

# NAWMP Action Plan



## A Companion Document to the 2012 North American Waterfowl Management Plan

December 2012



*North American Waterfowl  
Management Plan*

*Plan nord-américain de  
gestion de la sauvagine*

*Plan de Manejo de Aves  
Acuáticas de Norteamérica*



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This NAWMP Action Plan is a companion document to the 2012 North American Waterfowl Management Plan. It provides initial guidance and strategic ideas for implementing the 2012 Plan.

We invite the entire waterfowl management community – Flyway Councils; Joint Ventures; State, Provincial and Federal agencies; non-government organizations; and their supporting science teams – to work with the Plan Committee and its newly formed Interim Integration Committee (Appendix C) to make the expanded vision of these plans a reality.

The seven recommendations in the 2012 Plan and this Action Plan are vital to the future of waterfowl management. Of particular importance are the challenges of integrating waterfowl management and the necessity of engaging a broader public in support of waterfowl conservation. These recommendations will challenge the technical abilities and the resolve of the waterfowl management community. Yet, time and again that community has risen to a challenge, and we anticipate a similar response to the opportunities addressed here.

Unlike the 2004 Implementation Framework, which was prescriptive in nature, this Action Plan is largely conceptual. The waterfowl management community will need to decide how to implement the Plan in detail, and the approaches recommended here will evolve over the next few years as that community is fully engaged. For example, the present terms of reference for the Human Dimensions Working Group (Appendix B) is a draft that is still undergoing review by the National Flyway Council and the Plan Committee, and will be superseded by a final terms of reference early in 2013. We anticipate such advancements will be chronicled through reports on specific topics by various cross-functional teams from the waterfowl community, culminating in the next full update of the Plan sometime before 2017.

The Interim Integration Committee (IIC) meanwhile is charged by the Plan Committee with nurturing the integration of waterfowl management. The IIC is taking shape, developing first-year work elements, and will be soliciting participation by the full spectrum of waterfowl managers in the weeks and months ahead.

Thank you for your support in moving the 2012 Plan to this stage. “People Conserving Waterfowl and Wetlands” is a most worthy purpose. North America’s abundance and diversity of waterfowl is a continental treasure and our responsibility to conserve for future generations.

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## **Acknowledgements**

As with the North American Waterfowl Management Plan itself, this NAWMP Action Plan reflects broad input from the waterfowl management community. Several technical experts, listed below, contributed to the ideas contained herein. Members of the NAWMP Writing Team served double duty, providing technical expertise as well as contributing their substantial writing abilities to this Action Plan. This document would not have been possible without their efforts.

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## Introduction

The 2012 North American Waterfowl Management Plan (NAWMP or Plan) represents a new vision for waterfowl conservation. Consistent with earlier versions of the Plan, the 2012 NAWMP calls for attention to the continuing loss of key habitats, the increasing challenges to maintain the habitat base that we have, and the growing need to ensure the financial commitment to do so. But the 2012 Revision does more. For the first time, the Plan explicitly addresses the role of people – the waterfowl hunters, other conservationists and citizens who enjoy and actively support waterfowl and wetlands conservation. In doing so, the 2012 Revision challenges the waterfowl conservation community to reconsider and recommit to the core values underlying all of the waterfowl management enterprise. It questions some existing paradigms and suggests some new directions for waterfowl management and conservation. These core values and new directions are embodied in the three goals of the Revised 2012 Plan:

**Goal 1: Abundant and resilient waterfowl populations to support hunting and other uses without imperiling habitat.**

**Goal 2: Wetlands and related habitats sufficient to sustain waterfowl populations at desired levels, while providing places to recreate and ecological services that benefit society.**

**Goal 3: Growing numbers of waterfowl hunters, other conservationists and citizens who enjoy and actively support waterfowl and wetlands conservation.**

From these goals flowed seven recommendations:

- *Develop, revise or reaffirm NAWMP objectives* so that all facets of North American waterfowl management share a common benchmark;
- *Establish a Human Dimensions Working Group* to support development of objectives for people and ensure those actions are informed by science;
- *Build support for waterfowl conservation* by reconnecting people with nature through waterfowl, and by highlighting the environmental benefits associated with waterfowl habitat conservation;
- *Focus resources on important landscapes* that have the greatest influence on waterfowl populations and those who hunt and view waterfowl;
- *Adapt harvest management strategies* to support attainment of NAWMP objectives;
- *Increase adaptive capacity* so structured learning expands as part of the culture of waterfowl management and program effectiveness increases;
- *Integrate waterfowl management* to ensure programs are complementary, inform resource investments, and allow managers to understand and weigh tradeoffs among potential actions.

Some of these recommendations are tactical in nature, whereas others are more strategic. This Action Plan (AP) addresses them in three ways. First, for ease of cross-reference between the NAWMP and this AP, considerations important for implementation and key action items are addressed for each recommendation individually. The recommendation to “integrate waterfowl management”, which is a charge to incorporate all of the other recommendations in a structured,

coherent and adaptive framework, is treated in a separate section. That section – somewhat more technical in nature – is intended to help managers understand how component parts of an integrated system fit together in a way that enhances the informed management of waterfowl, their habitats, and the people who use and enjoy the resource. Collectively, these two sections, which comprise the body of this AP, are meant to prepare and motivate the waterfowl management community for implementing the 2012 NAWMP. The last body of information – Appendix A – contains deeper, technical details and ideas intended to assist and advance the thinking of the Interim Integration Committee (IIC) and the other technical/administrative bodies that will be undertaking the challenge of creating an integrated system of management.

With respect to individual recommendations, “building support for conservation” has emerged as a top tier issue in the waterfowl management community. The 2012 NAWMP suggests two complementary approaches to achieve this objective: creating a greater emotional attachment to waterfowl, and appealing to people’s pragmatic sense by emphasizing the many social and environmental benefits that result from waterfowl habitat conservation. Importantly, before commencing large-scale activities under this recommendation, human dimensions research should be employed to better understand issues and concerns, and a public engagement strategy developed to define outcomes, hone messaging, and identify target audiences.

The “development of new NAWMP objectives” is another important, early step in implementing the Plan. Objectives for waterfowl management were discussed at length during the NAWMP consultation workshops. From this list of objectives, the IIC and technical groups will need to identify and refine those that are most important to achieving NAWMP goals, and are unambiguous and measurable. Further, a suite of management actions must be identified for each objective, with associated (predicted) outcomes, assumptions, and uncertainties. These next steps should be taken as soon as possible, as they are foundational to Plan implementation.

Even though a Human Dimensions Working Group (HDWG) was recently created by the waterfowl management community, that group will need to become fully integrated into the next steps of Plan implementation. Their charge needs to be clarified, and adequate support will need to be provided to help ensure their success. The breadth of people-related objectives outlined in the Plan – from retaining hunters, to engaging other users, to increasing relevancy of conservation to the public – suggests that additional expertise may be required to assist the HDWG in their work..

“Focusing resources on important landscapes” and “adapting harvest strategies” are recommendations that relate to activities already ongoing in the waterfowl community. While progress is being made in these areas, the IIC and supporting groups should reconsider the context for each action (i.e., what are the fundamental objectives, the underlying assumptions, and the anticipated outcomes?). They must fit logically and seamlessly into the overall strategy of Plan implementation. Under each of these recommendations should be a suite of specific management actions. Each significant action should be measurable, monitored and subject to further refinement.

Finally, while the venture to integrate waterfowl management is itself an exercise in adaptive resource management, there is also the need and opportunity to inform individual programs using

the adaptive management approach. The concept of adaptive management – “learning while doing” – is not new to the waterfowl management community. Adaptive management was recommended as an approach for strengthening the biological foundation for NAWMP in the 1998 NAWMP Update. It was also a central focus of the 2004 NAWMP Update, and was strongly advocated as a preferred approach in the 2007 NAWMP Continental Progress Assessment (Paulin et al. 2007) and Joint Task Group (JTG) Reports (Anderson et al. 2007). Although there have been notable successes with respect to implementing adaptive management, there are many other opportunities to do so. The section dealing with this recommendation addresses the impediments to implementing adaptive management at the regional and local scale, and offers suggestions on how to overcome obstacles to utilizing this approach to structured decision making.

### **Responsibilities**

As outlined in the 2012 NAWMP Revision, the IIC – working in close coordination with the NAWMP Science Support Team (NSST), the Harvest Management Working Group (HMWG), the HDWG and others – is charged with leading the next steps in Plan implementation. Active engagement by scientists, researchers, academics and administrators will be vital to the success of this endeavor. The waterfowl management community at large has already provided significant, useful input during the 15 consultation workshops held in the three countries that are signatory to the Plan. The IIC and technical groups should build on this body of knowledge as next steps are undertaken. However, at critical junctures – for example, when objectives and associated tradeoffs are considered – the IIC and support groups will need to solicit input from the stakeholders and the management community at large.

This approach is most assuredly not a case of assigning the “heavy lifting” to the IIC while relegating the community at large to the “easy tasks”. Rather, the feedback from the waterfowl management community will address some of the most critical decisions in the process. For example, it is the waterfowl management community that needs to validate the step-down population objectives that will achieve the NAWMP goals. It is the community that needs to consider, and voice an opinion on, the trade-offs that will be inherent in striving to accomplish multiple objectives with finite resources. It is on-the-ground managers who need to provide details on specific management actions to achieve the objectives, as well as measurement of desired outcomes of those actions. And everyone needs to be thinking about issues of system control and the extent to which we can affect outcomes related to waterfowl populations, habitat and people – and how that reality should inform specific tactics and direct our focus to particular landscapes.

While reviewing the individual recommendations and the strategy to implement an integrated system of waterfowl management, it’s hoped that readers will consider their personal involvement, and ask themselves: “*How will I have input into next steps in the Plan?*” and “*What will my role be, today and in the future, in implementing the 2012 NAWMP?*”. NAWMP has been successful because of individual actions that are coordinated and leveraged with those of partners to achieve regional – and ultimately continental – results. The power of individuals with vision and commitment, working closely with other like-minded people, will be ever-more important in the future.

