

Harvest Management Working Group

2021 Annual Meeting Report



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PREFACE

This report provides a summary of presentations and discussions that occurred at the 33rd meeting of the Harvest Management Working Group (HMWG). The 2021 meeting focused on the revision of the pintail Adaptive Harvest Management framework and the problem framing and discussions of management objectives associated with the reconsideration of North American duck harvest management. For meeting details please refer to the appended [2021 HMWG Meeting Agenda](#). The HMWG is grateful for the continuing technical support from the waterfowl management community, including many colleagues from Flyway Technical Sections, the United States Geological Survey (USGS), and other invitees from management and research institutions. We acknowledge that information provided by USGS in this report has not received the Director's approval and, as such, is provisional and subject to revision.

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ACKNOWLEDGEMENTS

A working group comprised of representatives from the U. S. Fish and Wildlife Service (USFWS), the U. S. Geological Survey (USGS), the Canadian Wildlife Service (CWS), and the four Flyway Councils ([HMWG Members](#)) was established in 1992 to review the scientific basis for managing waterfowl harvests. The working group, supported by technical experts from the waterfowl management and research communities, subsequently proposed a framework for adaptive harvest management, which was first implemented in 1995.

The 2021 HMWG meeting report was prepared by the USFWS Division of Migratory Bird Management based on contributions from meeting participants. G. Scott Boomer was the principal compiler and serves as the coordinator of the HMWG.

Cover Art: The 2021–2022 Federal Junior Duck Stamp featuring a pair of Hooded Mergansers (*Lophodytes cucullatus*) painted by Margaret McMullen of Kansas.

1 Flyway and Partner Reports

1.1 Atlantic Flyway (Min Huang and Josh Stiller)

Multi-stock adaptive harvest management

We are now into the fourth regulatory cycle using the multi-stock AHM decision framework in the Atlantic Flyway. Since implementation, we have made one technical tweak to the framework, and that was to fix an oversight in the initial formulation of how and into which model (process or observation) we applied the scaling factor (d). That scaling factor spatially aligns our estimates of BPOP and harvest for ring-necks and American green winged teal. We made that change in 2019 and the policy is behaving more in line with our initial expectations. One continual desire is to be able to use harvest rates based on band recoveries for ring-necks and green-winged teal so that we can discontinue using an estimate of absolute harvest for these two species. We continue to pilot various pre-season ring-neck banding efforts, and if some of the current telemetry projects shed light on accessible molting areas we may be able to band the necessary annual sample. As our preseason banding priorities potentially shift, we feel that we could easily band enough teal.

Next year we will have to update the weights on each species as part of our 5-year look under the hood and initial double loop. These weights dictate the relative importance of each species in the optimization and are based on the regional importance in harvest of each species and the number of hunter days expended in each Region of the Flyway. At our winter 2022 meeting, as a Flyway technical committee, we will be discussing any other items that we want to examine as we begin our initial five-year double loop in 2022.

Mallard Harvest Strategy

Over the past four years, we have worked with the USFWS Atlantic Flyway office and DMBM to develop an integrated population model and harvest strategy for eastern mallards.

We conducted a final human dimensions survey to elicit hunter desires on bag limits and various permutations of those. Based on those results we developed a suite of regulatory alternatives that ranged from a four bird to a six bird mallard limit and various hen restriction variations. These were then simulated through the optimization process. At our fall 2021 Flyway meeting, we discussed the results of that simulation. We considered four separate alternatives: 4(2)/3(1)/2(1), 4(2)/2(1)/1(1), 4(2)/2(1), and 6(2)/4(2)/2(1). The three alternatives with a four bird bag limit in the liberal package generally had similar average fall flights and harvest. The simulation indicated that the 4(2)/2(1)/1(1) and 4(2)/2(1) resulted in 87% of the seasons being a 4-bird bag limit and 13% a 2-bird bag limit with no seasons in a 1-bird bag limit or closed. These two packages resulted in an average of five years between a bag limit change. The 4(2)/3(1)/2(1) package resulted in 79% of the seasons being in a 4-bird bag limit and 21% in a 2-bird bag limit with no seasons in a 1-bird bag limit or closed and an average of three years between a bag limit change. The 6(2)/4(2)/2(1) package resulted in a slightly higher average fall flight and lower average harvest. It also resulted in 15% of the seasons being in a 6-bird bag limit and 84% a 2-bird bag limit with no seasons closed and an average of four years between a bag limit change. We settled on the 4(2)/2(1)/1(1) package as the preferred eastern mallard harvest package. We are seeking approval from the HMWG to move forward with adopting the harvest strategy in February 2022.

We continue to have concerns about optimizing across an infinite time horizon. We briefly explored options such as the discounting of future returns during the formulation of Multi-stock AHM. Our urgency, however, to implement Multi-stock, did not allow us to fully explore and vet this type of approach to harvest management. We hope that the harvest management community will embrace this discussion as we begin to reconsider our approaches to duck harvest management overall.

Black Duck AHM

The 2013 International harvest strategy required the updating and technical review of the AHM protocol every five years. It has been since that implementation that we have conducted any major technical or policy changes. The BDAHM working group has identified a number of technical adjustments to be pursued. These include incorporating a new definition of TIP, aligning the spatial scale with Multi-stock AHM (Eastern Survey Area), and removing the mallard competition portion of the model. Now that there is additional technical capacity at BADS, John Yeiser is taking over BDAHM and we should make a lot of progress on these technical updates to the framework.

A policy and technical issue to address in the coming year is the parity constraint, which was the most contentious issue during the development of the International strategy. This constraint ensures equal harvest, measured through harvest rates, for both countries. The formulation of the parity constraint imposes a penalty on one Country if their harvest rates begin to exceed 60% of total harvest. A recent trend analysis indicated a strong decreasing trend over time in harvest rates in Canada and in practical terms, it is becoming increasingly evident that there may be a limit in Canada on attainable harvest rates. Incorporating this trend analysis into the framework and the current liberal package in Canada, results in the restrictive package rather than the current moderate package in the US. This ‘penalty’ being imposed on one Country when the other is two steps more liberal is not what we envisioned nor desired when we collectively agreed to the current parity formulation. Covid and the lack of survey data for the past two years unfortunately has delayed implementation of changes to Canadian black duck regulations. A number of changes meant to increase harvest rates were tabled due to the lack of survey data. Thus, the current disparity in harvest rates between the two countries will likely continue for the next two years, as Canada is just now entering their new two-year cycle. There may be a need for an interim policy decision to address the parity issue when Canada is in a liberal package. To that end the International policy team will be reconvened at some point in the next few months to decide the best way forward in the spirit of the Strategy.

Technical Capacity

As we are hopefully coming out of the two-year lack of Continental BPOP survey efforts, the importance of our long-term and robust monitoring programs was once again demonstrated. In the absence of the robust monitoring programs we have, and the data from those programs, it would have been very difficult to promulgate regulations in 2021. Not only did the monitoring programs allow for regulations to be set, but under the umbrella of AHM, seasons were promulgated in the absence of contemporary data and, importantly, contemporary lawsuits. It is critical that we push very hard to ensure that these monitoring programs do not get compromised in the coming years just because regulations were promulgated in their absence. The harvest management community along with the habitat community needs to ensure that complacency over monitoring does not settle in. The example of limited black duck harvest in Canada and potentially as a result, in the US, is one example of how our lack of monitoring data is directly affecting our decision making. Another example is with Atlantic Population and Atlantic Flyway Resident Population Canada goose harvest management. Whereby harvest opportunity on AFRP geese has been foregone due to a lack of both banding and BPOP data for migrant AP geese.

Unfortunately, it doesn't seem like vacancies are being filled with any urgency within the USFWS. In our report from December 2020, “We are pleased that progress within BADS has been made towards fully staffing the branch and we look forward to working with new staff and a new chief when that decision is made.” There is still no chief of BADS. We hope that the Service will prioritize filling this key vacancy, as well as the vacant Central Flyway representative position.

1.2 Mississippi Flyway (Adam Phelps and John Brunjes)

Discussions of HMWG-related issues by the Mississippi Flyway Council (MFC) and Technical Section took place at the winter and summer 2021 Flyway meetings. Due to COVID concerns, the winter 2020 meeting was the last in-person meeting we held; all subsequent meetings have been held via Zoom videoconference. Plans are for the Winter 2022 meeting to be in person (22-25 February, Orange Beach, Alabama), but the final decision will be made in mid-December 2021.

The summer 2021 meeting, via Zoom, was much abbreviated compared to a normal summer meeting. At that meeting, the Technical Section was updated on the work regarding the reconsideration of North American duck harvest management, largely focusing on the survey that was sent to state and federal agencies in July. In addition, the current priority list was approved.

One personnel change of note to the HMWG is that Larry Reynolds has accepted a promotion and will no longer be serving as the Louisiana representative to the Mississippi Flyway Council's Game Bird Technical Section. His replacement on the Northern Pintail Strategy Revision team will be selected at or before the winter 2022 meeting.

Reconsideration of North American Duck Harvest Management Survey: Mississippi Flyway Summary

Every Mississippi Flyway state except one participated in the survey, along with one federal partner. All results summarized here reflect responses from Mississippi Flyway respondents only. Overall, 47% of respondents believe that the current process for managing waterfowl populations and hunter opportunities is sustainable, while 27% believe it is not. The biggest reasons reported for not believing the process is sustainable were a) staff capacity and funding (at both federal and state levels) and b) the complexity of harvest strategies.

Mississippi Flyway respondents were less concerned with regulatory complexity than the national respondent pool was. Concerns expressed revolved around communicating regulations to hunters (enforcement, frequent regulatory changes, barrier to R3). However, we are more concerned with the complexity of harvest strategies than of regulations. The number of species-specific strategies, funding and administrative support for the necessary monitoring to support the strategies, and the knife-edged nature of some strategies were the most often-cited reasons for concern.

When asked what simplicity in waterfowl harvest management means, the two most frequently mentioned concepts were that regulations should be easily understood by the public and that annual changes to the regulations should be minimized. Other concerns included minimizing frameworks, regulatory alternatives, and single-species harvest strategies.

The Mississippi Flyway identified a draft list of objectives in this survey process. This should be considered a starting point for a more rigorous objective-setting process to come. In order of priority, these objectives are:

1. Ensure the long-term sustainability of duck populations
2. Ensure commitment to monitoring and the scientific foundation of management
3. Minimize closed hunting seasons
4. Maximize hunter satisfaction
5. Reduce key uncertainties to inform future decisions
6. Maximize hunter retention

7. Minimize the frequency of annual regulatory changes
8. Maximize season lengths
9. Maximize hunter recruitment
10. Minimize the number of species-specific harvest strategies

When asked to rank the most important issues to address with the current effort of reconsideration of duck harvest management, the Mississippi Flyway ranked them in this order. The question asked respondents to rank their top 5, so numbers 6-10 below seem to be relatively unimportant to the Mississippi Flyway.

