Harvest Management Working Group

2010 Annual Meeting Report

November 29 - December 2, 2010

New Orleans, Louisiana

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U.S. Fish & Wildlife Service
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Cover art: 2011 Federal Duck stamp artist James Hautman's painting of a pair of white-fronted geese (Anser albifrons).

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1 BACKGROUND

This report provides a summary of presentations and discussions that occurred at the 22nd meeting of the Harvest Management Working Group (HMWG). The theme of the 2010 meeting focused on the 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), current consultation efforts to inform the North American Waterfowl Management Plan (NAWMP) Revision, and the development of integrated-modeling frameworks to support coherent habitat and harvest management decision making (see attached 2010 HMWG Agenda). The HMWG also discussed and finalized a Terms of Reference and developed a planning strategy to facilitate the identification and 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

We conducted a 3-session workshop at our winter 2010 meeting to discuss the NAWMP revision. The Plan Committee has submitted the following statement regarding the purpose of the NAWMP: ***The purpose of the Plan is to sustain abundant waterfowl populations while preserving the traditions of wildfowling and achieving broad benefits to biodiversity, ecosystem processes and the people of North America. Plan goals will be accomplished by partnerships that conserve habitats and sustain populations, guided by sound science.*** The Atlantic Flyway believes that this statement is a reasonable representation of the vision of the North American Waterfowl Management Plan.

The Plan Committee Revision Steering Committee also provided a fairly lengthy and detailed draft Problem Statement to the waterfowl community asking for input on this critical part of the SDM process. The TS, after much deliberation, believes that the following more succinctly characterizes the problem that we face:

Although the waterfowl management community is in general agreement on the fundamental objectives of waterfowl management, it has not reached consensus on the means to achieve those objectives, nor the framework necessary for integrating multiple decisions in a way that efficiently allocates resources and coordinates actions.

The Atlantic Flyway developed a list of 3 fundamental objectives of waterfowl management, (1), **Maintain healthy waterfowl populations**, (2), **Maintain landscapes capable of sustaining waterfowl populations in perpetuity**, and (3), **Maintain the tradition, societal values, and economic benefits of hunting and other recreational uses of waterfowl.**

We also developed a list of measurable attributes that could be considered with each of the fundamental objectives.

One very important point that resonated throughout our TS discussions was that the scope of the NAWMP Revision has become too broad. We feel that it is critical to develop a framework for integrating multiple decisions that can assist us in better addressing the fundamental objectives of waterfowl management. We feel, however, that the integration of harvest and habitat management objectives should be at the forefront of this effort for the 2011/2012 Revision. While we agree that human dimensions (HD) are important to consider, we already implicitly factor human values into our harvest management decisions and to a lesser

extent, the habitat management decisions we make. We feel that it is premature and technically uncertain how to more formally incorporate human dimensions into the process. The integration of harvest and habitat management objectives, if possible at all, is a technically challenging enough endeavor. This sentiment was echoed by the participants at the Minneapolis summit (who overwhelmingly supported immediate efforts to achieve better integration/coherence of harvest and habitat management, but more equivocally supported efforts to integrate harvest, habitat and human dimensions).

SEIS

The Atlantic Flyway is in general support of preferred alternatives for the frequency of package review, stock specific harvest strategies, special regulations, zones and splits, and subsistence harvest regulations. There is some need for more detail with regards to the schedule and timing of the regulatory process before all member states can be comfortable with the preferred alternative. Most of the consternation revolves around the potential loss of a technical meeting and how species such as geese are dealt with in the proposed regulatory process. We have no real issues with setting regulations for ducks, woodcock, and doves using year old data. The other area where we have a non-consensus is with regards to the scale of management. Many states would like to have the opportunity to manage at a finer scale (i.e. management regions within a flyway), should the data warrant it. Thus, we would like to see language similar to Alternative 3, but perhaps not as explicit that it will occur, only that it could occur should data warrant a change to a finer scale.

Zones and Splits

We have polled all of our member states regarding whether they would be interested in changing their zone and split configurations. Three states (ME, NH, and WV) have indicated that they will likely move to change their current zone and split configurations. Vermont will likely change one of their existing zone boundaries, but not create a new zone. Some states are a bit miffed that repeatedly we have heard from the Service that they would not entertain any changes to zone and split configurations, but then are now saying that changes and assessment of those changes need to be in place by May 2011. If we had known that changes were on the table, several states would have liked to see a 2 zone, 2 split option on the table also.

Eastern Mallard Model

Along with Guthrie Zimmerman and Pat Devers we are conducting an initial assessment of the eastern mallard AHM models. This assessment will entail comparing observed parameter estimates to predicted estimates from the model. It may also entail comparing past parameter estimates (e.g., slope and intercept parameters relating population size to recruitment) to updated estimates from more current data. We envision this assessment of model performance as a foundation for initiating discussions about objectives for eastern mallard management, potential improvements to the model/consideration of alternative models (which will likely be a function model performance and objectives), and simulations of performance metrics (e.g., equilibrium BPOP under different season/bag limit combinations).

2.2 Mississippi Flyway (*Guy Zenner and Larry Reynolds*)

NAWMP Revision and Fundamental Objectives for Waterfowl Management

At their 2009 meetings, the Mississippi Flyway Council (MFC) and Technical Section used structured decision-making processes to identify fundamental objectives for duck management in the Flyway. The outcome was 7 draft fundamental objectives (in priority order):

(1) Maintain healthy duck populations as part of the North American fauna

(2) Conserve wetlands for their ecosystem goods and services, including waterfowl habitat

(3) Maintain the tradition of duck hunting

(4) Promote conservation behavior in the public at large

(5) Maximize harvest opportunity

(6) Maintain and improve hunting quality

(7) Provide for non-consumptive uses of duck populations and wetland habitats

A summary of the process used to obtain these objectives was appended to the Mississippi Flyway's 2009 report to the AHM Working Group. No additional attempts were made at the 2010 meetings to further refine or revise these objectives. As a result, we believe these remain the Mississippi Flyway's fundamental objectives for waterfowl management.

