4% of all cranes were banded (Table 1).

During 1969-2005, we obtained 13,152 useable observations of marked cranes and 188 recoveries of dead cranes. Marked cranes were observed in 8 western states and northern Mexico. Over 95% were sighted in Colorado, Idaho, and New Mexico and reflected extensive efforts of observers in major RMP concentration areas (Table 2). Recoveries of dead cranes were received from the same areas except Nevada. All observation data and recoveries have been recorded in a data base (Access).

Observational data recorded included all cranes identified to individuals for survival analysis; birds identified only by year class or state of banding were also included to assess population distribution. Numerous additional sightings that lacked marker identification details were excluded from the database.

We are in the process of vetting the data for inconsistencies and entry errors. Then, based on the distribution of sighting effort expended each year, we will develop sighting histories. These will be combined with band recovery data into a robust analysis of survival as a function of time, hunting pressure, and environmental predictors. We will also consider the possible impacts of marker loss on this analysis. Survival models will be developed and incorporated into a population model by the time of the spring 2006 Central and Pacific flyway meetings.

Table 1. Distribution and number of greater sandhill cranes from the Rocky Mountain Population banded at summer sites during 1969-94.

Location	No. banding years	Inclusive dates	Adults	Juveniles	Total	% of total
Colorado	8	1977-94		56	56	3.0
Idaho						
a. Grays Lake valley	23	1969-91	173	968	1,141	61.4
b. other	13	1969-83	20	253	273	14.7
Montana	3	1970-73		33	33	1.8
Utah	12	1970-90	2	63	65	3.5
Wyoming	13	1970-87	5	286	291	15.7
Total			200	1,659	1,859	100.1

Table 2. Distribution of 13,152 observations (live birds) and 188 recoveries (dead birds) of marked greater sandhill cranes from the Rocky Mountain Population during 1969-2005. All cranes were captured on summer areas in Colorado, Idaho, Montana, Utah, and Wyoming. Observation data excluded reports of marked birds which could not be identified by year or state of banding.

Location	Observations (Alive)		Recoveries (dead)	
	n	%	N	%
Arizona	14	0.1	2	1.1
Colorado	3,955	30.1	25	13.3
Idaho	3,199	24.3	32	17.0
Mexico	20	0.2	12	6.4
Montana	8	0.1	1	0.5
Nevada	4	Trace	0	0
New Mexico	5,425	41.2	64	34.0
Utah	110	0.8	6	3.2
Wyoming	417	3.2	46	24.5
Total	13,152	100.0	188	100.0

Other Webless Research Projects

Mourning Doves and White-winged Doves

Studies of Native Columbiformes in Tucson, Arizona, 2005

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Banding of mourning (*Zenaida macroura*) and white-winged doves (*Z. asiatica*) continued in 2005. A total of 500 mourning doves was banded, as were 109 white-winged doves. Fewer than 5 Inca doves (*Columbina inca*) were seen at the trap location (Catalina Foothills, northeast Tucson) and none was captured. All bandings were between March and 30 October although mourning doves were present at the trap site in substantial numbers every day. Breeding activities of mourning doves were initiated between 10 and 15 January and calling continued until 15 September. White-winged doves arrived in the area of the trap location in late March and most departed in mid to late August with few remaining into September. Breeding activity of white-winged doves commenced in April and mostly ended by mid August.

Twenty-three recoveries have been received from the ~5,200 mourning dove bandings since start of banding in 2000 with only 2 shot recoveries. Only 1 shot recovery (of 3 total recoveries) has been reported from the 819 white-winged doves banded. All recoveries were in Arizona for both species. Based on band recoveries, both mourning and white-winged doves banded in the Catalina Foothills area at the northeast periphery of Tucson would appear to be non-migratory with little exposure to harvest, However, since few white-winged doves occur in the Tucson area after early September, they are presumed to migrate into Mexico. Little is known about movement patterns of mourning doves in the Tucson area although there are clearly increases and decreases in number of birds at the trap location irrespective of food availability. Further, recaptures (repeat captures) at the banding site indicate that some banded birds are not available for capture or have trap avoidance during some months.

Few repeat captures have occurred of white-winged doves (50 recaptures of 43 different individuals during 2000-2005) unlike mourning doves (2,566 repeat captures during 2000-2005). Of the repeat captures of white-winged doves, 21 were first banded in 2000, 9 in 2001, 6 in 2002, 7 in 2003, 5 in 2004, and 2 in 2005. Of the 7 white-winged doves that were recaptured more than once (none more than twice after initial banding), 5 were recaptured after 1 year, 1 was recaptured after 3 years, and 1 was recaptured 5 years after year of banding. Only 1 white-winged dove banded in this program has been recaptured elsewhere (~5 miles southwest of the banding location in Tucson). No white-winged or mourning doves banded by others have been recaptured during the program.

Trichomoniasis (caused by *Trichomonas gallinae*) in mourning doves was essentially nonexistent (one documented affected bird) in 2005. Trichomoniasis was not observed in white-winged doves.