Lastly, as articulated in the 2012 NAWMP, this AP should be – must be – a living document that will be refined and adapted as the community progresses towards an integrated system of waterfowl management. There most certainly will be important breakthroughs as well as false starts and dead ends. A flexible, responsive AP should reflect those dynamics.

## **Addressing the Recommendations**

### **Develop, Revise or Reaffirm NAWMP Objectives**

Clear, measurable objectives are the foundation upon which an integrated system of management will be developed. Quantitative population objectives have inspired action and have been a centerpiece of NAWMP since its inception. It is now appropriate to revisit those objectives and reconsider them in light of the many changes that have occurred since they were formulated. Habitat objectives, which are traditionally established at the Joint Venture (JV) scale, will need to be reconsidered after new waterfowl population objectives are formulated. The context for habitat objectives should not only include a desired, continental carrying capacity for waterfowl, but environmental benefits and human values as well. Lastly, new objectives related to people – hunters, other dedicated users, and the public – must be developed and integrated into planning efforts and management actions. Establishing new objectives will require consideration of several factors. These factors, along with key actions, are summarized below.

#### Objectives for Waterfowl Populations

##### ***Key Actions – Objectives for Populations***

- Develop numeric population abundance objectives for species and populations where the following criteria can be met: (1) population demographics are well understood; (2) metrics are measurable through monitoring programs; and (3) objectives are consistent with those for habitat and public use/supporters.
- Establish model-based objectives founded on our current understanding of limiting and regulating mechanisms.
- For less understood species where it is not currently possible to develop objectives using the above approaches, develop conceptual population models to help prioritize information needs and identify alternative approaches to setting and assessing interim objectives until more is known about the population dynamics of these species.

NAWMP waterfowl population objectives established in the 1970s may not be appropriate today, for several reasons. First, historic and ongoing changes in habitat quantity and quality suggest that carrying capacity for some species may have degraded substantially in several landscapes, perhaps irreversibly so. In other landscapes, carrying capacity may have increased as a result of NAWMP activities or external drivers. Second, in the 26 years since the original NAWMP population objectives were established, we have witnessed how variable moisture

regimes have caused waterfowl populations to fluctuate within a range that is now considered “normal” by many biologists. This variation provides additional context for expectations of periodic maximum and minimum population sizes that may be anticipated, absent any permanent degradation in carrying capacity. Third, because original NAWMP population objectives were established primarily to meet the 1970s participation in hunting recreation, consideration should be given to how objectives should be adjusted to match current and future levels of demand. Fourth, newly-developed life cycle models provide a greater understanding of the population dynamics of some species. This new knowledge can and should be incorporated into the objective-setting process.

When new population objectives are established, they should: (1) have an unambiguous demographic interpretation that accounts for natural (i.e., uncontrollable) variation in the environment affecting populations, as well as the role of harvest in regulating population size, (2) be expressed as metrics that can be estimated through monitoring programs, and (3) be consistent with habitat and public use/support objectives. Currently, it is not possible to develop population objectives for all species and populations of waterfowl that meet fully the criteria specified above. Therefore, it will be important to consider alternative approaches to setting and evaluating interim objectives for these species until objectives rooted in a more explicit demographic understanding can be developed.

Retaining the old population objectives is not recommended. Population objectives from the 2004 NAWMP, which were utilized as interim objectives in the 2012 Revision, do not meet the criteria outlined above. Furthermore, current population objectives lack an unambiguous demographic interpretation that limits their utility as measures of performance and results in uncertainty about the role of harvest management in their attainment (Runge et al. 2006, Anderson et al. 2007). Whenever possible, new NAWMP population objectives should be founded on population-habitat models that characterize limiting and regulating mechanisms (e.g., Mattsson et al. 2012). Even if initial models are largely conceptual, they should clearly delineate the environmental conditions and harvest policy under which population objectives were to be obtained. Lacking such explicitness, it is impossible to compare the results of monitoring programs to objectives or to gauge the success of conservation efforts. Demographic-based objectives also will better enable assessment of responses to climate change or other broad-scale system change, since they would be rooted in current knowledge of mechanisms limiting and regulating population change.

Alternative approaches to setting interim population objectives will be necessary and informative for some species while (and if) objectives rooted in a more explicit demographic understanding are developed. For example, current objectives for Eastern Prairie, Mississippi Valley, and Southern James Bay populations of interior Canada geese are expressed as a minimum (versus a target) population size. Because harvest of burgeoning populations of temperate-nesting giant Canada geese is a high management priority (for population control and hunting opportunity), waterfowl managers revised objectives for these interior populations that co-mingle with Giant Canada Geese to the lowest, socially-tolerable population level, allowing more liberal Giant harvests. The best approach to establishing new population objectives will undoubtedly differ across species, and will be related to decisions about how to simultaneously manage for multiple waterfowl stocks.

In addition to numerical abundance objectives, nearly two-thirds of those who participated in the NAWMP consultation workshops felt that NAWMP should include continental-scale, numeric distribution objectives for breeding, migration and wintering areas. This would allow JVs that accommodate shared populations – particularly during the same stage of their life cycle – to plan for the portion of the population that will utilize their geography. This presumes that habitat management at the scale implemented by NAWMP partners can affect these distributions. Further, it assumes that affecting distributions is desirable, notwithstanding possible issues of short-stopping during fall and winter and potential effects on hunting opportunity (Green and Krementz 2008). Clearly, the waterfowl management community should address the utility, feasibility and desirability of establishing population distribution objectives. This should involve the NSST (with respect to utility and feasibility) and the HMWG (with regards to desirability and harvest management implications) working together to resolve this question.

### Objectives for Habitat

#### ***Key Actions – Objectives for Habitat***

- Formulate habitat objectives in the context of consumptive and non-consumptive public use objectives as well as continental waterfowl population objectives.
- Develop habitat objectives for JV regions that are linked to continental objectives and coordinated across JVs to ensure collective coverage of the Plan’s overall goals.
- Derive habitat objectives for JVs from population models that describe the effects of regional habitats in limiting and regulating waterfowl populations.
- Design habitat programs that provide values to waterfowl hunters as well as for public use and support.

Since the initial specification of population objectives in 1986, a key challenge to NAWMP implementation has been the development of a consistent and cohesive set of regional habitat objectives necessary to achieve continental population objectives. This continues to be a fundamental challenge for habitat conservation because the factors that regulate many continental waterfowl populations are uncertain, and the role that regional habitat conditions play in those processes is not completely understood.

JVs are increasingly using scientific approaches to determine what, where, when, and how much habitat is required to accommodate the portion of continental waterfowl utilizing their geographies. This step-down planning – from continental NAWMP population objectives to regional objectives – is a logical construct that will continue to serve NAWMP well and help guide implementation at the JV level. However, habitat objectives should be revisited once new waterfowl population objectives are developed. When this is done, managers should also consider whether habitat is secured for the long term, or whether critical resources are vulnerable to external drivers like agricultural practices, urban encroachment, water shortages and climate change. In addition, establishing a desired continental carrying capacity for some waterfowl populations may aid in developing coherent objectives for these populations, waterfowl harvest, and habitat, per the recommendations from the JTG. Finally, JV habitat objectives should be

renewed in light of the objectives soon to be developed around people, both users and supporters of waterfowl conservation.

Ideally, habitat objectives for JVs would be derived from population-habitat models that describe the role of regional habitats in limiting their contribution to continental waterfowl population objectives. Spatially-explicit, life-cycle models would enable NAWMP, for the first time, to evaluate quantitatively how JVs (singly or collectively within a region) could contribute to achieving continental population goals. Proof of concept has already been demonstrated through the development of a few such models, so rapid progress may be possible within a couple of years for some species. Certainly, such data-intensive approaches to setting habitat objectives will not be possible for all species, and other options will have to be pursued to develop habitat objectives reflective of the full suite of North American waterfowl. Examples of alternative approaches include the commonly employed method of bioenergetics modeling or simple reference to past landscape conditions.

Similar to population objectives, habitat objectives should be developed not only in the context of the biological requirements of waterfowl, but also in light of new, explicit objectives for public use and growing support for waterfowl conservation. For example, numerous studies point to the loss of places to hunt and crowding in public wetlands as barriers to hunter participation. There is little understanding, however, of the mechanistic relationships between habitat availability, distribution, or accessibility to consumptive and non-consumptive public users and public participation, satisfaction, or support. With the addition of the third NAWMP goal focused on public use, habitat objectives will need to be sufficient to support hunters and viewers in addition to meeting waterfowl population objectives.

### Objectives for People

#### ***Key Actions – Objectives for People***

- Assess current trends in waterfowl hunting, viewing, and other waterfowl-associated recreation.
- Develop quantified and realistic objectives for waterfowl hunting participation, waterfowl viewing participation, and support for conservation.
- Develop a framework to achieve objectives for waterfowl hunting participation, waterfowl viewing participation, and support for conservation.
- Create the institutional capacity necessary to implement and evaluate strategies developed to achieve people-related objectives.

For the first time, the waterfowl management community has committed itself not only to maintaining desirable numbers of waterfowl and the habitats they require, but also to the conservation (recruitment and retention) of resource users, including hunters and others who enjoy waterfowl. Formulating objectives for people will be a challenging but important undertaking. For waterfowl hunters – a population for which we have good historic information

– objective-setting will need to consider societal changes, obstacles to hunter recruitment, and effective marketing of recreational opportunity; all areas outside the typical expertise of waterfowl managers. Establishing objectives for other users will also be challenging, but should consider trends and demands for viewing waterfowl and opportunities to enhance people’s interactions with birds and their habitats.

The addition of the third NAWMP goal, “growing numbers of waterfowl hunters, outdoor enthusiasts and other citizens who enjoy and actively support wetland and waterfowl conservation” signifies a fundamental shift in waterfowl management by making the human element explicit and therefore directing resources specifically to human dimensions and public engagement objectives. Comprehensive strategies to increase participation in hunting, viewing and conservation will require the development of explicit, quantifiable objectives pertaining to people. Unlike those for habitat and waterfowl populations, the NAWMP has never had explicit objectives related to people, and developing such objectives will require thoughtful deliberation and the acquisition and analyses of baseline information.