Draft SEIS on the Issuance of Regulations for Migratory Bird Hunting

For the purposes of informing discussions on the draft SEIS at this meeting, we polled the Mississippi Flyway Council Tech Section representatives for their unofficial preferences (Table 1) on the alternatives (see attached list of Draft SEIS Issues and Alternatives) listed in the draft document.

Table 1 – Mississippi Flyway Council Technical Section Representatives unofficial positions on draft SEIS alternatives.

1. Schedule and Timing of the General Regulatory Process

Alternative	Endorsement	Comments
Alt. 1	11	IA, IN, OH, TN, KY, AL, IL, AR, MO, MS, LA IA - Process has been working and allows for action to be taken if bpops drop substantially. There are a lot of issues to address for a single annual meeting - can barely get work done now IN - Possiblly Alt. 2 if guaranteed that regs would not change at the last minute after a poor bpop report OH - Prefer to rely on real data rather than model predictions because predicitons will likely result in more conservative regs due to the uncertainty associated with them, which penalizes hunters TN - Should not set regs without bpop data. Only advantage to Alt. 2 is time and money savings KY, LA - too many issue to address for one meeting, use the current bpops to develop best harvest strategies AL - current process is working fine IL - current process is working, enables response to bpop changes, Alt. 2 creates more conservative regs that penalize hunters so agencies can save time and money, counter to human dimensions issues MO - should not change if seasons are more conservative, unclear how harvest strategies would be modified, we should take additional risk with bpops and not with hunter participation MS - too many issue to address for one meeting, use most current info to develop harvest regs

Alt. 2	2	MN, WI MN - Assuming the FWS and Flyways commit to not reacting to poor duck bpops or AHM recommendation for mod or restrictive season. If we are going to react, we may as well use Alt. 1 WI - Reduces knee-jerk reactions & makes state regs process easier. However, FWS must guarantee no last minute changes if duck bpops drop. More "conservative regs" is troubling & needs clarification

2. Frequency of Review and Adoption of Duck Regulatory Packages

Alternative	Endorsement	Comments
Alt. 1	3	TN, AL, MS MS - regs should be set using the most current data
Alt. 2	10	IA, MN, IN, OH, WI, KY, IL, AR, MO, LA KY - learn more by limiting changes to 5 year intervals LA there are no packages if we change them annually MO - keep tinkering to a minimum

3. Stock-Specific Harvest Strategies

Alternative	Endorsement	Comments
Alt. 1	12	IA, IN, OH, WI, TN, KY, AL, IL, AR, MO, MS, LA IA - maybe Alt. 2 if it simplified regs but did not restrict harvest too much WI - Maybe Alt. 2 if it simplified regs & did not restrict harvest too much. Not convinced that species-specific regs have a great impact on duck bpops TN - Possibly Alt. 3 KY - we are learning from the stock specific harvest strategies and should continue to do so MO - maybe Atl. 2
Alt. 2	1	MN

4. Special Regulations

Alternative	Endorsement	Comments
Alt. 1	8	TN, KY, AL, IL, AR, MO, MS, LA KY - experimental seasons help us learn about impacts on non-target stocks IL - impacts on interior geese need evaluation, may still be case by case evaluations demanded MO - eliminating experimental seasons could be detrimental to interior goose populations MS - experimental seasons help us learn about impacts on non-target stocks LA we need to acknowledge potential impacts through an evaluation, even if limited in scope
Alt. 2	5	IA, MN, IN, OH, WI IN - Evaluations are for migratory Canada geese, not resident geese. Will special early and late seasons really be approved without evaluations?

5. Management Scale for the Harvest of Migratory Birds

Alternative	Endorsement	Comments

Alt. 1	13	IA, MN, IN, OH, WI, TN, KY, AL, IL, AR, MO, MS, LA IA, LA - maybe Alt. 2, definitely not 3 MN - perhaps Alt. 2 MO - should separate Great Lakes mallards and have same regs in rest of Miss. Flyway and Central Flyway for midcontinent mallards

6. Zones and Split Seasons

Alternative	Endorsement	Comments
Alt. 1	11	IA, IN, OH, TN. KY, AL, IL, AR, MO, MS, LA
Alt. 3	1	MN
Alt. X	1	WI Eliminate federal restrictions on zones and splits - not biologically based and no evidence they help duck bpops

7. Subsistence-Harvest Regulatory Process

Alternative	Endorsement	Comments
Alt. 1	12	IA, MN, IN, OH, WI. KY, AL, IL, AR, MO, MS, LA
Alt. 2	1	TN

Other Issues The following are some important issues that continue to be discussed in the Mississippi Flyway. These issues are:

- That the effectiveness of some species-specific regulations are questionable given the rudimentary duck identification skills of most hunters. Thus we are also unsure how effective they are at reducing harvests or increasing breeding populations.
- That hunter recruitment and retention issues are still given very little, if any, consideration in the annual process of developing migratory game bird hunting regulations.
- That declining numbers of hunters are not explicitly incorporated into any harvest models and strategies.
- That a time table for the review and/or revision of regulatory packages continues to be delayed.
- That maximizing the long-term cumulative harvest may not be the best means objective for achieving the Flyway's fundamental objectives.
- That we still have not developed a strategy for dealing with the difficult communications issues that will undoubtedly arise when the duck season becomes restrictive.