The Use of Artificial Nesting Structures in Mourning Dove Nesting Research and Habitat Management

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Despite a wealth of mourning dove (*Zenaida macroura*) nesting studies, the causes and consequences of nest site selection in the species remain poorly understood. Previous studies have measured parameters associated with nesting sites and drawn inductive conclusions regarding their relative importance based on observed data patterns. This study used an experimental approach to understanding nest site selection mourning doves by using artificial nesting structures to manipulate availability of potentially high-quality nesting sites. Extension publications advocate the use of such artificial nesting structures to improve mourning dove nesting habitat and nest success, but there have been no recent evaluations of the effects of these structures on dove nesting or productivity, and there are no research-based guidelines for their use in mourning dove management. The overall goal of this project was to evaluate the value(s) of artificial nesting structures for mourning doves research and conservation. Specific objectives included evaluation of the relative quality of nesting sites offered by artificial nesting structures, development of an optimal strategy for establishment of these structures in potential dove nesting habitat, assessment of the relative importance of various nest site parameters (including species of substrate, height, and previous site use) in dove nest site selection, and evaluation of methods for estimating mourning dove daily nest survival rate during incubation and brooding using nests monitored at 7-day intervals using non-invasive (non-flushing) methods.

This study took place May 2004-August 2005 in Putnam County, Tennessee. During May-August 2004, potentially suitable nesting habitat on woodlot edges and in suburban park-like areas was surveyed once per week for mourning dove nests, and nests found were monitored weekly. To minimize observer effects, incubating adults were not flushed, if possible, and nest contents only were recorded in the case of an inadvertent flush or lack of incubating adult. Nest site characteristics such as height and species of substrate were recorded. During January-March 2005, 250 artificial nesting structures were constructed and placed in randomly-selected trees, stratified by species, in areas surveyed in 2004. Artificial structures also were placed in half of the sites used for nesting in 2004. Nesting surveys were conducted May-August 2005, using the same methods and study areas as in 2004. Daily nest survival rates (DNSRs) were calculated by nest check interval using Mayfield-type exposure models. Nest check intervals were used for analysis rather than activity periods (incubation vs. brooding) because nest contents were not observed on most visits. Daily survival rates of natural nests were compared between years and tree species, and effects of nest height and week of nesting on DNSRs of natural nests were modeled, using Mayfield logistic regression. Daily survival rates of natural and artificial-structure nests in 2005 were compared similarly. Effects of tree species, structure height, and previous site use on use of, and nest success in, artificial structures were modeled using standard logistic regression. Overall nest success was calculated separately for natural and artificial-structure nests using apparent (successful/total) methods and 2 alternatives, one using DNSRs during intervals 1 and 3 to represent daily survival during 14-day incubation and 10-day brooding periods, respectively (I-B method), and a second using DNSRs for successive (7-day) nest check intervals (3-I method).

Scott Simmons installing an artificial nesting structure during studies of mourning dove nesting in Putnam County, Tennessee.

Scott Simmons inspects the contents of a failed mourning dove nest during studies in Putnam County, Tennessee.

Totals of 99 and 81 natural (non-artificial structure) nests were found in 2004 and 2005, respectively. Daily survival rate of natural nests during interval 1 varied among substrate types and was highest (0.988) in man-made structures and lowest (0.914) in eastern redcedar (*Juniperus virginiana*). Daily nest survival rate during interval 1 also was positively related to week of nesting, but no measured covariate affected DNSR during subsequent nest check intervals. A total of 51 nests occurred in artificial structures in 2005; overall use rate of structures was 20%. Interval 1 DNSR was higher for artificial-structure nests (0.978) than for natural nests (0.950) in 2005, but DNSR during subsequent intervals was similar between these nest types. Use of artificial structures varied among tree species, and was highest in eastern white pine (*Pinus strobus*). Rate of structure use also was higher in previously-used sites than new sites. No measured covariate affected nest success in structures, however. Estimates of overall success of natural nests

A mourning dove nesting in an artificial structure in Putnam County, Tennessee. These structures provide for higher nesting success than natural sites, and should be useful for research and backyard dove management.

varied among methods, and consistently was lowest using the I-B method. Among artificial-structure nests, apparent, I-B, and 3-I estimates of overall nest success were similar (73%, 70%, and 75%, respectively).

Results indicate that artificial nesting structures provide for higher nesting success, on average, than natural sites selected by doves. These structures should be placed in eastern white pine for highest use by doves. High use of structures located in nest sites used in 2004 suggests that doves select nesting sites based on specific tree/site characteristics, or that doves return to nest in sites where they were raised or nested in previous years. Nest monitoring using a 7-day interval and non-invasive (non-flushing) methods may minimize observer influence on nesting while providing useful data that can be analyzed in a traditional incubation-brooding framework, even though nest contents are not recorded during nest visits. Daily survival rates during intervals 1 and 3 seem to provide reasonable estimates of DNSRs during incubation and brooding, respectively. Interval 2 provides little useful information, as this interval includes periods of both incubation and brooding, and estimates of overall nest success that include DNSR from interval 2 (i.e., 3-I method) likewise are of little use. Because dove nest mortality is highest and most susceptible to environmental influences during interval 1, focusing on this first interval of nesting seems appropriate in studies of nest mortality.

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