Objectives for people should address multiple audiences, ranging from hunters, birders, and photographers to the public at large. These objectives can be divided into three general categories: (1) hunter participation, (2) viewer participation, and (3) support for conservation. Baseline hunter and viewer participation trend information, as well as current levels of support, will be needed to inform the objective-setting process. A demographic interpretation of participation can be developed by looking at key factors such as recruitment and retention rates, similar to population demographic models that track variables such as births, deaths, immigration, and emigration to describe population dynamics. The third category of objectives, support for conservation, will require additional refinement of the salient dimensions of support. Potential types of support could include the generation of economic, political, social, and human capital necessary to support population, habitat, and people-related objectives.

Achieving objectives for hunting, viewing, and conservation will each involve different tactics and target different audiences. Previously, the waterfowl management model was based on the assumption that providing abundant waterfowl and habitat was sufficient to support hunting and viewing participation. Now, it is recognized that management actions will need to address both natural and the social landscapes to achieve people-related objectives. Many conservation organizations and state/provincial agencies have already begun to develop marketing campaigns, mentoring programs, and other strategies to engage the public. However, without coordination and an adaptive framework, it is difficult to assess which strategies are most effective or to build upon one another’s successes and dovetail strategies at multiple scales.

Since efforts to increase participation in waterfowl-related recreation and support for conservation are already underway, a first step should be to conduct an initial appraisal/inventory of these activities and determine which NAWMP objectives they address and how they relate to conceptual models. After conducting this inventory, the waterfowl management community should examine whether current strategies are targeting the most important drivers of participation and support for conservation, then identify where to target future resources to engage the public and achieve the third goal of NAWMP. Uncertainties about the effectiveness of management actions should be addressed in an adaptive management framework.

Much of the work described under this recommendation will be supported by the HDWG, which will be responsible for human dimensions research to better understand factors associated with participation in waterfowl-related recreation and active support of conservation programs. Strategic public engagement (see Appendix D) will be critical to implementing marketing and communications programs in support of this recommendation.

### **Establish a Human Dimensions Working Group**

#### ***Key Actions – Human Dimensions Working Group***

- Provide a forum (the HDWG) to provide the scientific and technical foundations to define objectives, develop conceptual frameworks, and evaluate outcomes of NAWMP management actions focused on people.
- Define objectives for hunters, birders, supporters.
- Formulate a team to coordinate the planning, design, delivery, and evaluation of public engagement actions.

The recommendation to form a HDWG represents a significant step in expanding the institutional capacity of the waterfowl management community to achieve people-related objectives. A HDWG will provide a forum to provide the scientific and technical foundations to define objectives, develop conceptual frameworks, and evaluate outcomes of management actions targeting the people-related objectives. The draft Terms of Reference for the HDWG (Appendix B) provides additional detail on the composition and charge of this committee.

Given the breadth of the multiple human objectives included in the NAWMP, a second entity must also to be convened to coordinate planning, design, delivery, and evaluation of public engagement management actions. The Leadership, Funding and Communications Work Group (LFCWG) – a subcommittee of the NAWMP Plan Committee (PC) – is well positioned to serve this role. In the planning process, the LFCWG would identify target audiences, acquire preliminary information necessary to develop messages and action, set objectives, and identify desired outcomes. In the design phase, this group would develop and pre-test specific messages, actions, and experiences to promote participation in hunting and viewing and support for conservation. In the delivery phase, the LFCWG would implement messages, campaigns, activities, and experiences. In the evaluation phase, it would consult with the HDWG to develop appropriate metrics to determine the effectiveness of a public engagement effort in achieving objectives. A Public Engagement Framework (Appendix D) provides additional information on the LFCWG and associated communications and marketing efforts.

The LFCWG will require participants with skills in marketing, education, and other public engagement tactics. A variety of templates already exist for creating a LFCWG. Perhaps the two best examples include the Association of Fish and Wildlife Agencies' North American Conservation Education Strategy (focused on developing and implementing consistent education messages and practices), the Recreational Boating and Fishing Foundation (initiated to increase

participation in boating and fishing), and the Council to Advance Hunting and Shooting Sports. Each of these efforts uses slightly different approaches to coordinate efforts among local, state, and federal governmental agencies, nongovernmental organizations (NGOs), and commercial organizations to engage the public. Nonetheless, these and other efforts provide useful examples of how to proceed with public engagement in support of NAWMP.

### **Build Support for Waterfowl Conservation**

#### ***Key Actions – Build Support for Waterfowl Conservation***

- Compile a comprehensive review of the environmental and societal benefits of managing, restoring and protecting waterfowl habitat. Where critical information is lacking, strategic investments in research and monitoring should be made.
- As appropriate, employ human dimensions research to inform communication and marketing strategies for financial and political support of waterfowl conservation.
- Use the LFCWG to develop and implement strategies to engage the public in support of conservation.

This tactical recommendation must be employed to achieve objectives related to people, but it has obvious strategic connections with habitat objectives as well. “Support” can be construed in several ways. Financial support through the purchase of hunting licenses and stamps, along with the imposition of excise taxes and entrance fees, is a traditional mechanism whereby user groups help advance waterfowl management. Increasing membership in non-profit conservation organizations is another tactic to increase revenue dedicated to the cause. Associated actions might include expanding the base of support to engage larger numbers of users/members, increasing fees, or inventing new programs by which people can lend their financial support. Public-sector support for conservation funding also requires political support from the general public.

Using waterfowl to connect people with nature assumes that support for conservation will increase when people develop a strong emotional attachment to birds and their habitats. Indeed, waterfowl – being large, colorful, abundant and widely distributed – would seem to be ideal species for this purpose. However, it will be important to determine first which segments of society are most likely to respond positively to appeals for wetland conservation support. This strategy will be foreign to many waterfowl managers, and will likely require changing paradigms with respect to traditional conservation delivery programs. Consider, for example, that programs designed to reconnect people with nature through waterfowl might require modest but strategic investments in waterfowl habitats within and near urban areas, where concentrations of people reside.

Perhaps the greatest, long-term opportunity to build support for waterfowl conservation is to communicate and market the strong linkages between habitat conservation and ecological goods and services recognized and valued by the public (NAWMP 2012 Revision, Table 1, p.17). To

be most effective, the waterfowl community needs to speak to top-of-mind issues and concerns of the general populace. While some information of this type is available in the “NAWMP Value Proposition” ([http://www.nawmp.ca/pdf/Value\\_Prop\\_March-small.pdf](http://www.nawmp.ca/pdf/Value_Prop_March-small.pdf)), there will undoubtedly be a need to synthesize existing literature and invest in new research, as well as initiate strategic marketing campaigns that are tailored to regional environmental issues and concerns. Metrics of performance could range from successful ballot initiatives in support of conservation, to the passage or renewal of progressive public policies that help secure waterfowl habitat. Again, the habitat JVs, through their member organizations, are in an ideal position to implement this recommendation, and several have already begun work on such initiatives.

Since some scientific information already exists on the broader environmental benefits that result from waterfowl habitat conservation actions, there is an immediate opportunity to begin informing key audiences even as additional research is undertaken. This largely involves “packaging” information for different audiences, then communicating it in a way that resonates with people and evokes action. These and related topics are addressed in the Public Engagement Framework (Appendix D).

### **Focus Resources on Important Landscapes**

#### ***Key Actions – Focus Resources on Important Landscapes***

- Identify primary issues that must be considered when targeting waterfowl habitat conservation while achieving the three fundamental NAWMP goals.
- Develop scalable decision support tools for targeting management actions based on prioritization of conservation issues as determined by stakeholders.
- Identify the most important areas to deliver waterfowl habitat conservation at multiple spatial scales (continental, flyway, JV region).

In addition to setting population, habitat and people objectives, an important step in the NAWMP planning phase is to consider where to focus limited resources to greatest effect. Ultimately, that focus will be achieved by resolving ambiguities in objectives and the relative weight among objectives, and developing the modeling framework to support this process and future decision-making. Maps or other products that highlight certain landscapes as being “important” will be outcomes of this larger process. Importantly, this work should follow the development of clear objectives. In the interim, there is value in beginning to synthesize the available biological and spatial databases, and considering the many options for prioritizing the landscape of North America.

The 1986 NAWMP and subsequent updates emphasized the need to focus conservation resources in areas most important to waterfowl demography. Refinement of the map depicting *Areas of Greatest Continental Significance to North American Ducks, Geese, and Swans* (2012 NAWMP, Appendix B) took this “demographic view” of the world, but clearly did not consider (for example) the distribution of waterfowl users or potential supporters. Social components will need to be added to the traditional population-habitat focus for targeting conservation programs.

In addition, while the foundational value of population abundance and distribution remains key to continental-scale assessment, decision support products should also consider those waterfowl species of greatest concern, landscapes most limiting waterfowl populations and (potentially) areas expected to be significantly impacted by climate change.

This is a recommendation that can only be addressed through prioritization decisions at several scales. Although a continental perspective is important, regional or JV-level allocation decisions could ultimately have a greater effect on waterfowl populations and human objectives. Many JVs have already begun such planning exercises, and a forum is needed to share experiences and learn which approaches are most effective.

Lastly, decision criteria matrices and other decision support tools may be useful for helping target resources given multiple criteria (see Appendix A). Decision tools will likely include layers of information such as risk of waterfowl habitat loss or degradation, natural community diversity, important population sources and sinks, greatest opportunity for conservation, expected return on investment, and areas where current users and potential uses are located on the landscape.

