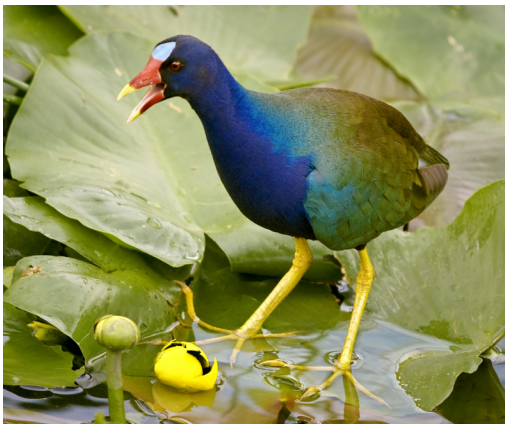
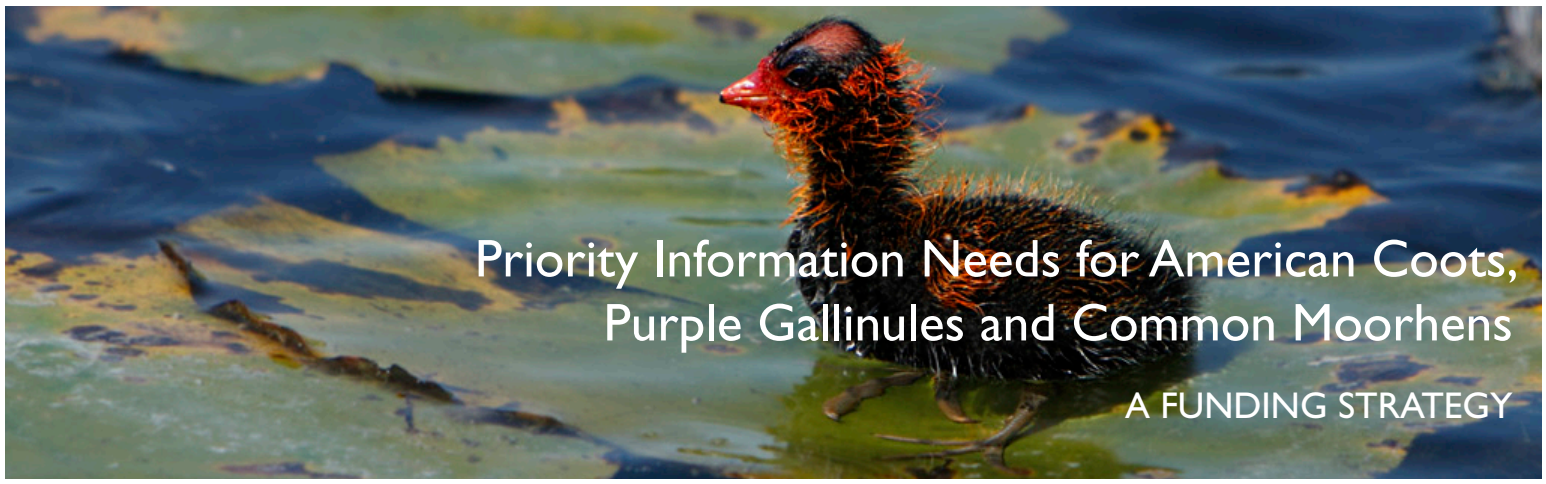


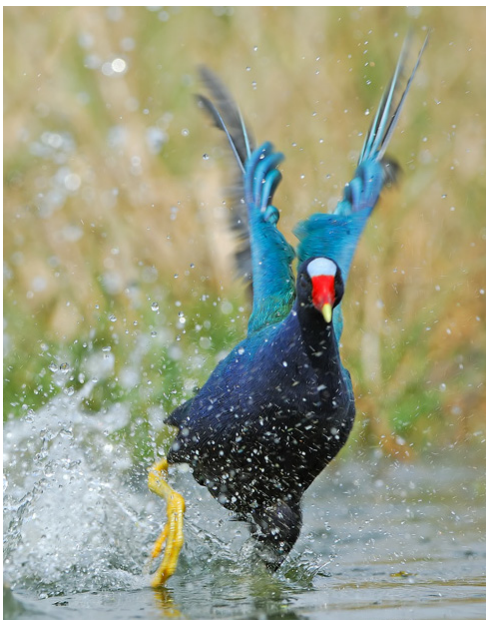


Priority Information Needs for American Coots, Purple Gallinules and Common Moorhens

A FUNDING STRATEGY

Developed by the Association of Fish and Wildlife Agencies' Migratory Shore and Upland Game Bird Support Task Force.

August 3, 2010



D.J. Case and Associates (editor). 2010. Priority Information Needs for American Coots, Purple Gallinules and Common Moorhens: A Funding Strategy. Developed for the Association of Fish and Wildlife Agencies by the Migratory Shore and Upland Game Bird Support Task Force. 13pp.

