Harvest Management Working Group

2011 Annual Meeting Report

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Compiled by:

G. Scott Boomer
U.S. Fish & Wildlife Service
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Cover art: Joseph Hautman's painting of a wood duck (Aix sponsa) was selected as the 2012 Federal Duck stamp.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 BACKGROUND

This report provides a summary of presentations and discussions that occurred at the 23rd meeting of the Harvest Management Working Group (HMWG). The theme of the 2011 meeting focused on work planning for large-scale issues that may impact current decision-making frameworks resulting from rapid changes in the social, biological, and environmental landscapes that support waterfowl management. The HMWG discussed several important topics that are directly relevant to current decision-making protocols, including the Draft Supplemental Environmental Impact Statement on the Issuance of Annual Regulations Permitting the Hunting of Migratory Birds (SEIS), the current draft of the North American Waterfowl Management Plan (NAWMP) Revision, and the double-looping process of Adaptive Harvest Management (see attached 2011 HMWG Meeting Agenda). The HMWG also discussed and finalized a Terms of Reference and discussed the prioritization of future technical work and communication efforts (see attached HMWG Terms of Reference).

2 REPORTS FROM PARTNERS

2.1 Atlantic Flyway (*Min Huang and Bryan Swift*)

NAWMP Revision

The Atlantic Flyway generally supports the ideas and directions contained within the Revision. We agree that habitat, waterfowl populations, and humans are inseparably linked and that integrating the three is paramount to the future of our endeavour. Since the release of the Joint Task Group report the AFC has repeatedly been on record in support of the integration of the waterfowl management enterprise. We support the ultimate formation of a Human Dimensions working group, but would urge that the objectives, bounds, and working context of this group be defined well in advance of its formation. We think that it is imperative that we move forward with a formal integration of habitat and harvest management objectives, but also feel that it is premature to formally incorporate measures of human dimensions at this point in time.

We did have several reservations about the initial draft. These included the lack of discussion or even mention of the ecology and biological needs of our shared waterfowl resource. This is in stark contrast to past updates and something that needs to be included. The greatest threat to waterfowl is the continued erosion of the habitat base from both the political front and continued changes on the ground. Shifting budgetary priorities and legislative agendas may result in drastic detrimental changes to the wetlands and associated uplands that our waterfowl resource relies upon. However, only cursory mention of habitats and habitat protection is given within the text of the Revision. There was way too much mention of institutions and process. This, in our opinion, does not in any way instil a sense of inspiration about the waterfowl management enterprise or the resource itself. We find this a bit troubling, particularly if one of the fundamental objectives of the Revision is to recruit new constituents. Further, as written, the Revision seems to target the scientific community, not the lay person, whom it seems the Revision really wants to include as a partner.

We felt that more needed to be included on the past and current success of the Plan. There have been many great accomplishments and those need to be celebrated as we move forward. How are we to recruit and include new partners if we don't inspire them to a worthy and successful cause? We need to see the Action Plan.

As we move forward with formal integration, the Federal agencies need to take the lead in allocating existing resources to achieve the technical and policy decisions that lie in front of us. Envisioned efficiencies will not be realized by creating more bureaucracies and entities. The technical capacity currently exists within the various working groups (e.g., HMWG, NSST) and Plan partners (e.g., state agencies, NGO's) to develop integrated models, at least on the habitat and harvest management side of the equation. The technical working groups need guidance and marching orders from the Federal agencies and the Flyway Councils as to what the priorities are and where to begin the technical work that needs to be completed to fulfill the vision in this Revision.

Eastern Mallard Model

Along with Guthrie Zimmerman, Paul Padding, and Pat Devers we continue our assessment and revamping of the Eastern mallard AHM models. This assessment indicates that the current Eastern mallard AHM models are not performing in a satisfactory manner. Too frequently, the observed BPOP decreased when the models predicted an increase, or vice versa. The assessment also indicates that density dependence, at least as a function of productivity, may not be an important factor in Eastern mallard population dynamics at the current scale of analysis. This inability to detect a strong density dependence signal may be due to a number of factors (data bias, monitoring scale, system change). The changing weights of the current model set and the shift towards the models that posit a lack of or weak density dependence have resulted in a change to a very conservative optimal harvest policy, with a mallard BPOP threshold of 700,000 for a restrictive season and a 675,000 closure threshold. If we were to use model parameters that this assessment recently updated, the optimal harvest strategy would call for a closed season when the BPOP was as high as 900,000 birds, a level that we have never observed in the Northeast plot survey area, and is in the upper limits of what is observed throughout North America. This year's estimate was 746,000, and just one year ago (with prior model weights) the harvest strategy did not call for anything less than a liberal (60-day) season at or above 400,000 birds.

Regardless of the cause, a lack of demonstrable density dependence renders our use of AHM with the current model set and a long-term objective of maximizing cumulative harvest inappropriate.

Given the results of this assessment and the current state of the AHM process, the Atlantic Flyway is beginning a thorough discussion of just how we should be setting our duck hunting regulations. For instance, should we continue to base our regulatory structure solely on Eastern mallards, or perhaps a suite of species (multi-stock management)? If the latter, a concerted effort on the part of the AFMGTS and the USFWS will have to occur to make this a plausible reality in the near to midterm. Is an AHM approach appropriate, given the seeming lack of density dependence that we can detect? If so, we need to develop new alternative models that might better capture density dependence, perhaps on the survival side.

A more basic question and higher priority that the Atlantic Flyway is in the process of addressing is identifying our overall objectives for duck harvest management in the AF. To that end, we are in the initial steps of an SDM exercise to develop the fundamental objectives for the underlying foundation for our regulatory process in the AF. We will be discussing those and the next steps such as development of an alternative suite of population models, at this meeting.

SEIS

We eagerly await the Final EIS and hope that the comments put forth by all 4 Flyway Councils have been given careful consideration in the formulation of the Preferred Alternative. We stand ready to assist in any technical and policy work that will arise from implementation of the Preferred Alternative. The SEIS and the current review and assessment of the Eastern mallard model set and objectives is timely and hopefully large scale adjustments to the Eastern mallard AHM process will coincide with the timelines set forth in the SEIS.

Zones and Splits

Only 2 states in the AF, Maine and New Hampshire are interested at this time in any changes to their zone and split configurations.

2.2 Mississippi Flyway (*Larry Reynolds and Adam Phelps*)

SEIS

At the winter 2011 meeting, the Mississippi Flyway Council (MFC) and Technical Section (MFCTS) further discussed the draft SEIS and sent comments to the USFWS. Of the 7 issues, the Mississippi Flyway (MF) supported the USFWS preferred alternatives for all but the schedule and timing of the general regulatory process for which we supported the no-change alternative. However, the MFC indicated it may support the USFWS preferred alternative of promulgating annual regulations using a single process based on prior year data or model-based predictions if concerns about implementation are addressed. Those concerns include defining extreme or unexpected circumstances that would cause changes in regulations after annual data are collected, timing of the single-process technical meeting, potential reduction in hunting opportunity due to increased uncertainty from using prior year or predicted data in harvest management strategies, and the significant challenges of communicating such a change to constituents. At the summer 2011 meetings, some limited simulation information was presented suggesting there would be little lost opportunity from using a single process, but additional information is desired.

In supporting the USFWS preferred alternatives for both zones and split seasons and frequency of review and adoption of duck regulatory packages, the MF expressed a preference for having those 5-year periods out of sync so changes in both are not considered at the same time. Also in expressing support for the USFWS preferred alternative for use of stock-specific harvest strategies, discussion included desire for caution in any expansion of species-specific harvest management strategies. That caution was revisited in discussions of a proposed change in daily bag limit for redheads and an associated harvest management strategy this past summer, which was not supported unanimously by the Upper Regulations Committee and did not pass the Lower Regulations Committee. However, MFC has directed the Diving Duck Committee to prepare a prescribed redhead harvest strategy to guide future decisions.

Lastly, the MF continues to support the inclusion of Human Dimensions in the SEIS and included considerations for such in comments to the USFWS. The fundamental objective of waterfowl management shared by all Flyways of maintaining or expanding the number of waterfowl hunters and others who support waterfowl and wetlands conservation likely requires it. Although we consider human dimensions implicitly in our harvest management decisions, the fact that we are losing hunters while waterfowl populations are high and harvest regulations liberal suggests we need to consider additional and/or different ways to incorporate potential impacts on hunter participation and satisfaction into our regulation-setting process.

NAWMP Revision

The MF had very little discussion of the revision over the past year, and although the draft document was available for review at the time of the summer meetings, few members considered it until shortly before the comment period deadline in September. The following is a brief synopsis of the comments forwarded to the NAWMP Revision Steering Committee from the MFC which show the perspective of the MF on a number of associated issues:

(1) The document is vague about changes to be implemented to more efficiently direct or redirect resources to meet fundamental goals. We understand the details are to be included in a forthcoming action plan, but it is difficult to evaluate this document without them.

(2) The assertion regarding current inefficiencies and other problems inherent in waterfowl management are not well supported. Documentation of those problems in our current system and how integration of habitat management, harvest management, and human dimensions would address those problems should play a more dominant role in this document to make a compelling argument for implementation, which we find lacking.

(3) We do not believe lack of integration or coherence of habitat management, harvest management, and human dimensions is the greatest challenge facing waterfowl management. We think the greatest challenges are habitat loss and degradation and the public policy and funding to address them.

(4) The 3 goals are appropriate, but relative importance is unclear because of the critical linkages between them.

(5) Population goals are the most important and easily measured, and the habitat required to maintain those populations has been the underpinning of the NAWMP since the beginning. We think the desire for harvest and habitat management to be linked through population goals is a major focus of this revision, but we do not believe populations are affected much by hunting regulations. Consequently, we are uncertain of how that integration will actually function in terms of harvest or habitat management actions.

(6) Specific objectives for hunter recruitment and retention are not established, and methods to measure and track retained or recruited hunters are not clear. Given the 3rd goal, it seems necessary to expand inclusion of human dimensions in this process to at least identify meaningful measurable objectives. The plan is not clear about intended scale, but we believe that the state is the appropriate level for recruitment and retention efforts.

(7) What do we mean by " "engage a broader constituency"? We probably don't engage hunters as well as we should, and it is not clear what we want from non-hunters. Most of our discussions include finding financial and policy support from non-hunters. Concern was raised about conflicts between hunters and non-hunters regarding management priorities.

(8) Without clearly demonstrated inefficiencies that will be addressed by integration, we are concerned that integration will lead to increased bureaucracy and impediments to progress for each discipline. The addition of the Integration Technical Team (ITT) seems counter to a streamlined, more efficient waterfowl management process.

(9) To make waterfowl management more efficient, effective and responsive, we look to the Joint Venture model of incorporating various organizations with different but related expertise if that is deemed necessary. We need clear population goals and on-going habitat assessments; additional human dimensions information on what influences hunter recruitment and retention; and secured funding sources for habitat conservation.

(10) Without clearly demonstrated benefits from implementing this new NAWMP, we aren't certain that current institutions need to be changed.