1. Reviewing/ revising monitoring programs to address current and future needs and constraints
2. The length of time needed to develop, vet, and implement a new or revised harvest strategy
3. Reduce the number of single-species harvest strategies
4. Evaluate alternative regulatory options
5. Evaluate potential implementation of flat bags for some species
6. Evaluate strategies that will maximize opportunity
7. Review/revise procedures to ensure timely publication of Federal Register documents
8. Reduce annual time commitment for Federal biologists
9. Consider alternative timing schedules for setting regulations (e.g., multi-year regulations)
10. Reduce annual time commitment for State biologists

HMWG Priority List

With no changes made this year, the Mississippi Flyway had few comments regarding the priority list. Most or all participants in the discussion recognize the importance of the highest priorities in the list. There was some discussion regarding lower priorities that have remained on the list for years, and whether they are useful additions to a list that rarely gets addressed beyond the highest priorities.

The Mississippi Flyway would like to thank Pat Devers and BADS staff again for providing the descriptive narrative that accompanies the draft priority list. Having the background and implications of these proposed priorities available at a glance is immensely helpful in our discussions.

Concerns with SEIS 2013

Many of our discussions at the summer 2021 meeting revolved around SEIS 2013. With concerns regarding drought conditions on the prairies and what many thought were unrealistic predictions of pond counts and breeding populations, discomfort was expressed by many Technical Section members regarding the appropriateness of a liberal duck season recommendation for 2022-23. Perhaps the primary issue discussed was related to the following paragraph (Alternative 2, page 159):

“The Service proposes that during the implementation period, the Service and Flyway Councils, with appropriate public input, will define what circumstances, if any, warrant changing the regulations after they have been established for a given year. A collaborative effort will be made to develop a process that details how these changes would be effected and implemented, if it was determined that circumstances warranted changing regulations. The belief of the Service is that such changes should be considered only in extreme situations and such occurrences should not be frequently considered, if at all.”

Exactly what circumstances would be extreme enough to justify or allow changes to the regulations the subsequent summer remains unclear. The process to amend the decision also remains unclear. Indications from the Service during the summer 2021 meeting were that only a season closure could be considered in these “extreme situations,” though that has never been formally discussed or codified. We appreciate that the Service altered the language to address concerns the Flyways had about the language on this topic in the Draft SEIS, and that the Flyways should have pushed earlier for clarification on this paragraph. While the current situation could not have been predicted, the unilateral declaration that closure is the only remedy available to respond to extreme situations is concerning in the context of no attempted coordination from either party. We believe that clarification of “extreme situations” and their potential remedies need to be formally addressed. We would like consultation to begin between the Service and the Flyways regarding what that process would entail.

COVID-related Monitoring Concerns

In immediate terms, there is little more concerning in waterfowl management than the absence of much of the usual 2020 and 2021 monitoring data. We trust that all possible efforts will be made to perform the 2022 surveys. However, we also need to be prepared if surveys are prevented from occurring next spring. We appreciate the work that was performed by BADS for the 2020 and 2021 regulatory cycles. We are glad to see that discussions of 2022 are on the agenda for this meeting, though we fervently hope they will prove unnecessary. While we recognize the necessity of these approaches in the extreme circumstances of the past two years, we completely reject them under any circumstances where observational data can be collected. The inclusion of annual monitoring data in the process is critical and must be re-instituted as soon as is practicable. If the Service sees ways in which the states of the Mississippi Flyway can assist in reinstating robust monitoring, we encourage them to bring those suggestions to our attention.

1.3 Central Flyway (Mike Szymanski and Kevin Kraai)

Impacts of COVID-19 continue to be felt in the waterfowl management process. However, state and federal personnel have continued to make necessary adjustments to continue the science-based decision-making processes that drive promulgation of waterfowl harvest regulations. The Central Flyway held virtual technical committee and Council meetings in February and March. August meetings were held “in-person;” however, federal partners were not able to attend due to ongoing travel restrictions, resulting in a hybrid meeting setting. Despite exceptional efforts by the host state agency, New Mexico Department of Game and Fish, it was difficult to have productive discussions amongst all partners, given varying internet connection qualities and difficulties of online guests hearing in-person participants. We hope that in the not-too-distant future, we can resume full, in-person meetings.

Unfortunately, for the second year in a row, waterfowl monitoring efforts were affected by the pandemic. Instead of holding a collective “wingbee” with a large gathering of personnel, duck wings and goose tails from the Parts Collection Survey were sent to Central Flyway “checkers” for examination and classification. While state agency personnel were glad to be able to fulfill a 1-year stopgap, our checkers believe that some form of in-person wingbee is needed to classify the harvest from the 2021-22 hunting season. It is the collective knowledge and experience of the checkers that adds the final gains in accurate determination of the age and sex of waterfowl harvests in the USA.

The Division of Migratory Birds also worked with state waterfowl biologists and National Wildlife Refuges to relocate pre-season duck banding crews that could not travel to Canada due to ongoing travel restrictions. Data from pre-season duck banding operations are critical to annual monitoring efforts, addressing communications challenges, supporting important retrospective analyses, and most importantly, supporting annual decision-support analyses in the regulatory process. Our banding committee chair is continuing discussions with the Mississippi Flyway banding committee chair and the Service to start planning for the upcoming banding season.

The most conspicuous waterfowl monitoring effort that has been affected by the pandemic has been suspension of the May Breeding Ground Habitat and Population Survey. The survey was suspended again in 2021 related to international travel restrictions, and the Service concluded that a survey only covering the USA portion of the survey area would not be beneficial. We agree with that determination and hope that the survey can be resumed in its full form in spring 2022. Again, Service staff were able to use the long-term dataset coupled with other data to fulfill stopgap modeling needs for the regulatory process.

Two consecutive years with no population or habitat data from the May survey and increasingly severe drought conditions in the prairies had resulted in many questions and concerns from the public and other conservation partners. The Central Flyway agreed with the Service that continuing to use the AHM process, without deviation, would result in the most appropriate decision-making framework. The HMWG also crafted a communications document to help address concerns by constituents and policymakers. It's too early to know if better breeding conditions will return to the Prairies for spring 2022, but it is critical that the May survey be conducted in 2022 to bring ground-truthed data back to the process and reduce uncertainty around decision points. We highly recommend the Service begin to further investigate remote sensing and surface water extraction methods to modernize data collection and reduce uncertainty of our monitoring programs in the face of travel restrictions. We are eager and hopeful for the May survey information to return so that adjustments to Midcontinent AHM that have been delayed since the beginning of the pandemic can be implemented.

Our flyway continues to have great interest in reducing some of the “gyrations” of regulations amongst duck stocks. The HMWG has committed to reviewing North American waterfowl management as a priority, given varying geographical coverages of harvest management strategies and decision support tools for ducks. We look forward to the completion of the northern pintail harvest strategy revision, which will play an important role in helping shape discussions as they relate to other species. We also appreciate the ability to experimentally evaluate 2-tier duck harvest regulations in South Dakota and Nebraska; their inaugural seasons in the evaluation are underway. Our flyway strives to have biologically sustainable harvests that do not include regulations that create situations that are overly difficult to comply with in the field. Our hope is that regulations can provide necessary protections for the resource, but not create undue barriers for hunters, and reduce resource waste if mistakes occur. We desire regulatory paradigms that are supported by sound-science which can be achieved through our three main monitoring efforts (breeding population, pre-season banding, and harvest surveys). These data are the lifeblood of North American waterfowl management and conservation and must remain intact, and vigorous.

These are the opinions and perceptions of the Central Flyway's HMWG representatives, both long-term members of the Central Flyway; this statement has not been reviewed or approved by the entire Central Flyway membership.

1.4 Pacific Flyway (Brandon Reishus and Jason Schamber)

The Pacific Flyway Council (PFC) and Study Committee (SC) discussed HMWG issues relevant to the flyway at the 2021 summer meeting, held as a hybrid in-person and videoconference meeting. The SC approved the draft 2022 priority list without changes, which was subsequently endorsed by the Pacific Flyway Council. The SC also reviewed the results from the Reconsideration of Duck Harvest Management survey; this issue generated a great deal of discussion. Currently, the SC has no strong concerns related to duck management in the Pacific Flyway but anticipates continued engagement on this issue as it develops further as an HMWG priority. The SC would like to express appreciation for receiving the HMWG communications document produced by the communications team describing the AHM process for current and future hunting seasons when confronted with missing data and drought. SC members indicated the document helped alleviate challenges communicating the background and rationale of regulatory decisions to agency leadership and constituents. Finally, the following are specific updates on HMWG priorities important to the Pacific Flyway.

Northern Pintails

The revision of the Northern Pintail Harvest Strategy remains a top priority for the Pacific Flyway. A report of revision progress and an updated timeline was provided to the SC by Mike Runge and Scott Boomer at the summer meeting in August 2021. The indicated progress was such that a fully revised strategy may be considered at the December 2021 HMWG meeting with flyway technical review in February 2022. The SC strongly supports this timeline to meet an expectation of implementing the revised strategy (or initiating an experimental phase) in fall of 2023.

The SC appreciates the extensive work done by the Pintail Working Group, US Geological Survey, and Division of Migratory Bird Management (DMBM) and looks forward to continual collaboration in the revision process and evaluation of the revised strategy.

Western Mallard

Past work by the HMWG and DMBM updated the Western Mallard AHM protocol to include other breeding and harvest areas important to the Pacific Flyway (British Columbia and Washington, and banding data from Idaho). We remain supportive of efforts to continue to broaden the geographic scope of the protocol by inclusion of information from other states such as Nevada and Utah. However, we continue to view this work as non-critical, as reflected by its lower status in the 2022 HMWG priority list (Long-Range).

1.5 USFWS Flyway Representatives (Pat Devers)

Nothing much to add in addition to report presented by Min Huang of the Atlantic Flyway Technical Section. Priorities for the Atlantic Flyway include completion of the Eastern Mallard Harvest Strategy, Northern Pintail Harvest Strategy, and addressing delays in the publication of federal register documents related to annual migratory bird hunting regulations. Other important issues include closing the Atlantic Flyway Special Sea Duck Season beginning with the 2022–2023 hunting season. Also, the Atlantic Flyway Technical Section and Council continue to be concerned about the status of Atlantic Population Canada geese. The Migratory Bird Program Headquarters Office is going through a re-organization. The Branch of Conservation, Regulations, and Permits is being elevated a Division. The Division of Migratory Bird Management will consist of the Branch of Assessment and Decision Support, Branch of Monitoring and Data Management, Branch of Migratory Bird Surveys, and the Flyway Representatives.

Branch of Assessment and Decision Support: status of post-doctoral research projects

1. Time Dependent Decision Making: The BADS and USGS Eastern Ecological Science Center (previously Patuxent Wildlife Research Center) obtained funding from the USGS Powell Center to conduct a synthesis of making time dependent decisions for migratory bird conservation in the face of system change, including climate change. This project will evaluate three migratory bird case studies: 1) waterfowl harvest management; 2) wind energy development and eagle conservation; 3) waterfowl habitat conservation in the prairie pothole region. The waterfowl harvest case study will focus on mid-continent mallard adaptive harvest strategy and Atlantic Population Canada goose harvest management. Jamie Ashander is the post-doctoral research assistant coordinator on the project.