Priority Information Needs for American Coots, Purple Gallinules and Common Moorhens

A Funding Strategy

Developed by the Association of Fish and Wildlife Agencies'
Migratory Shore and Upland Game Bird Support Task Force

Compiled and Edited by
David J. Case and Sarah J. Sanders
D.J. Case & Associates
August 3, 2010

Photo credits:

Top row: common moorhen by ap.; purple gallinule by shell game
Second row: American coot juvenile by Alan Vernon
Third row: American coot by Dave-F; purple gallinule by Chuck Welch
Fourth row: common moorhen by Brett Donald

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Executive Summary

This Strategy contains recommendations for obtaining priority information needed to improve habitat and harvest management decisions for migratory populations of American coot, purple gallinule, and common moorhen by focusing on evaluating and improving knowledge of monitoring efforts, vital rates (survival, reproduction, and recruitment) and habitat needs during the annual life cycle of these birds. The Strategy is intended to increase financial support for management and research during the next 5 to 10 years with thoughtful and deliberate planning based on scientific principles.

The Migratory Shore and Upland Game Bird Support Task Force determined that convening a group of American coot, purple gallinule, and common moorhen experts would be the most efficient and effective process to develop the Strategy. Experts from Flyways, universities, and from state and federal agencies in the United States (U.S.) and Canada were invited to participate in the process.

The best available information on the range-wide population status of American coot, purple gallinule, and common moorhen comes from the North American Breeding Bird Survey. Although the Breeding Bird Survey is poorly designed for monitoring population trends of marshbirds (Ribic et al.1999), no other survey currently monitors these species on a continental scale. All three species show insignificant long-term (1966–2006) trends and significant, declining short-term (1997–2007) trends. Better information on the population status of American coot exists within the traditional survey area covered by the annual Waterfowl Breeding Population and Habitat Survey. American coots, purple gallinules, and common moorhens are hunted in the U.S., Canada, and Mexico. The continental harvest of all three species is low relative to other migratory game birds. A majority of the U.S. harvest for all three species takes place in the states of Louisiana, California, Florida, and Texas (Raftovich et al. 2009).

Discussions during three online meetings resulted in the identification of four priority information needs for American coots, purple gallinules, and common moorhens (in no particular order):

1. Implement a National Marshbird Monitoring Program.
2. Update the National Wetland Inventory.
3. Continue to improve the Harvest Information Program sampling frame.
4. Determine breeding origin of American coots and common moorhens that are harvested at high-harvest locations.

Workshop participants identified two overarching guidelines that should be considered in further development of each of the priority information needs: (1) Consider the effects of climate or ecosystem change on American coot, purple gallinule, and common moorhen

habitats and ultimately on the abundance and distribution of these species, and (2) Actively engage Canada and Mexico. It is important to consider the role that habitat and harvest management decisions in Canada and Mexico have on the overall management of these species. New or expanded information-gathering activities should be range-wide in scope.

The priorities described in this Strategy promote efforts to reduce uncertainty in current management practices. Improved information will better enable managers to target site-specific and range-wide management and monitoring programs, increasing the cost-effectiveness of management.

Introduction

In 2006, the Migratory Shore and Upland Game Bird Working Group established a Migratory Shore and Upland Game Bird Support Task Force (Task Force). The Task Force is composed of nine representatives of state, federal, and non-governmental organizations. The Task Force was directed to update the research and management needs of the 16 species of migratory shore and upland game birds and to develop a strategy for funding priority research and management needs for these species. American coot, purple gallinule, and common moorhen were one of the groups of species selected.

STRATEGY PURPOSE

This Strategy contains recommendations for obtaining priority information needed to improve habitat and harvest management decisions for migratory populations of American coot, purple gallinule, and common moorhen by focusing on evaluating and improving knowledge of monitoring efforts, vital rates (survival, reproduction, and recruitment) and habitat needs during the annual life cycle of these birds. The Strategy is intended to increase financial support for management and research during the next 5 to 10 years with thoughtful and deliberate planning based on good scientific principles. Resulting priorities will be used to guide the acquisition and expenditure of funds, as well as provide the means to attract additional funding from partners interested in the habitats and the populations of migratory shore and upland game birds. Separate from the Strategy, an Action Plan will be developed to encourage partners to collaborate and support these information needs, to use or redirect current funding, and to secure new funding. Finally, the Action Plan will ensure the development of a consistent message when pursuing funding.

STRATEGY DEVELOPMENT PROCESS

The Task Force determined that convening a group of American coot, purple gallinule, and common moorhen experts would be the most efficient and effective process to develop the Strategy. Experts from Flyways, universities, and from state and federal agencies in the United States (U.S.) and Canada were invited to participate in the process. The group held three online meetings during February–March 2010. A list of participants is included in Appendix A. The Task Force retained D.J. Case & Associates to facilitate the online meetings and to compile and finalize the Strategy.