(11) We strongly support the formation of a Human Dimensions Working Group and associated tasks starting with identifying methods for measuring, tracking, and influences on hunter recruitment and retention.

(12) The ITT is tasked with much of the foundational work for integrated waterfowl management, and the Flyways should have explicit input and representation.

Other Issues

Along with those explicitly stated in the SEIS and NAWMP Revision discussions, the MF continues to have some additional concerns:

- That the effectiveness of some species-specific regulations is questionable given the rudimentary duck identification skills of most hunters. Consequently, we question whether those regulations obtain the desired effect.
- That complicating regulations via species-specific harvest strategies, season closures, and partial seasons, may negatively affect hunter participation and satisfaction without clear benefit to population status.

- That maximizing long-term cumulative harvest may not be the best means objective for achieving the MF's fundamental objectives.
- That a time-table for the review and/or revision of regulatory packages continues to be delayed.
- That we still have not developed a strategy for dealing with the difficult communications issues that will likely arise when the duck season becomes Restrictive, especially if the Moderate package is not used.

2.3 Central Flyway (*Mike Johnson and Mark Vrtiska*)

The 2011 regulatory year has seen the "unveiling" of the draft Supplemental Environmental Impact Statement (SEIS) on migratory bird hunting and the gathering of input for the revision of the North American Waterfowl Management Plan (NAWMP). As stated last year, we anticipate that these two documents will - together or separately - impact waterfowl management for years to come. The Central Flyway (CF) is anxious to see how the recommendations and actions from each unfolds. We appreciate the opportunity to respond and provide input on both of these important efforts, and we currently are in the midst of discussing both of these topics within the CF but also with the other Flyways. We are hopeful that these two endeavors will bring forth necessary change and address some of our concerns we have expressed in the past, such as stock-specific management, the proliferation and integration (or lack thereof) of new duck harvest strategies, and waterfowl hunter recruitment and retention.

The CF remains very concerned about waterfowl hunter recruitment and retention and what the continued declining trend in hunters may mean for the management and the future of waterfowl and waterfowl hunting traditions. This past year, the CF Council [again] passed a recommendation for the formation of a Human Dimensions Working Group (Recommendation #9, July 2011). We realize this is not an easy or simple task, as even within our own Flyway we have had vigorous discussion about the objectives, composition and supervision of such a group.

Commensurate with the formation of a HDWG, we've also initiated discussion about new or different duck regulations that may promote hunter recruitment and/or retention. Further discussion and fleshing out more details about potential options or strategies will take place at our working meeting in two weeks. We believe that time is of the essence in dealing with the decline of waterfowl hunters. We've enjoyed the longest period of lengthy duck seasons since the formation of Flyway councils. Just how much waterfowl hunter recruitment and retention efforts are we prepared to do or can we do when seasons become restrictive?

We are becoming increasingly concerned about the quality of the banding recovery data base because of a number of issues. These include band collecting, the targeting of banding sites by hunters to shoot banded birds, production of fake bands and markers, selling of bands and markers, selling of unreported bands and markers, and reporting false recovery information from purchased bands. These types of activities appear to have increased in recent years because of the internet. We believe they may have serious implications to one of the most important monitoring programs. The issue needs to be addressed first, to gather better information on the extent of the problems and second, if it is a serious problem, then how do we go about fixing it?

The CF has been and will continue working on issues regarding resident Canada and light goose overabundance. Both of these issues will take considerable discussion and effort within and across Flyways. The CF is initiating a 3-year Flyway-wide "resident" CAGO banding program beginning this year. We have asked west-tier Mississippi Flyway (MF) states and Manitoba to continue CAGO banding during this period to help us better understand the population dynamics and harvest of birds that cross Flyway boundaries.

The CF is interested in developing a redhead harvest strategy, in cooperation with the other Flyways, which will allow our hunters additional hunting opportunity for these abundant birds.

Finally, specific to this group, the CF would like to see continued work (e.g., recruitment models) on mid-continent mallards. While other duck harvest strategies and management issues have arisen that required

attention, work on mid-continent mallards has obvious implications to our Flyway - as well as the MF - and we believe it is important to upgrade our AHM models to be able to continue to provide hunting opportunity. We encourage further work on incorporating U.S. ponds in the AHM models. We also want to note that high priority items (see below) were identified at last year's meeting and we believe we need to immediately start addressing those items.

(1) Highest Priorities (Urgent and Important)

- Mid-continent mallard AHM sub-model performance assessment; (S. Boomer, N. Zimpfer, M. Vrtiska, others).
- Eastern mallard AHM sub-model performance assessment; (B. Swift, M. Huang, G. Zimmerman, P. Devers).
- Updated Methods for estimation of mallard harvest rates (HMWG, PHAB).
- Evaluation and development of adjustments to harvest strategies based on changes in timing of regulatory decisions in association with proposed SEIS alternatives (Entire HMWG, leads to be identified for individual strategies).
- Coherence/NAWMP Review in collaboration with NSST and Human Dimensions Working Group (S. Boomer (coordinate with J. Coppen), P. Devers, K. Richkus.)

2.4 Pacific Flyway (*Jon Runge and Don Kraege*)

NAWMP Revision

The Pacific Flyway recognizes the time and energy spent developing the North American Waterfowl Management Plan 2012 Revision. Integrating harvest management and habitat conservation using common population objectives is a necessary and achievable goal. Because these objectives are fundamental to harvest management, such a process should directly involve Flyway councils. The Plan Revision recommends developing an Integration Technical Team. Given the existence of Flyway councils, the Pacific Flyway is unsure that establishment of this additional level of organization is necessary to integrate human dimensions, population and habitat management. From a harvest standpoint, the Pacific Flyway anticipates periodic surveys to help ensure harvest packages and regulations are structured to help support hunter retention and recruitment needs. However, we do not expect human dimensions data to be part of an annual optimization effort that would inform selection of a harvest package.

The Pacific Flyway continues to identify the following as key philosophies: 1) Provision, maintenance, and improvement of sufficient habitat throughout the ranges of waterfowl are critical; 2) Partnerships developed under NAWMP have substantially increased not only habitat for waterfowl and other wetland dependent species, but have generated greater political support for wildlife conservation; 3) Hunting opportunity is of high value to our Flyway, even when it requires complex hunting regulations. This hunting opportunity must continue to be consistent with biological data and current understandings of the roles of harvest in waterfowl population dynamics and political support; and 4) Maintaining traditional differences among the Flyways that address differences in hunter numbers, bird numbers, habitats, and hunter preferences.

Northern Pintail

In 2010, the Pacific Flyway Study Committee recommended a pintail harvest strategy to include an option of a liberal bag limit of 3 in the newly adopted derived strategy. The Pacific Flyway Council compromised with other Flyways for a maximum limit of 2, which was adopted by the USFWS. In 2011, the breeding population of northern pintails was estimated at approximately 4.4 million. This is the largest observed breeding population since 1980, and 10% above the long-term average. Pintails have increased 146% from

the low of 1.8 million in 2002. Based upon the current population model, the predicted breeding population will be in excess of 5 million in 2012. As habitat conditions have largely improved in prairie Canada from 2010, the 2011 fall flight estimate could be in excess of 6.5 million. The NAWMP goal of 5.6 million could be achieved in 2012 if the trend continues. It makes little sense to maintain a maximum 2 bird bag with estimated abundance at the NAWMP goal. The Pacific Flyway would like to reopen discussion about increasing pintail harvest potential at higher population levels.

Western Mallards

We recommend exploring options incorporating mallards and other waterfowl stocks derived from surveyed areas in Canada important to the Pacific Flyway (e.g., Alberta, NWT) into the decision process in the future. We believe that much additional work is needed on western mallard. Improved surveys are now being conducted in British Columbia and Washington, and states such as Nevada are continuing their efforts to improve or create breeding waterfowl surveys.

Supplemental Environmental Impact Statement on the Issuance of Annual Regulations Permitting the Hunting of Migratory Birds

The Pacific Flyway has the following positions on the SEIS: 1) We are concerned about the potential effects of adopting a single annual decision making process based on previous year's information. The SEIS states that additional uncertainties inherent to the proposed process may result in more conservative harvest. With hunter recruitment and retention issues experiencing increasing importance, needless restriction of harvest seems unwise. Additional work is needed to evaluate effects on regulations for low abundance species (e.g. pintail, mottled duck, black duck, canvasback) 2). We support review of regulatory packages once every five years while highlighting the importance of maximizing harvest in an adaptive fashion, rather than selecting risk-averse packages that fail to take advantage of increasing stocks that occur within the 5 year cycle. 3) The Pacific Flyway reiterates its request for a structured decision-making process to determine the degree of stock-specificity the Flyways and USFWS wish to target. We note that while the SEIS assumes that increases in stock-specific management are a given, this Working Group has discussed at least 8 different levels of detail regarding stock-specificity in harvest management (AHMWG, Portland, OR, 2009), some of which examined the reduction of complexity in stocks. 4) We question the definition of "management scale" for migratory bird harvest in part due to the implication that harvest management and monitoring scales are by necessity the same. Allowance of different harvest packages would assist states in achieving hunter recruitment or retention goals. 5) We continue to support a five-year cycle for adjusting hunting zones and season splits as defined in the preferred alternative, while also supporting the increased flexibility the Service allowed States in the number of zones and splits. 6) We continue to support spring-summer subsistence hunting season with regulations necessary to ensure long-term conservation of the migratory bird resource and traditional subsistence harvest practices.

AHM Working Group Terms of Reference

The Pacific Flyway has formally suggested some edits to the Harvest Management Working Group Terms of Reference. Specifically, due in part to the fact that the Flyways are inherently a minority on the HMWG, we have suggested that the TOR make it clear that the HMWG is not a decision-making body, and that any recommendations forwarded from this group should be consensus decisions of the Working Group. Additionally any issues on which consensus is not reached should have all sides of the issue included as part of the Working Group report.

3 NEW BUSINESS

After updates from Flyway technical section members, several presentations were given introducing new issues for consideration by the HMWG. These included policy issues regarding a proposal for modifying regulatory alternatives in the Central Flyway and a description of recent changes in hunter band recovery and reporting behavior. In addition, the HMWG was updated on efforts to assess eider population dynamics and the development of a redhead harvest strategy. The HMWG provided feedback on these issues and considered this technical work in relation to work planning and in the discussion of the HMWG's work priorities for 2012.

3.1 Central Flyway ideas for a modified licensing system (*Mark Vrtiska*)

Despite abundant duck and goose populations and the apparent abundant hunting opportunity, the number of waterfowl hunters across the U.S. has steadily decreased. In the recent peak of duck populations from 1996–2010, the number of waterfowl hunters did not rise in conjunction with duck populations. There are likely many causes behind the decline of waterfowl hunters in the U.S. and Nebraska, but the impact of "complex" waterfowl hunting regulations on waterfowl hunter recruitment or participation has not been fully explored.