2. Exploring the formal incorporation of hunter dynamics in waterfowl harvest strategies: This project is funded by the BADS. The purpose of this project is to explore the conceptual and analytical aspects of what steps would be required to incorporate the status and dynamics of waterfowl hunters in existing decision-making frameworks that are used to inform annual waterfowl hunting regulations. This

project is a ‘top-down’ approach to exploring human dimensions issues as they relate to revised goals of the NAWMP with an emphasis on developing the conceptual decision-making framework and preliminary analytical methods to support the decision-making process. The post-doctoral research assistant on this project is Richard Berl. The project objectives are:

1. Develop system model(s) of hunter dynamics linked to the regulatory decision and other biological responses (e.g., changes in vital rates);
2. Derive necessary parameter estimates through statistical analysis or elicitation procedures;
3. Conduct Value of Information analysis to quantify the benefits of pursuing a decision framework that jointly considers biological and social objectives relative to current decision frameworks.

3. Integration of Breeding Bird Survey and eBird data to improve estimates of bird distribution and growth trends at multiple scales: This project is funded by the BADS. The purpose of this project is to develop analytical methods and code for integrating BBS and eBird data to provide improved estimate of bird distribution and trends at multiple spatial scales.

4. Design and evaluation of long-term monitoring programs using marked individuals to inform annual life cycle modeling and conservation of migratory birds: This project is funded by the BADS. The goal of this project is to evaluate the performance, benefits, and costs of alternative monitoring programs based on marked individuals. This information will help the BADS provide recommendations on future funding needs and allocation to support migratory bird conservation and management. The objectives are:

1. Define and clarify the decision context for each of the two case studies; a. Develop conceptual annual life cycle model relative to the specified decision context or use existing life cycle model;
2. Identify key model parameters that can/need to be estimated, in part or full, by monitoring marked individuals;
3. Develop a range of alternative monitoring designs to estimate key model parameters; a. Elements of the alternative monitoring designs will include spatial and temporal scales, marking technique, number and timing of capture occasions, and re-encounter process;
4. Conductive a preliminary, qualitative decision analysis to identify a preferred design relative to the number and quality of parameters that can be estimated and estimated cost of operation;
5. Conductive a quantitative assessment of the preferred alternative including overall design and power analysis to develop recommendations for implementation.

1.6 Canadian Wildlife Service (Chris Roy)

Proposed amendments to the hunting regulations The Canadian Wildlife Service is launching public consultations on proposed amendments to the hunting regulations for migratory game birds in Canada. The proposed changes for the establishment of the 2022/23 and 2023/24 are available [online](#).

The key proposed changes are: Eliminating the signature requirement for the Federal Migratory Game Bird Hunting permit; Increasing opportunity to harvest Temperate-breeding Canada Geese in the Atlantic provinces; Extending the spring season for overabundant Temperate-breeding Canada Geese in southern Manitoba; and lifting harvest restrictions on White-fronted Geese in Saskatchewan and Alberta.

The comment period runs from January 15 to February 14, 2022. During this period, you are invited to submit your comments by email to: MbregsReports-Rapports-Omregs@ec.gc.ca.

1.7 Acting Branch of Assessment and Decision Support (Mark Seamans)

The Branch of Assessment and Decision Support (BADs) will be hiring a new branch chief in the first half of 2022. Former branch chief, Pat Devers, is now the USFWS Atlantic Flyway Representative. In 2021 Jeff Hostetler was hired as a quantitative ecologist in BADs. For the 2021 regulatory cycle Jeff provided help with multiple harvest strategies including multi stock, eastern composite estimates, and wood ducks.

The priorities for BADs in 2021–22 are: 1) revision of the northern pintail harvest strategy; 2) reconsidering North American duck harvest management in the U.S.; and 3) development of an eastern mallard harvest strategy. In addition, BADs continues to provide analytical support for a variety of non-harvest management issues including: conflict species management (e.g., double crested cormorant, common ravens, and gulls); and the six working groups (e.g., grasslands, western forests, collision mortality) that are responding to the 3 billion bird effort.

1.8 Branch of Monitoring and Data Management (Kathy Fleming)

We are tentatively planning for in-person wingbees in 2022 with the following schedule: AF: Jan 31 – Feb 4; MF: Feb 7 – 11; CF: Feb 21 – 25, and PF: Feb 28 – Mar 4. We are asking for reduced participation (just checkers and a few additional attendees). We will need to hold off on making a final decision to hold the wingbees until January.

Update on the WBPHS Review (John Sauer, Kris Winiarski, Emily Silverman): A manuscript has been completed describing the percent coverage of continental populations and regional stocks used for harvest management by WBPHS and other breeding waterfowl surveys. This work used modeled waterfowl distribution data from the recently published [Adde et al. \(2020\)](#) modeling results for Canada and status and trends map products from eBird for the US. Priority species and stocks considered in this analysis were: Mallard (stocks: mid-continent, western), Pintail, Scaup spp., Blue-winged teal, Canvasback, Black duck, Ring-necked duck (stock: eastern), Green-winged teal (stock: eastern), Goldeneye (stock: eastern), and Scoter spp. Predicted relative abundance in un-surveyed ecoregions was summarized to identify possible gaps in current survey coverage. Next steps include: (1) Using integrated model surfaces to explore alternative stratifications and (2) determining optimal allocation for best stratification. Remaining funding will extend project to September 2022. Also, there will be a release of the WBPHS historical document collection compiled by BMDM in early 2022 and available to the public through the FWS repository ServCat.

Other branch activities include the launch of the Migratory Bird Program Data Repository, integrated with the MB Data Catalog, a searchable database of operational and legacy data held by the MBP. The catalog and repository will be available to all DOI staff. Data in the repository can be accessed programmatically using SQL queries in R, Python, etc. and contain full metadata.

Harvest Survey Review update: The hunter focus groups report was recently finished by DJ Case and is available by request. Recommendations from that report are being used to guide improvements to the harvest survey and outreach efforts to educate hunters about the importance of their contribution of harvest data. There is an ongoing analysis by Dave Otis (doves) and Emily Silverman (waterfowl) to evaluate the reliability and predictiveness of the current HIP stratification, and to explore other potential stratification designs to improve precision in harvest estimates. BMDM is currently in its 3rd overlap year of the paper and online survey, and will move to the online-only survey next season. Paper surveys will be made available for hunters who request them. Analysis of the 3 years of online and paper survey data will be completed this year, and summarized in a report.

1.9 Canadian Prairie Region mallard harvest management plan (Jim Leafloor)

Jim described the details of the Canadian Prairie Region mallard harvest management plan ([see appended summary](#)) which is currently under review by the Canadian harvest management community.

2 Partner Updates

2.1 NAWMP Plan Committee Liaison (Todd Sanders)

The North American Waterfowl Management Plan Committee (PC) is an international body that provides leadership and oversight for the activities undertaken in support of the North American Waterfowl Management Plan (i.e., Plan leadership and management). The PC consists of up to 18 members, 6 each from Canada, the United States, and Mexico. In the U.S., each Flyway Council nominates a representative, and the FWS Director appoints up to two federal representatives from the directorate.

The U.S. representatives on the PC include: Jerome Ford, Co-Chair; U.S. Fish and Wildlife Service Gray Anderson; Atlantic Flyway Council (VA) Joe Benedict; Mississippi Flyway Council (TN) Jeb Williams; Central Flyway Council (ND)

There have been a number of retirements associated with the PC in the last year. Replacements have been identified to date in only some places. The list of retirements and replacements follows:

Jorge Coppen, U.S. Fish and Wildlife Service (NAWMP Coordinator); Nov 2020

Acting: Tony Roberts, U.S. Fish and Wildlife Service

Stafford Lehr, Pacific Flyway Council (PC); Jun

No replacement identified yet

Karla Guyn, Ducks Unlimited Canada (PC); Dec?

No replacement identified yet

Jim Dubovsky, U.S. Fish and Wildlife Service (U.S. Advisor, ISC Liaison to the HMWG); Feb

Todd Sanders, U.S. Fish and Wildlife Service

The PC typically meets two times per year, generally winter and late summer, and in 2021 met virtually on February 18 and August 31–September 1. The meeting objectives were:

1. To continue to provide leadership and assess progress of reporting JVs and recommend future actions, and
2. To discuss and assess planning and implementation of core aspects of NAWMP programs and strategic priorities.

The PC heard reports from two Joint ventures (species or habitat) at each meeting. The PC also heard reports from the PC's primary partners (working groups) including:

1. North American Waterfowl Management Plan Science Support Team (NSST),
2. Human Dimensions Working Group (HDWG),

3. Communications Committee, and
4. Integration Steering Committee (ISC).

Reports from some of these working groups are provided elsewhere. A couple of major work items include identifying NAWMP metrics and development of an issue paper on waterfowl monitoring. Performance metrics may help in accountability for funds received and in fostering support. The metrics will be related to the NAWMP objectives for populations, habitat, people, and integration. The primary partner working groups have been asked to provide input into potential metrics that are currently available and are applicable internationally or nationally to all Joint Ventures. The PC/ISC are waiting on additional input from the NSST expected in about December or January. Next steps will include PC discussion and then proposed metrics will be distributed to the working groups for review.

An issue paper on waterfowl monitoring was drafted by the ISC and presented to the PC for consideration in 2020. This is consistent with the PC role to identify major, long-term, international waterfowl issues and make recommendations to the Plan signatories. The paper was revised by the PC in spring 2021 and is now final. The product is a one page document that identifies the value of waterfowl monitoring to NAWMP, population assessment, and informed decision making for harvest and habitat management.

2.2 NAWMP Integration Coordinator (Diane Eggeman)

Diane Eggeman presented an update on the NAWMP Integration Steering Committee (ISC). The update summarized the ISC's work plan, progress made in 2021 by the ISC and under the North American Waterfowl Professionals Education Plan (NAWPEP).

The ISC held virtual meetings approximately monthly throughout the year. Todd Sanders has now filled the slot on the ISC vacated by the retirement of Jim Dubovsky, as the HMWG liaison to the Plan Committee. Kevin Kraai continued to serve as the HMWG ex-officio member.

The ISC worked on providing guidance to the NAWMP community on how to apply and consistently interpret existing waterfowl population objectives as applied to habitat conservation of Joint Ventures (JVs). This effort resulted in communication with Joint Venture Coordinators, addressing identified needs to clarify and provide technical support, and adjustments to Plan Committee process and interactions with JVs.

The ISC continued its webinar series on the societal benefits of NAWMP. After 9 webinars, this effort is now at a transition point where the ISC is reconsidering the scope and frequency of the webinars.

Other ISC work in 2021 has included (1) involvement in planning a white paper related to landowner and land-manager engagement in NAWMP JV habitat work, (2) continued progress on incorporating a decision support system for landscape prioritization at regional levels, integrating across all 3 NAWMP goals, (3) providing a draft issue paper to the Plan Committee on waterfowl population monitoring, and (4) developing possibilities for metrics to measure and communicate progress related to NAWMP integration.

The NAWPEP Steering Committee completed its strategic plan, which received endorsement from the Plan Committee, and developed a work plan. Other progress included conducting a survey of employers of waterfowl professionals to measure future demand. These results will be finalized and reported early in 2022. Steering Committee members began an inventory of fellowships, internships, and scholarships available for waterfowl-focused college and university students. NAWPEP has connected with the National Association of University Fish and Wildlife Programs and has met with faculty from several universities regarding their interest in adding endowed chairs for waterfowl professors.