2.3 Central Flyway (*Mark Vrtiska and Josh Richardson*)

The 2011 regulatory cycle appears to be a year in which waterfowl harvest management will be impacted for many years to come. The draft Supplemental Environmental Impact Statement (SEIS) on hunting and the revision of the North American Waterfowl Management Plan (NAWMP), considered either together or independently - will influence the future of waterfowl on many levels, and perhaps 2011 will be considered a watershed year for waterfowl management. The Central Flyway (CF) appreciates 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 passed a recommendation for the formation of a Human Dimensions Working Group (Recommendation 10, July 2010). 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. The CF also has had vigorous discussion about duck harvest management objectives in the past couple of years. However, our discussions can only go so far in terms of harvest management without information regarding duck hunters, or perhaps, we stop when we realize the depth and breadth of information we may need to answer our questions regarding waterfowl hunters. Nonetheless, given the aforementioned documents, we believe we are at a major crossroads in the history of waterfowl harvest management, and we have to begin to start addressing questions regarding waterfowl hunters, and feel a sense of urgency about initiating this effort. 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?

Hunter's Choice Experiment

The Hunter's Choice Experiment has been completed and a report has been distributed to the Service and other flyways. We hope individuals in this working group and other interested parties take the time to peruse the report and implications within. The CF still has work to do in terms of addressing the operational nature of implementing such regulatory package. But, from this experiment, we have come to realize to a greater extent that within-flyway options for regulatory packages such as HC or season-within-a-season needs consideration.

Finally, specific to this group, the CF would like to see continued work (e.g., recruitment models) on mid-continent mallard. 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 that we believe is necessary to continue to provide hunting opportunity.

2.4 Pacific Flyway (*Dan Yparraguirre and Jon Runge*)

NAWMP Revision

The Pacific Flyway supports the general concept of seeking integrated goals for populations, habitats, hunting opportunity and fostering strong public support for waterfowl. Regarding human dimensions, we are concerned that formally incorporating this unspecified objective into the process using a quantified decision making framework will create a more complex and expensive hunt regulation process. We recommend preliminary efforts focus on linkages between harvest and habitat as a first step. The Pacific Flyway has long identified 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.

NAWMP Structured Decision Making, Round 1

As part of the SDM process for a revised North American Waterfowl Management Plan, the Pacific Flyway Study Committee identified 3 fundamental objectives for the revised Plan:

(1) Maintain landscapes capable of sustaining waterfowl populations in perpetuity with associated ecological benefits.

(2) Maintain viable waterfowl populations as part of the North American fauna.

(3) Support the tradition of waterfowling.

Northern Pintail

The Pacific Flyway recommended that harvest management for pintails be based on a derived strategy that uses: 1) Maximum Sustained Yield (MSY) as a harvest objective; 2) constrains closed seasons to breeding populations below 1.75 million; and 3) eliminates partial seasons (shorter pintail seasons within a longer general duck season).

Specifically, the Pacific Flyway recommended strategy 39 as its preferred strategy for regulations in 2010-11 and that further review continue for the next year. Harvest strategy 39 meets previously-stated Pacific Flyway positions to minimize closed and partial seasons and likely reduces the frequency of regulations changes. The Pacific Flyway supports a derived strategy that does not have an explicit allocation of harvest among the flyways.

Western Mallards

We remind the Working Group that our Council has requested that the Service explore options of 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 mallards. Improved surveys are now being conducted in British Columbia and Washington, and some other Pacific Flyway states are continuing their efforts to improve or create breeding waterfowl surveys. Additional work is needed on estimating harvest rates relative to regulation packages.

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

The Pacific Flyway has only begun to review the SEIS. Fortunately, the Pacific Flyway has established positions on many of the 7 major components in the SEIS. Past Council actions have: 1) encouraged caution regarding expansion of stock-specific harvest strategies; 2) consistently supported managing harvest at a scale that supports opportunities and needs that are unique to each flyway; 3) supported additions to existing zone and split criteria and a five year schedule for selections of changes in zone and split season options; and 4) consistently supported the spring-summer Alaskan subsistence season with regulations necessary to ensure long-term conservation consistent with the customary and traditional subsistence harvest of migratory birds by Alaskan indigenous inhabitants.

AHM Working Group Terms of Reference

In March, The Pacific Flyway Council requested that the National Flyway Council work with the AHM Working Group to continue development of the Terms of Reference to address concerns about composition and role of the group. All 4 Flyway Councils were asked to review these Terms of Reference for endorsement, without amendments. The Pacific Flyway believed the document was a good start at defining roles and responsibilities, but had one significant concern with the draft that prevented Pacific Flyway endorsement. Membership of the group would be formalized at 26 members, with 8 flyway representatives, 16 from USFWS, and 2 from USGS. The draft does not address the fundamental need to balance the composition of the group among flyway representatives and others. In the Pacific Flyway, majority and minority reports are not

presented, the consensus or final decision via vote is the group's position, and we would prefer a system that didn't require Flyway representatives to always be a minority by definition.

2.5 Zones and Splits (*Jim Kelley*)

In 2010 the Service agreed to propose a change in the criteria that States utilize to configure their arrangement of duck zones/splits every 5 years. As part of that proposal an Environmental Assessment was required to determine the anticipated environmental impacts of such a change. The methodology used to estimate the potential increase in harvest resulting from an increase in the number of duck zones in the U.S. was outlined. We examined the relationship between the number of zones in a state and the number of duck exposure days during the regular duck season by comparing these two variables in 1978 and 1996 for each Flyway. The length of the regular duck season was similar in both years (i.e. 50 days in Atlantic Flyway); however the number of duck zones had increased in many states during the period from 1978-1996. The slope from linear regression was used to estimate the percent change in duck exposure days that would occur if a new duck zone is added within a state's boundary. We defined an exposure day as any day in which all or some portion of a state was open to duck hunting during the regular season. For each Flyway, the average percent change in exposure days per zone addition was calculated.