There has not been an examination of the role of regulations on hunter recruitment/retention and for managers responsible for regulations, there are few options within their control to affect hunter recruitment/retention. Thus, by simplifying regulations to the point that individuals increase their participation, managers may be able to better understand the role of regulations in waterfowl hunter recruitment/retention. However, simplifying regulations to increase hunter recruitment/retention may come at the expense of hunting opportunity. Thus, dual objectives exist in duck hunting regulations in: 1) ensuring maximum hunting opportunity and 2) maximizing hunter participation, recruitment and retention.

A regulatory system where all available duck hunting opportunity is afforded to those individuals that desire it but complemented by a regulatory system that increases participation would be ideal in meeting these dual objectives. This system also must be easier to administer and enforce, not overly impact species of concern in regards to harvest and use existing programs for evaluation.

To meet these dual objectives, implementation of a two-tier system, where duck hunters themselves identify the regulatory option they want to operate under, administered through the Harvest Information Program (HIP) may be needed. One tier of hunters is afforded maximum hunting opportunity (e.g., daily bag restrictions) while the other tier is afforded easier regulations (e.g., no bag restrictions). This two-tier system can be evaluated via HIP information as well as using the USFWS's Parts Collection Survey data. Tracking the number of waterfowl hunters can be accomplished via HIP. Both sets of hunters can be tracked via HIP and their unique numbers and determine if the number of hunters has increased or not. Additional survey efforts may be conducted to ascertain other factors or answer questions regarding the implementation and use of the two-tier system. Duck harvest will be evaluated by USFWS Parts Collection Survey (PCS) with survey sampling effort for both groups of hunters. PCS data will determine if species harvest composition is different between Tier I and Tier II hunters, timing of harvest and provide estimates of effort (e.g., days afield). Harvest estimates from the PCS also will assist in examining overall duck harvest in Nebraska.

3.2 Emerging issues affecting band recovery information (*Mike Johnson*)

Information was presented describing band recovery and reporting issues relative to band collecting, selling bands and markers, selling and distributing fake bands, false recovery reports, targeting of banding sites by hunters and related issues. These issues need to be more closely examined by the BBL, FWS, CWS and state and provincial wildlife agencies.

3.3 Considerations for updating harvest strategy regulatory alternatives (*Don Kraege and Jon Runge*)

The Pacific Flyway Council would like to reopen the discussion about more pintail harvest potential at higher population levels, either through a different strategy or a higher bag limit when the population meets a prescriptive threshold. The Working Group discussed the current AHM protocol for pintails in relation to the following harvest strategy considerations:

- In 2010, the Pacific Flyway Study Committee recommended a pintail harvest strategy to include an option of a liberal bag limit of 3 in the newly adopted derived strategy (Table 1). The Pacific Flyway Council compromised with other Flyways for a maximum limit of 2, which was adopted by USFWS.
- In 2011, the breeding population of northern pintails was estimated at approximately 4.4 million. This is the largest observed breeding population since 1980, and 10% above the long-term average. Pintails have increased 146% from the low of 1.8 million in 2002 (Figure 1)).
- Based upon the current population model, the predicted breeding population will be in excess of 5 million in 2012. As habitat conditions have largely improved in prairie Canada from 2010, the 2011 fall flight estimate could be in excess of 6.5 million.
- The NAWMP goal of 5.6 million could be achieved in 2012 if the trend continues. Does it make sense to maintain a 2 bird bag at the NAWMP goal?

Table 1 – The Pacific Flyway Council's 2010 top two rankings for the selection of a harvest management objective for Northern pintail Adaptive Harvest Management.

PFSC		Objective	Closure		Regulation Frequencies				
Rank (score)	**Strategy**	**"shoulder"**	**threshold**	**Closed**	**Partial**	**L1**	**L2**	**L3**	**L5/L7**
1 (.471)	39b	MSY	1.75	17%	0%	45%	3%	36%	0%
3 (.450)	39	MSY	1.75	17%	0%	25%	59%	0%	0%

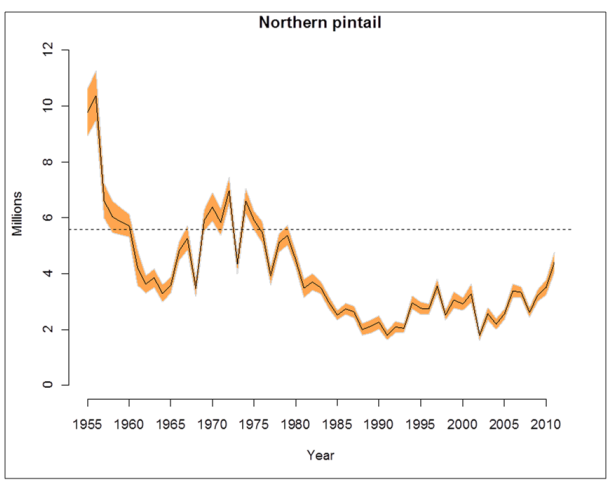

Figure 1 – Northern pintail population estimates and 95% confidence intervals observed in the Waterfowl Breeding Population and Habitat Survey (traditional area) from 1955–2011.

Given these materials, the HMWG discussed the role of objectives elicitation in the "double-loop" process of AHM and timing of when adaptive management protocols should re-consider the specification of harvest management objectives.

3.4 Eider assessment (*Chris Dwyer*)

The American common eider (*Somateria mollissima dresseri*) is a USFWS Focal Species and has been identified as one of the highest priority species for which information on harvest management is the greatest need for supporting management decisions (http://www.seaduckjv.org/sdjv_implementation_plan.pdf). In recent years, concerns have been raised about decreasing population trends and potential changes in survival/harvest potential over time. In addition, the highest priority need identified by Environment Canada's Monitoring Strategy for American Common Eider is to provide information to ensure that harvest is sustainable. Such information includes a better estimate of population size, survival, productivity, harvest rate and derivation. Eider banding has been occurring in the northern portion of the Atlantic Flyway for many years, however, a comprehensive analysis of the recapture and recovery data has been lacking. To begin addressing information needs in a step-wise fashion, an assessment of eider banding, recapture and recovery data from Maine is currently underway. The objectives of the assessment include:

- Updating the analysis conducted by Krementz et al. (1996) and include males in the analysis;
- Determine whether trends exist in survival rate estimates, over what time periods and/or geographic areas;
- Incorporate mark-recapture data for the State of Maine to obtain period survival estimates and movement patterns;
- Use the results from Maine to engage the larger eider banding community (Nova Scotia, Labrador, St. Lawrence Estuary) to conduct a more comprehensive, regional analysis of the banding data; and,
- Determine whether the current banding effort provides sufficient information to support decision-making.

Preliminary results will be prepared and presented at the Atlantic Flyway Game Bird Technical Committee Winter Meeting, and facilitate a larger discussion among managers on the next steps/priority information needed to support harvest management decisions. Input on priority information will be incorporated into the SDJV Implementation Plan Update to ensure there is a greater focus on research and monitoring needs, and a clear link between SDJV priorities and decision-making.

3.5 Redhead assessment

In response to a 2011 late season recommendation from the Central Flyway to liberalize redhead bag limits, the USFWS responded by specifying that any regulatory change for redhead harvest management should be guided by the principles of informed decision-making. These expectations were formalized in the Federal Register, which further specified how harvest management objectives and regulatory alternatives along with a predictive modeling framework were required to develop a harvest strategy. Given this context, the HMWG meeting provided an opportunity to discuss the development of a redhead harvest strategy in relation to the HMWG's priorities for technical work. The resulting discussion focused on the differences between derived and prescribed harvest strategies and the level of effort required to develop the policy and technical elements of a redhead harvest strategy. At the close of the HMWG meeting, the redhead harvest strategy was not considered when prioritizing action items and technical work to be conducted by the HMWG for the 2012 regulation cycle.

4 ASSESSMENT UPDATES

4.1 Black Duck (*Pat Devers*)

The Black Duck Adaptive Harvest Management Working Group (BDAHMWG) held its annual meeting in Burlington, VT in November. The BDAHMWG continued working through a structured decision making process to resolve issues concerning the objective of black duck harvest and maintaining equitable access to black duck harvest between the U.S. and Canada. The BDAHMWG finalized recommendations for the International Black Duck Management Group to implement an AHM strategy based on a 98% right shoulder strategy and a two-part parity constraint. The final technical framework will be recommended to the International Black Duck Management Group in February 2012. If adopted the framework will be recommended for adoption by the U.S. Service Regulations Committee, the Atlantic and Mississippi Flyway Councils, and Canadian Wildlife Service's Executive Committee. If adopted by all stakeholders the BDAHM framework will be used to establish 2013 black duck harvest regulation in Canada and the U.S.

4.2 2011 teal assessment update (*Kathy Fleming*)

Purpose: assess harvest potential of the 3 NA teal species:

(1) Description of the population dynamics of each species: almost complete

(2) Derivation and distribution of the harvest: complete for BWTE, GWTE

(3) Assessment of past and current harvest pressure: in progress

(4) Assessment of population response to harvest pressure: in progress

(5) Assessment of the impacts of incremental regulatory changes on harvest, particularly with regard to special seasons: in progress

Also, in 2011 the teal assessment group added 2 Canadian representatives: Bruce Pollard (east) and Jean-Michel Devink (prairies).

Survival and Recovery Analyses

Blue-winged teal

- Used band-recovery data from 1965–2009. Survival rates between the 3 groups (east, west, and central) did not differ appreciably, although survival rates by age and sex did; survival rates were highest for adult males, then adult females, juvenile females, and lowest for juvenile males (though rates did not differ statistically between juvenile groups).
- Recovery rates differed between the 3 groups (east, west, and central) but did not differ appreciably with sex. Recovery rates for juveniles were highest in the east group, then central, then the west group; adult recovery rates followed this same trend but were lower, with smaller (but still significant) differences among groups
- Annual east (compiled state pond count time series) and west pond counts did not appear to be related to annual survival or recovery rates in the 2-group models (east and west, separated by -87 deg longitude line).
- Models with survival and/or recovery rates constrained to linear trends did not fit the data well.
- Models with early and regular season structure as covariates (hunter-season-days for early season, season bag-days for regular season) did not fit the data well.

- Recovery rates did track years with early season closures (were low in 1968, 1988–1991) but did not track changes in season days or the number of hunter-season-days.

Green-winged teal

- Candidate models included age-, sex, and MRPP region-specific survival and recovery rates. Initial results suggest that estimation of age- and sex-specific parameters may be difficult for some years due to sparse banding and recovery data in some MRPP regions. Further analyses will investigate models that combine sex or age classes to improve small sample sizes, and will explore the effect of special and regular harvest season history on survival and recovery rates.

Teal in Pacific Flyway

- Using a Brownie analysis for blue-winged, cinnamon, and unknown teal banded in the Pacific Flyway and extreme western Central Flyway (i.e., intermountain Colorado) from 1982–2009, Tom Aldrich ran 22 models containing time, sex and age (2 age classes) specificity for survival and the same 3 factors as well as region of capture for recovery. The two low AIC models were a model containing yearly effects on survival and recovery (AIC wt = 0.92) and a similar model that also contained an additive effect for age on both survival and recovery (AIC wt = 0.08). It should be noted that some of the time-specific survival estimates in these models are unrealistic due to data scarcity.