2.3 Human Dimensions Working Group (Vacant)

The HMWG discussed the lack of a working group member who serves as a representative to the Human Dimensions Working Group. Although not ideal, working group members believed that annual updates from the NAWMP Plan Committee Liaison and the NAWMP Integration coordinator were sufficient to maintain a working understanding of the activities of the Human Dimensions working group. More importantly, the working group acknowledged a willingness to engage with the Human Dimensions Working Group on an *ad hoc* basis to address issues that are relevant to the HMWG and require additional coordination.

2.4 Unified Science Team (Kevin Kraai)

Kevin reported on the outcomes of the May, 2021 Unified Science Team virtual meeting. The summary of the meeting notes have been appended to this report ([UST meeting notes](#)).

2.5 Communication Team (Min Huang)

In response to a lot of misinformation and supposition on various social media and listserv postings, the Committee developed an FAQ document on the effects of Covid on various operations, the drought conditions in the prairies, and promulgating regulations in the face of missing data. This FAQ document was distributed to the Flyways and the DMBM. The document was well received and helped to quell some of the confusion about how the regulations process was responding to the current set of crises.

There was a fair amount of discussion coming out of the North American Natural Resources Conference and the winter Flyway Council meetings about monitoring and the increasing need to maintain critical monitoring programs. A missive from the Plan Committee to the USFWS and CWS regarding that issue was received very unfavorably. The National Flyway Council asked the HMWG to potentially take on this issue and see what traction might be gained through routing the discussion through the harvest management side. The Communications Team had a couple of calls to discuss this request and ultimately decided that this issue was not a task that fell solely upon the Communications Team. There was discussion of governance and from whom this kind of request should come, as the Working Group works at the behest of the Flyways and the Service. Further, the issue of monitoring and the importance of those data for implementation of all of the facets of the North American Waterfowl Management Plan spans far more than just the harvest management community. The Committee thought that discussions should occur with the NSST and the JV's to develop a unified position on the critical importance of monitoring and the continued need for those data to inform all facets of NAWMP.

The Committee has several items that continue to be on their plate, but somewhat on the back burner. We are ready to develop whatever materials are needed once the pintail harvest strategy is completed. This was a task assigned to the Committee as the pintail work was progressing. The current iteration of the strategy will need some communication materials, however, it was discussed that the pintail action team would address this interim product. Once the strategy is finalized, the Committee will produce and disseminate whatever materials are deemed necessary. The Committee also has as a task to try and address the schism between academia and the management community. The first step towards a unified community was to set up a workshop with two or three of the prominent university labs in the country, the USFWS, USGS, and some of the members from the Councils. This workshop would be the precursor to a larger, more encompassing event at the next duck symposium. Due to Covid and the associated logistical issues arising from that, this workshop has not occurred. As restrictions ease, there should be a concerted effort to initiate this contact. Perhaps a test of this concept might be a discussion of pintail population dynamics and regulatory alternatives arising from that analysis.

There is also the potential need for communications documents surrounding the hoped for resumption of Continental surveys, and for some species (e.g., arctic goose populations) banding. As more is known about

the status of the spring breeding surveys and banding operations, the Committee will determine what is needed.

Communications Team:

Min Huang (AF, chair)
Adam Phelps (MF)
Mike Szymanski (CF)
Brandon Reishus (PF)
Pat Devers (FWS)
Dave Case (DJ Case & Associates)

2.6 Two-tier license system updates (Rocco Murano and Matthew Garrick)

Declines in duck hunters in many states across the Central Flyway are well documented. Crucially, South Dakota has lost approximately 50% of its active resident duck hunters since the late 1990's. Reductions in duck hunter participation undermine the North American Model of Wildlife Management and will ultimately reduce support for wetland and grassland conservation. Several recent human dimensions projects have shown duck identification on the wing to be a barrier to potential recruitment, retention, and reactivation of duck's hunters. In an attempt to reverse this trend, experimental regulations will be used to evaluate the barrier of identifying waterfowl on the wing.

Beginning in the 2021-2022 duck hunting season South Dakota and Nebraska began a two-tiered system of duck hunting regulations for a minimum of four years. In this system, duck hunters registered themselves under one of two different regulatory options via the Hunter Information Program (HIP). One option, (Tier I) is the traditional duck daily bag that offers maximum hunting opportunity (i.e., current daily bag limits with all species-specific daily bag restrictions) while the other option (Tier II) is a simplified daily bag (i.e., three-duck daily bag limit with no species or sex restrictions).

The tier-II option became available to hunters in South Dakota on July 1, 2021. Hunters who choose tier-II were asked to participate in both a harvest diary and parts collection, sending in wings to be used in comparison to tier-I hunters. Post season surveys will be used to track many variables including demographics, satisfaction, churn rate, and avidity of tier-II participants. Beginning in the Spring of 2021 a multifaceted outreach effort including podcasts, traditional print media, social media posts, and direct emails were employed. Over the next four duck seasons, participation trends, harvest information, and hunter opinion of two-tier licenses will be tracked and compared to surrounding states participation and harvest.

South Dakota Results from the 2021 duck season are preliminary, as the duck season is still in progress but as of early November 18, 800 migratory bird certificate holders had chosen tier-II (5% of total). Of those, 500 were residents (4.4% of all resident migratory bird certificate holders) and 300 were nonresidents (6.7% of all non-resident migratory certificate holders). Of those, 142 (18%) were 17 and under, 122 (15%), were 18-25, 129 were 26-35 (16%), 107 (13%) were 36-45, 121 (15%) were 46-55, and 179 (22)% were over the age of 55 (Figure 1). Gender breakdown tier-II participants included 70 female (9%) and 730 males (91%).

Nebraska As of January 11th, there were 2,975 tier-II hunters compared to 25,847 tier-I hunters. Of the tier-II hunters, 324 were non-residents from 34 states. Approximately 8% of tier-II hunters were youth, with 30% of tier-II hunters <54 years old (Figure 2). There were 2,819 males (95%) to 156 females (5%).

After duck seasons end in January, surveys will be sent to tier-II hunters, asking a number of questions regarding their motivation for participation and satisfaction with the regulations option.

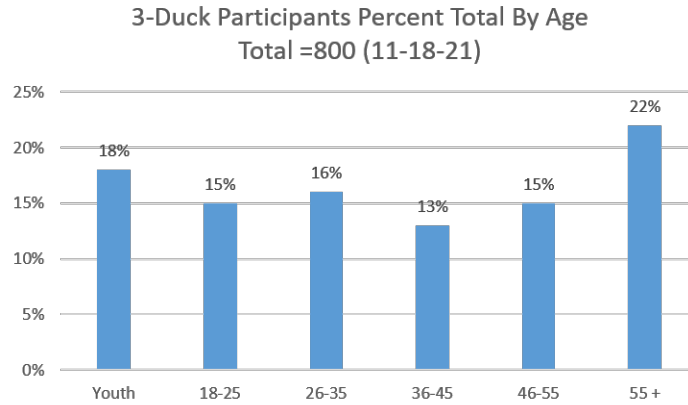


Figure 1 – Age Distribution of tier II hunters in South Dakota for the 2021/2022 hunting season.

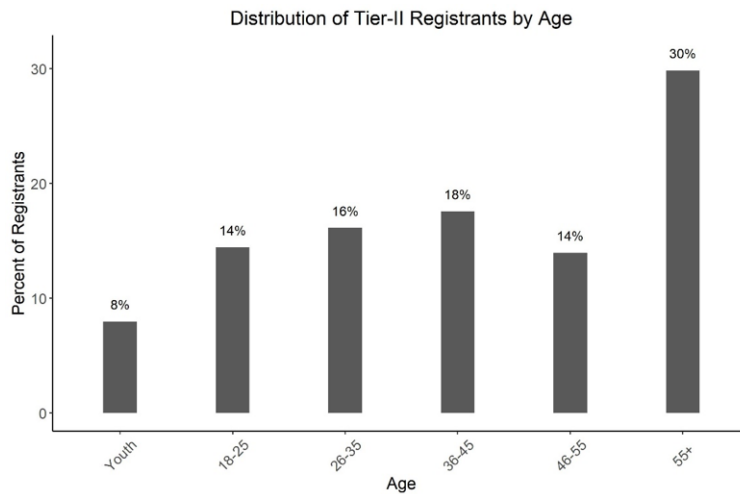


Figure 2 – Age distribution of tier-II hunters in Nebraska for the 2021/2022 hunting season.

2.7 Integrating human dimensions (Richard Berl)

It is necessary to integrate a predictive approach to human dimensions into the harvest management regulatory process to understand hunter dynamics in response to policy and to set optimal policy for future conditions that hunters have not experienced. Work is needed to establish the problem and objectives to be addressed through modeling hunter dynamics. The primary questions of this project are to determine how harvest regulations affect hunter participation and how participation affects harvest rates. Some preliminary relationships in the data are explored, with plans for the future and potential data sources to be used.

2.8 Time-dependent optimal solutions to address system change (Jamie Ashander)

A big challenge for harvest management is anticipating system change in our management strategies. When and how is early action needed to achieve our objectives in a changing system?

We review theoretical results for this question (Tucker and Runge 2021), derived by assuming known future change (in the form of changes to underlying demographic parameters) and then applying finite-time dynamic programming to find time-dependent optimal policies that account for, and indeed, anticipate,

these changes. These results showed that optimal policies can anticipate future change and that failing to account for system change has very different effects, depending on the nature of the change: failing to account for declines in carrying capacity (K) results in under-harvest; failing to account for declines in intrinsic growth rate (r) leads to over-harvest.

We then present ongoing work applying these techniques to the question of setting hunting regulations for mid-continent Mallard (MCM), given potential future climate change. Using a simplified implementation of the AHM model coupled to a climate-based pond model (Zhao et al. 2016), we study time-dependent optimal policies for two potential future climate scenarios. These scenarios, drawn from recent demographic modeling work (Zhao et al. 2019), correspond to a climate for the prairie pothole region (PPR) in 2100 that is either warmer and wetter (“positive” climate) or hotter and drier (“negative” climate). We show how time-dependent optimal policies differ between these futures, with more liberal harvest policies being required to maintain harvest goals in the “negative” climate.

Finally, we describe future plans. First, we are working to extend this analysis of MCM harvest policy to examine policies under projected climates for a variety of established climate scenarios (four specific SSPs from CMIP-6) and to expand the treatment of uncertainty in the model. Second, we plan to apply these ideas to Atlantic Population Canada geese.

3 Pintail AHM

3.1 *Pintail AHM revision updates (Mike Runge and Scott Boomer)*

We began our update with a brief review of the historical decision framing that resulted in the establishment of northern pintail AHM. This summary provided both a technical overview of the pintail population model and the key policy deliberations that were necessary for implementing an AHM framework that jointly serves all 4 Flyways. This background was concluded with a discussion of the criticisms and limitations of the current modeling framework as well as the desire to explore the resolution of additional uncertainties (e.g., alternative formulations of compensatory mortality) with pintail AHM.