Status of American Coots, Purple Gallinules, and Common Moorhens

POPULATION STATUS AND TRENDS

The best available information on the range-wide population status of American coot, purple gallinule, and common moorhen comes from the North American Breeding Bird Survey. Although the Breeding Bird Survey is poorly designed for monitoring population trends of marshbirds (Ribic et al.1999), no other survey currently monitors these species on a continental scale. All three species show non-significant long-term (1966–2006) trends and significant declining short-term (1997–2007) trends (Table 1). It should be noted that these trends are based on a limited number of Breeding Bird Survey routes.

Efforts are currently underway to improve monitoring for these species. During the past 10 years, scientists have developed and refined protocols to better survey marshbirds, including purple gallinules, common moorhens and American coots (Conway 2009); however, stakeholders are only now taking steps to implement the marshbird monitoring framework at the landscape scale (Johnson et al. 2009).

Table 1. Population trend estimates from the North American Breeding Bird Survey.

Species	Region	Period	Trend[a]	P[b]	N[c]
Purple gallinule	Survey Wide	1966-2006	-4.09	0.37	29
		1997-2007	-31.64	<0.01	10
Common moorhen	Survey Wide	1966-2006	-0.58	0.63	131
		1997-2007	-5.26	0.03	67
American coot	Survey Wide	1966-2006	-0.50	0.39	610
		1997-2007	-6.40	<0.01	368

[a] Trends (% change/year) obtained from: Sauer, J. R., J. E. Hines, and J. Fallon. 2008. The North American Breeding Bird Survey, Results and Analysis 1966– 2007. Version 5.153.2008. USGS Patuxent Wildlife Research Center, Laurel, MD. Do not cite without permission from authors.

[b] P-values less than or equal to 0.05 indicate trend is significantly different from zero.

[c] Number of Breeding Bird Survey routes used in analysis for trend estimates.

Better information on the population status of American coot exists within the traditional survey area (Figure 1) covered by the annual Waterfowl Breeding Population and Habitat Survey. Coots are counted during both aerial and ground-based surveys, which enable visibility-corrected estimates of population size. However, the assumption that ground-based survey crews detect 100% of coots on transects is almost certainly violated (Arnold 1994). It should be noted that although the survey covers the core of the American coot breeding range, many coots breed outside of the area covered by the survey. Results from the survey indicate highly variable population levels between years, with a long-term average of 1.75 million coots breeding within the traditional survey area (Figure 2).

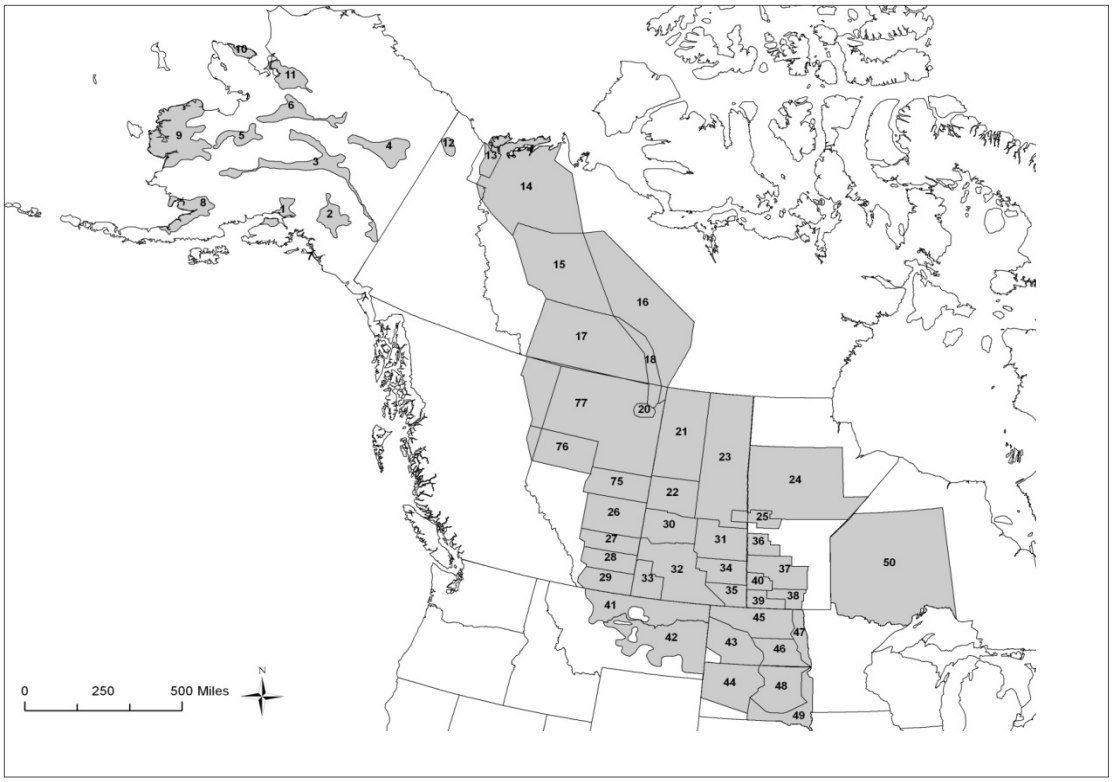

Figure 1. Traditional survey area (shaded gray) for the annual Waterfowl Breeding Population and Habitat Survey.