The above analysis was used to estimate the impact on duck harvest that would result if the Service's split/zones criteria were changed to allow more zones. The number of duck exposure days during the 2009 regular season was determined for each state in each Flyway. For each state, the number of exposure days was multiplied by the flyway-specific proportional increase in days expected if a zone was added to that state. In addition, the number of ducks harvested per exposure day was estimated by dividing each state's 2009 regular season total duck harvest by the total number of duck exposure days in the state for that year. The expected increase in harvest resulting from the addition of a zone in each state was determined by multiplying the number of ducks harvested per exposure day by the additional exposure days per zone addition. The expected increase in total duck harvest was determined for each Flyway and nationally, and compared to the estimated Flyway and national harvest in 2009. It should be noted that this analysis is based on the assumption that all eligible States add one duck zone within their boundaries. Because some States do not maximize the number of zones currently allowed, it is likely that not all States will avail themselves of the opportunity to add zones if the zoning criteria are modified. Therefore, the estimated increase in harvest due to a change in the zoning criteria is a maximum estimate that will not likely be realized.

3 ASSESSMENT UPDATES

3.1 Scaup (*Scott Boomer*)

This brief presentation updated Working Group members on the planned work to continue the development of an alternative model to represent scaup population and harvest dynamics. Due to conflicting priorities limited progress was achieved in 2010. Several technical challenges related to the uncertainty of the rate and time frame for the anticipated, continued population decline was discussed as well as the implications for deriving time dependent harvest policies.

3.2 Black Duck (*Pat Devers*)

The Black Duck management community has been developing an adaptive harvest management (AHM) framework since 2000. During this time the framework as evolved from one based on Mid-Winter Inventory data (1950–2007) to breeding population data (1990-2010). The current framework incorporates the Mid-Winter Inventory data as informative prior distributions on key model parameters. The framework is designed to inform harvest management decisions and to increase our understanding of 2 competing hypotheses of black

duck population regulation. These hypotheses include the influence of mallard competition on black duck productivity and the influence of harvest mortality on annual survival. These hypotheses are combined to create 4 competing models:

(1) Mallard competition and additive mortality

(2) Mallard competition and compensatory mortality

(3) No mallard competition and additive mortality

(4) No competition and compensatory mortality

The technical development of the model framework is scheduled to be completed by December 2010. However, two key policy issues remain unresolved the definition and functional form of the parity constraint and the definition and functional form of the population goal constraint. The parity constraint is intended to achieve an equitable distribution of black duck harvest between Canada and the U.S. The Black Duck Adaptive Harvest Management Group is using a Structured Decision Making process to achieve consensus regarding these constraints for final recommendation to the International Management Group and incorporation into the black duck AHM framework. The proposed black duck AHM framework is scheduled to be introduced to the Flyways for consideration in summer 2011 with a goal of implementing the framework for the 2012/2013 hunting season.

3.3 Summary of progress on teal assessment (*Kathy Fleming*)

In July 2009, the SRC requested that flyways appoint representatives to assist Service staff on a comprehensive assessment of teal (blue-winged, green-winged, and cinnamon) population harvest potential, to help inform future decisions regarding teal harvest management. This assessment group currently consists of 2 representatives from each flyway, 2 Service Flyway Representatives, and several Service staff from the Population and Habitat Assessment Branch and from Regional Offices. The group has been given 3 years to complete the assessment, which consists of the following components: Description of the population dynamics of each species; derivation and distribution of the harvest; assessment of past and current harvest pressure; assessment of population response to harvest pressure; and assessment of the impacts of incremental regulatory changes on harvest, particularly with regard to special seasons.

Our progress to date has included, in the first year:

(1) Creation of a document sharing website for access by the teal assessment group to post and share research reports and other documents related to the assessment;

(2) Compilation of teal harvest, abundance, banding and recovery datasets, and special season history;

(3) Completion of ongoing analyses of the distribution and derivation of blue- and green-winged teal harvest.

In the second year, we have been conducting analyses of survival and recovery rates for blue- and green-winged and cinnamon teal, and productivity analyses for blue- and green-winged teal. In the third year, we will develop population models which incorporate information derived from harvest and band recovery analyses, and use these models to predict harvest potential under different regulatory scenarios.

3.4 An evaluation of mid-continent mallard AHM sub-model performance (*Scott Boomer and Nathan Zimpfer*)

The mid-continent mallard model set was last revised in 2002. We compared model predictions for the reproductive (Strong or Weak density dependence) and survival (Additive or Compensatory harvest mortality)

sub models with observed age ratios and annual survival rates estimated with monitoring information from the pre-season banding program and the parts collection survey. The preliminary results suggest that the survival sub-models are providing an adequate representation of mallard survival rates, but the reproductive sub-models are under-predicting midcontinent mallard age ratios. Further analyses also suggested an increasing trend in the ratio of juvenile to adult female direct recovery rates, which were used to adjust raw age ratios for differential harvest vulnerability. Age ratios calculated with the updated vulnerability estimates were still greater than model predictions.

3.5 Eastern mallard AHM model assessment (*Guthrie Zimmerman, Bryan Swift, Min Huang, Pat Devers*)

Eastern mallard AHM, which was implemented in 2002, is based on 6 population models that represent hypotheses regarding density dependence (strong versus weak) and a potential bias in survival and reproductive parameters. Although, the relative performance of these models has been assessed each year by updating model weights, we have not conducted an assessment of the performance of the reproductive and survival submodels since implementation. We used the most recent parts collection survey data and banding data to estimate observed recruitment and survival rates since 2002. We compared the predictions of recruitment from the weak and strong density dependent hypotheses to the observed values and noted that observed recruitment indices were within the prediction intervals for all years under the weak density dependence hypothesis, and under all years except one for the strong density dependence. Although observed values were within the 95% prediction intervals, we observed opposite trends from one year to the next in the observed versus predicted indices for some years. Observed survival rates were generally higher than predicted for adult male, juvenile male, and adult females. In contrast, observed survival rates for juvenile females were less than predicted. Similar to recruitment, overall mean survival rates were similar to predicted values, but observed and predicted survival showed opposite trends in some years. These patterns suggest that the survival and recruitment submodels are adequately represent the mean values of these parameters, but are not adequately capturing temporal variability. Next, we updated model parameters by adding data since 2002 to the estimation process. We observed increases in the differential vulnerability and survival from non-harvest mortality parameters, whereas we observed a decrease in the intercept and slope parameters relating spring BPOP to recruitment (i.e., a decrease in the strength of density dependence).