We then provided more details on an integrated population model (IPM) and Bayesian estimation framework we developed to estimate and represent pintail population and harvest dynamics from breeding population (BPOP), band-recovery, harvest age ratio, and harvest data. As a lead-in to discussions focused on how the IPM results would be used to evaluate pintail harvest potential as well as derive harvest strategies through dynamic optimization, we briefly reviewed how density dependence relationships form the basis for much of the harvest theory we use to determine sustainable harvest strategies that we often represent with yield curves. The results from the IPM assessment were used to quantify pintail harvest potential based on a set of equilibrium analyses that evaluated pintail equilibrium dynamics as a function of the BPOP settling latitude. Based on the updated demographic estimates from the IPM, we found that pintail harvest potential is very sensitive to pintail BPOP settling dynamics. When the pintail population settles at latitudes $\geq 55.7^\circ$, the resulting equilibrium harvest levels are less than the harvest expected with the implementation of a full season length and a 1-bird bag (Figure 3). The resulting harvest strategies based on these relationships result in more conservative harvest policies in comparison to current AHM results.

We then presented the results of an evaluation of the potential gain in management performance if an experiment were conducted to determine the effect of a 3-bird liberal season on the total pintail harvest. Based on a power analysis, it was determined that a 3-year experimental season with a 3-bird bag would allow us to distinguish between competing hypotheses about expected changes in pintail harvests in the Pacific Flyway and all Flyways combined. However, derived harvest strategies based on these hypotheses suggest that any long term gain in resolving this uncertainty would be minimal.

The HMWG expressed concern with these outcomes and agreed that additional assessment and analytical work are required before these results are considered final and serve as the basis for a new pintail harvest

strategy. We agreed to circle back with the pintail working group to discuss future analytical work and discuss communication plans in advance of the upcoming winter Flyway meetings. We discussed the following action items:

1. Meet and discuss next steps with the Pintail Working Group
 - (a) Analytical and assessment work
 - (b) Regulatory process timeline for developing an updated pintail harvest strategy
2. Develop communication materials in preparation for upcoming Flyway meetings
3. Provide Flyway meeting updates

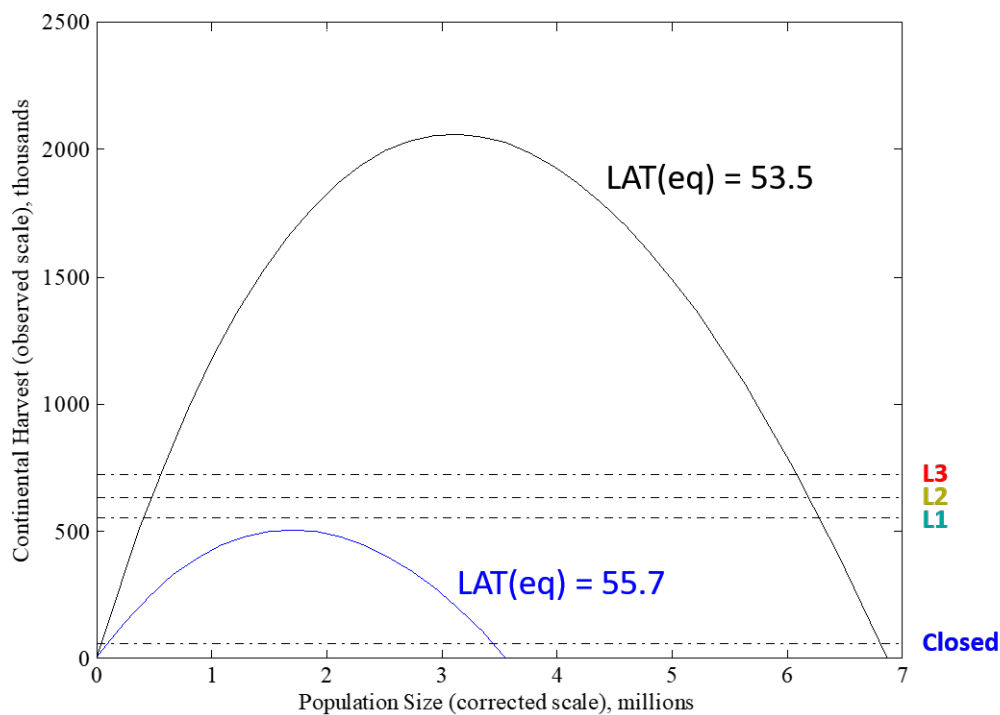


Figure 3 – Equilibrium harvest levels as a function of corrected population size for continental northern pintail (*Anas acuta*), for two long-term settling patterns. The expected continental harvest is shown for three harvest strategies: a liberal season length with a 1, 2, or 3 pintail bag limit.

4 Reconsideration of North American Duck Harvest Management

4.1 History of multi-stock discussions at Harvest Management Working Group meetings (Scott Boomer)

The Harvest Management Working Group has a long history in considering how variation in stock-specific harvest potential should be accounted for when deriving waterfowl harvest regulations. After the establishment of mid-continent mallard AHM in 1995, the working group wrestled with the issue of how to inform harvest regulations for non-mallard stocks with more limited harvest potential. In 2003, the working

group held a day long workshop focused on different approaches to multi-stock AHM. The resulting outcomes varied by Flyway affiliation and affirmed that independent season lengths for individual stocks were unacceptable and that multi-stock AHM requires explicit management objectives which at the time were agreed to be ambiguous. However, there was general agreement that any approach to multi-stock management should consider simplified regulations wherever possible. Technical work that supported these discussions was led by Fred Johnson and colleagues. This work outlined potential options for multi-stock harvest management that explicitly recognized variation in stock-specific harvest potential (Johnson et al. 2002), and developed analytical methods to evaluate the harvest potential of non-mallard stocks (Johnson 2003). The HMWG followed up on these discussions when Fred Johnson led another multi-stock harvest management learning session in 2008 designed to demonstrate the inherent tradeoffs involved with managing multiple stocks of waterfowl with a common regulatory framework. As AHM frameworks were established for black ducks, pintails, and scaup, the HMWG tabled discussions about multi-stock AHM until the mid-continent and eastern mallard AHM frameworks entered the double-loop learning phase of AHM. As a result, the Atlantic Flyway abandoned eastern mallard AHM in favor of an explicit multi-stock AHM framework for informing hunting regulations. The mid-continent mallard AHM revisions resulted in a framework based on mid-continent mallard population status with an expectation that non-mallard stocks will be addressed when assessment frameworks are developed to support a trade-off analysis that will inform decisions about multi-stock approaches to harvest management in the Mississippi and Central Flyways.

4.2 Survey results (Stiller, Phelps, Szymanski, Reishus)

During the summer of 2021, the Harvest Management Working Group surveyed the four Flyway technical sections and the USFWS Flyway representatives to help frame the problem of reconsidering waterfowl management. We sought to identify what states and service biologists view as concerns or problems with the current methods of setting waterfowl hunting frameworks in North America. The survey elicited responses from 44 states and 5 USFWS representatives responded to the survey. The key findings of the survey suggested there is concern among practitioners about the long-term sustainability of the current process (i.e., many species-specific frameworks, complex and difficult to communicate modeling and strategies, etc.), there is concern about the complexity of regulations and the subsequent impacts on hunter participation, and the lack of funding to support robust long-term monitoring programs. Respondents expressed concern about the detrimental, cumulative effects of complexity as the lack of clear, readily understandable decision processes and results can lead to distrust, especially with knife-edge strategies that change frequently. Lastly, respondents repeatedly emphasized the importance of and concern for the financial and administrative support for long-term monitoring programs and personnel.

The information from this survey was used to help frame the decision problem focused on the reconsideration of waterfowl harvest management. The next step of the process will be to develop and frame the objectives of the effort and work with the Flyways to reassess how waterfowl management is conducted.

4.3 Problem framing (HMWG)

The HMWG reviewed the elements of a draft problem statement describing the details of the of the HMWG priority: “Reconsideration of North American duck harvest management in the United States.” This discussion focused on management scale, highlighting differences across Flyways in harvest potential and corresponding harvest management objectives. The working group anticipates that a trade-off analysis will most likely be required to derive harvest strategies to achieve these disparate objectives.

4.4 Draft objectives hierarchy (Pat Devers)

The HMWG discussed a preliminary objectives hierarchy for duck harvest management in the United States. This draft hierarchy was developed from information gathered as part of the Flyway specific survey

(see 4.2), objectives identified as part of the mid-continent mallard and northern pintail double-looping efforts, the development of the Atlantic Flyway Multi-stock AHM process, and the revision of the eastern mallard AHM framework. Prior to discussing the preliminary objectives hierarchy, the HMWG reviewed the types and definitions of objectives and measurable attributes:

1. Fundamental objectives: the outcomes a decision maker cares about.
2. Means objectives: specific methods for achieving ≥ 1 fundamental objectives.
3. Process objectives: reflect the mandates or preferences of the decision maker's organization relative to how decisions are made.
4. Strategic objectives: reflect the long-term mission of the decision maker's organizations.
5. Measurable attribute: specific metric that can be used to consistently estimate and report the anticipated consequences of a management action with respect to a particular objective.

The HMWG spent time discussing and revising the draft objectives hierarchy and allowed for additional comments to be submitted following the meeting. The HMWG agreed to present an overview of the draft problem statement and objectives hierarchy to the Flyway technical sections during the winter 2022 meetings for input.

Draft objectives hierarchy relative to North American duck harvest management in the United States. Note, the hierarchy does not imply importance or priority.

- Ensure the long-term conservation of North American duck populations
 - Obtain accurate measures of the state of waterfowl populations
 - Understand waterfowl population dynamics
 - Understand the effects of hunting on waterfowl population
 - Avoid annual harvest rates that exceed maximum sustained yield
- Provide sustainable long-term harvest opportunity
 - Maximize season length
 - Maximize species daily bag limits
 - Minimize complexity of annual regulations
 - * Minimize number of species with differential daily bag limits
 - * Minimize number of stock specific regulations
 - Minimize occurrence of restrictive regulations
 - * Minimize occurrence of a closed season
 - * Minimize occurrence of closed season for individual species
 - * Minimize occurrence of 1-bird daily bag limits for most species under the liberal regulatory option
 - Minimize frequency of annual changes in harvest regulations
- Maintain waterfowl hunter population
 - Understand hunter dynamics
 - Obtain accurate estimates of the state of hunter population(s)
 - Understand the effects of regulations on hunter dynamics
 - * Annual regulations

- * Special regulations
 - Understand the drivers of hunter dynamics
- Implement a sustainable harvest management process
 - Publish federal frameworks on time
 - * Reduce the number of annual federal register documents required to open hunting seasons
 - Publish season selections on time
 - Publish state regulations on time
 - Avoid/limit the number of stock specific harvest strategies
 - Avoid/limit number of differential species specific daily bag limits
 - Reduce complexity of stock-specific harvest strategies
 - Reduce the length of state regulations
 - Implement cost efficient monitoring programs
 - Implement harvest strategies that are robust to short- and long-term disruptions to monitoring programs
 - Use methods that can accommodate missing observation
 - Minimize number of annual, multi-partner meetings
 - Minimize number of annual state specific meetings
 - Minimize probability of litigation challenging the establishment of annual hunting seasons
 - Minimize difficulty of explaining annual regulations to hunters

4.5 Next steps (HMWG)

Members of the working group will work with the Flyway technical committees to refine the draft objectives hierarchy at the winter 2022 meetings. Results from those meetings will be compiled during spring 2022, and used for the basis of a formal, facilitated objective-setting process that will occur during the summer Flyway meetings. These objectives will be brought to the HMWG in December 2022 for development of potential actions.