### **Adapt Harvest Management Strategies**

#### ***Key Actions – Adapt Harvest Management Strategies***

- As waterfowl population, habitat, and user objectives are established, revisit harvest strategies to accommodate multiple, explicit objectives.
- Clarify the interpretation of waterfowl population objectives and the role of harvest management in attaining these objectives.
- Develop modeling frameworks that describe biological (i.e., waterfowl population) as well as social (i.e., hunter and other user) system dynamics, and predict the effects of diverse regulatory decisions on both systems.
- Assess trends and tradeoffs related to regulatory alternatives including rule simplicity, harvest opportunity, hunter satisfaction, hunter participation, and management risk. Thoughtful consideration and research is needed to explicitly identify and quantify these tradeoffs.
- Develop an integrated decision framework (e.g., JTG “Shoulder Strategy”) that ensures harvest policies are consistent with continental population objectives.

The 2012 NAWMP reaffirms the desire, prevalent throughout the waterfowl management community, that harvest management must continue to safeguard waterfowl populations while offering adequate recreational opportunities. It goes on to acknowledge the different approaches to regulations setting in Canada and the U.S., and recognizes the success of Adaptive Harvest Management (AHM) in providing insights into duck population dynamics while reducing the contentiousness in the regulations process. Finally, the NAWMP suggests that the development

of an integrated system of waterfowl management may necessitate a reconsideration of harvest management strategies in the context of achieving all three NAWMP goals.

Leading up to the revision of the NAWMP and during the consultation workshops themselves, concerns were expressed that the process for setting regulations (in the U.S.) consumed substantial resources, and it was suggested that the regulations setting process be simplified in order to free up staff time and funding to address other priorities. In contrast, some workshop participants and technical groups have asserted that the *status quo* (i.e., AHM) was already simple because it contained a limited suite of regulatory actions, relied on a specified set of population dynamics models based on our understanding of waterfowl demography, and had established a rigorous and objective process for decision-making that is embraced by the management community. Thus, it was unlikely that significant savings would result from designing a simpler system, because any system committed to informed management will require a comparable investment in monitoring and evaluation. With the U.S. harvest management community now deliberating the 2012 Supplemental Environmental Impact Statement on Issuance of Annual Regulations Permitting the Hunting of Migratory Birds (currently in draft form) and the need to consider how harvest management can help achieve the goals of NAWMP, now is a good time to consider if and/or how changes to U.S. harvest management should be implemented.

The merits of AHM notwithstanding, two issues emerged during the period of AHM implementation that have caught the attention of the waterfowl management community and warrant further consideration. First, the decision to constrain harvest when the mallard population was below the NAWMP goal generated discussion about the proper role of harvest management in helping to achieve waterfowl population objectives. Should managers reduce harvest to try and increase populations that are below objective levels, particularly when the populations in question are at a low ebb because of a natural dry cycle on the breeding grounds? Second, it was recognized that harvest management objectives for waterfowl populations are not coherent with those for NAWMP (Runge et al. 2006). Therefore, Plan partners lack a shared context for their population and habitat goals, and harvest managers cannot translate Plan accomplishments into harvest opportunity. The potential consequences are inefficient allocation of resources to meet Plan objectives and habitat conservation efforts that may not affect important vital rates for waterfowl. These issues catalyzed the work of the JTG, which offered a unifying framework under which harvest and habitat could be managed under a common model. Now, NAWMP has added yet another goal related to people, including not only hunters but other users and the public at large.

Although it adds further complexity, considering hunter objectives in the context of regulations setting is timely. Not only is this consistent with the desires of harvest managers to address declining hunter numbers and related issues, but it also provides a context for regulatory decisions. For example, should regulations strive to maximize hunting opportunity (e.g., by providing an extra bird in the bag) when the population of a particular species is marginally higher than in previous years? When presented in the context of a fundamental objective (i.e., increase hunter numbers, participation or satisfaction), human dimensions research can help inform whether proposals of this type are useful tactics or time-consuming and unproductive measures. This may help decision-makers balance conflicting interests; specifically, a desire to

not forego any perceived “harvest opportunity” as well as a simultaneous aversion to biological risk. Reconciling these competing interests is made particularly challenging in the case of waterfowl management by the need to simultaneously consider the harvest potential and effects of common regulations on a suite of species. Likewise, as the management community considers how best to link harvest management and population objectives with habitat conservation, it may also prompt further introspection on the regulatory process given the often limited level of control that harvest regulations exert on populations. An ongoing effort to identify opportunities for further streamlining of the regulatory process, while maintaining a commitment to informed management, should be maintained.

### **Increase Adaptive Capacity**

#### ***Key Actions – Increase Adaptive Capacity:***

- Given adequate system control, embrace adaptive management as the standard approach for making management decisions and improving performance.
- Implement incentives, and remove impediments, to encourage adaptive management.
- Invest resources in monitoring and assessment, as they are integral to an adaptive management approach.
- Establish a process for institutional review and change that would facilitate adaptive management, and enable the development of an integrated system of waterfowl management.

For nearly two decades, the waterfowl management community has formally embraced the principles of adaptive resource management as an approach to informed decision making. An adaptive approach to harvest regulation was formalized in the U.S. in 1995 with the implementation of AHM. Likewise, the principles of adaptive management (AM) were endorsed as a vehicle for strengthening the biological foundation for NAWMP habitat conservation delivery in the 1998 NAWMP Update, were a central focus of the 2004 Update, and were strongly advocated for in the 2007 Continental Progress Assessment and JTG Reports. The 2012 Revision of the NAWMP has reaffirmed the commitment of the waterfowl management community to informed approaches to management and to the specific principles of AM as a useful decision-making framework.

Adaptive management is most appropriate when: (1) there is a real management decision to be made among differing alternatives, (2) clear objectives can be stated, (3) there is value in reducing uncertainty and an opportunity to apply new information, (4) uncertainty about the system can be modeled, and (5) monitoring programs can be established to provide critical information on system status and response to management. These conditions apply to many, but not all, decision problems faced by waterfowl managers. For some problems, other approaches to decision-making may be more appropriate. Some of these are described in Appendix A. It is likely, however, that multiple approaches and tools will be brought to bear to properly frame

conservation problems and questions, as well as to aid in effective decision, making when management problems have been clearly defined.

Why has it been so challenging to institutionalize AM as a standard operating procedure? One reason may simply be that natural resource management agencies tend to be inherently risk-averse – in the face of uncertainty, no action (or no change) appears to be the safest decision. The perceived political, social or economic cost of making mistakes creates a powerful disincentive to engage in “learning while doing”. Another reason, and perhaps one of the most significant barriers, is a lack of leadership and a failure to develop a broad organizational commitment to AM as a central strategy to achieve long-term goals (Stankey 2002). Within the waterfowl management community, for example, no institution or agency exists with a strong mandate to champion and facilitate such a policy. How then might NAWMP stakeholders more fully embrace and implement structured learning as a means to increase adaptive capacity and improve program effectiveness? Six elements are essential (Stankey 2002):

1. *Learning should be a performance element for both managers and decision makers.* Systematically reducing uncertainty should become a priority of waterfowl managers.
2. *Controlled risk-taking in the face of uncertainty should be encouraged.* The focus on risk-aversion should shift to more openness for experimentation and systematic learning.
3. *Adaptive management should be treated rigorously and formally.* Adaptive approaches involve more than simply muddling through. They establish a deliberative and purposeful process through which questions are framed, alternative hypotheses are proposed and implementation is designed to enhance learning opportunities. Results then are critically evaluated, and, if appropriate, subsequent actions and policies are revised and applied, again in such a manner as to enhance the continuing process of learning.
4. *Leadership and clarity of vision is essential.* The ability to excite, motivate, and sustain organizational commitment to adaptive management requires people who lead, not just manage.
5. *Monitoring and assessment programs are critical.* Without such programs, adaptive management cannot succeed.
6. *Organizations should be integrated, not compartmentalized.* An adaptive approach for all components of the waterfowl management enterprise should permeate organizational thinking and behavior.

## **Integrating Waterfowl Management**

An enterprise as vast as the conservation and management of North America’s landscapes and waterfowl populations for specific societal benefits involves numerous decision problems at multiple temporal, geographic, and jurisdictional scales. Moreover, as was apparent in discussions of the individual recommendations, there are strong interactions among objectives and management programs that must be considered. An integrated system of management strives to formulate coherent objectives, meaning that they are harmonious, mutually reinforcing, and striving for the same endpoints – in this case, the goals of NAWMP. How does one achieve this balance?

## **Weights and Tradeoffs**

In most decision problems, all objectives are not equal in importance. One way to quantify this inequality is by weighting a suite of objectives relative to their importance. When resources are finite and/or limiting, tradeoffs may become necessary. A variety of methods are available to explicitly consider tradeoffs among objectives, including multiple criteria decision-making methods (Berger 2006, Belton and Stewart 2010, Huang et al 2011, Probert et al. 2011), knapsack solutions (Hajkowicz et al 2007), and choice-based methods such as conjoint analysis (Adamowicz and Boxall 2001, Carlsson et al 2003, Arifin et al. 2008, Hussain, et al. 2003). These methods and others will enable the waterfowl management community to solicit input from multiple stakeholders in a systematic and explicit fashion to develop objectives that reflect the relative value (weights) of different levels of waterfowl populations, habitat, and hunters/viewers. This will be an important, early step in the development of an integrated system of management. As the community gains experience with integrated management, weights and associated tradeoffs should be subject to adaptation and modification.

## **Models**

Models are abstractions of systems, typically depicted by mathematical equations representing the whole system and select sub-components. They will be an essential part of an integrated system of management, because they provide the capability to predict the consequences of management actions with respect to objectives while incorporating various forms of uncertainty. Some models that will inform an integrated system will be empirically-based and rigorous, relying on long-term data and well-documented responses between management actions and demographic consequences. Examples include models that predict waterfowl harvest rates from regulatory alternatives, or habitat models that predict changes in recruitment or survival rates based on management actions. Alternatively, models of poorly described or understood processes may be more theoretical while still providing a basis for prediction. Where substantial uncertainty exists about how a system functions and responds to management intervention, alternative hypotheses about system response may be described. Comparing the contrasting predictions of alternative models to observations from targeted monitoring programs provides the basis for learning and improved decision-making. These and other modeling approaches will be utilized under a system of integrated management.