3.6 Continental banding needs assessment (*Nathan Zimpfer*)

The banding needs assessment serves to determine appropriate banding levels for the purpose of informing and evaluating harvest management decisions while providing information for the understanding of population dynamics. With this revision we are also seeking to emphasize the linkage between banding and management objectives. Our intent is to provide a greater understanding to banders and managers of how banding data are integrated into the management process and how changes to the banding program or missed banding goals may impact management decision making.

Using parameter estimates from historical banding efforts, we can generate expected estimates of vital rates given a predetermined level of banding. These estimates are are then used in a population model to estimate allowable harvest rates. These allowable harvest rates are then be compared to the expected observed harvest rate resulting from some regulatory decision. If the observed harvest rate is less than the allowable harvest rate then the level of banding was sufficient for management decision making. This entire process is simulated over a range of banding levels, and regulatory decisions (i.e., harvest rates) to develop an understanding of the frequency of errors, where an error occurs when the observed harvest rate exceeds the allowable harvest rate. The management community can then utilize the resulting curves under various regulatory options to determine what level of confidence in harvest management decisions is necessary for management decision making.

Good study design principles suggest that a sample should be distributed in a manner that captures or represents the population of interest. With regard to banding, these principles are adhered to when possible.

However, failure to adhere to these guidelines will have an impact on management decisions. We developed a search algorithm that moves bands around the landscape to determine which arrangement best achieves an objective to minimize the spatial heterogeneity of mean annual survival rates. With this search routine we can account for variation in the cost of banding operations in different environments, the patchy distribution of waterfowl, and other logistical constraints such as the number of stations currently operated to understand the potential impacts on the estimation of population wide vital rates.

4 TECHNICAL PROGRESS TOWARDS INTEGRATED DECISION FRAMEWORKS

4.1 Integrating harvest and habitat management for North American waterfowl: a prototype for Northern Pintail (*Brady Mattsson, M.C. Runge, J.H. Devries, G.S. Boomer, J.M. Eadie, D.A. Haukos, J.P. Fleskes, D.N. Koons, W.E. Thogmartin, and R.J. Clark*)

We developed and evaluated the performance of a metapopulation model that enables managers to examine, for the first time, the consequences of alternative management strategies involving regional habitat conditions and hunting on both harvest opportunity and carrying capacity (i.e., equilibrium population size in the absence of harvest) for migratory waterfowl at a continental scale. Our focus is on the northern pintail (*Anas acuta*; hereafter, pintail), which serves as a useful model species to examine the potential of integrating waterfowl harvest and habitat management in North America. We developed submodel structure that captures important processes for pintail populations during breeding, fall migration, winter, and spring migration while encompassing spatial structure representing three core breeding areas and two core nonbreeding areas. A number of predictions from our baseline parameterization (e.g., carrying capacity of 5.5 million, equilibrium population size of 2.9 million and harvest rate of 12% at maximum sustained yield [MSY]) were within 10% of those from the pintail harvest strategy under current use by the U.S. Fish and Wildlife Service. To begin investigating the interaction of harvest and habitat management, we examined equilibrium population conditions for pintail across a range of harvest rates while perturbing model parameters to represent: (1) a 10% increase in breeding habitat quality in the Prairie Pothole region (PR); and (2) a 10% increase in nonbreeding habitat quantity in the Gulf Coast (GC). Based on our model and analysis, a greater increase in carrying capacity and sustainable harvest was seen when increasing a proxy for habitat quality in the Prairie Pothole region. This finding and underlying assumptions must be critically evaluated, however, before specific management recommendations can be made. To make such recommendations, we require 1) extended, refined submodels with additional parameters that explicitly link influences of regional habitat management and environmental conditions to key life-history parameters; 2) a formal sensitivity analysis of the revised model; and 3) cost estimates for changing these additional parameters through regional habitat management efforts.

Toward this end, we have begun developing submodels for regional dynamics in the Gulf Coast and Alaska. For the Gulf Coast population, we are developing a bioenergetic model that links habitat management actions (e.g., expanding total habitat area or increasing food densities within existing habitat areas) to regional winter-spring survival that accounts for uncertainty about how pintails select habitats. This Gulf Coast model therefore specifies explicit mechanisms for density-dependent survival. For the Alaska population, we constructed a conceptual reproductive model that links climatic variables to regional fall age ratio. We have yet to identify a clear density-dependent mechanism for pintail reproduction in Alaska. We foresee great utility in using an integrated modeling approach to predict habitat and harvest management influences on continental-scale population responses.

4.2 Black Duck: integrating habitat and population dynamics (*Pat Devers, Mark Gloutney, Rod Brook, Dan McAuley, Min Huang, Eric Reed, John Coluccy, Guthrie Zimmerman, Conor McGowan, Brady Mattsson*)

The Black Duck Joint Venture (BDJV) and partners are developing a decision support tool (DST) to inform black duck habitat management and improve our understanding of limiting factors. The purpose of the framework is to allow the BDJV to provide our habitat management partners will clear recommendations of where and how habitat management should be pursued to increase the continental carrying capacity for black ducks. It is assumed an increase in carrying capacity will result in a larger black duck population (or achievement of the North American Waterfowl Management Plan goal for black ducks) and more hunting opportunity. However, there is a great deal of uncertainty regarding black duck limiting factors (i.e., how habitat influences vital rates) and the influence of habitat management on these limiting factors. Therefore, the BDJV anticipates the DST will need to be developed as an adaptive management framework that achieves three objectives:

(1) Inform habitat management decisions throughout the black duck's annual life cycle and at multiple spatial scales;

(2) Prioritize monitoring and research efforts; and

(3) Synthesize monitoring and research information to improve habitat planning and delivery over time.