Production Analyses

Blue-winged teal

- Wing and band recovery data were insufficient to support estimating annual blue-winged teal production indices at a regional scale (i.e., separate indices for the mid-continent region and eastern North America).
- Continental age ratios: We also found that country-specific and season-specific (special September and regular seasons in the U.S.) harvest age ratios, corrected for differential vulnerability, yielded similar estimates of preseason age ratios for both males and females. Consequently, we used all available wing and band recovery data from both Canada and the U.S. (including both special September and regular seasons in the U.S.) to produce annual, continental, sex-specific preseason age ratios.
- Constant differential vulnerability: Estimates for both sexes were very imprecise when differential vulnerability was allowed to vary annually, thus, we treated it as a constant (1970–2008 mean). We have not decided yet whether male or female age ratios provide the "best" indices.
- Age ratios were estimated in two ways: traditional calculations based on direct recoveries and annual vulnerabilities from wing and harvest data; and within a Bayesian framework where vulnerability and age ratios and their variances are estimated simultaneously. In the latter model juvenile recovery rates were modeled as offsets to adult rates; traditional calculations estimated these separately based on direct recoveries of each juvenile cohort.

Green-winged teal

- Age ratios were calculated separately for the three breeding reference areas identified in the MRPP analysis: Western, midcontinent, and eastern groups. The three groups' data were separated largely along Flyway boundaries (Pacific Flyway [Western group], Central and Mississippi Flyway combined [Midcontinent group], and Atlantic [Eastern group])
- Harvest age ratios were adjusted by the differential vulnerability of young to adults. Although fairly large numbers of GWT have been banded for adults and immatures in each year, annual vulnerability (immatures per adult) estimates varied widely (ranges: Eastern group = 0.80 to 6.28; Midcontinent group = 0.79 to 4.19; Western group = 0.27 to 2.48). Average of the vulnerability estimates for each group were used to calculate fall age ratios.

- On average, the resulting fall age ratios did not appear to differ significantly (averages: Eastern group = 1.14 immatures/adult; Midcontinent group = 1.23 immatures/adult; Western group = 1.21 immatures/adult), although estimates for the Eastern group may have declined relative to the other two groups in recent years.

Remaining Questions and Research

Effect of season structure on harvest

- To determine if a linear relationship existed between blue- and green-winged teal harvest and the changing US early and regular harvest season structure in the Atlantic, Mississippi, and Central Flyways from 1965–2008. Data from years/Flyways in which there was no early season were not used.
- Season structure variables: Number of early season days, number of early season states, regular season days, regular season bag
- Population variables: BPOP, harvest age ratio (not corrected for vulnerability which is assumed constant)
- In general, BWTE harvest was not well predicted by season structure, BPOP, or age ratios in the Atlantic or Mississippi Flyways. Predictors of early season harvest in the AF were BPOP and the number of states with an early season (both positive); predictors of regular season harvest were the number of regular season days and the harvest age ratio (both positive); $R^2 < 0.52$. Predictors of early season harvest in the MF were BPOP and age ratios; for regular season harvest, the number of regular season days and the harvest age ratio (both had $R^2 < 0.52$).
- Models predicted harvest better in the Central Flyway; early season harvest was predicted by the number of states with an early season and the number of early season days offered ($R^2 = 0.72$). Regular season harvest was best predicted by the number of days in the regular season and the regular season bag ($R^2 = 0.51$).

Population Modeling Questions: Functional form of Density Dependence

- Some indication of density dependence indicated by plots of age ratio vs. BPOP
- Is BPOP a good representation of density?
- What is the relationship between ponds and density?
- Is there overflight in dry years?

Population drift and overflight in BWTE:

- The spatial pattern in BWTE BPOP from did not indicate much overflight in dry years (e.g., compared to other species such as pintails).
- Population drift has occurred: after controlling for changes in survey effort, weighted geographic center of population has drifted southeast about 300 miles (give or take the annual variation around this drift). This appears to be due to a trend towards much higher densities in the US prairies in the last decade.

Tasks remaining: Year 3

- Finish analyses
- Decide on modeling structure for each species: determined by anticipated use of the model and quality of information available.
- assemble population modeling subgroup for BW and GW teal
- Decide on final product for CITE
- Produce report

4.3 Scaup (*Scott Boomer*)

Due to conflicting priorities, very little progress was achieved in the development of an alternative model to represent scaup population and harvest dynamics. It was noted that at next year's HMWG meeting, a summary of model performance and observed scaup harvest levels will be presented in anticipation of discussions focusing on the regulatory packages used in the scaup harvest strategy. The 2010–2011 hunting season represents the 3rd year of experience with the current set of scaup regulatory packages, after which, scaup regulatory packages will be eligible for re-consideration and discussion.

4.4 Updated methods for estimation of mallard harvest rates (*Scott Boomer and Guthrie Zimmerman*)

With the cessation of reward banding efforts in 2010, we lack the ability to update estimates of mallard harvest rates with direct recoveries of reward bands. As a result, we developed methods to estimate mid-continent and eastern mallard adult male harvest rates from direct recoveries of standard bands adjusted with recent reporting rate estimates. These analyses were complicated by the acknowledgement of regional variation in reporting rate probabilities. We used harvest area-specific reporting rates weighted by the number of direct recoveries from each harvest area to calculate an annual weighted reporting rate that was then used to adjust direct recovery rates of birds marked with standard bands. We compared observed harvest rates of adult male mallards recovered from 2002–2010 and estimated from direct recoveries of reward bands to harvest rates estimated from direct recoveries of standard and control bands adjusted with weighted reporting rate estimates. Overall, annual estimates were similar with overlapping 95% credibility intervals, but there was some evidence suggesting that harvest rates from control and standard bands were higher than estimates from reward bands (Figure 2). We concluded that uncertainty from reporting rate estimates appears to be minimal and manageable with current levels of banding effort and the preliminary estimates of annual harvest rates based on standard (and control) bands are comparable to estimates based on reward bands. We plan to develop a finer-scale description of reward and standard banding locations and corresponding recovery locations and testing current estimation procedures with expected values. We believe it may be necessary to re-consider our current procedures for data imputation, weighting, and estimation by combining these procedures in a hierarchical, Bayesian estimation framework.

4.5 Eastern and Mid-continent mallard AHM sub-model performance (*Guthrie Zimmerman and Scott Boomer*)

Members of the HMWG began a performance assessment of the population models used to support mid-continent and eastern mallard AHM in 2010. Although model weights can provide a relative comparison (i.e., relative to the other models in the model set) of the alternative hypotheses considered for AHM, we were interested in evaluating how well the survival and recruitment sub-models performed as part of the double-loop learning process in adaptive management. First, we used observed harvest rates and survival rates in the absence of harvest, which were calculated in the 2002 revisions, to derive predicted annual survival rates under additive (mid-continent and eastern mallards) and compensatory (mid-continent mallards only) hypotheses. We compared these predicted survival rates to observed rates calculated from annual estimates derived from preseason mallard banding data and Brownie band recovery models. Similarly, we used spring breeding population data (mid-continent and eastern mallards), spring pond estimates (mid-continent mallards only), and regression parameter estimates from the 2002 revisions to derive predicted recruitment estimates for the two mallard stocks under weak and strong density dependence hypotheses. We then compared these predicted recruitment estimates to observed recruitment rates derived from parts collection wing age ratios corrected for differential vulnerability. The results of this assessment will (1) illustrate what we have learned about how harvest influences population dynamics of these stocks and relative strength of density dependence in recruitment, and (2) help guide discussions of appropriate models and hypotheses to support AHM after the Flyways and USFWS conduct a thorough re-evaluation of mallard harvest management objectives, which will also be part of the double-loop learning process.

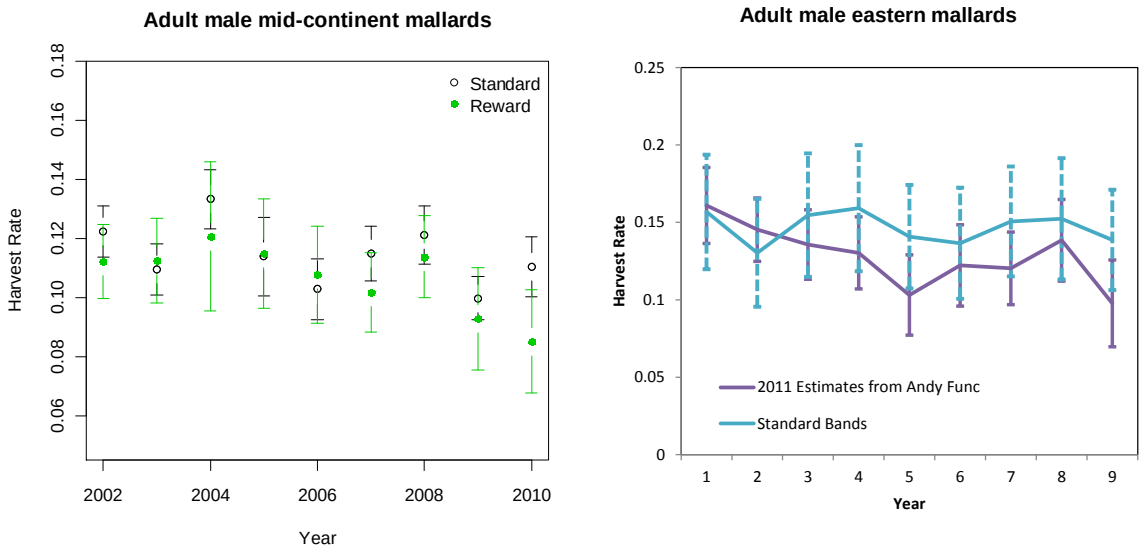

Figure 2 – Mid-continent and eastern mallard adult, male harvest rates estimated with reward and standard band recoveries from 2002–2010.

5 HMWG STRATEGIC PLANNING

The HMWG recognizes several large-scale issues that may directly impact current harvest management decision-making protocols: the Draft Supplemental Environmental Impact Statement on the Issuance of Annual Regulations Permitting the Hunting of Migratory Birds (SEIS), the current draft of the North American Waterfowl Management Plan (NAWMP) Revision, and the technical updates of mallard modeling frameworks that support the double-looping process of Adaptive Harvest Management. Planning for an independent response to any one of these single topics will undoubtedly affect responses to the other concerns and in the absence of a guiding vision of how to address these issues, the management community will likely continue to be reactive to these potential impacts to the management system, while suffering from an uncoordinated response to individual issues that will likely be inefficient and potentially result in work at cross purposes.