To inform models, one must be able to identify a suite of actions and predict the outcomes of those actions. The waterfowl management community has decades of experience with management actions that will be of great value during the model-building stage. Quantified outcomes of management actions are less common, again suggesting the merits of an adaptive management approach wherein knowledge advances through structured learning as management actions are implemented.

### The Joint Task Group Model

The most effective way to ensure coherence is by utilizing a common theoretical framework to address multiple objectives. This was accomplished by the JTG, which developed a yield curve

approach that integrates habitat conservation, harvest management, and stakeholder support under a single framework (details in Anderson et al. 2007). Considering the intent of NAWMP framers, the JTG recommended that population objectives represent equilibrium population sizes that would result if environmental conditions similar to those of the 1970s prevailed. This framework is general and can be modified to reflect different baseline conditions and alternative harvest policies for a variety of waterfowl species.

The JTG model defines population carrying capacity, depicts a yield curve, and enables harvest managers to select which point on the yield curve where they prefer to manage harvest. By establishing coherent harvest and habitat management objectives and maintaining a consistent harvest policy (i.e., the “shoulder strategy” advocated by the JTG), this conceptual framework would allow population objectives to be compared directly to the results of ongoing waterfowl population monitoring, thus providing the measurable criteria envisioned in the original NAWMP and subsequent updates.

The JTG framework also provides a basis for understanding the influence of harvest on the attainment of population objectives, and provides an avenue for ensuring that harvest policies are consistent with continental population objectives. Finally, this modeling approach provides a basis for integration of population and habitat objectives with integration of harvest (user elements). Thus, it can help identify the effect of modifying any one of a set of objectives (i.e., population, habitat, or user objectives) on the other two sets of objectives. This is the essence of trade-off analysis, and it will be a critical step in finalizing revised objectives for waterfowl management.

The model proposed by the JTG provides the most advanced thinking on the integration of habitat conservation and harvest management under a cohesive framework. This model fits well into an adaptive management framework, and therefore should be a strong candidate to inform integrated management at a continental scale. Nonetheless, several challenges remain to implementing the JTG model. Those are discussed in Appendix A.

### Meta-Population Models

It is noteworthy that the waterfowl community is already learning from, and extending, the JTG framework. For example, hierarchical and spatially-explicit meta-population models have been developed for northern pintails (*Anas acuta*; Mattsson et al. 2012). These models enable managers to examine, for the first time, the consequences of alternative management strategies involving habitat conditions on breeding and nonbreeding areas, and the effect of hunting on both harvest opportunity and carrying capacity at a continental scale. Likewise, other researchers have developed an integrated scaup (*Aythya affinis* and *A. marila* combined) population model that allows populations of scaup *and* hunters to vary in response to management actions on breeding and nonbreeding areas. One obvious recommendation to advance integrated management is to support the completion of these efforts already underway. Thinking about these decision problems is most advanced under these modeling efforts. Therefore, they are most likely to provide rapid opportunities to learn and to experiment with new integrated approaches to goal setting, monitoring and assessment.

Regardless of the modeling framework used to support specific decision problems, models and their predictions provide the means for enabling Plan resources to be cost-efficiently applied to the highest priority landscapes and conservation actions. In order to integrate more formal approaches to user management, models must be developed to describe the influence of harvest, habitat, and user/supporter management actions (as well as background environmental, socioeconomic, and cultural change) on user objectives. The Flyways Councils have already engaged social science experts to develop conceptual models that reflect the management community's perceptions of what drives participation in hunting. Based on a combination of expertise from anthropology, psychology, and sociology and waterfowl biologists, these models suggest efforts to influence hunter participation must address factors influencing an individual's decision to hunt, the processes that lead to the development of an identity as a hunter, and the generation of social, political, economic, human, and natural capital needed to maintain the overall waterfowl hunting/management institution. These models reflect more general processes to foster social change and will provide a good starting point to develop similar models addressing participation in birding and conservation.

### **Targeted Monitoring Programs**

Monitoring provides the means to track progress toward attainment of objectives and to compare the predictions of alternative system models with actual observations. Models that predict most accurately can be given greater weight in future decisions, thereby improving the basis for decision-making. To be most effective, monitoring should be focused on the key parameters associated with a specific decision problem.

For some decision problems confronting waterfowl managers, well-developed monitoring programs already exist that are scaled appropriately and targeted at key system parameters. Examples are the extensive population and habitat monitoring programs currently supporting the AHM decision framework for mallards. This is the exception rather than the rule, however, as waterfowl managers have struggled to secure resources for the monitoring required to inform decision processes at smaller scales. Fortunately, the information derived from long-term monitoring programs designed to support harvest regulation have provided guidance to habitat managers as well as insights into environmental mechanisms limiting and regulating waterfowl abundance. In addition, in some regions, JVs have made significant strides toward monitoring landscape condition in response to Plan activities and external influences.

It may be possible to modify or augment the design of existing surveys to address decision problems at smaller scales. An example might be to modify stratification and increase sampling intensity of the Waterfowl Breeding Population and Habitat Survey to support decision-making at smaller scales to assist in JV program delivery and evaluation. A key challenge in moving toward a coherent and integrated framework for pursuing objectives linked across scales will be development of the scale/decision-specific monitoring programs necessary to inform decision-making for not only population and habitat management, but in support of user recruitment and retention objectives as well. The waterfowl management community is currently expending considerable resources on monitoring. While useful, not all of these programs are contributing directly to the enhanced decision-making capacity envisioned here, which suggests that some redirection of existing resources may be possible.

Ongoing operational program evaluations by the U.S. Fish and Wildlife Service (USFWS) and Environment Canada should continue to enhance the cost-effectiveness of waterfowl monitoring programs. Renewed efforts should be undertaken to address monitoring deficiencies for some species (e.g., certain sea ducks), which hamper efforts to understand population dynamics and to implement appropriate conservation measures. On-going efforts by the three species JVs and cooperating habitat JVs have resulted in improved monitoring (e.g., winter surveys and habitat delineation) and objective-setting processes for some species, but additional progress is required to formulate objectives for a broader suite of species and guide associated decision frameworks.

Continued development of monitoring programs to track landscape-level habitat conditions is essential to inform the establishment of habitat objectives, to track progress toward their attainment, and to recognize and adapt to broad scale system changes. The management community – in particular the JVs – must re-double efforts to inventory their habitat base and assess the degree to which critical resources may be at risk from future changes in environmental and socioeconomic drivers. To fulfill this critical need, JVs should develop tracking systems to document habitat accomplishments and devise monitoring systems that track net change in important landscape features. As much as possible, such monitoring should be done in partnership with Landscape Conservation Cooperatives (LCCs), the U.S. Geological Survey (USGS), the Canadian Wildlife Service (CWS), the U.S. Department of Agriculture (USDA), Ag Canada, and other agencies operating in all three countries. These and other organizations are invested in monitoring programs that compliment the needs of NAWMP, particularly those focused on detecting and responding to system change. Many questions remain regarding the most critical habitat metrics (i.e., critical seasonal resources or habitat features providing food, shelter, and sanctuary) to monitor within the various JVs, and ongoing efforts by the NSST to identify metrics should continue. This work should be informed and directed by the development of models to support decision-making.

For user objectives, it seems evident that a multi-dimensional approach will be required. New programs will need to be implemented, but the possibility exists to better utilize existing surveys conducted at periodic intervals. The ultimate choice in monitoring will depend on participation objectives, management actions and the scale of their application.

### **Further Considerations and Challenges in Integrated Waterfowl Management**

As the waterfowl management community develops an integrated system of management, it will be necessary to confront two different types of challenges – technical issues and process issues, and some (e.g., cross-scale issues) that are both.

#### Technical Issues Related to Integration

It will be essential to develop solutions that support a range of decisions and actions. Many of these technical issues, which have been discussed previously, are summarized here:

- Confirming or revising population, habitat and social objectives; the major means objectives to achieving these; the major trade-offs in managing toward those objectives; and metrics to gauge progress.

- Management decisions at various spatial and temporal scales, and the means to link these largely independent decision processes. Approaches may vary from quantitative models derived from considerable empirical evidence to more qualitative expressions of less-informed, hypothetical relationships.
- Decisions on the scales at which decision processes (and thus model linkages) should occur. These might be eco-regional, JV regions, provinces, flyways, etc. The number of goals to integrate may vary among management questions and scales.
- Implementation of integrated decisions at smaller scales, so the overall user goals, for example, might be stepped down to smaller scales for implementation, much like the habitat goals have been “stepped down” in the past.

The development of linkages among decision frameworks for various objectives and at various spatial and temporal scales may be the most significant technical challenge to face in the process of integration. One overriding question is how formal or how intricate these linkages should be beyond the most basic need to consider multiple, competing objectives in decision-making, and a commitment to periodic review of progress toward those objectives. A second consideration is whether to attempt to do this holistically (i.e., for all three goals and for all spatial scales) from the outset, or to begin where there are some insights about how to proceed for a subset of objectives or at a single spatial/temporal scale (e.g., for population and habitat goals as in the JTG model for mid-continent mallards and pintails)? While it might be useful to consider an overarching conceptual model depicting how an ideal integrated system might work, initial tangible progress is more likely to be made on more narrowly defined problems and smaller scales. The opportunity for integration at finer scales is discussed in Appendix A.

A substantial effort will be required over the next 3-5 years to address the technical issues related to integration, specifically how best to apply informed management principles and approaches at multiple scales to pursue the three inter-related objectives. Different approaches to decision-making will be dictated by different decision contexts, and combining decision theoretic methods with other approaches described earlier will likely be necessary.