The BDJV has developed an initial prototype of the framework and will continue development over the next 1-2 years. The BDJV anticipates having a simplistic, but useful model framework in place by 2012 or 2013. The BDJV anticipates the model framework will need continued refinement and development over the next several years to develop a framework to inform habitat and harvest management simultaneously.

4.3 Using structured decision-making to develop a comprehensive decision framework for scaup conservation (*Jane E. Austin, G. Scott Boomer, James E. Lyons, Robert G. Clark, David W. Howerter, Stuart M. Slattery, Mark D. Koneff*)

Breeding populations of North American scaup (greater and lesser scaup combined) declined from the mid-1980s to the mid-1990s and have remained low; the lesser scaup is now recognized as a focal species of concern. Causes of low populations, as well as the issues and controversies surrounding population status, reflect the many challenges often faced by the waterfowl management community including: multiple, often competing values and objectives that vary regionally; biological, environmental, and sociological uncertainties; and large geographic scales. We used the principles of structured decision making to develop a biologically based conservation framework that explicitly recognizes the social value of scaup hunting. Our initial focus was on problem identification (resource allocation) and the specification of fundamental objectives. We engaged the waterfowl community in three workshops where participants:

(1) Defined the problem and objectives;

(2) Identified potential management actions, measureable attributes and affected vital rates (e.g. scaup recruitment and survival, hunter recruitment and retention);

(3) Constructed functional relationships between vital rates and management actions;

(4) Developed prototype models to represent scaup and hunter population dynamics; and

(5) Identified uncertainties and key issues for conservation planning.

Scaup population models included alternative hypotheses about scaup responses to environmental variation and exploitation. Models then were used to estimate 25-year trajectories of continental hunter numbers and scaup populations in three breeding regions (prairies, boreal forest, tundra) under different suites of management actions and alternative hypotheses. We used several decision-analysis tools to evaluate what management actions would best achieve our fundamental objectives. This decision framework is among the first to confront technical challenges in obtaining coherence in waterfowl management by explicitly considering biological and management linkages between populations, habitats, harvest, and human dimensions. Thus, the community engagement and modeling processes we employed could serve as a template for future work on exploited species of high conservation concern.

5 FUTURE CHALLENGES AND DOUBLE LOOP LEARNING

5.1 Draft Supplemental Environmental Impact Statement on the Issuance of Annual Regulations Permitting the Hunting of Migratory Birds (*Bob Trost*)

The Draft SEIS is currently undergoing public review and comment. The comment period will close on March 31st. We briefly reviewed the seven major alternatives included in the Draft SEIS and provided clarification to questions from other AHM participants. The slides used in the review of the Draft SEIS are attached. Service staff are available to answer any points of clarification that folks may have. We are hopeful that everyone with an interest in this process takes the time to review and comment on the draft document.

5.2 AHM and the NAWMP Revision: where do we go from here? (*Fred Johnson*)

This presentation described characteristics of institutional learning and adaptation as they relate to efforts to integrate waterfowl harvest and habitat management. It was argued that a re-framing of waterfowl management has been difficult in large part because of the differences in governance structures between AHM and NAWMP, and because of on-going changes in social values and the dynamics of ecological systems. It was suggested that a re-framing of waterfowl management should take advantage of: (1) the NAWMP revision and SEIS on Sport Hunting to help clarify relevant values, roles, responsibilities, and institutions; and (2) the AHM and NSST working groups to provide innovations for coping with system behaviors and changes that influence the effectiveness of management. Efforts to achieve coherence might also be more successful if they: (1) relied on informal networks to tackle issues of integration; (2) let governance and institutional arrangements evolve/emerge in response to selective pressure; (3) were skeptical of (and open to failure in) efforts to predict consequences of shoulder strategies; and (4) developed ways to help define, assess, and manage risk (as opposed to statistical uncertainty).

It was also argued that large-scale changes in the dynamics of ecological systems merit more attention from waterfowl managers because of the growing evidence of such change and because all conservation planning depends on an ability to predict a system's temporal trajectory. Moreover, adaptive management (as currently practiced) is predicated on an assumption of stationary system dynamics. A common assessment framework for waterfowl population dynamics was proposed as a way for both harvest and habitat managers to evaluate and plan for system change. Possibilities for adapting to system change were also discussed, including: (1) assuming that system dynamics are stationary for only short periods of time and developing new predictive models at the end of each planning horizon; (2) using current trends and forecasts to develop predictive models that capture a realistic range of system change; (3) building resilience in a model set by increasing the diversity of models considered; and (4) developing management policies that are robust to change (i.e., those that are expected to deliver satisfactory performance while avoiding really bad outcomes).

In the end, the challenge to those seeking more effective harvest and habitat management is what is has always been: predicting consequences of controlled and uncontrolled environmental drivers, and valuing those consequences so that a preferred management strategy can be identified. But the task has gotten more

difficult because the future has become more uncertain and because stakeholder values are more diverse than previously appreciated.

5.3 AHM and multiple objectives: where do we want to be on the shoulder? (*Mike Runge*)

The enterprise of adaptive harvest management has always recognized that the objective function was central to the development of a harvest strategy, but eliciting that objective function has always been problematic. In recent years, instead of talking about maximizing sustained yield, we've increasingly talked about "managing on the shoulder" of the yield curve. This shoulder objective, which we've figured out how to implement technically, essentially acknowledges that there are more things we care about than just maximizing yield. Indeed, anytime a new harvest strategy is developed, stakeholders ask for a number of performance metrics, including frequency of closed seasons, frequency of liberal seasons, frequency of multiple-bird bag limits, the harvest distribution across flyways, and many others. In other words, harvest management is an exercise in balancing multiple objectives, but our analytical framework to date has focused on discussion of a single, perhaps integrative, objective function. We haven't had the language or analytical structure to really look at harvest decisions as multiple-objective problems.