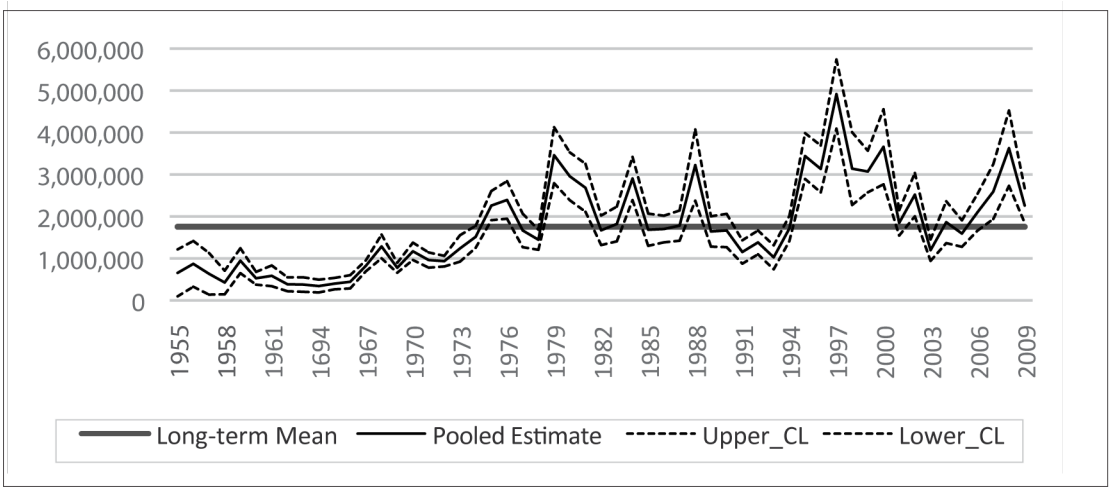

Figure 2. American coot population estimates and 95% confidence intervals for the traditional survey area of the annual Waterfowl Breeding Population and Habitat Survey during 1995–2009. The wide, dashed line represents the long-term average. (Source: U.S. Fish and Wildlife Service, unpublished data).

HUNTING AND HARVEST

American coots, purple gallinules, and common moorhens are hunted in the U.S., Canada, and Mexico. American coot harvest in the U.S. has shown a long-term decline since the early 1950s and has been less than 500,000 birds per year since the start of the Harvest Information Program (HIP) in 1999 (Figure 3). Common moorhen and purple gallinule harvest has

been variable during this time, with harvest estimates never exceeding 100,000 birds per year (Figure 4). The majority of the U.S. harvest for all three species takes place in the states of Louisiana, California, Florida, and Texas (Raftovich et al. 2009). In the U.S., there has been an average of 33,000 coot hunters per year and 4,500 moorhen/gallinule hunters per year since 1999 (U.S. Fish and Wildlife Service 2009). In Canada, coot harvest has declined considerably from an average of 44,000 birds per year in the 1970s to fewer than 4,000 birds per year over the past 10 years (Gendron and Collins 2007). Likewise, hunter participation has declined dramatically in Canada from an average of 10,000 successful hunters per year in the 1970s to fewer than 1,000 hunters per year over the past 10 years. Little is known about harvest of these species in Mexico.