#### Process Issues Related to Integration

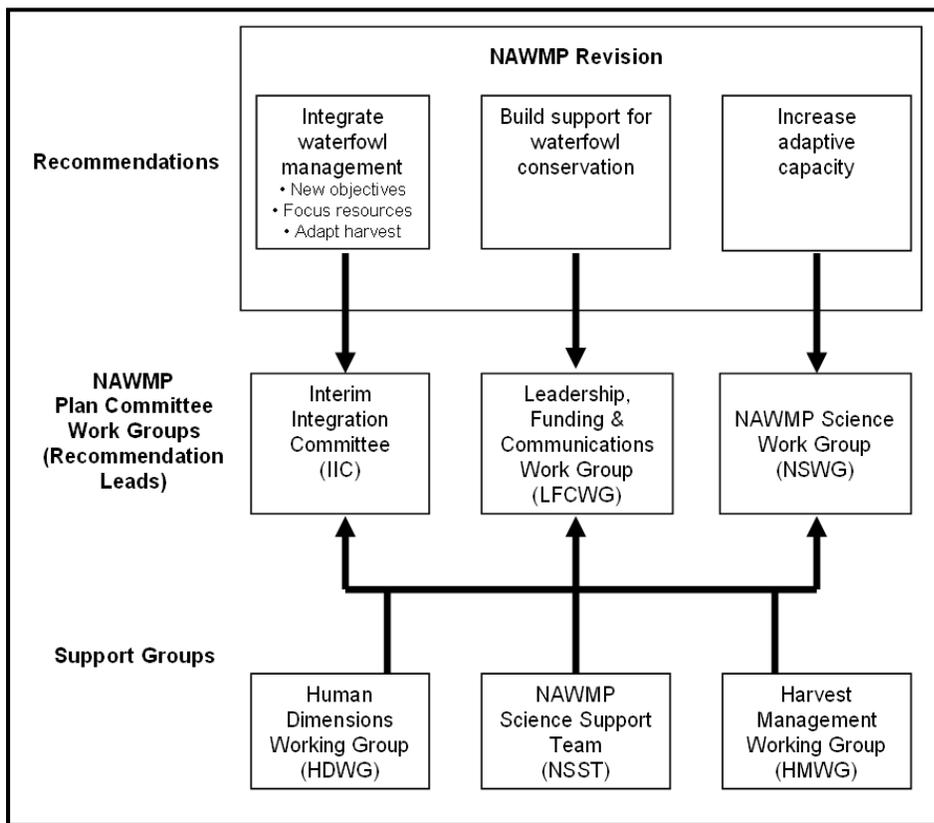
Two process challenges must be overcome for integration to proceed. First, it needs to be determined how multiple objectives for waterfowl management will be established (i.e., by what *social process* this would be accomplished). Here, the term “social process” is used to broaden the discussion beyond purely technical matters. One option is to rely on existing institutions and processes to achieve coherent adaptive actions. An alternative is to establish an entity with a new, overarching facilitation or coordination function. This AP recommends a hybrid approach, wherein the IIC will lead the integration effort in consultation with existing waterfowl management institutions.

Second, when a set of coherent objectives is established, again from a *process* point of view, procedures need to be established to monitor progress toward achieving the expanded NAWMP objectives and adapt actions in light of those results. It should be determined who will assume responsibility for an expanded set of objectives. If this involves multiple institutions, they

should develop the means to coordinate actions in pursuit of those objectives, monitor performance metrics and adapt (as warranted) to the results.

One significant challenge is that no existing entity possesses clear responsibility for the interrelated decision problems that should be defined and addressed in an integrated system. Similarly, there is no single institution able to determine who will participate in the development of objectives, what stakeholders will be consulted, what technical resources will be committed to the task, and – ultimately – who will make the relevant decisions, monitor progress, and adapt the system in the future as required. The waterfowl management community should resolve these issues with due respect for the long-standing institutions and processes already in existence, but this is likely to require considerable time to evolve.

Given how the different institutions of waterfowl management have developed, it is understandable that these and other coordination issues have emerged. These barriers to integrated decision-making need to be addressed. As an initial step to maintain momentum for achieving greater coherence and integration of waterfowl management, the PC will assume an



interim facilitation role and, as noted briefly in the 2012 Revision, will appoint an IIC to promote coherent management of North American waterfowl populations and harvest, habitat conservation, and the growth of associated users and conservation supporters (diagram). Development and implement of a public engagement strategy will be led by the LFCWG. Science support and increasing adaptive capacity will be led

by the NAWMP Science Work Group (NSWG). All of these three committees/work groups will be under the direction of the NAWMP PC, but supported by existing institutions – in particular, the HDWG, the NSST, and the HMWG.

As outlined in the Terms of Reference for the IIC (Appendix C), this committee will focus on leadership and administrative, institutional, and technical matters related to integration. The creation of the IIC seems highly preferred at the onset of efforts to implement the integrated

vision of the 2012 Plan. Because many matters still require both technical and process resolution, it seems unwise to recommend more permanent changes in management processes or structure at this time. However, in the longer term, the waterfowl conservation community should create a more permanent focal point for reaching consensus around integrated objectives and providing a forum to review monitoring and assessment data. This would help track progress toward achieving the Plan's multiple goals and objectives, and identify warranted changes in program direction, emphasis, or monitoring/assessment efforts. This body (or these bodies) would serve a consensus-building function and hopefully motivate countries, flyways agencies and others to act in a unified manner.

When the first set of explicit objectives have been specified and linked decision frameworks and monitoring systems developed, the three federal governments that have over-arching management authority for migratory birds and treaty responsibilities should consider comprehensive, long-term changes in processes and/or institutions to ensure future success of integrated waterfowl management. To facilitate this, we urge that the IIC, with support of the PC, lead this review. Logically, this review should be the foundation for the next update of the NAWMP. The analysis should include an assessment of movement toward Plan goals and objectives, a review of progress in understanding functional linkages and the dynamics of the interacting human, avian and habitat systems that are being managed, and the waterfowl management community's effectiveness, efficiency and responsiveness to change.

### **Next Steps**

#### **Immediately, upon signing of the 2012 NAWMP Revision**

1. The PC, in consultation with the USFWS and the CWS, will form the IIC. The IIC will be composed of senior managers and technical staff within the waterfowl management and conservation community. Technical representation will be composed of appropriate membership from the HMWG, the NSST, the developing HDWG, and other expertise as deemed necessary. The IIC will provide leadership and oversight of ongoing efforts to improve coherence of waterfowl conservation (additional details in Appendix C).
2. The IIC will require a significant commitment of staff time and financial resources to complete its work in the time frame outlined here. Development of a work plan and budget for the IIC must be an early, top priority.
3. The newly-created HDWG will be integrated into the Revision implementation process to provide expertise and a forum to debate and develop all necessary components to fully integrate user objectives into decision-making frameworks supporting waterfowl management. The HDWG will be represented on the IIC and will coordinate its efforts closely with the HMWG and NSST.
4. The PC will charge its LFCWG to lead development and implementation of a NAWMP public engagement strategy.

### Within 1 Year (September 2013)

1. The IIC will work with the HDWG, HMWG, and NSST to develop formal objectives for users/supporters, and will identify quantitative metrics for expressing these objectives. Rather than eliciting additional suggestions from the waterfowl management community, the IIC should consider utilizing the results of the NAWMP consultation workshops to formulate a suite of measurable objectives that would then be reviewed and amended based on comments from the waterfowl management community and select stakeholders.
2. The IIC will consider the challenges posed by simultaneous management of multiple species and stocks differing in life history characteristics, population status and threats, data availability, and conservation challenges. The issue of multi-stock management is of fundamental importance to the framing of objectives and hence for all the elements of an informed decision process. The extent to which individual species status and dynamics will be considered in decision-making must be reconciled before substantial progress can be made on other integration issues.
3. The IIC will work in cooperation with the HDWG and NSST to specify potential actions that could contribute to attainment of continental user/supporter objectives and their associated costs and anticipated impacts. In some cases, particularly with respect to user objectives, baseline human dimensions research will be necessary to better identify the types of management actions likely to be successful and what effects might be anticipated.

### Within Two Years (September 2014)

1. The IIC should agree on a modeling framework to represent continental-scale processes linking waterfowl populations, habitat, and users/supporters. This framework should incorporate ecological and social models, and provide a broadly agreed upon tool to evaluate tradeoffs among population, habitat, and user objectives and establish a set of quantitative objectives for populations, habitat, and users. Full integration of social objectives may require additional time.
2. Pilot efforts to develop cross-scale, linked modeling frameworks to support integrated decision making for pintails, scaup, and black ducks should continue and be fully integrated into the development of revised continental objectives where possible. Such efforts represent a high degree of integration where decisions at multiple scales are evaluated within a single decision framework for their contribution to broad-scale objectives.

### Within Three Years (September 2015)

1. Where highly integrated decision frameworks are not yet feasible, the IIC should work with the waterfowl management community to identify decision processes at scales ranging from continental to regional (e.g., JV). The IIC should facilitate and support the development of pilot projects to develop, or reformulate, decision support frameworks to address specific decision problems, but for all three NAWMP goals. For example, JVs (in

collaboration the HMWG and HDWG) should identify decision problems at regional or smaller scales and construct the spatially-explicit modeling frameworks needed to revise JV habitat objectives and performance metrics, and inform decision-making at regional or smaller scales. These frameworks should provide conceptual linkages to the objectives and models developed for decisions at larger scales, even if formal integration is determined to not be possible.

#### Within Four Years (September 2016)

1. The IIC, with support from the NSST, HMWG and HDWG, should summarize scale-specific monitoring needs to implement pilot decision frameworks that are initially developed for integrated population, habitat, and user/supporter management. The IIC should coordinate with the waterfowl management community to pursue new or redirect existing resources to meet these priority monitoring needs.
2. The IIC should summarize and report on lessons learned in developing decision frameworks for integrated management at multiple scales. This report should offer insights on (1) circumstances favoring tight integration versus less structured integration of decision frameworks across scales, (2) recommendations on useful approaches to decision making for various classes of decision problems (e.g., decision theoretic versus less structured approaches such as scenario planning), (3) when application of multiple approaches may be helpful, and (4) specific technical considerations in developing informed decision frameworks to address multiple objectives.
3. When the nature of integration from a technical perspective is better defined, the IIC should coordinate a comprehensive, inclusive, international review of the institutional structures and processes in place to support integrated waterfowl management and conservation, form recommendations for any necessary restructuring, and consult comprehensively with the waterfowl management community to seek broad consensus and support for any necessary restructuring.