Multi-criteria decision analysis (MCDA) is a body of techniques for solving problems that have competing objectives. It is most commonly used for one-time decisions, but can we also use it for dynamic decisions? That is, how do we couple MCDA and stochastic dynamic programming (SDP)? One way is to think of alternative objective functions as the "actions" to evaluate in a MCDA, solve the individual SDPs associated with the different objective functions, then evaluate through simulation the performance of those different alternatives against an array of objectives that are deemed important.

The development of the 2010 northern pintail harvest strategy used this approach of integrating MCDA with SDP. A series of objectives were developed that reflected the stakeholder values, including the desire to conserve pintail populations, to provide high quality harvest opportunity, to minimize regulatory burden to the public, to encourage hunter participation, and to provide other non-consumptive uses. Initially, 46 permutations of the objective function were created by varying the shoulder point, closure threshold, partial season options, and inclusion of higher bag limits. These 46 permutations were solved with SDP and the performance of those strategies against a number of metrics was simulated. The flyways were asked to provide input about how to weight the different objectives through a "swing weighting" exercise. This elicitation was used in a MCDA to identify the optimal strategies that performed best against the desired metrics. Much to everyone's surprise, two strategies (39 and 39b) rose to the top for each of the flyways. Both of these strategies sought maximum sustained yield (100% shoulder), had a closure threshold at 1.75 million pintails, and did not allow for partial seasons; they differed in whether a 3-bird liberal bag was ever allowed. Review of the initial results motivated the creation of another 36 potential strategies. These were fully evaluated, and some of them performed even better in balancing the multiple objectives, but there was little time during the regulatory cycle to give full consideration to these additional options. Strategy 39 was adopted by the four flyways and the USFWS, and is not in place as the pintail harvest strategy.

Thus, we developed a pintail harvest strategy through a formal analysis of multiple objectives, with the dynamic optimization embedded in the alternatives. This framework finally allowed us to have an explicit discussion about the tradeoffs inherent in different strategies and how we might wish to balance those tradeoffs. This approach has promise for other stocks, and indeed, potentially for multi-stock management, for which the tradeoffs are even more complex. In the end, all the work we do in harvest management about balancing multiple objectives. MCDA allows us to embrace the decision tools that are designed for those situations.

6 DEVELOPING A STRATEGY FOR THE FUTURE OF AHM

Toward the close of the meeting, the Working Group invested a full day to discuss it's role in the future of adaptive harvest management and the strategic planning necessary to navigate the double loop of the

adaptive management process. To faciliate this discussion, each member participated in a "round-robin" forum and was asked to verbally respond to the question: *"Does the Harvest Management Working Group still have relevance?"* In general, meeting participants concluded that the Working Group was still relevant, but agreed that the:

(1) the Harvest Management Working Group has lost its focus;

(2) the technical work that is evaluated at each annual meeting should be accomplished more collaboratively with members of the Working Group;

(3) the Harvest Management Working Group needs a more defined role for communicating and prioritizing the technical work required to support adaptive harvest management decision-making frameworks.

6.1 Harvest Management Working Group Terms of Reference

After the "round-robin" forum, the Working Group discussed formalizing a Terms of Reference (see attached HMWG Terms of Reference.) The discussion of the Terms of Reference considered the role of voting to determine a consensus and the makeup of the Working Group's membership. Ultimately, it was decided that the Working Group did not operate by majority rule or formal voting, but would attempt to achieve consensus on all issues.

6.2 Harvest Management Working Group Terms Priorities and Plans for 2011

After the Terms of Reference were agreed upon, the Working Group then developed a list of priorities and project leads for technical work to be accomplished in 2011 (see attached 2011 Priorities.) To facilitate the coordination of this technical work, a communication/planning strategy was developed to help prioritize and direct the HMWG activities throughout the regulatory cycle. The proposed timeline and communication process specifies that:

(1) at the close of the HMWG meeting, a list of technical work priorities and project leads is established;

(2) Flyway Technical Committees and Councils and the Service then review the priority list and provide comments and feedback during the Winter and Summer meetings;

(3) in August, based on adjustments to priorities, technical progress, and regulatory issues, the Harvest Management Working Group Coordinator drafts and distributes an agenda and facilitates a conference call or webinar to coordinate the planning of next year's Harvest Management Working Group Annual Meeting.

2010 Harvest Management Working Group Meeting Agenda

November 29 - December 2, 2010, New Orleans, LA

Monday (November 29) ***Flyway council representatives meeting***

- [1700] Flyway council representatives meeting (Vrtiska)

Tuesday (November 30) ***Orientation, updates***

- [0800] Welcome,introductions,logistics (Case, Boomer)
- [0815] Meeting overview - agenda
- [0830] Flyway reports/perspectives (State technical representatives)
  - Atlantic
  - Mississippi
  - Central
  - Pacific
  - Hunters choice
  - Zones and splits
- [1000] Break
- [1015] Assessment updates
  - Scaup (Boomer)
  - Black duck (Devers)
  - Teal (Fleming)
  - Others
  - Mid-continent mallard AHM sub-model performance (Boomer)
  - Eastern mallard AHM sub-model performance (Zimmerman)
  - Continental banding needs assessment (Zimpfer)
- [1145] Wrap-up and preparation for afternoon session (Case)
- [1200] Lunch