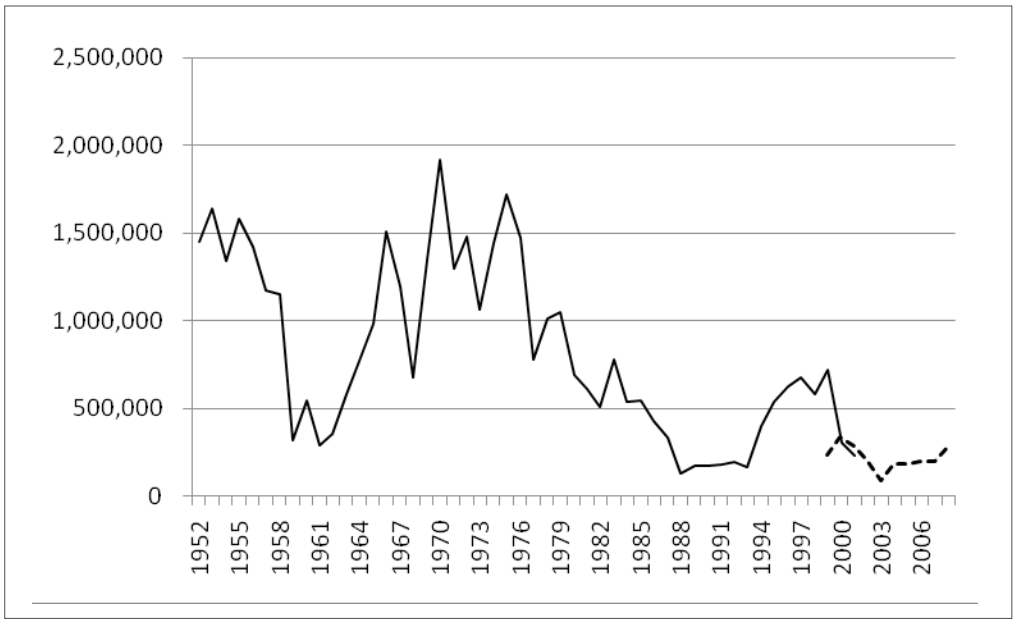

Figure 3. Estimated American coot harvest in the United States, 1952–2008. The solid line represents estimates from the Mail Survey Questionnaire, which was discontinued in 2001, while the dashed line represents estimates from the current Harvest Information Program, which started in 1999. Estimates from 2003–08 are preliminary. (Source: U.S. Fish and Wildlife Service Branch of Harvest Surveys).

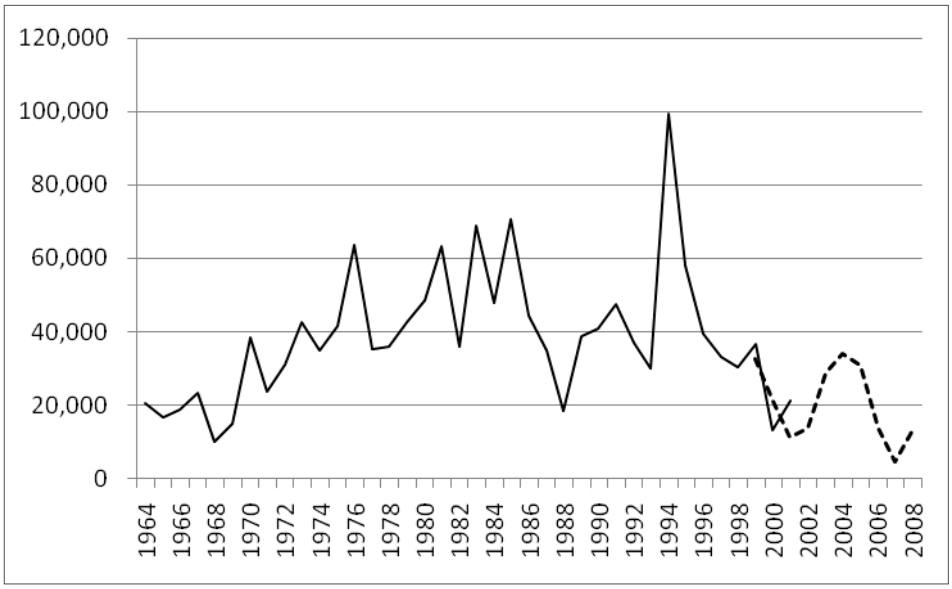

Figure 4. Estimated combined common moorhen and purple gallinule harvest in the United States, 1964–2008. The solid line represents estimates from the mail survey questionnaire, which was discontinued in 2001, while the dashed line represents estimates from the current Harvest Information Program, which started in 1999. Estimates from 2003–08 are preliminary. (Source: U.S. Fish and Wildlife Service Branch of Harvest Surveys).

Priority Information Needs

Discussions during three online meetings resulted in the identification of four priority information needs for American coots, purple gallinules, and common moorhens (in no particular order):

1. Implement a National Marshbird Monitoring Program.
2. Update the National Wetland Inventory.
3. Continue to improve the Harvest Information Program sampling frame.
4. Determine breeding origin of American coots and common moorhens that are harvested at high-harvest locations.

Rationale, descriptions, timetables and costs for each of the priorities follow.

GUIDELINES

Workshop participants identified two overarching guidelines that should be considered in further development of each of the four priority information needs:

1. Consider the effects of climate or ecosystem change on American coot, purple gallinule, and common moorhen habitats and ultimately on the abundance and distribution of these species.
2. Actively engage Canada and Mexico. It is important to consider the role that habitat and harvest management decisions in Canada and Mexico have on the overall management of these species. New or expanded information-gathering activities should be range-wide in scope.