Given these multiple, linked challenges, the HWMG focused the remainder of the meeting in a series of case studies to develop a strategic plan to guide current policy discussions and prioritize future technical work. Through breakout groups and discussions, the HMWG described the short- and long-term harvest management issues relevant to adaptive harvest management and the Harvest Management Working Group, outlined the key technical and policy challenges associated with these issues, and developed a strategic process for addressing these challenges by:

(1) identifying the critical information, research, or resources necessary to develop solutions to technical challenges;

(2) highlighting the communication requirements for continued coordination with the Service Regulations Committee and the Flyway Councils;

(3) Identifying short- and long-term priorities;

5.1 Case Study I (*Draft SEIS on the Issuance of Annual Regulations Permitting the Hunting of Migratory Birds*)

The HMWG was organized into break-out groups to begin discussions focused on the technical issues resulting from changes in the timing of regulatory decisions associated with the Preferred Alternative specified in the draft SEIS. Each group was asked to list all decision-making frameworks that would require adjustments and identify the scope of technical changes while specifying discrete tasks and corresponding project leads. The results of each breakout group where then compiled for subsequent discussions that focused on prioritization.

Breakout Group 1 Results

General Discussion

- Need sideboards on changes to operational decision frameworks; minimize changes to state variables and objectives;
- Develop a process for admitting technical changes associated with modeling frameworks (predictions)
- Ad-hoc committees to facilitate collaborative work on technical adjustments
- Standards for evaluations of implications of changes in timing to regulations process
- Need communication strategies for harvest management community and the general public

Priorities

- Mallard decision frameworks (Mid-continent, Western, Eastern)
  (1) Technical: POMDP (optimization), model weight updating
  (2) Development of predictive models that may be dependent on Spring information (e.g., Canadian pond model)
- Other decision frameworks
  (1) northern pintail
  (2) scaup
  (3) black duck
  (4) canvasbacks
  (5) teal

Breakout Group 2 Results

Is the Flyway Rep list of Harvest Strategies a complete list? Are we missing anything?

- Mid-continent and Rocky Mountain Crane populations in the Central Flyway
  - RMP Cranes get assigned to the RMP Crane Committee
  - MCP Cranes - Central Flyway with input from MN.
- Wood ducks?

  - When do we move toward a harvest strategy, could build in anticipated change in timing of the regulations cycle

- What about Teal?
  - No predictive model at the moment
  - How do you determine Special Teal seasons?
- National Duck Strategies (e.g., MC Mallards, Pintail, Scaup, Canvasback)
  - Falls to the Service (PHAB staff)
- Eastern Population of Tundra Swans
  - Assign to the Swan Committee
- Black Ducks
  - Interim Strategies - already operating on previous year's information
  - AHM - would still have to follow suit

Timing of this one SRC meeting?

- Late April would be ideal from the Service perspective
  - Better data available for predictions
- Flyways need to weigh in on this issue.

Should the transition to the new Regs cycle timing be independent of the AHM Double Loop Process?

- First step make the switch
  - Then move toward improving predictive models?
  - No real need to make the same changes to all strategies - use previous year's data vs. "prediction"
- Harvest Management Objectives
  - Do they need to be revised first (e.g., unhappy with MSY)
  - Makes sense to revisit objectives first BUT. It takes too long.

What about any cost to the hunters/public?

- - Longer comment period on proposed regulations.

Communication Plan?

- Hunters/Media/Others
- What if BPOPs differ greatly from predictions and cause hunters concern or give the perception of loss of opportunity?

Other Technical Challenges that need to be addressed first?

- Alternate ways to update model weights?

- Improve sub-model performance?
- Dealing with partial observability
- Change to MATLAB software - retooling code

What about other Alternatives in the SEIS?

- (i.e.) Setting regulations for multiple years
  - Might work well for ducks, but maybe not other species
  - Potentially jeopardizes annual monitoring programs

Breakout Group 3 Results

Schedule & Timing of Regulations Process

- need to update all of the harvest strategies that depend on current year info
- related - need to redo harvest strategies that rely on CWS plot survey data b/c sample size to be cut?
- are there any goose strategies that will be difficult to change to new system (e.g., Dusky CAGO)?
- can we develop a common metric/currency for evaluating the impact of scheduling/using previous year's data
- Do any strategies rely on current year's update of banding data? If so, will need to accommodate.

Package Review

- technical work in advance of package review - FWS & Flyways

Stock Specific Harvest Strategies

- all need to be updated to account for change in timing of meetings
- assess whether past actions would have been different if done in the proposed manner
- what are the implications for each strategy of having a single meeting - have done for mid-continent mallard

Special Regulations

- no issues

Management Scale

- no issues

Splits & Zones

- EA done

Policy

- Technical Sections indicated they don't want to lose their winter meetings but did not decide what is the optimal timing of their meeting
- Are there state public hearing processes that will need to be changed to accommodate the new timing
- What is the fate of the January SRC meeting?
- FWS will set date for their SRC meeting so all associated Flyway meeting will have to be scheduled to back up from there
- Are there philosophical decisions that Councils will have to make during package reviews (e.g., Atlantic Flyway wanting to change season length and/or bag limit; other technical assessments needed to help make these decisions)?

Breakout Group 4 Results

Table of harvest strategies that will need to be adjusted for changes in timing of regulatory decisions

- For all stocks under the "shared" and Flyway column, the individual Flyways and technical committees would be responsible for updating plans to conform to the new regulations cycle
- For stocks under the "national" column, mourning doves and woodcock strategies already are amenable to the proposed new schedule; for all others the DMBM would be the lead for updating the strategies

Potential impacts of harvest opportunity by moving to the new regulations cycle.

- Recognized the initial assessment was a "first cut," and that more work needed to be done to refine the process, particularly the need to include partial observability in the process (which to date has not been done and may present some real problems analytically)
- Because the results of any such assessment depends on the objectives of harvest management (as well as the model set and regulatory alternatives), should we attempt to revise (if necessary) the management objectives before/as we do the assessments
  - The issue with eastern mallards highlights the concern about following a strategy and getting results that were unforeseen and undesirable
  - The fact that K for MC mallards is likely to decline makes it likely that the current harvest management objective will be unpalatable (i.e., "penalty" in harvest opportunity is likely to increase as K decreases yet NAWMP goal remains unchanged)
  - But, revisiting objectives takes a lot of time, likely more than we would like for implementing the new regulatory schedule
- Concern about doing the assessment on impacts to harvest opportunity with current AHM construct, then changing the construct (objectives, models, regulations packages) and then getting results that are not acceptable - what do we do then?
- Management community needs to make a decision as to whether we'll live with the current harvest management objectives and do the updates to meet the new regulatory schedule, or do both in concert
- High priority to do this assessment for all mallard stocks, pintail, and scaup
- Canvasback and teal strategies may take significant efforts to retool and conform with the new regulations schedule

Summary: Case Study I

Several decision frameworks were added to the list of harvest strategies that will require technical adjustments resulting from changes in timing of regulatory decisions (Table 2). During discussions of the breakout group reports, the HMWG also identified some of the key technical work that will be required to modify each decision framework in preparation for changes in the timing of regulatory decisions.

There were several common themes that emerged from the breakout group discussions. The HMWG concluded that further assessments evaluating the harvest management implications associated with changes in the timing of regulatory decisions should be conducted on "fixed" decision frameworks (i.e., evaluations of decision frameworks should not consider changes to state variables or objectives). In addition, the Working Group should develop a consistent process and agreed-upon metrics and standards for evaluating timing impacts. Several outstanding issues associated with the SEIS will have to be addressed by the waterfowl management community, including the consideration of the timing of winter technical section meetings, communication strategies to the management community and public, and the need to communicate the highest priority technical work to the SRC and Flyway Councils.

5.2 Case Study II (*North American Waterfowl Management Plan Revision*)

In preparation for discussions about the NAWMP revision and its potential implications for the HMWG, Jim Ringelman (NAWMP Revision Coordinator), provided a progress report on the status of the current draft of the Revision. Each breakout group was asked to address the following questions to stimulate discussion about the linkages between the NAWMP Revision and Adaptive Harvest Management.

(1) What can be done to streamline harvest management so our intellectual and financial capital can help address other priorities?

(2) To what extent, if any, should harvest management be used to achieve NAWMP waterfowl population objectives?

(3) What role should harvest management play in perpetuating the waterfowling tradition and building support for conservation?

Breakout Group 1 Results

Question 1: What can be done to streamline harvest management so our intellectual and financial capital can help address other priorities?

The group raised some concerns/questions about the reallocation of resources:

- reallocation may result in the erosion of monitoring programs
- where will the "re-allocated" resources go, especially the money? This capital will likely go to other priorities - not related to waterfowl management.
- intellectual: technical aspects of coherent goals of harvest and habitat management are steep;

It was suggested that we need a cost-benefit analysis to determine the operational costs of current system versus a stream-lined version. Maybe the question should be re-worded: If our resources are reduced by 50%, how will the harvest management community respond? Because the fundamental objectives of harvest management (population, harvest) are consistent with two of the goals of the NAWMP, if you streamline, you will lose something, which affects your ability to meet all of the NAWMP goals. This seems like a shell

Table 2 – Harvest management decision frameworks, technical adjustments, and project leads identified at the 2011 HMWG working group meeting, resulting from discussions about the implications of changes in timing of regulatory decisions associated with the preferred alternative specified in the draft SEIS.

Management Scale	Technical Issue	Technical Lead
National		
AHM Mallards	Optimization, model weight updating, process for admitting technical changes associated with predictions, formation of ad-hoc committees to facilitate collaborative work,	DMBM
Pintail	Optimization, model weight updating, process for admitting technical changes associated with predictions, formation of ad-hoc committees to facilitate collaborative work,	DMBM
Canvasback	Adjust harvest strategy for decisions based on predicted BPOP	DMBM
Scaup	Optimization, model weight updating, process for admitting technical changes associated with predictions, formation of ad-hoc committees to facilitate collaborative work,	DMBM
Teal	Adjust triggers to special teal season	DMBM/ Eastern 3 Flyways
Wood duck?		DMBM
Woodcock	NA	
Mourning Dove	NA	
Shared		
MCP Cranes	TBD	Flyway Tech Committees
RMP Cranes	TBD	Flyway Tech Committees
EP Tundra Swans	TBD	Swan Committee
Mid-continent SHC	TBD	Flyway Tech Committees
Black Duck	TBD	DMBM/CWS?
Pacific Flyway		
Cacklers	TBD	Pacific Flyway
Dusky	TBD	Pacific Flyway
Aleutian	TBD	Pacific Flyway
Wrangel Island	TBD	Pacific Flyway
PF Brant	TBD	Pacific Flyway
BT Pigeons	TBD	Pacific Flyway
PF WFG	TBD	Pacific Flyway
Central Flyway		
Hi-Line	TBD	Central Flyway
Mississippi Flyway		
MVP	TBD	Mississippi Flyway
EPP	TBD	Mississippi Flyway
SJBP	TBD	Mississippi Flyway
Atlantic Flyway		
Atl. Brant	TBD	Atlantic Flyway
AP CAGO	TBD	Atlantic Flyway
NAP CAGO	TBD	Atlantic Flyway
AFRP	TBD	Atlantic Flyway

game ("robbing Peter to pay Paul").