5 Assessment Updates

5.1 2021 BPOP imputation procedures (John Yeiser and Mark Otto)

The COVID-19 pandemic disrupted the Waterfowl Breeding Population and Habitat Survey (WBPHS) during 2020 and 2021, leaving gaps in breeding population estimates data that hinder the optimization of harvest policy. For example, Alaska strata (WBPHS strata 1-12) were not sampled in 2020 yet all but stratum 12 were sampled in 2021. Similarly, no data was collected by state partners in Minnesota, Michigan, or Wisconsin (Great Lakes states) in 2020 and no data was collected in Minnesota in 2021. These data are typically used to inform optimal policy recommendations for the Western mallard and mid-continent mallard stocks.

Ideally, some predictive framework would be available to fill in data gaps for missing years (e.g., an integrated population model using parallel sources of data such as wings and banding data). In absence of these holistic predictive frameworks, we need some mechanism to impute these survey estimates that accounts for any likely trends in the data (process variability) and uncertainty surrounding the gathering of data (sampling variability).

We developed a hierarchical random walk model with spatially correlated error structure to relate observed data in Alaska and Great Lakes states to unobserved data. This modeling approach allowed us to use historical data within a stratum as well as correlations among similar strata to predict unobserved estimates for both Great Lakes and Alaska mallards (separately) in 2020 and 2021. There was stronger spatial structure among strata in Alaska compared to state-level estimates among Great Lakes states, however predicted population sizes across all surveys followed historical trends and had an acceptable amount of uncertainty. We see this method as an effective and scalable approach to imputing missing observation data in the WBPBS.

5.2 Eastern mallard harvest strategy development (Tony Roberts)

Waterfowl harvest in the Atlantic Flyway has exhibited several characteristics that have differentiated it from harvest in other Flyways. Reservations about the appropriateness of mallards for setting flyway regulations lead the AFC to adopt a Multi-Stock AHM framework that sets the Atlantic Flyway general duck season regulations based on the status of four species, but mallards are not represented. Despite this, mallards are still an important bird in the bag of hunters and have exhibited declining population trends over the last two decades, hence a sustainable harvest strategy is needed to maintain the population while continuing harvest when warranted. A new strategy was developed predicated on an integrated population model (IPM) of eastern mallard population dynamics.

We used multiple sources of data in a full annual cycle IPM composed of three subcomponent models: 1) annual and seasonal survival estimated using a Brownie dead recovery model using pre- and post-season banding data of adults and juveniles to estimate age-specific harvest and seasonal survival rates; 2) a fecundity model using annual Parts Collection Survey data and banding and recovery data; and 3) a state-space model of the annual breeding abundance. We structured the IPM using available data during 1998-2018. We used the resulting model estimates to calculate equilibrium dynamics of the harvested eastern mallard population. We used IPM estimates in an optimization procedure explore different harvest strategies.

The IPM posterior estimates for population abundance tracked closely with the observed estimates. Average population growth rate over the entire time period was 0.99 and posterior median estimates of annual and seasonal survival rates were relatively stable for adult cohorts and declined through time for juvenile cohorts. The results of the equilibrium analysis suggested a population abundance at maximum sustainable yield of 792,000 with a carrying capacity of 1,347,000 at an equilibrium kill rate of 0.19. Simulation of the optimal policy of the alternative regulatory structures resulted in an average fall flight ranging from a minimum of 1.534 to a maximum of 1.642 million mallards. The mean number of years between regulatory changes ranged from 3–5 years. Each policy structure had optimal policies that called for a 4-bird bag alternative at the most recent observed breeding population abundance of 1.05 million birds.

5.3 Incorporation of citizen science information into population estimates (Paige Howell)

The COVID-19 pandemic has disrupted field research programs, making conservation and management decision-making more challenging. However, it may be possible to conduct population assessments using integrated models that combine community-science data with existing data from structured surveys. We developed a space-time integrated population model to characterize spatial and temporal variability in population distribution. We fit our integrated model to 10 years of eBird (2010–2020) and 9 years of aerial survey (2010–2019) mottled duck count data to forecast 2020 breeding population size along the western Gulf Coast of Texas and Louisiana. Estimates of mottled duck abundance were similar in magnitude to estimates calculated using previous methods, but were more precise, and showed evidence of a declining population. The spatial distribution for mottled ducks each year was characterized by several concentrations of relatively high abundance, although the location of these abundance ‘hotspots’ varied over

time. Expected abundance was higher, for areas with a higher proportion of area covered by marsh habitat. By leveraging large-scale community-science data, we were able to conduct a population assessment, despite the disruption in structured surveys caused by the pandemic. As participation in community-science platforms continues to increase, we anticipate modeling frameworks like the model we developed here, will become increasingly useful for informing conservation and management decision-making.

5.4 Reward banding update (Pam Garrettson, Scott Boomer, Nathan Zimpfer)

We presented preliminary data describing the first 4 1/2 years of a 5-year reward banding project for mallards, and a completed 3-year project for black ducks. For mid-continent mallards, target banding levels were approached in 2017 and 2018 with lower banding numbers observed in 2019 and 2020. In 2020, relatively few reward bands were placed in Canada due to Covid-19 restrictions. In 2021 however, the banding goal was exceeded, with 1450 reward and 1454 control bands placed, and we hope this will improve our inferences from the study. A preliminary analysis of direct recoveries of mallards released with \$65 and \$100 bands suggest similar harvest rates of birds banded with these dollar amounts, which suggests that we can pool these bandings when updating mid-continent mallard harvest rate estimates for use in annual AHM protocols. Preliminary, median reporting rate estimates of 0.93 (95% CI: 0.80, 0.99), 0.85 (95% CI: 0.68, 0.97), 0.92 (95% CI: 0.79, 0.99), and 0.88 (95% CI: 0.68, 0.99) were observed in 2017, 2018, 2019, and 2020 respectively, with an overall mean of 0.90 (95% CI: 0.74, 0.99). These results suggest that band reporting rates have increased considerably compared to estimates from previous reward banding investigations (Boomer et al. 2013). For American black ducks, reporting rates (2017–2019) were 0.80 (95% CI: 0.66, 0.95), 0.65 (95% CI: 0.49, 0.82), and 1.00 (95% CI: 0.98, 1.01) overall, and for Canada, and the US, respectively. Reporting rates of black ducks in both the US and Canada have increased since they were last investigated (Garrettson et al. 2014), but a substantial gap between the two countries remained.

We also reported on issues that affected the US Bird Banding Lab’s servers on two multiple-day occasions during the fall of 2021. Services disrupted included the reportband.gov site, the BBL bander portal, and BBL’s access to its Oracle databases. The first issue involved an electrical switch, and the second, problems with their internet provider(s). The BBL has taken steps to mitigate damage from these incidents, including accepting reports by email during outages, posting a warning about the outage on its home page, resending auto-emails that were generated during the outages, and they are asking for emergency contacts from a few Federal/State biologists to more easily get the word out in case of another outage. BBL chief Tony Celis-Murillo reports that they have gotten considerable support for a long-term fix for these issues from the new Center director (Tom O’Connell), assistant director (Brian Richardson), and IT chief (David Orlovitz), and they are exploring various solutions such as cloud-based servers and mirror sites.

5.5 Modeling black duck harvest rate distributions (John Yeiser)

Predicting the expected harvest rates of black ducks under different policy packages is an important component of annual black duck harvest policy optimization. For many of the years where black duck adaptive harvest management has been implemented, Canada has pursued “moderate” policies and the U.S. has pursued “restrictive” policies. Over the last several years, however, both Canada and the U.S. have implemented more liberal policies (“liberal” packages in Canada and “moderate” packages in the U.S.).

Initially, because these policies were uncommon, there were not enough empirical data to understand how these policy changes would impact harvest rates in either country, so we assumed that liberalization of harvest policy would increase adult male harvest by 30%. As more years of data have been collected on harvest, this assumption has been validated for the U.S. but not for Canada. In fact, using our current methodology (Bayesian updating), we would expect lower harvest in Canada during liberal policy years compared to moderate policy years. This is counter-intuitive, and it triggered a closer look into the Canadian harvest of black ducks.

After initial data inspection, we explored fitting a linear regression model to Canadian harvest data over time. We included policy and time as covariates. We found that there was strong evidence for a decrease in Canadian harvest over time as well as an increase in harvest with liberalization of policy. By accounting for this decrease in harvest over time, we were able to predict that moderate policies indeed would produce lower harvest than liberal policies for the 2022-2023 hunting season. However, overall expected harvest for both policy alternatives decreased markedly compared to previous estimation.

Another important component of black duck policy optimization is the parity constraint, where harvest in either country is restricted to be within 40-60% of total harvest. Since the predicted Canadian harvest under liberal policy packages was now much lower than before, this parity constraint was triggered during the optimization, causing optimal harvest policies in the U.S. to become much more restrictive. We brought this issue to the Black Duck Adaptive Harvest Management Working Group and the Black Duck Joint Venture technical committee. Both bodies agreed that reductions in harvest in one country as a result of low harvest in another country was not the original intent of the parity constraint, and discussions on how to revise this constraint are ongoing. From a technical standpoint, the Branch of Assessment and Decision support will dedicate efforts to further develop harvest rate estimation for both Canada and the U.S.

6 HMWG Priority Actions and Work Plan

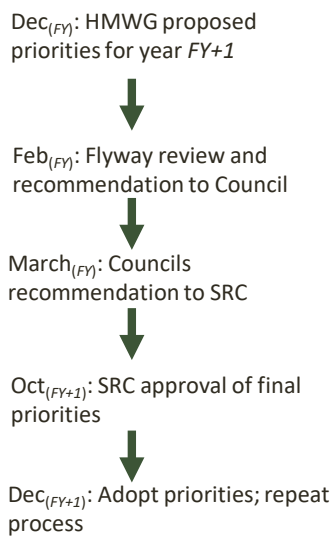
The HMWG opened up a discussion to review the annual process for identifying and finalizing HMWG priorities. Because of the changes in meeting schedules associated with the SEIS ([U.S. Department of the Interior 2013](#)), the revised timeline was developed ([Figure 4](#)) and allows for more discussion of work progress between Technical Sections, Councils, and SRC members and admits a process for which new priorities can be proposed throughout the year.

Progress reports on many of the FY2021 priority action items associated with [HMWG Priorities](#), were presented at this year's meeting. In addition, new priorities were not considered or proposed during this year's discussions. The HMWG noted that additional work items that the Service or the Flyways would like to see addressed that are not included in these actions would necessarily delay completion of the highest priority tasks.

6.1 2022 HMWG meeting

The next HMWG meeting will be hosted by the Central Flyway in Corpus Christi, TX, from 11–15 December 2022.

Previous Schedule



Adopted Schedule

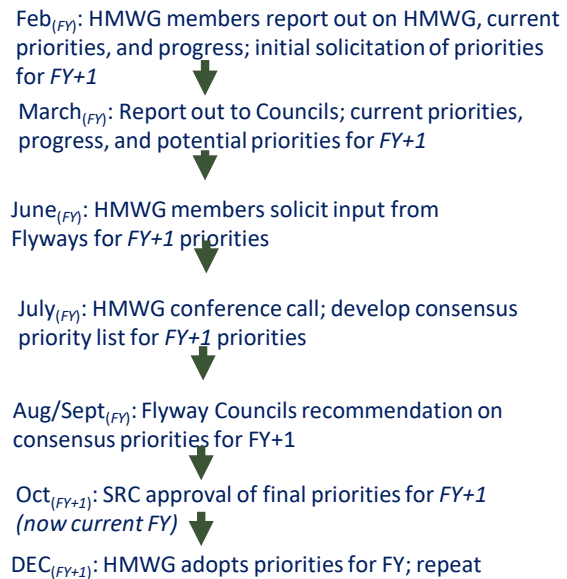


Figure 4 – A revised timeline for updating the Harvest Management Working Group Priorities.