Priority 1. Implement a National Marshbird Monitoring Program

RATIONALE

An operational marshbird monitoring program conducted on a national scale is critical to assist with harvest management decisions for coots, gallinules, and moorhens. These species are difficult to monitor because of their elusive habits, cryptic coloration, and use of difficult-to-access dense wetland habitats. Although harvest estimates for these hunted species are available through the Harvest Information Program (HIP), annual harvest management decisions are made with considerable uncertainty due to lack of information on abundance and population trends. Lack of basic population trend and habitat information also causes uncertainty concerning population response to habitat management. Recognizing this uncertainty, a series of workshops conducted since 1998 has resulted in a set of field protocols that have the potential to provide a national monitoring framework for coots, moorhens, gallinules, rails, snipe, and similar non-game species (Conway 2009, Johnson, et al. 2009). The need for this information priority also was identified in the funding strategy for rails and snipe (DJ Case & Associates 2009).

DESCRIPTION

A monitoring protocol has been tested and piloted in several locations from April through June (depending on the latitude) around the U.S. (Conway 2009). The field survey protocol consists of two parts: (1) a passive listening period, followed by (2) a period when playback tapes are used to elicit calls from target species. This survey format increases the opportunity to detect all marshbird species and individuals present. Strata for the national monitoring program will be hierarchical in nature; i.e., local wetland, state, bird conservation region, flyway, and continental species range. Although numerous details have been finalized during a development and pilot phase, considerable uncertainty exists about full survey implementation at a national and/or continental scale. Although trend information for coots is currently available from the annual Waterfowl Breeding Population and Habitat Survey, a national marshbird survey is expected to provide more precise trend information for coots throughout the full breeding range as well as trend information for other marshbirds.

TIMETABLE AND COST

The following actions must occur during the next five years to ensure complete implementation of the monitoring program and full collaboration with all affected stakeholder groups:

1. Inform all flyway councils and respective technical committees of the current progress of the national marshbird monitoring program and tentative implementation schedule. This communication need is critical because individual states and provinces, and/or other cooperating stakeholders, under the leadership of the flyway councils and technical committees, will ultimately conduct the survey on an operational basis.

2. Convene a regional meeting targeted at the Atlantic and Mississippi Flyways webless game bird technical committees and monitoring program experts to further refine implementation details in states with the largest harvest of coots, gallinules, and moorhens. Estimated meeting and travel costs: $40,000.

Objectives of the meeting will be to:

- Finalize issues related to the collection and use of the monitoring data in harvest and habitat management at the flyway and state level
- Discuss implementation details about stakeholder responsibilities (e.g., responsible flyway technical committee member to coordinate activities within each flyway)
- Identification of funding needs to successfully implement monitoring at a flyway level

Purchase of field equipment is required each time a new state is brought into the monitoring program. Estimated cost is $1,000 per state for field equipment. To conduct surveys, estimated cost is $5,000 to $50,000 per state annually during years 2–5 of implementation for the national marshbird monitoring program; cost varies depending on the area of wetlands within each state and the volunteer force available to help conduct surveys.

As outlined above, implementation of the national marshbird monitoring program during the next 1–5 years will occur incrementally with initial emphasis on states and provinces in the Atlantic and Mississippi Flyways. Implementation will next occur in the Central and Pacific Flyways (years 6–10), with long-term work aimed at expanding the survey to a range-wide monitoring effort that includes Canada, Mexico, and Central America.

Priority 2. Update the National Wetland Inventory

RATIONALE

The National Wetland Inventory could fulfill a fundamental need for the management of wetland-dependent birds by providing data on status and trends of their habitat. Because of budgetary constraints, many mapping products from the National Wetland Inventory have become outdated and progress in producing updated maps has decreased. Updated National Wetland Inventory data are critically needed to manage all wetland-associated birds and other wildlife. Uncertainty about the status and trends of wetlands could make all other management actions inefficient and/or ineffective.

Management of habitat is a fundamental component of wildlife management, not just for coots, gallinules and moorhens, but for all wildlife species. Wetlands are dynamic components of the landscape; draining and conversion of wetlands is still a serious problem in many areas of the country. Wetlands change through time even without the intervention of humans on the landscape. Climate change may affect wetlands more quickly and catastrophically than other landscape features. For wetland-dependent and associated birds, these changes are likely to have greater population-level effects than any other management actions that occur.

DESCRIPTION

The National Wetland Inventory program was established by the U.S. Fish and Wildlife Service in 1974. Its initial purpose was to conduct a nationwide inventory of wetlands on a relatively coarse scale (1:250,000) that could be used for wildlife management. There was a consensus among managers at the time that these data were needed to effectively manage waterfowl, waterbirds, and other wetland-associated wildlife. To answer the basic question of how many acres of wetlands were within the U.S., the National Wetland Inventory program

conducted a Status and Trend study to document wetlands past and present. The Status and Trend study found that from the mid-1950s to the mid-1970s, 458,000 acres per year of wetlands had been lost in the conterminous U.S. (Frayer et al. 1983). This information was very useful in galvanizing the public and influenced policymakers to initiate programs to both slow wetland loss and undertake restoration efforts to reverse the loss.