Question 2: To what extent, if any, should harvest management be used to achieve NAWMP waterfowl population objectives?

Harvest management objectives should determine population goals (e.g., "This is how many we want to take and this is what we need in terms of population size"); the NAWMP goal should not be in the harvest management objective function.

Question 3: What role should harvest management play in perpetuating the waterfowling tradition and building support for conservation?

Harvest management is fundamental to the maintenance of the waterfowling tradition (opportunity).

Breakout Group 2 Results

Question 1: What can be done to streamline harvest management so our intellectual and financial capital can help address other priorities?

This assumes that we want to reallocate money and time to other issues or habitat. Money really would not be freed up if we streamlined harvest management. Most money is spent on monitoring programs and monitoring would likely not go away since it is the foundation for harvest management and also serves habitat management.

Question 2: To what extent, if any, should harvest management be used to achieve NAWMP waterfowl population objectives?

Were still unclear about what the population goals mean? Therefore it makes it difficult to determine to what extent these goals should play a role in harvest management. What are the measurable attributes for habitat - should we use surrogates like ponds. Should these measureable attributes be linked to goals? For example, the PPJV has good measureable habitat attributes with respect to 4 mi sq blocks, but other JVs may not.

Question 3: What role should harvest management play in perpetuating the waterfowling tradition and building support for conservation?

Harvest Management is fundamental to hunters and perpetuating the waterfowling tradition.

- Without harvest management we really wouldn't have any hunters.
- There is debate about whether regulations or harvest management has any effect on hunter numbers.
- Over the last decade, we have experienced very liberal regulations but we are still losing hunters. There are simple regulations in Canada with a continued hunter population decline.
- It's not what we're doing with regulations that influences participation, but we don't want to do anything that unnecessarily drives hunters out of the field.
- Hunter numbers are driven more by habitat (i.e., access) rather than harvest management.
- It may be possible to manipulate regulations on youth days to recruit new hunters.
- What are the fundamental objectives of harvest management, and are those objectives congruent with the NAWMP goals? Should we maximize harvest opportunity consistent with long term conservation while considering other societal constraints that limit regulatory complexity (i.e., closed and partial seasons)?

Breakout Group 3 Results

Question 1: What can be done to streamline harvest management so our intellectual and financial capital can help address other priorities?

We should probably not confuse streamlining with more free time; there may not be more time available in the end. There is little doubt that down the line, we will have to streamline the process, but it is not obvious how to proceed. We need to adhere to the "no tinkering" rules rather than deviating to take advantage of new perceived opportunities. Are there better ways we can monitor and inform our models? It may be possible to free up time for H-D if we loosen up on attention to harvest, if we assume "opportunity" is what we are trying to provide.

Question 2: To what extent, if any, should harvest management be used to achieve NAWMP waterfowl population objectives?

Harvest management population objectives depend on what we want for an equilibrium population size. We should derive population objectives based on other NAWMP objectives and be less arbitrary when we set the next goals (not just the mean of the 1970's). Using a yield curve is probably the best approach to settle on an appropriate population objective that is coherent with NAWMP goals.

Question 3: What role should harvest management play in perpetuating the waterfowling tradition and building support for conservation?

Providing opportunity is still the course that makes sense now, but we need more H-D work to inform that decision in the future. We should make sure regulations aren't discouraging folks from hunting and remove impediments if they are there. Mentoring will undoubtedly be important; who will do that? We should tap into existing programs that aim to: recruit people to shooting sports, fishing and hunting, set up special situations that encourage new hunters (youth hunting areas, etc.), reach out to a new demographic (beyond white males), and connect how hunters who purchase duck stamps, etc. contribute to broader societal values.

Breakout Group 4 Results

Question 1: What can be done to streamline harvest management so our intellectual and financial capital can help address other priorities?

We are not really sure where the savings would come from? Would the savings result from a reduction in the number of regulation meetings (e.g., SEIS), or assessment activities? We question whether there are big savings to be had and, even if there were, doubted that they would be redirected to waterfowl habitat conservation. There is a concern that less emphasis on harvest management might mean fewer resources for monitoring.

Question 2: To what extent, if any, should harvest management be used to achieve NAWMP waterfowl population objectives?

Is the question "to what extent should harvest management help achieve goals" or "what role should pop. objectives play in regulating harvest?" If the former, there are doubts that changes in regulations could be translated into more hunters and thus more support for habitat conservation. If the latter, there is concern that the Revision is not addressing the key problem of defining population objectives in an ecological context. Until that is done, we may not be well served trying to use them in harvest management. However, harvest management can help inform the effort to define population objectives (in the context that the JTG report provided), but until that task is completed we shouldn't be using pop objectives in harvest management. If doing so (omitting them) resulted in "excessively liberal" regulations, there are more straightforward ways

than invoking NAWMP goals to introduce conservatism.

Question 3: What role should harvest management play in perpetuating the waterfowling tradition and building support for conservation?

There are doubts that anything we do in harvest management has much of an effect on hunter recruitment and retention. And even if that were not so, the support would still be inadequate to sustain waterfowl over the long term in the face of large-scale trends (e.g., demands for food, fiber, energy; climate change). We would probably be better served by trying to find ways to get non-consumptive users to provide support for conservation.

5.3 Case Study III (*Mallard AHM Model Set Revision*)

The last Case Study focused on the policy elements and technical work associated with the double-looping process of AHM. The HMWG was organized into groups focusing on each Flyway to discuss current efforts evaluating the model sets used to predict the population dynamics of eastern, western, and mid-continent mallard stocks. Each group was instructed to identify the key policy and technical issues along with project leads to revise each mallard AHM decision framework.

Atlantic Flyway Breakout Group Results

The Atlantic Flyway and USFWS have been concerned about the performance of the eastern mallard AHM harvest strategy, and began to consider: (1) different objectives than currently used, (2) performance of the submodels, and (3) uncertainty about the state variable (i.e., what should we use to monitor eastern mallards. We decided to conduct a double-loop process for revising the eastern mallard AHM decision framework. The group is concerned about the length of time it will take to complete the full process, so the group is interested in developing an interim strategy.

Specific Tasks To Complete

(1) Interim strategy Development-

- Leads: Bryan Swift, Min Huang with Guthrie Zimmerman for tech support
- Proposed strategy by the winter Flyway meeting
- Will begin by looking at American black duck interim strategy

(2) Objectives

- Leads: Bryan Swift, Min Huang, Paul Padding
- Stakeholders: Identified and engaged
- Initiated structured decision-making process
- Next steps: weighting fundamental and means objectives and measurable attributes
- Completed at the summer Flyway meeting

(3) Regulatory Alternatives

- Leads: Bryan Swift, Min Huang, Pat Devers, Jon Klimstra, Gut Zimmerman
- Assess changes in bag limits and season length on harvest rate distributions

(4) Models

- Leads: Mallard Committee (Conceptual); Gut Zimmerman and Pat Devers (Quantitative)
- Identify predictors for survival and recruitment
- Explore alternative hypotheses and functional forms for density dependence in recruitment or survival
- Update differential vulnerability
- Time scale - what years should be considered when updating models
- Update at the winter 2012 Flyway meeting

(5) Monitoring

- Leads: Mallard Committee, John Sauer, Gut Zimmerman, Jon Klimstra
- Identify scale of eastern mallards - intertwined with objectives and modeling
- Harvest distribution and derivation
- Integrating NE plot survey with CWS plot and USFWS transect surveys

Mississippi Flyway Breakout Group Results

Our discussion focused on two themes: (a) potential revisions to the current AHM protocol for midcontinent mallards that may be desirable; and (b) the things that absolutely have to get done with respect to the SEIS for midcontinent mallards and other species important to the Flyway. The group believed that the former, while important, was a second-order priority compared to the needs associated with the SEIS: conversion to MDPSolve, optimization under partial observability, and the potential regulatory implications for mallards, canvasbacks, scaup, and pintails. This is a lot of technical work that will tax even current resources, and an expectation of significant progress on the second-order priorities may not be realistic. The group stressed the need to be realistic when appraising priorities and estimating the time and money required to accomplish them. New, expensive initiatives, no matter how desirable, are not likely to succeed in the current budget climate. Rather, we should be asking what things are not likely to be accomplished, and how that would impact our mission.

Specific Tasks To Complete

(1) Objectives

- Revisit the objective function, specifically the need/desire to include the NAWMP goal as a constraint. This discussion needs to be informed by simulations to help understand the implications of changing the objective function, but caution needs to be exercised in relying on these forecasts. Explicit acknowledgement of consistent objectives (coherence) with habitat management
- The Flyways should also be given a heads-up at this time on the need to begin thinking about potential changes to the objective function, its relationship to the NAWMP process, as well as the status of assessment work regarding implementation of the SEIS.

(2) Regulatory Alternatives

- low priority

(3) Models

- The group also believed that work on a revised model set should begin as soon as possible, and that there needs to be some communication at the 2012 winter Flyway meetings regarding background, motivation, and needs for this work.
- It would be desirable to have one or two Flyway technical people involved in the modeling effort, and a lead from PHAB at Patuxent (would Nathan Zimpfer be available?)

Central Flyway Breakout Group Results

Specific Tasks To Complete

(1) Objectives

- back off of MSY?
- remove NAMWP goal?
- explicit acknowledgement of consistent objectives (coherence) with habitat management;
- need to develop a process for objectives elicitation
- concerns about when to engage Mississippi Flyway
- considerable discussion about how to account for a declining K in objectives specification

(2) Regulatory Alternatives

- low priority

(3) Models

- Update current estimates of vulnerability and age ratios
- Update parameter estimates of current recruitment (high priority) and survival (low priority) models
- Develop models of recruitment with new predictors (US ponds)

Pacific Flyway Breakout Group Results

Specific Tasks To Complete

(1) Regulatory Alternatives

- Reconsideration of management alternatives in pintail AHM

(2) Models

- Adjustment to AHM strategies to accommodate change in the timing of the regulation setting process (mallards and northern pintail)
- Adjustment to mean latitude anchor point in pintail AHM submodel
- Inclusion of other state BPOP surveys (WA, BC, possibly NV and ID) in mallard AHMD
- Reconsideration of mallard AHM in accounting for midcontinent mallard stock transition into PF (Alberta), may involve modification to midcontinent mallard AHM

6 HMWG PRIORITY ACTIONS AND WORK PLANNING

After summarizing the results from the breakout groups for each case study, the Working Group began a discussion to identify the highest priority work associated with each action item. At the outset of the discussion, it quickly became apparent that the work associated with the evaluation of the harvest management implications resulting from the changes in the timing of regulatory decisions specified under the preferred alternative of the draft SEIS represented the highest priority for technical work in 2012 (Table 3). The scope of this work was then compared to priority rankings from the 2010 HMWG meeting and a new priority list was developed for review by the SRC and the Flyway Councils in preparation for the 2012 regulations cycle

(see attached 2012 Priorities) . 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.