#### Longer-term Steps

At about five years from the signing of the NAWMP Revision (i.e., 2017), the PC and IIC should lead the comprehensive review of progress made toward attaining new Plan objectives under all three goals and determine how effective the interim processes and institutions have been for achieving integrated waterfowl management. This should include a review of external factors affecting NAWMP outcomes and suggested course corrections as appropriate. The PC should also review progress in understanding functional linkages and the dynamics of the interacting human, avian and habitat systems that we are attempting to manage. The PC will also assess the waterfowl management community's effectiveness, efficiency and responsiveness to change. Finally, it will offer recommendations for any needed changes in program direction, monitoring/assessment functions, or new processes and/or institutional changes necessary to help advance integrated waterfowl management.

At approximately 10-year intervals, future Plan updates should include a review of Plan goals and objectives, asking whether these are still appropriate and evaluating whether the governance

structures and processes in place are still effective.

Adopting this interim, expanded role would mean a more active coordination function for the PC and imply some necessary changes in membership and probably incremental staff support. Strong working linkages to the three technical support bodies (NSST, HMWG and HDWG) also will be essential for success. Whether the IIC – drawing members from all three of these technical support bodies – remains for the longer term or transitions into something else should be resolved as work on the AP unfolds. Regardless, it will be essential for the waterfowl management community to have enhanced access to advice from the combined expertise of these vital technical groups.

## Table of Lead Responsibilities

Lead organizations identified to carry out tasks in this Action Plan.

Task	Who <sup>1</sup>										
	PC	USFWS	CWS	NFC	IIC	NSST	HMWG	HDWG	LFCWG	PAG/SAT	BDJV
<b><i>Immediately upon signing of the 2012 NAWMP Revision:</i></b>											
1. Form an Interim Integration Committee (IIC).											
2. Develop work plan, budget and resourcing plan for IIC.											
3. Integrate newly developed HDWG into revision process and coordinate efforts with the LFCWG, HMWG and NSST.											
4. Design and begin to implement a public engagement strategy.											
<b><i>Within One Year (September 2013)</i></b>											
5. Recommend a technical framework given the challenges of simultaneous management of multiple species and stocks.											
6. Develop formal objectives for users/supporters and identify quantitative metrics.											
7. Conduct a review of the environmental and societal benefits of managing, restoring and protecting waterfowl habitat. Identify information gaps and propose how to address them.											
8. Specify potential actions to attain continental user/supporter objectives and evaluate associated costs and anticipated impacts.											
<b><i>Within Two Years (September 2014)</i></b>											
9. Agree on a modeling framework to represent continental-scale processes linking waterfowl populations, habitat, and users/supporters, incorporating: ecological and social models; an method to evaluate tradeoffs; and a set of quantitative objectives for populations, habitat, and users.											
10. Incorporate cross-scale, linked modeling frameworks to support integrated decision-making for pintail, scaup and black ducks.											

Task	Who <sup>1</sup>										
	PC	USFWS	CWS	NFC	IIC	NSST	HMWG	HDWG	LFCWG	PAG/SAT	BDJV
<b><i>Within Three Years (September 2015)</i></b>											
11. Identify decision processes at scales ranging from continental, to regional, to local. Facilitate the development of pilot projects to develop, or reformulate, decision support frameworks to address specific decision problems for all three NAWMP goals											
<b><i>Within Four Years (September 2016)</i></b>											
12. Summarize scale-specific monitoring needs to implement pilot decision frameworks that are initially developed for integrated population, habitat, and user/supporter management.											
13. Coordinate with the waterfowl management community to pursue new, or redirect existing, resources to meet priority monitoring needs.											
14. Summarize and report on lessons learned in developing decision frameworks for integrated management at multiple scales, considering: <ul style="list-style-type: none"> <li>• circumstances favoring tight integration vs. less structured integration of decision frameworks across scales.</li> <li>• recommendations on useful approaches to decision making for various problems (e.g., decision theoretic vs. less structured approaches).</li> <li>• technical considerations in developing informed decisions to address multiple objectives.</li> </ul>											
15. Coordinate a comprehensive, inclusive, international review of the institutional structures and processes to support integrated waterfowl management and conservation											
<b><i>Longer Term</i></b>											
16. Conduct a comprehensive review of progress made toward attaining new Plan objectives under all three goals, and determine how effective the interim processes and institutions have been for achieving integrated waterfowl management (about 5 years).											

Task	Who <sup>1</sup>										
	PC	USFWS	CWS	NFC	IIC	NSST	HMWG	HDWG	LFCWG	PAG/SAT	BDJV
17. Plan updates - review Plan goals and objectives, evaluate whether these are still appropriate and whether the governance structures and processes in place are still effective.											

- <sup>1</sup> (PC) Plan Committee
- (USFWS) U.S. Fish and Wildlife Service
- (CWS) Canadian Wildlife Service
- (NFC) National Flyway Council
- (IIC) Interim Integration Committee
- (NSST) NAWMP Science Support Team
- (HMWG) Harvest Management Working Group
- (HDWG) Human Dimensions Working Group
- (LFCWG) Leadership, Funding and Communications Work Group
- (PAG/SAT) Pintail Action Group and Scaup Action Team
- (BDJV) Black Duck Joint Venture

## Appendix A

### Technical Details and Additional Considerations for the IIC

During the NAWMP consultation workshops and subsequent discussions among members of the NAWMP Revision Writing Team, several technical approaches and issues were discussed and debated. In addition, during the initial phases of Plan development, a technical working group was convened to consider alternative approaches for developing an integrated system of waterfowl management. This appendix captures some of those discussions with the intent that they will help guide subsequent work by the IIC and to stimulate thinking within the waterfowl management community.

#### Weighting Objectives and Tradeoffs – Integration at a Finer Scale

Development of an integrated set of continental objectives will also have implications for integration at finer scales, focusing on narrower questions, more geographically discrete areas, or concentrating on a particular stage of the life cycle (e.g., breeding versus non-breeding regions). These efforts will also need to address each of the three goals of waterfowl management, albeit with differing emphasis. How might the waterfowl community move forward in evaluating the tradeoffs among the three fundamental goals and weighing the relative merits of alternative management objectives that seek to advance these goals at different scales? One way to help conceptualize these tradeoffs is with a ternary diagram (Figure A1). Here, the three goals of waterfowl management (landscapes, populations and hunters/viewers) represent the apices of the triangle, and alternative management objectives are plotted in a position that approximates the degree to which they address each of the three goals.

This is a simple but useful framework for several reasons. First, it provides a means by which to more formally position each management objective relative to our central goals and to other management objectives. In essence, these plotted positions are an expression of our belief in the relative utility of any given management action to contribute toward the three goals. This forces us to recognize that we cannot consider any management action in isolation – there will always be tradeoffs. A ternary plot serves as a simple visual method to represent these tradeoffs and linkages explicitly.

A second value is that this approach can be used to illustrate how objectives for each of the three goals interact. While most management problems contain elements and decision points related to all three goals, the weights associated with different objectives can differ considerably. As such, they each land in a different place within the ternary triangle. Therefore, integration is not a single, optimal point in the triangle, but rather an assemblage of multiple points within the ternary space - a “decision landscape”, or decision space. Some management problems may require extensive integration across all three goals, while others may be relevant to only a single goal with little influence on the remainder.