In response to wildlife managers who argued that smaller scale information in a Geographic Information System (GIS) context was needed, the National Wetland Inventory program changed techniques to supply those products. These GIS products are produced by National Wetland Inventory staff and a large number of cooperators. Cooperators include over 20 federal agencies, states, universities, tribal governments, and nonprofit organizations. Other contributors have included North American Waterfowl Management Plan (NAWMP) joint ventures, Ducks Unlimited, and the National Wildlife Refuge Program.

The large number of cooperators, contributors and users of National Wetland Inventory data highlights the critical need for timely, accurate, and precise wetland data to manage wetland-associated birds and wildlife. Most current National Wetland Inventory products are in the form of web-accessed GIS tools that provide flexibility for wetland and wildlife managers. This large partnership has formed because the data and GIS products are used every day by wildlife biologists, climate change scientists, and planners from many disciplines. The National Wetland Inventory is critical as a planning tool for anyone involved in natural resource management.

Today, the National Wetland Inventory program produces GIS products. However, this is done at a fairly slow rate of about 1.2% of the land area in the lower 48 states per year. This is largely the result of reductions in funding and the increased cost of producing technologically-current digital data. The National Wetland Inventory program, initially funded at less than $1 million per year in 1974, reached a peak of $8 million per year in 1992; and is currently funded at about $5 million per year (Tiner, 2009). Despite its reduced budget, the program has the potential to produce needed wetland data faster than many recently proposed new initiatives (many of which are based on a rationale of monitoring climate change). In addition, many other local and national initiatives (e.g., National Land-Cover Database) have used the National Wetland Inventory directly to inform their mapping efforts.

TIMETABLE AND COST

The estimated cost associated with a vigorous National Wetland Inventory program is in the millions of dollars. Although the cost is high, the benefits of better and more current wetland data would be shared by an entire suite of wetland-associated wildlife. Funding for an accelerated National Wetland Inventory effort could and should come from a wide variety of sources. In fact, many of the partners who currently use National Wetland Inventory data contributed during the creation of the inventory. However, other stakeholders should be approached and alternative funding sources need to be identified. For example, some wetland mitigation fines and assessments should be evaluated for possible contribution to the National Wetland Inventory program. The task of mapping wetlands is a continuous process, because wetlands are dynamic systems, but the rate of mapping should be increased to 5–10% per year at a minimum to supply the needs of wildlife managers.

Priority 3. Continue to Improve the Harvest Information Program Sampling Frame

RATIONALE

The Harvest Information Program (HIP) provides the sample frame for annual nationwide surveys of migratory bird hunters in the U.S. However, HIP certification is only required of legally-licensed hunters. In some states, certain hunters (e.g., juniors, landowners, seniors) who are exempted from state licensing requirements are not required to become HIP-certified and thus are not included in the sampling frame. The resulting incomplete sample frame is a source of bias that should be reduced or, preferably, eliminated from the annual HIP estimates.

Screening questions asked during the HIP certification process are used to identify hunters by type (e.g., duck, goose, woodcock) in order to increase the efficiency of the sampling procedure. When registering for the HIP, hunters are asked a series of six or seven questions, including: "Did you hunt for snipe or coots last year?" and "Did you hunt for rails or gallinules last year?" Hunters who reported hunting for these species the previous year are sampled at much higher rates than those who did not, thereby concentrating sampling effort on the few hunters who hunt these species. However, estimates of hunter numbers suggest that screening data are not accurately identifying snipe, coot, rail, or gallinule hunters. For example, according to 2007 HIP screening data received from the states, 270,000 hunters said they hunted snipe or coots the previous year, and 184,000 said they hunted rails or gallinules. However, the HIP survey estimated that fewer than 60,000 people hunted either snipe or coots that year (2006), and fewer than 14,000 people hunted rails or gallinules. Thus, it appears that either many hunters are responding inaccurately to the screening questions, or some license vendors do not record hunters' responses accurately. Furthermore, it is not clear that even accurate information on prior-year hunting activity is an effective way to identify people who will hunt these lightly hunted species the next year. Because of these problems, stratification based on the current screening questions has not been as efficient as expected. As a result, annual HIP estimates of hunter activity and harvest have been imprecise, especially at the state level.

DESCRIPTION

A complete sample frame of all migratory bird hunters will reduce the bias in HIP hunter activity and harvest estimates. States that allow license exemptions for certain groups of hunters should be encouraged to require those hunters to obtain HIP certification. The Association of Fish and Wildlife Agencies has endorsed this recommendation in the past and should continue to recommend that its member states pursue efforts to obtain complete sample frames. In the meantime, federal and state biologists should initiate a comprehensive effort to estimate how many migratory bird hunters are excluded from the HIP sample frame due to state licensing exemptions. This would provide valuable insight into the magnitude of the bias that an incomplete HIP sample frame causes.