Tuesday (November 30) ***NAWMP Revision Workshop II***

- [1300] NAWMP Revision Workshop II (Case)
- [1700] Adjourn

Wednesday (December 1) ***NAWMP Revision Workshop II***

- [0800] Recap, continuation of Workshop (Case)

- [1130] Evaluation (Case)
- [1200] Lunch

Wednesday (December 1) ***Technical progress towards integrated decision frameworks***

- [1300] Northern pintail (Mattsson)
- [1345] Black duck (Devers)
- [1430] Scaup (Boomer)
- [1515] Break
- [1530] Group discussion: coherence, integration, and adaptive harvest management (Case)
- [1700] Adjourn

Thursday (December 2) ***Future challenges and double loop learning***

- [0800] AHM and the NAWMP Revision (where do we go from here?) (Johnson)
- [0900] AHM and multiple objectives (where do we want to be on the shoulder?) (Runge)
- [1000] Break
- [1000] SEIS (Trost)
- [1100] Group discussion (Case)
- [1200] Lunch

Thursday (December 2) ***Preparation for 2011***

- [1300] Group discussion: developing a strategy for the future of AHM (continued)
  - AHM working group terms of reference
  - Priorities for technical work
  - Communication needs and challenges
- [1500] Break
- [1530] Meeting summary and action items (Case)
  - Plans for next meeting: location, dates, topics
  - Parting thoughts
- [1700] Adjourn

Harvest Management Working Group

Terms of Reference

2 December 2010

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 1992-2010, over 100 individuals have participated in 22 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.

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), representatives appointed by the USGS (2), and representatives appointed by the Canadian Wildlife Service (2). 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 on all issues while working cooperatively.

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 December 2, 2010 for forwarding to the Flyway Councils and the Service Regulations Committee for review.

Draft SEIS Issues and Alternatives

(1) Schedule and Timing of the General Regulatory Process

- Alt 1 (no change) - promulgate annual regulations using separate early and late seasons based on previous or current year biological information and established harvest strategies.
- Alt 2 (FWS preferred) - promulgate annual regulations using a single process for early and late seasons based on predictions derived from long-term biological information and established harvest strategies.
- Alt 3 - promulgate biennial (or longer) regulations using separate early and late season processes.
- Alt 4 - promulgate biennial (or longer) regulations using a single process for early and late seasons.

(2) Frequency of Review and Adoption of Duck Regulatory Packages

- Alt 1 (no change) - regulatory packages adopted annually.
- Alt 2 (FWS preferred) - establish regulatory packages for five-year periods.

(3) Stock-Specific Harvest Strategies

- Alt 1 (no change, FWS preferred) - continue use of currently employed stock-specific harvest strategies and develop new strategies when necessary.
- Alt 2 - significantly reduce the use of stock-specific harvest strategies.
- Alt 3 - expand the use of stock-specific harvest strategies to include most individual stocks.

(4) Special Regulations

- Alt 1 (no change) - no change to currently allowed special regulations.
- Alt 2 (FWS preferred) - eliminate experimental evaluation requirements for special regulations on overabundant Canada geese, periodically re-evaluate other existing special regulations on a case-by-case basis to determine whether they are still justified, and require experiments for any new special regulations not involving resident Canada geese.

(5) Management Scale for the Harvest of Migratory Birds

- Alt 1 (no change, FWS preferred) - maintain the current scale of management for all migratory birds.
- Alt 2 - expand the existing management scale by reverting to a single continental management scale for monitoring of ducks, mourning doves and American woodcock. The existing harvest management units (e.g., flyways,management units) would be maintained to account for regional differences in hunter numbers and harvest pressure.
- Alt 3 - work to further geographically refine the scale of duck harvest management, and maintain existing management scales for other stocks.

(6) Zones and Split Seasons

- Alt 1 (no change, FWS preferred) - continue the use of zones and split seasons and the five-year schedule for consideration of changes.
- Alt 2 allow annual adjustment to zone/split-season configurations for all migratory game birds.

(7) Subsistence-Harvest Regulatory Process

- Alt 1 (no change, FWS preferred) - allow a spring-summer subsistence hunting season with regulations necessary to ensure the long-term conservation of the migratory bird resource.
- Alt 2 - open a spring-summer subsistence hunting season which incorporates fall-winter hunting season regulations (e.g., bag limits, shooting hours).

2011 Harvest Management Working Group Priorities

Priority rankings and project leads for technical work proposed at the 2010 Harvest Management Working Group meeting.

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

- Mid-continent mallard AHM sub-model performance assessment (*Scott Boomer, Nathan Zimpfer, Mark Vrtiska, others...*)
- Eastern mallard AHM sub-model performance assessment (*Bryan Swift, Min Huang, Guthrie Zimmerman, Pat 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 collaboration with NSST and Human Dimensions representatives (*Scott Boomer (coordinate with Jorge Coppen), Pat Devers, Ken Richkus.*)

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

- Multi-stock management (*Jon Runge, Mike Runge, Greg Balkcom (?), Jim Gammonley*)
- Time dependent optimal solutions to address system change (*Scott Boomer, Fred Johnson, Mike Runge*)

(3) **Additional Priorities**

- Incorporation of U.S. ponds into mid-continent mallard AHM reproduction models (*Jim Dubovsky, Nathan Zimpfer, Pam Garrettson*)
- Western mallard AHM sub-model performance assessment (*Todd Sanders, Jon Runge, Dan Yparraguirre*)
- Mid-continent mallard AHM objective function (*Guy Zenner, Josh Richardson, Mark Vrtiska, Jon Runge*)
- Alternative methods for updating model weights (*Scott Boomer, Todd Sanders, Mike Conroy?, Guthrie Zimmerman, Pat Devers, Mike Runge*)
- Alternative scaup population model(s) (*Scott Boomer, Diving Duck chairs*)
- 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*)

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.

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Figure 1 – 2010 Harvest Management Working Group meeting participants at New Orleans, Louisiana.