During the work planning exercises, the HMWG identified several broader issues and action items that outline the scope of the highest priority technical work:

(1) Perform assessments on "fixed" decision frameworks (i.e., minimize changes to state variables and objectives)
   - Leads: PHAB and Flyway Representatives
   - Submit to partners for broader review

(2) Develop a consistent process (metrics/standards) for evaluating timing impacts
   - Leads: State Technical and Flyway Representatives
   - Submit to partners for broader review

(3) Develop strategies to communicate with the management community and the general public
   - Leads: State Technical and Flyway Representatives
   - Coordinate with Alicia King (USFWS) to develop formal strategy

(4) Facilitate discussions for the determination of the timing of winter technical section meetings
   - Leads: State Technical and Flyway Representatives
   - Submit to partners for broader review

The Working Group also discussed the outcomes of discussions about linkages between the NAWMP revision and harvest management decision frameworks and concluded that there were no relevant action items to consider at this time. However, the HMWG is very interested in learning about the role of the Working Group in the forthcoming NAWMP Revision Action Plan.

The Working Group is committed to the double-loop learning process of AHM, but recognizes that the process will require a significant amount of time that should not preclude technical work focused on the evaluation of the implications of changing the timing of regulatory decisions specified in the draft SEIS. Project leads identified in Case Study III were advised to continue working with each group and addressing each action item when possible, with the understanding that technical work associated with the SEIS will take precedence.

Table 3 – Harvest management decision frameworks, technical issues, project leads, deadlines, and action items identified at the 2011 HMWG working group meeting, resulting from discussions about the implications of changes in timing of regulatory decisions associated with the preferred alternative specified in the draft SEIS.

Decision Framework	Issue	Leads	Deadline	Action	Priority
National					
Mallard stocks	Optimization, model weight updating	Johnson, Boomer	12/2012	POMDP	High
	Software conversion (ASDP to Matlab)	PHAB, USGS	12/2012	Fackler contract	High
	Process for admitting technical changes associated with predictions	PHAB, Flyway Reps	12/2012		High
	Formation of ad-hoc committees to facilitate collaborative work	PHAB, Flyway Reps	12/2012		High
Pintail	See mallards (above)	Sanders, Runge	12/2012		High
Scaup	See mallards (above)	Boomer, PHAB	12/2012		High
Canvasback	Adjust harvest strategy for decisions based on predicted BPOP	Silverman	12/2012		High
Teal	Adjust triggers for special teal seasons	Fleming and Teal group	12/2012		High
Shared					
MCP Cranes		CF Tech Comm and MN	12/2012		High
RMP Cranes		CF and PF	12/2012		High
Black duck		Devers and CWS	9/2012		High
Pacific Flyway					
Cacklers, Dusky, Aleutian, Wrangel Island, PF Brandt, BT Pigeons, PF WFG		PF Tech Comm	12/2012		High
Central Flyway					
Hi-Line		CF Tech Comm	12/2012		High
Mississippi Flyway					
EPP, MVP, SJBP		MF Tech Comm	12/2012		High
Atlantic Flyway					
AP, NAP		AF Tech Comm	12/2012		High

LITERATURE CITED

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Harvest Management Working Group

2011 Meeting Agenda

Philadelphia, PA

Monday (November 28) ***Travel Day***

[1700] State Technical Representatives meeting (Vrtiska)

Tuesday (November 29) ***Orientation and Reports from Partners***

[0800] Welcome, introductions, logistics, agenda (Case and Boomer)

[0830] Flyway reports/perspectives

- Atlantic, Mississippi, Central, Pacific (State Technical Representatives)
- USFWS (Flyway Representatives)
- CWS (Ingram)
- Continental banding needs assessment (Richkus)
- HMWG Terms of Reference (Boomer)

[1000] **Break**

[1015] New Business

- Central Flyway ideas for a modified licensing system (Vrtiska)
- Emerging issues affecting band recovery information (Johnson)
- Considerations for updating harvest strategy regulatory alternatives (Runge)
- Eider assessment (Dwyer)
- Redhead assessment

[1200] **Lunch**

[1300] Assessment updates

- Black duck AHM (Devers)
- Scaup assessment (Boomer)
- Teal assessment(Fleming)
- Updated methods for estimation of mallard harvest rates (Boomer and Zimmerman)
- Eastern and Mid-continent mallard AHM sub-model performance (Zimmerman and Boomer)

[1500] **Break**

[1515] Updates continued...

- SEIS (Trost)
- Evaluation and adjustments to harvest strategies based on timing of decisions in relation to SEIS (Boomer and Johnson)
- NAWMP Revision (Ringelman)
- HMWG/NSST collaboration (Boomer)

[1630] HMWG work planning: context and objectives (Case and Richkus)

[1700] **Adjourn**

Wednesday (November 30) ***HMWG Work Planning Session I***

[0800] HMWG work planning: orientation to case studies (Case and Richkus)

[0830] Case Study I: SEIS

- Group discussion: issue identification (∼*30 min*)
- Break out groups: task identification (who, what, where, when, how) (∼*45 min*)
- Group reporting (∼*30 min*)
- Group discussion: coordination of actions (∼*45 min*)

[1200] **Lunch**

[1300] Case Study II: NAMWP Revision

- Group discussion: issue identification (∼*30 min*)
- Break out groups: task identification (who, what, where, when, how) (∼*45 min*)
- Group reporting (∼*30 min*)
- Group discussion: coordination of actions (∼*45 min*)

[1530] Case Study III: Mallard AHM Model Set Revision

- Group discussion: issue identification (∼*30 min*)
- Break out groups: task identification (who, what, where, when, how) (∼*45 min*)
- Group reporting (∼*30 min*)
- Group discussion: coordination of actions (∼*45 min*)

[1800] Adjourn

Thursday (December 1) ***HMWG Work Planning Session II***

[0800] Recap and Review Agenda (Case)

[0810] Review "scoping document" concept

[0830] SEIS - priority actions and work plan

[0930] SEIS - communications

[1000] **Break**

[1020] AHM Mallard Models - priority actions and work plan

[1100] NAWMP Revision - recommendations/priority actions/work plan

[1130] **Lunch**

[1300] Other priority actions and new business

[1330] Review of last year's priority actions

[1400] Next meeting location, dates, topics

[1415] Parting thoughts: Round Robin

[1500] Adjourn

Friday (December 2) ***Travel Day***

Harvest Management Working Group

Terms of Reference

29 November 2011

Background

Following the publication of Supplemental Environment Impact Statement on Sport Hunting in 1988, the U.S. Fish and Wildlife Service (FWS) desired to develop a regulations-setting process consistent with the preferred alternative of stabilized regulations for fixed periods of time. In 1992, a working group originally comprised of 21 technical representatives from the FWS, the four Flyway Councils (Councils), and the U.S. Geological Survey (USGS) was established at the request of the Service and with the cooperation of the Councils.

The work of this group culminated in the FWS adopting an adaptive management process for establishing duck harvest regulations in 1995. The process came to be identified as Adaptive Harvest Management and the group of technicians the Adaptive Harvest Management Working Group. The Working Group evolved into a partnership of representatives from the FWS, the Councils, Canadian Wildlife Service (CWS) and USGS. During 1992–2011, over 100 individuals have participated in 23 meetings held by the working group.

The FWS and the Councils recognized that numerous technical improvements and communication challenges associated with the implementation of this Adaptive Harvest management approach remained and the group continued to meet annually since the implementation of Adaptive Harvest Management for Mid-Continent mallards in 1995. The group expanded its scope to include other stocks of mallards, other species including some non-duck species, and the development of other model based harvest strategies. To reflect the changes in the roles and responsibilities for the group, the name of the group has changed several times since 1992, e.g. Stabilized Regulations Working Group, Interagency Working Group for the Development of Guidelines for Stabilized Harvest Regulations, Adaptive Harvest Management Technical Working Group, and Adaptive Harvest Management Working Group.

This Terms of Reference document describes the current administrative structure, expanded roles, membership, and responsibilities for this group. To reflect these changes, the name of the group has been changed to the Harvest Management Working Group (HMWG).

Mission

To serve in an advisory capacity to the U.S. Fish and Wildlife Service and Flyway Councils by providing technical guidance, evaluation, and coordination for the development and improvement of harvest strategies for waterfowl management.

Roles and Responsibilities

(1) Identify and advocate actions that will further the development, evaluation and support for continued use, and expansion of Adaptive Harvest Management as the process by which hunting recommendations are promulgated. The working group will not make specific recommendations regarding harvest regulations, but will strive to effectively communicate the technical background of this process to all stakeholders.

(2) Assist in the synthesis of new information, development of analytical techniques, technical assessments, and retrospective analyses of existing data related to evaluation and further improvements of harvest management strategies.

(3) Develop and implement communication strategies for harvest management as a scientifically and administratively sound approach for managing waterfowl harvests.

(4) Work in cooperation with the NAWMP Science Support Team, Human Dimensions Working Group, and other entities in developing general approaches for planning, monitoring, and assessing an integrated strategy for

managing waterfowl populations and their habitats. Invite representative members of the NSST and Human Dimensions working groups to participate in the annual Harvest Management Working Group meeting.

(5) Evaluate the utility of technical tools and information to assist policy makers in understanding tradeoffs among multiple competing objectives and in identifying fundamental goals of harvest management.

(6) Identify policy issues that need resolution to move harvest strategies forward, and elicit responses to those issues from appropriate administrators.

(7) Provide annual progress reports as needed to the Flyway Councils and the FWS for review and potential action.

(8) The primary focus of the HMWG will encompass duck harvest management, but may in the future address geese as appropriate.

(9) In light of the expanded roles and responsibilities of the group which affect harvest management roles and responsibilities of all Flyways, the HMWG should not be viewed as a surrogate to obtaining full Flyway technical committee and Council input on important harvest management issues.

Membership

The HMWG members (26) or their designees should provide policy and technical expertise in harvest management, habitat conservation initiatives, and human dimensions considerations. The HMWG consists of two appointed representatives from each of the 4 Flyway Councils (8), the respective FWS Flyway Representatives (4), Chief of Population and Habitat Assessment (DMBM) (1), Chief of Harvest Surveys (DMBM)(1), FWS Regional Migratory Bird Chiefs (8), USGS scientists (2), and CWS representatives (2). The composition of the group is designed to provide a broad array of geographic and administrative expertise for independent collaborative discussion of waterfowl management issues, rather than representation for individual agency positions. All costs of participation will be the responsibility of the attendees' agencies. In addition, any additional FWS, USGS, or Flyway/State technical personnel are welcome and encouraged to participate in meetings.

Coordinator

The coordinator will be the Chief (or designated staff member) of the Population and Habitat Assessment Branch (DMBM). The coordinator will be responsible for presiding over meetings, overseeing group business including establishment of meeting agendas, and reporting on the activities of the group.