An alternative to improving state-specific HIP sample frames would be to establish a federal permit that all migratory bird hunters would be required to obtain annually. Although this would provide the ideal national sampling frame, a number of states have resisted the idea of a federal permit in the past because they viewed licensing hunters as strictly the states' purview. However, the administrative burden of the HIP may have resulted in changed attitudes toward a federal migratory bird permit.

Therefore, state agencies should be canvassed to reexamine the feasibility of a federal permit that would replace the current HIP certification requirements. This could be done through a questionnaire designed to determine what problems states are still having with regard to managing the HIP, what it would take to correct those problems, the costs of making necessary adjustments, and whether they would be willing to consider a federal permit as an alternative.

The efficacy of the current coot, snipe, rail, and gallinule screening questions should also be examined thoroughly (see also the *Priority Information Needs for Rails and Snipe: A Funding Strategy*). The 2–4 year study would entail (1) simulations comparing results from stratified samples (based on the current screening questions) and simple random samples, and (2) year-to-year comparisons of survey responses and screening question responses to determine whether most people hunt these species annually, or only occasionally. The latter comparisons would shed light on whether prior-year hunting is a good predictor of current-year hunting for these species.

TIMETABLE AND COST

The total estimated cost associated with this priority over 2–4 years is $350,000.

Priority 4. Determine Breeding Origin of American Coots and Common Moorhens that are Harvested from High-harvest Locations

RATIONALE

Very little is known about the breeding origin of American coots and common moorhens that are harvested in North America. This type of information is critical for linking population monitoring efforts with hunting season recommendations. Migratory bird managers have used banding data to determine breeding origin for other harvested species (i.e., Canada geese, mourning doves); however, relatively few coots and moorhens are banded and recovery rates are extremely low. Therefore, researchers should assess the utility of using other methods, such as stable isotopes, to determine the breeding location of harvested coots and moorhens. Initial work should focus on determining breeding location for birds harvested in high-harvest states such as Louisiana, California, Texas, and Florida. If feasible, managers can use these data to focus monitoring efforts toward breeding areas that are important to harvest.

DESCRIPTION

Recent developments in the use of stable isotope analysis (e.g. Hobson 2005, Hobson and Wassenaar 2008) may help identify breeding origins of coots and moorhens harvested in high-harvest states such as Louisiana, California, Texas, and Florida. Measurements of isotopes such as deuterium, carbon, sulfur, and nitrogen in bird feathers reflect the isotopes found where the feathers were grown. The isotope signatures can vary spatially to form isotopic landscapes, which are commonly referred to as isoscapes (Bowen and West 2008). By collecting feather samples from known breeding locations, researchers can then compare isotope signatures from harvested birds to determine breeding origin.

A project to address this priority need will be multi-phased with the main objectives being: (1) determine what feathers provide the best isotope signatures for determining breeding areas, (2) develop an isoscape map showing isotope signatures from across the coot and

moorhen breeding range, and (3) assess if the origin of harvested birds can be determined using stable isotopes. Collecting feather samples during both the breeding and hunting season will require close cooperation between federal, state, provincial, and private partners.

TIMETABLE AND COST

It is estimated that a pilot study to evaluate this methodology will take two years and cost $150,000. After appropriate methods are developed, subsequent research should focus on assessing the entire range and diversity of important breeding areas for these species.

Measuring Success

The priorities described in this Strategy promote efforts to reduce uncertainty in current management practices. Improved information will enable managers to target site-specific and range-wide management and monitoring programs, increasing the cost-effectiveness of management.

Specific outcomes expected for each priority include:

Priority 1:

- Success will be measured by the national marshbird monitoring program becoming operational and being funded independently from the webless migratory game bird program. Ultimately, success will occur over several decades when long-term trends of abundance become available to help inform harvest and habitat management decisions at the flyway level. The marshbird monitoring program will help address key uncertainties (e.g., population level response to harvest, population trajectory) in management decisions. Stakeholder input, via the flyways, will be essential for developing a formal decision framework for harvest regulatory decisions, and developing required precision for the survey.

Priority 2:

- Success will be measured by producing wetland mapping data at a higher rate than the current 1.2% per year. The rate should be increased to 5–10% per year.

Priority 3:

- Success will be measured by having harvest estimates that are more accurate and precise, given the improved sampling frame for the more lightly hunted species of migratory game birds. Stakeholder (e.g., flyways) input will be essential for developing desired precision levels of harvest estimates for these species.

Priority 4:

- Success will be measured when important breeding areas for harvested coots and moorhens are identified and the information is used to target monitoring programs for these species.

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Appendix A

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