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Harvest Management Working Group 2021 Meeting Agenda Virtual

Tuesday 7 December 2021

- 11:00 Welcome, introductions, logistics, agenda (Boomer, Kraai)
- 11:15 Flyway reports
Atlantic, Mississippi, Central, Pacific (State Technical Representatives)
US Fish and Wildlife Service (Flyway Representatives)
Canadian Wildlife Service (Roy)
US Fish and Wildlife Service DMBM/BADS (Seamans)
US Fish and Wildlife Service BMDM/BADS (Fleming)
Canadian prairie region mallard harvest management plan (Leafloor)
- 13:30 BREAK
- 14:00 Partner updates
NAWMP NAWMP Committee update (Sanders)
NAWMP Integration (Eggeman)
Human Dimensions Working Group ()
National Science Support Team (Kraai)
Communication team (Huang)
Two-tier license system update (Murano and Garrick)
Integrating human dimensions (Berl)
Time-dependent optimal solutions to address system change (Ashander)
- 16:30 Adjourn

Wednesday 8 December 2021

- 11:00 Pintail AHM revision
Recap (Runge)
Equilibrium analyses/optimization
Decision analyses
- 13:30 Break
- 14:00 Reconsideration of North American duck harvest management
History of multi-stock discussions at HMWG meetings (Boomer)
Survey results (Stiller, Phelps, Szymanski, Reishus)
Problem framing (HMWG)
Draft objectives hierarchy (HMWG)
- 16:30 Adjourn

Thursday 9 December 2021

- 11:00 Meeting recap (Boomer)
Pintail AHM revision - next steps
Reconsideration of N. A. duck harvest management - next steps
2021 BPOP imputation procedures (Yeiser and Otto)
Eastern mallard harvest strategy development (Roberts)
Incorporation of citizen science information into population estimates (Howell)
- 13:30 Break

14:00 Reward banding update (Garrettson)
Modeling black duck harvest rate distributions (Yeiser)
Finalize HMWG Terms of Reference (HMWG)
HMWG Priorities (HMWG)
Plans for 2022: action items and task assignment (HMWG)
Next meeting: location (Central Flyway: Austin, TX), date, topics...
16:30 Meeting summary and parting thoughts (HMWG)
16:30 Meeting Adjourned

Summary of the Harvest Management Plan for Mallards in Prairie Canada

- INTRODUCTION

The Harvest Management Plan for Mallards in Prairie Canada was developed jointly by the Canadian Wildlife Service and the governments of the Prairie Provinces in 2021. Based on long-term declines in hunter numbers, and the small contribution that prairie Canada makes to continental Mallard harvests, this plan aims to prevent unnecessary amendments to the schedule of the *Migratory Birds Regulations* (hunting regulations), and it will be used to determine the appropriate Mallard harvest regimes.

Mallards are the most commonly harvested duck species in all Prairie Provinces, and they have consistently accounted for more than half of the total duck harvest across the region since 1969. By comparison, no other species of duck accounts for more than 10% of the harvest. Harvest management of Mallards in prairie Canada has been guided by the Prairie Canada Mallard Harvest Strategy (Canadian Wildlife Service 1993), which was drafted following a period of prolonged drought on the prairies, and during an era of much larger hunter numbers. Since the 1970s, major changes have occurred in waterfowl hunter numbers and harvest; active waterfowl hunters in prairie Canada have declined by 73%, from a high of almost 165,000 in 1976, to less than 42,000 in 2018. Over the same time-period, Mallard harvest has declined by 77%, from a high of 1.15 million, to less than 300,000 in 2018.

The old Prairie Canada Mallard Harvest Strategy was recently updated to:

- 1) develop a regionally consistent, transparent approach to the regulation of duck hunting in prairie Canada;
 - 2) better document the use of harvest rate thresholds and minimum population size thresholds for making harvest management decisions, similar to the way they are used in modern goose management plans; and
 - 3) describe annual monitoring requirements.
-); and
3).

Following the National Guidelines for Establishing Migratory Game Bird Hunting Regulations (Canadian Wildlife Service 2017), our goal was to ensure that: (1) mallards were harvested at sustainable levels, with due respect for their traditional use, (2) regulations were simple, stable, and easily enforceable, and (3) regulations did not discriminate by provincial/territorial residency of Canadian hunters.

- MALLARD HARVEST REGIMES

The Harvest Management Plan is designed to identify appropriate Mallard harvest levels in Canada by attempting to maintain abundance and harvest rates within historical bounds. Thresholds were identified based on 60 years of monitoring data and harvest management experience; this included a lower threshold for mallard abundance, and an upper threshold for harvest rate. The abundance threshold represents the lowest 3-year average abundance of mallards observed since spring surveys began in 1955, and we know from previous experience that mallards were able to recover from this low level after the last period of drought ended in the early 1990s. The harvest rate threshold represents the historical level of take in prairie Canada during a time when hunter numbers were much higher than they are today. If mallard populations fall below the abundance threshold, and harvest rates exceed historical levels, then harvest restrictions would be put in place.

The management plan consists of two pre-defined regulatory packages:

Liberal Regime

When the 3-year running average of the WBPHS (strata 20-40, 75-77) exceeds 3.4 million Mallards, and the 3-year average harvest rate of adult male Mallards banded and shot in prairie Canada is below 5%, liberal harvest regulations will remain in place, or will be prescribed at the next opportunity for regulatory changes. Changes will be in place for at least one regulatory cycle (2 years).

Liberal regulations are defined as:

- daily bag limit of 8 ducks, for residents or non-residents, 8 of which may be Mallards of either sex
- a maximum season length of 107 days

Restrictive Regime

When the 3-year running average of the Waterfowl Breeding Population and Habitat Survey (WBPHS; strata 20-40, 75-77) falls below 3.4 million Mallards, and the 3-year average of the harvest rate of adult male Mallards banded and shot in prairie Canada exceeds 5%, restrictive harvest regulations will be prescribed at the next opportunity for regulatory changes. Restrictions on bag limit, hunting season dates, or a combination of the two will be imposed, commensurate with the proportion that the harvest rate threshold has been exceeded. Changes will be in place for at least one regulatory cycle (2 years).

There are two distinct restrictive regimes, and they are defined as:

Restrictive-1

Any combination of:

- non-resident daily bag limit of 2-7 ducks (2-7 of which may be Mallards of either sex) and a non-resident season length of 31-107 days

Restrictive-2

Any combination of:

- resident daily bag limit of 2-7 ducks (2-7 of which may be Mallards of either sex) and a resident season length of 31-107 days;
- closure of the non-resident season.

Restrictive hunting regulations will only be considered in the event of historically low populations of breeding Mallards, coupled with unusually high harvest levels, which collectively have never been experienced over the monitoring history of this population (Figure 1). In the event of restrictive regulations, non-Canadian residents will incur restrictions first. Non-residents account for about half the total duck harvest in prairie Canada, and provincial policies in all 3 provinces prioritize resident hunting opportunity (Manitoba Department of Mines, Energy, and Natural Resources 1979, Alberta Fish and Wildlife 1982, Saskatchewan Ministry of Environment 2017).

• MONITORING

For population monitoring purposes, Mallard abundance estimates from strata 20-40 and 75-77 of the WBPHS will be used as an index of population size. Mallard populations in prairie Canada undergo annual fluctuations in response to variation in wetland conditions. The lowest 3-year mean population size was 3.4 million (1984-86), and this will represent the low population threshold for the purposes of this harvest management plan, below which hunting restrictions may be considered (Figure 1). Importantly, the history of monitoring indicates that the population was able to recover to historically high levels after reaching this low in the mid-1980s. The current 3-year mean population size (2017-2019) is 5.49 million Mallards.

Adult male Mallards, banded in prairie Canada in July and August, and recovered in prairie Canada between September 1 and December 21 will be used for monitoring harvest rates. Harvest rates of Mallards in prairie Canada peaked in the late 1960s at 5-6%, then declined until the early 1990s, and have been relatively stable at about 1% since then (Figure 1). On a continental scale, harvest rates of adult male Mallards banded in prairie Canada have been relatively stable at about 10% since the early 2000s, but were greater than 20% during their peak. To determine sample size requirements for Mallard banding to support this harvest management plan, we conducted simulations of precision across various

sample sizes using a threshold harvest rate of 5%, and a band reporting rate of 90%. Simulations revealed a coefficient of variation of 10% with ~2500 bandings, and associated 95% CL around a 5% harvest rate were estimated to be $\pm 0.9\%$ at 2500 bandings. Therefore, the objective is to band 2500 adult male Mallards each year, distributed across prairie Canada.

Harvest rates and breeding population indices will be updated on a biennial basis, and the harvest management plan will be reviewed and, if necessary, updated or modified every 5 years.

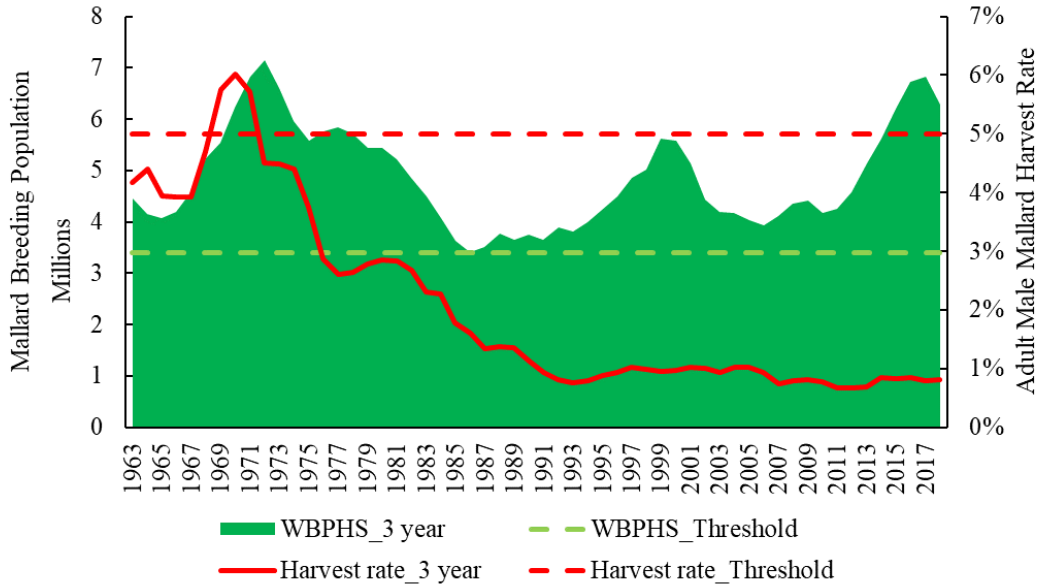


Figure 1. Trends in breeding population size (3-year mean) and harvest rate (adult male; 3-year mean) of Mallards in prairie Canada, in relation to the proposed population threshold (3.4 million) and harvest rate (5%), 1963-2019.