Decision Making

The HMWG does not operate by majority rule, or formal voting, but will strive to reach consensus (i.e., no dissenting opinions) on all issues while working cooperatively. Consensus issues affecting Flyway harvest management ultimately need formal endorsement by full Flyway Technical Committees and Councils before being considered official Flyway input to CWS, FWS and the Service Regulations Committee on these issues. On issues where the group does not reach consensus, the meeting report will describe the differing viewpoints for future resolution.

Meetings

The HMWG will meet at least once a year. Meetings will be planned to occur in advance of the January/February Service Regulations Committee Meeting, generally in November or December.

This Working DRAFT was agreed to by the Harvest Management Working Group on November 29, 2011 for forwarding to the Flyway Councils and the Service Regulations Committee for review.

2012 Harvest Management Working Group Priorities

Priority rankings and project leads identified for the technical work proposed at the 2011 Harvest Management Working Group meeting.

(1) **Highest Priorities (Urgent and Important)**

- Evaluation and development of adjustments to harvest strategies based on changes in timing of regulatory decisions in association with the preferred SEIS alternative (*See Table 3. for specific action items and technical leads*)

(2) **Long-Range Priorities (Non-urgent, but Very Important)**

- Eastern mallard AHM model set Revision (*Double-loop process; Bryan Swift, Min Huang, Guthrie Zimmerman, Pat Devers*)
- Mid-continent mallard AHM model set Revision (*Double-loop process; Mark Vrtiska, Scott Boomer, Nathan Zimpfer, others...*)
- Multi-stock management (*HMWG*)
- Time dependent optimal solutions to address system change (*Scott Boomer, Fred Johnson, Mike Runge*)

(3) **Additional Priorities**

- Coherence/NAWMP Review collaboration with NAWMP Science Support Team and Human Dimensions Working Group representatives (*Scott Boomer (coordinate with Jorge Coppen), Pat Devers, Ken Richkus.*)
- Developing methods to communicate with constituents (*Dave Case, Pam Garrettson, Communications Team*)
  - Planning for communication challenges associated with changing packages
  - Updating Harvest Management Working Group communications plan
- Harvest Management Working Group coordination with monitoring program reviews (e.g., WBPHS, Banding Needs,... *Nathan Zimpfer, Pam Garrettson*)

2011 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
U.S. Fish & Wildlife Service
11510 American Holly Drive
Laurel, Maryland 20708-4017
phone: 301-497-5684; fax: 301-497-5871
e-mail: scott_boomer@fws.gov

USFWS Representatives:

Nanette Seto (Region 1)
U.S. Fish & Wildlife Service
911 NE 11TH Avenue
Portland, OR 97232-4181
phone: 503 231-6159
fax: 503 231-2019
e-mail: nanette_seto@fws.gov

Jeff Haskins (Region 2)
U.S. Fish & Wildlife Service
P.O. Box 1306
Albuquerque, NM 87103
phone: 505-248-6827 (ext 30)
fax: 505-248-7885
e-mail: jeff_haskins@fws.gov

Jane West (Region 3)
U.S. Fish & Wildlife Service
5600 American Blvd West
Bloomington, MN 55437-1458
phone: 612-713-5432
fax: 612-713-5393
e-mail: jane_west@fws.gov

Emily Jo Williams (Region 4)
U.S. Fish & Wildlife Service
1875 Century Blvd.
Atlanta, GA 30345
phone: 404-679-7188
fax: 404 679-4180
e-mail:emilyjo_williams@fws.gov

Sherry Morgan (Region 5)
U.S. Fish & Wildlife Service
300 Westgate Center Drive
Hadley, MA 01035-9589
phone: 413-253-8610
fax: 413-253-8293
e-mail: sherry_morgan@fws.gov

Casey Stemler (Region 6)
U.S. Fish & Wildlife Service
P.O. Box 25486-DFC
Denver, CO 80225-0486
phone: 303-236-4412
fax: 303-236-8680
e-mail:casey_stemler@fws.gov

Russ Oates (Region 7)
U.S. Fish & Wildlife Service
1011 East Tudor Road
Anchorage, AK 99503-6119
phone: 907-786-3446
fax: 907-786-3641
e-mail: russ_oates@fws.gov

Marie Strassburger (Region 8)
U.S. Fish & Wildlife Service
2800 Cottage Way, W-2606
Sacramento, CA 95825
phone: 916-414-6464
fax: 916-414-6486
e-mail: marie_strassburger@fws.gov

Khristi Wilkins (Region 9)
U.S. Fish & Wildlife Service
10815 Loblolly Pine Drive
Laurel, Maryland 20708-4028
phone: 301-497-5557
fax: 301-497-5581
e-mail: khristi_wilkins@fws.gov

Ken Richkus (Region 9)
U.S. Fish & Wildlife Service
11510 American Holly Drive
Laurel, Maryland 20708-4017
phone: 301-497-5994
fax: 301-497-5871
e-mail: ken_richkus@fws.gov

Paul Padding (Region 9)
U.S. Fish & Wildlife Service
11510 American Holly Drive
Laurel, MD 20708
phone: 301-497-5851
fax: 301-497-5885
e-mail: paul_padding@fws.gov

Jim Kelley (Region 9)
U.S. Fish & Wildlife Service
1 Federal Drive
Fort Snelling, MN 55111-0458
phone: 612-713-5409
fax: 612-713-5393
e-mail: james_r_kelley@fws.gov

Jim Dubovsky (Region 9)
U.S. Fish & Wildlife Service
P.O. Box 25486-DFC
Denver, CO 80225-0486
phone: 303-236-4403
fax: 303-236-8680
e-mail: james_dubovsky@fws.gov

Bob Trost (Region 9)
U.S. Fish & Wildlife Service
911 NE 11th Ave.
Portland, OR 97232-4181
phone: 503-231-6162
fax: 503-231-6228
e-mail: robert_trost@fws.gov

Canadian Wildlife Service Representatives:

Eric Reed
Canadian Wildlife Service
351 St. Joseph Boulevard
Hull, QC K1A OH3, Canada
phone: 819-953-0294
fax: 819-953-6283
e-mail: eric.reed@ec.gc.ca

Joel Ingram
Canadian Wildlife Service
Suite 150, 123 Main Street
Winnipeg, MB R3C 4W2, Canada
phone: 204-984-6670
fax: 204-983-5248
e-mail: joel.ingram@ec.gc.ca

Flyway Council Representatives:

Min Huang (Atlantic Flyway)
CT Dept. of Environmental Protection
Franklin Wildlife Mgmt. Area
391 Route 32 North Franklin, CT 06254
phone: 860-642-6528
fax: 860-642-7964
e-mail: min.huang@po.state.ct.us

Bryan Swift (Atlantic Flyway)
NY Dept. Environmental Conservation
625 Broadway
Albany, NY 12233-4754
phone: 518-402-8866
fax: 518-402-9027 or 402-8925
e-mail: blswift@gw.dec.state.ny.us

Larry Reynolds (Mississippi Flyway)
LA Dept. of Wildlife & Fisheries
P.O. Box 98000
Baton Rouge, LA 70898-9000, USA
phone: 225-765-0456
fax: 225-763-5456
e-mail: lreynolds@wlf.state.la.us

Adam Phelps (Mississippi Flyway)
Indiana Division of Fish and Wildlife
553 E. Miller Drive
Bloomington, IN 47401
phone: 812-334-1137
fax: 812-339-4807
e-mail: APhelps@dnr.IN.gov

Mike Johnson (Central Flyway)
North Dakota Game and Fish Department
100 North Bismarck Expressway
Bismarck, ND 58501-5095
phone: 701-328-6319
fax: 701-328-6352
e-mail: mjohnson@state.nd.us

Mark Vrtiska (Central Flyway)
Nebraska Game and Parks Commission
P.O. Box 30370 2200 North 33rd Street
Lincoln, NE 68503-1417
phone: 402-471-5437
fax: 402-471-5528
email: mark.vrtiska@nebraska.gov

Jon Runge (Pacific Flyway)
Colorado Division of Wildlife
317 West Prospect
Fort Collins, CO 80526
phone: 970-472-4365
fax: 970-472-4457
e-mail: Jon.Runge@state.co.us

Jeff Knetter (Pacific Flyway)
Idaho Dept. of Fish and Game
600 Walnut Street, P.O. Box 25
Boise, ID 83707
phone: 208-287-2747
fax: 208-334-2114
e-mail: jknetter@idfg.idaho.gov

USGS Scientists:

Fred Johnson (USGS)
Southeast Ecological Science Center
U.S. Geological Survey
P.O. Box 110485 Gainesville, FL 32611
phone: 352-392-5075
fax: 352-846-0841
e-mail: fjohnson@usgs.gov

Mike Runge (USGS)
Patuxent Wildlife Research Center
U.S. Geological Survey
12100 Beech Forest Rd. Laurel, MD 20708
phone: 301-497-5748
fax: 301-497-5545
e-mail: mrunge@usgs.gov

2011 Harvest Management Working Group Meeting Participants

HMWG Member	Representation	Affiliation
Min Huang	Atlantic Flyway Council	Connecticut Dept. of Environmental Protection
Bryan Swift	Atlantic Flyway Council	New York Dept. of Environmental Conservation
Paul Padding	Atlantic Flyway Representative	U.S. Fish & Wildlife Service
Adam Phelps	Mississippi Flyway Council	Indiana Dept. of Natural Resources
Larry Reynolds	Mississippi Flyway Council	Louisiana Dept. of Wildlife and Fisheries
Jim Kelley	Mississippi Flyway Representative	U.S. Fish & Wildlife Service
Mike Johnson	Central Flyway Council	North Dakota Fish and Game
Mark Vrtiska	Central Flyway Council	Nebraska Game and Parks
Jim Dubovsky	Central Flyway Representative	U.S. Fish & Wildlife Service
Don Kraege	Pacific Flyway Council	Washington Dept. Fish and Wildlife
Jon Runge	Pacific Flyway Council	Colorado Division of Wildlife
Bob Trost	Pacific Flyway Representative	U.S. Fish & Wildlife Service
Khristi Wilkins	Harvest Surveys Branch Chief	U.S. Fish & Wildlife Service
Ken Richkus	PHAB Branch Chief	U.S. Fish & Wildlife Service
Sean Kelly	Region 3 Bird Chief (Designee)	U.S. Fish & Wildlife Service
Chris Dwyer	Region 5 Bird Chief (Designee)	U.S. Fish & Wildlife Service
Joel Ingram	Canadian Wildlife Service	Canadian Wildlife Service
Eric Reed	Canadian Wildlife Service	Canadian Wildlife Service
Fred Johnson	USGS	U.S. Geological Survey
Other Participants		
Scott Boomer	PHAB	U.S. Fish & Wildlife Service
Dave Case	Facilitator	D.J. Case & Associates
Patrick Devers	BDJV	U.S. Fish & Wildlife Service
Todd Sanders	PHAB	U.S. Fish & Wildlife Service
Guthrie Zimmerman	PHAB	U.S. Fish & Wildlife Service
Jim Ringelman	NAWMP Revision Coordinator	Ducks Unlimited
Kathy Fleming	PHAB	U.S. Fish & Wildlife Service