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Unified Science Team Virtual Meeting Notes
Tuesday, 4 May 2021 (2 hours)

A. Pacific Flyway Integrated Landscape Conservation: Meeting the Needs of Waterfowl, Shorebirds and Waterbirds in a New Era of Water Scarcity (Matt Reiter, Mark Petrie).

Initial phase of project of integrating between the SONEC region and Central Valley. Advisory team developed and set the following objectives.

- 1) Document monthly changes in waterfowl & shorebird habitat over the past 37 years.
- 2) Identify risks to surface water supplies important to waterfowl, shorebirds and other wetland dependent birds.
- 3) Evaluate how these risks to surface water supplies would impact waterfowl & shorebird carrying capacity.
- 4) Evaluate how a decline in surface water supplies within one landscape may compound challenges for waterfowl and shorebirds in the other landscapes.
- 5) Integrate management scenarios across the three landscapes and determine the conservation actions needed to maintain the overall resilience.

Questions related to carryover effects, inclusion of Eadie's SWAMP model, and inclusion of Motus in the Klamath Basin. Updated CVJV Implementation Plan is available at https://www.centralvalleyjointventure.org/assets/pdf/CVJV_2020_Implementation_Plan.pdf. See <https://www.srs.fs.usda.gov/pubs/60724> for an example of landscape change in southwestern Oregon.

B. Integration in Grasslands (Jim Giocomo, Graeme Patterson)

Grassland Work Group Gap Analysis (Central & Mississippi Flyways). Survey to state, national, federal or NGO private lands programs (map of programs – <https://arcg.is/XTT4i>; StoryMap - <https://arcg.is/1ba895>). Objectives were:

- 1) Map multi-national grassland habitat programs and bird conservation efforts
- 2) Provide a snap-shot of current projects addressing declines in grassland species
- 3) Help determine where collaboration efforts & funding are needed in North American grassland landscapes.

Summits for developing roadmaps for recovering grassland species were held in the Mississippi Flyway (www.msflywaygrasslandssummit.com) and Central Flyway (www.grasslandsroadmap.org). A Constellation Governance Model is described as a way to include multiple partner/stakeholder involvement.

On a regional scale, the JV8 was formed to engage and expand Migratory Bird Joint Venture partnerships across North American for the stewardship of native grassland ecosystems in the midcontinent (<http://www.Jv8.org>).

C. Team 2 Report - Integration among Bird Groups within JVs (co-chairs – Brad Andres, Mark Petrie, Greg Soulliere, Josh Vest)

A series of questions were developed and presented to the JV Coordinators and other staff that focused on:

- 1) If and how integration occurs (species, habitats or both), development of explicit objectives, strength of the biological foundation for bird groups, and the basic planning unit (BCR, else)?
- 2) What is the scale of integration and have efficiencies been achieved?
- 3) Are adequate delivery programs available for all birds?
- 4) What are the barriers for addressing species?
- 5) Is effectiveness evaluated and at what scale?
- 6) Do you have existing or planned examples of landscape-scale or bird-habitat association integration?

The process for collecting information from the JVs was:

- 1) Email sent to JVCs explaining project with questions
- 2) Virtual interview scheduled with JVC and sometimes other staff
- 3) Some interviews recorded; transcribed results
- 4) Team will be working on standardizing summarizing results
- 5) All teams working on draft report over the summer
- 6) 19 out of 21 interviews conducted

D. Team 3 Report – Integrating Human Dimensions and Bird Conservation Objectives (co-chairs – Jessica Barns, Ashley Gramza, Mark Petrie)

Like Team 2, interviews were conducted with JV staff and partners, which included a set of pre-interview online questions. The main purpose was to assess how human dimensions is be integrated into planning and delivery within the JVs. Questions posed to the JVs focused on:

- 1) the extent and nature of social science in implementation plans, including assumptions about attitudes
- 2) current capacity and challenges to integrate social information into planning
- 3) capturing and sharing JV experiences with integrating social science
- 4) assessing the openness to include social science in the Joint Venture conservation enterprise

For both teams, templates will be developed to standardize assessment of interview responses. One of the positive outcomes of the interviews were the conversations with JV staff. Beyond birds, there are good examples of integration across other taxa and inclusion of ecosystem services.

E. Comparing Waterfowl Objectives (and Spatial Data) of UMGLJV Decision Support Tool and new NSST Regional Priority Landscapes Planning Tool (Greg Soulliere, UMGLJV)

Waterfowl populations and social aspects are fundamental objectives that can be integrated via targeted habitat delivery (i.e. quantity, quality and placement).

In the broadest sense, patterns of priority landscapes identified by the JV and NSST tools were similar across the JV region. However, some differences were apparent because objectives (and associated spatial data) differed between UMGLJV tool and NSST tool. Spatial resolution was also greater with the regional UMGLJV tool, related to data input.

Biggest difference in objectives (and spatial data) were for non-breeding waterfowl, which lead to map products that differed far more than breeding season maps generated by each tool.

UMGLJV regional model was developed as a simple, understandable (for JV partners) framework that can be adjusted to incorporate other spatial layers to address additional objectives. In Wisconsin, for example, additional layers were used to develop a state-level step-down plan, where landscapes were characterized as conservation capital (retention focus) or conservation opportunity (restoration focus). The latter included parameters for hunting, birding, and ecosystem services like fisheries, carbon sequestration, and natural cover.

F. Applying the new NSST Regional Priority Landscapes Planning Tool to the Eastern Habitat Joint Venture region (Tania Morais)

No Decision Support Tool for prioritizing landscapes in the EHJV. Only have a Coordinator, no science staff but do have a science team. Currently revising the implementation plan. The NSST model includes the objectives of increasing abundance of priority landscapes and incorporating hunter recruitment, retention and reactivation and bird viewing opportunity.

Hunter elements may not be as important in the EHJV as in the USA, and social inputs might be different. Identified important areas may not have conservation opportunities for habitat actions. Will continue to work on refining and revising map.

Questions/Comments: Priority Landscape tool is useful for stimulating conversation within JVs. National Wildlife Refuges are using the tool in allocation assessments. How often and how to update the data? Initial model was viewed as a demonstration project. Long-term viability of model updates and "ownership". Tool is likely most effective at the regional level, but there is a need to have a consistent assessment at the continental scale? Future discussion is needed.

G. Team 1 Report – Establishing Full Annual Cycle Conservation Objectives for all Bird Groups (Mike Brasher, Josh Vest)

A number of actions were identified under this theme in the UST work plan. To date the majority of work has been on evaluating alternative methods and data sources (e.g., eBird) to develop migration chronology curves. The notion is to develop these across JV regions. Effort has been volunteer driven, and next steps will require dedicated effort to move this topic forward. Funding support is being pursued to support a post-doc at Cornell. Code has been written to get abundance information at one- to two-week timeframes by drawing a polygon around the region of interest. Gulf Coast and Intermountain West JVs are working with eBird data and testing against other more structured datasets. Report might be high-level guidance on inter-regional coordination re partnerships and biological aspects. Also, develop a case study that focuses on coordination between and among JVs. Need to take lessons learned from the waterfowl experience and apply to other bird groups, after assessing the need and value to JVs.

H. Actions

- 1) Need to replace (recently promoted) Jim Giocomo as JVC representative on UST Executive Committee.
- 2) AFWA PIF/Waterbird/Shorebird Working Group task to generate a high-level, continental, broad-scale list of critical threats to migratory birds (John Alexander) following the Conservation Standards process (<https://www.conservationmeasures.org/>). The northeast states sponsored the work in this link, standardizing threat and conservation action language so that State Wildlife Action Plans could be more easily combined. There is an ongoing project to provide further information on threats and actions for the regional species of conservation need in a database that can be queried (see <https://rcngrants.org/content/northeast-regional-conservation-synthesis-state-wildlife-action-plan-revisions-0>).
- 3) Meeting was recorded but ended up being too large to upload on YouTube
- 4) Develop template/process for collating and summarizing interview information (Team co-chairs)
- 5) Upcoming meetings (virtual or in-person or both)
 - a) present results and conclusions from team reports
 - b) review actions associated with theme 1
 - c) review and revise 2018-2022 work plan relative to report conclusions and theme 1
 - d) discuss maintenance and updating NSST Regional Priority Landscape tool

I. Participants

Last Name	First Name	Primary affiliation
Alexander	John	PIF
Andres	Brad	USSCP
Avers	Barb	MI DNR
Barnes	Jessica	NABCI
Bartuszevige	Anne	PLJV
Brasher	Michael	NSST
Brewer	Gwen	ATL FLY
Correll	Maureen	ACJV
Dettmers	Randy	PIF
Devries	Jim	PHJV
Eggeman	Diane	NAWMP IC
Fitzsimmons	Owen	CEN FLY
Franco	Jesus	RGJV
Giocomo	Jim	OPJV
Gramza	Ashley	PLJV
Green	Mike	USFWS
Gregg	Ian	ATL FLY
Hagy	Heath	NWRS - SE
Haverland	Amanda	OPJV
Huang	Andrew	CIJV/CPBHJV
Humburg	Dale	NAWMP
Keller	Becky	AMJV
Kraai	Kevin	NSST
Lancaster	Joe	GCJV
Martin	Kate	SDJV
Matthews	Anna	OPJV
Mini	Anne	LMVJV
Morais	Tania	EHJV/BDJV
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Olson	Dave	NSST
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Patterson	Graeme	JV8
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Raedeke	Andy	MIS FLY
Reiter	Matt	USSCP

Last Name	First Name	Primary affiliation
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Ringelman	Kevin	LSU
Roberts	Tony	NAWMP
Smith	Noelle	CEN FLY
Soulliere	Greg	UMRGLJV
Thogmartin	Wayne	NSST/PIF
Varner	Dana	RWBJV
Vermillion	Bill	USSCP/GCJV
Vest	Josh	PPJV
Wightman	Catherine	NGPJV
Yarris	Greg	CVJV

FY2022 Harvest Management Working Group Priorities

Table 2 – Priority rankings and project leads discussed at the 2021 Harvest Management Working Group.

Priority Level	Status	Participants
Highest Priorities (Urgent and Important)		
Northern pintail AHM revision	On-going	Flyway Councils, DMBM, USGS
Reconsideration of North American duck harvest management	On-going	Flyway Councils, DMBM
Evaluation of experimental two-tier license system	On-going	Central Flyway, DMBM
Development of an eastern mallard harvest strategy	On-going	Atlantic Flyway, DMBM
Re-invigorating institutional support for AHM	On-going	DMBM, HMWG communications team
Long-range Priorities (Non-urgent, but Very Important)		
Time-dependent optimal solutions to address system change (e.g., habitat change; hunter dynamics; climate change).	On-going	USGS, BADS
Western mallard AHM revision	On-going	Pacific Flyway, BADS
Additional Priorities		
Waterfowl Banding needs assessment	On-going	BADS, USGS, Flyway Councils
Waterfowl harvest potential assessment methods case study development	On-going	Atlantic Flyway Office, DMBM

Harvest Management Working Group Members

This list includes only permanent members of the Harvest Management Working Group. Not listed here are numerous persons from federal and state agencies that assist the Working Group on an ad-hoc basis.

Coordinator:

Scott Boomer

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