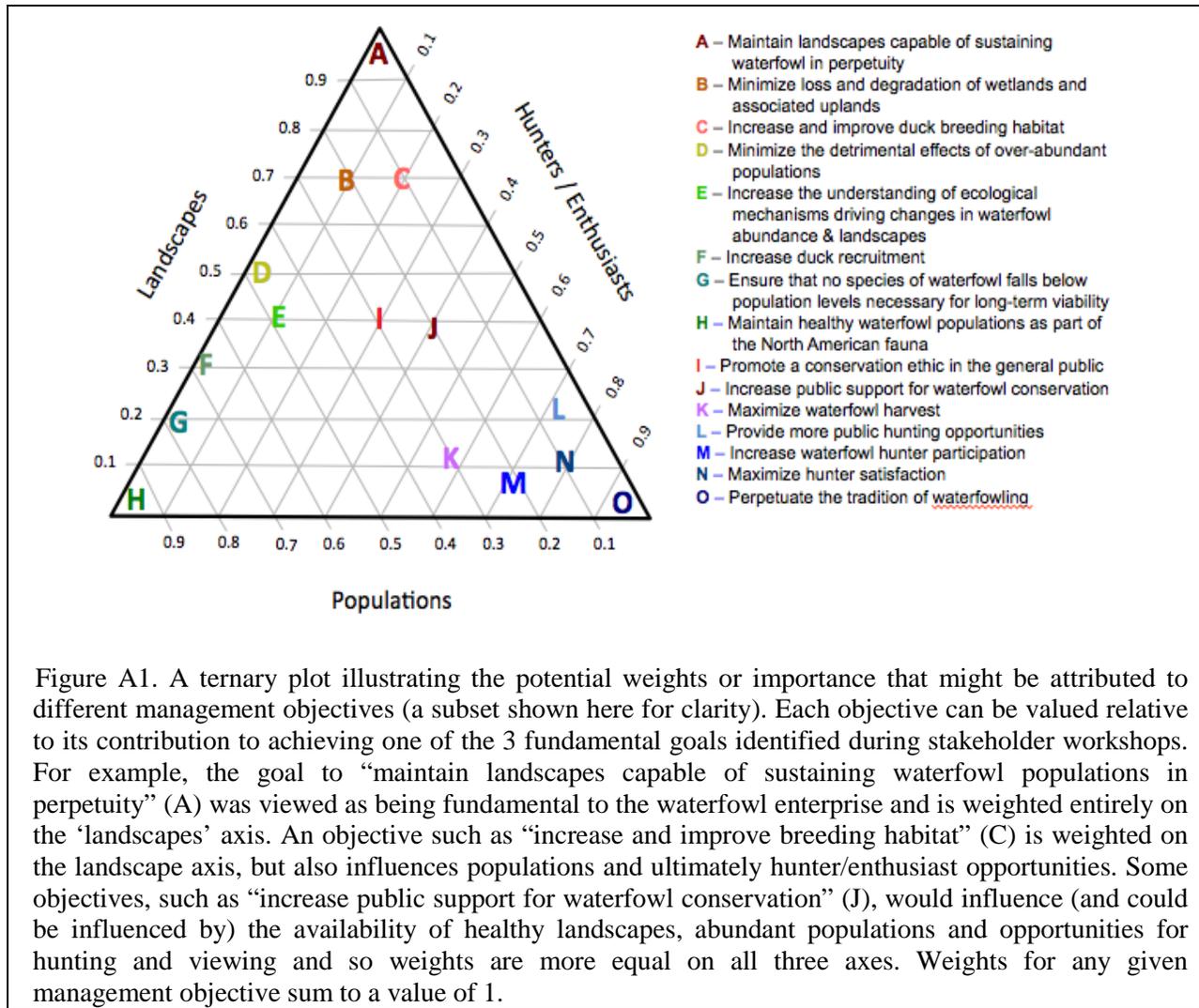


Figure A1. A ternary plot illustrating the potential weights or importance that might be attributed to different management objectives (a subset shown here for clarity). Each objective can be valued relative to its contribution to achieving one of the 3 fundamental goals identified during stakeholder workshops. For example, the goal to “maintain landscapes capable of sustaining waterfowl populations in perpetuity” (A) was viewed as being fundamental to the waterfowl enterprise and is weighted entirely on the ‘landscapes’ axis. An objective such as “increase and improve breeding habitat” (C) is weighted on the landscape axis, but also influences populations and ultimately hunter/enthusiast opportunities. Some objectives, such as “increase public support for waterfowl conservation” (J), would influence (and could be influenced by) the availability of healthy landscapes, abundant populations and opportunities for hunting and viewing and so weights are more equal on all three axes. Weights for any given management objective sum to a value of 1.

## Models – Challenges and Opportunities

### Models for People

The waterfowl management community already makes extensive use of models in habitat and population management. However, when developing hunter, viewer, or conservation recruitment and retention strategies, the management community often implements management actions based on implicit assumptions of what individuals think influences participation. This creates a situation wherein a shared framework of understanding is missing and opportunities for learning may be missed. A better alternative is to develop models that represent our current state of understanding informed by social sciences and management experiences and then manage in an adaptive framework.

In an integrated system of waterfowl management, participation and support models must be linked to models depicting perceptions of the relationships between participation/support, habitat

and waterfowl populations. Rather than more formal quantitative predictive modeling, these linkages could be developed through “scenario planning” approaches. Scenario planning involves thinking about and specifying a wide range of plausible futures, factoring in both well-known trends and uncertainties, and using this information to provide a set of scenarios that can guide decision making. The story lines should be grounded in reality but still address uncertainties and surprises. Scenarios are generally useful for “encouraging systematic planning in uncertain situations or revealing dynamic processes and causal chains that lead to different outcomes.” (Bennett et al. 2003). Scenario planning may be particularly effective in managing systems characterized by high uncertainty and low controllability (Peterson et al. 2003, Allen et al. 2011), features common to hunting participation, viewing participation, and support for conservation.

### Considerations in Implementing the JTG Model

Although conceptually a good fit as a continental modeling framework to set objectives and perhaps inform large-scale decisions such as harvest regulation, challenges need to be overcome to implement the JTG model. First, the implementation of this approach has focused on individual waterfowl species; however, the selection of a desired harvest rate in the JTG model affects more than a single species, because many duck species in North America are managed under a common set of regulations (i.e., based largely on annual abundance estimates for three stocks of mallards and habitat condition). It is unclear how single species harvest strategies derived from these models will affect hunter participation. Thus far, harvest strategies using this type of model are still based on the largely untested assumption that relatively small regulatory changes will have an effect on hunters. The recent trend in the U.S. towards development of species-specific, JTG-like models for every species cannot be sustained, not only because we lack the necessary empirical data to inform these models but also because of limited time and human resources. The JTG model is also considerably more complex than the regulatory model used in Canada and Mexico, so compatibility among countries may be desirable. Indeed, Canada is currently exploring ways of simplifying further its harvest regulation-setting processes. Therefore, the issue of multi-stock management remains a substantial challenge in moving forward with integration efforts. Indeed, this issue transcends the selection of appropriate modeling frameworks and also relates to the revision of Plan objectives and the identification of appropriate management options.

Another challenge in pursuing JTG-like population dynamics models to describe and predict system responses to management relates to the NAWMP public use goal. The JTG model only recognizes the importance of habitat for waterfowl, not hunting/viewing. As a result, more work will need to be done to extend this framework to address hunters/viewer management. Other challenges were detailed in the JTG report, and are as relevant today as when they were first offered by the JTG. The challenges notwithstanding, the JTG provides one possible modeling framework that could be employed to establish revised NAWMP objectives and provide an overarching framework for integrated management, but even it will require further refinement and development to serve in this capacity.

## Decision Algorithms and Tools

Adaptive management is rooted in statistical decision theory, which is a systematic approach to decision-making in the face of uncertainty (Walters 1986, Williams et al. 2002). Adaptive management represents an iterative implementation of decision theoretic principles. Under adaptive management approaches, policies (i.e., sets of state-dependent optimal decisions) are derived most frequently through optimization. A number of optimization methods may be used depending on the nature of the decision problem. Most frequently, an optimal state-dependent decision is that which maximizes, over the long-term, some benefit related to the explicit statement of objectives for the decision problem at hand. Within an adaptive framework there are, however, alternative approaches for contrasting possible decisions such as maxi-min or robust optimization algorithms that may be more applicable in specific decision contexts. Maxi-min seeks to identify an action that is associated with the ‘least-bad’ worst-case outcome. Robust optimization alternatively seeks to identify options that are least sensitive to uncertainty (Polasky et al. 2011). Such approaches may be more applicable under more severe forms of uncertainty induced by climate change and other drivers of system change. Alternatively, time-dependent adaptive management solutions may be an appropriate approach under extreme uncertainty (Conroy et al. 2011). Time-dependent solutions seek optimal policies over a relatively short (and predictable) window of time, as opposed to the long-term time horizon typically considered, and require an increased commitment to double-loop modifications to the decision framework.

### Alternatives to Decision Theoretic Frameworks

Adaptive management will be most useful when: (1) there are clear information gaps and learning is needed to achieve management goals; (2) there are good prospects for learning and it is feasible to reduce uncertainty through time and via management; and (3) there are opportunities for adjustment; managers must be able to (operationally, socially, politically, etc.) change management direction in response to learning (Doremus et al 2011). The value of adaptive management will further depend on the degree of uncertainty and the extent to which a system can be controlled (Peterson et al 2003). Adaptive management will be most effective when there is a high level of uncertainty, but also a high degree of controllability such that resources respond to management actions.

Other approaches to systematic decision-making may be more appropriate when the conditions for successful application of adaptive management are not met. One example is scenario planning. Scenario planning “involves thinking about a wide range of plausible futures, factoring in both well-known trends and uncertainties, and using this information to provide a set of story lines that can guide decision making. The story lines should be grounded in reality but still address uncertainties and surprises. Scenarios are generally useful for encouraging systematic planning in uncertain situations or revealing dynamic processes and causal chains that lead to different outcomes.” (Bennett et al. 2003). Scenario planning may be particularly effective in managing systems characterized by high uncertainty and low controllability (Peterson et al. 2003, Allen et al. 2011), such as JV habitat objective-setting and conservation planning in the face of extreme uncertainty related to climate change and ongoing socio-economic changes associated with globalization.

The Thresholds Approach has also been suggested as an alternative to decision theoretic approaches. In this context, thresholds approaches are viewed as having utility in organizing thinking about complex systems. “Thresholds” refer to levels of the system that, if crossed, lead to a regime shift and fundamentally different system dynamics, or to other undesired consequences. A thresholds approach can facilitate thinking about critical boundaries as well as the potential consequences of crossing them (Polasky et al. 2011), however thresholds are often determined subjectively in many conservation applications. While sometimes perceived as an alternative to decision theoretic methods, threshold approaches are, in fact, most powerful when implemented within a structured decision making (i.e., decision theoretic) framework. Within a structured decision approach, three types of thresholds are relevant to conservation decision making: ecological, utility, and decision thresholds (Martin et al. 2009). Here, ecological and utility thresholds are based on understanding or hypotheses about the functioning of the ecological system being managed and the decision-maker’s objectives, respectively. Under a decision theoretic formulation of a thresholds approach, decision thresholds are derived from ecological and utility thresholds (Martin et al. 2009). Thresholds approaches may be useful where a range of acceptable states can be defined based on both ecological thresholds (e.g., the potential to overharvest based on life history characteristics of a species) and utility thresholds (e.g., user participation levels at which political support for waterfowl conservation erodes; or carrying capacity required to maintain waterfowl populations capable of meeting recreational demands).

Yet another approach to inform decision-making in the management of complex ecological-social systems is the concept of resilience thinking, which has evolved over recent decades into a general perspective or approach to analyzing social-ecological systems in an integrated fashion (Gunderson and Holling 2002, Fischer et al. 2009). The unstructured nature of resilience thinking may be both a strength and a weakness of the approach. It’s a strength in that it encourages unconstrained and imaginative thinking, however it doesn’t necessarily lead to clear management recommendations. In problems involving the conservation and management of complex social-ecological systems, it is likely that a variety of methods will be necessary to properly analyze and frame problems and to aid in effective decision-making. Indeed, there is an emerging interest in the integration of decision theoretic and less structured approaches to promote conservation action that is both effective and long-term (Fischer et al. 2009).

### **Monitoring Programs**

From the context of user objectives, monitoring programs should be able to track changes in the quantitative metrics used to define these objectives as well as the outcome of management actions designed to impact the metrics. More specific monitoring will be needed to assess outcomes of specific management actions. Monitoring hunter participation may include active waterfowl hunter numbers reflected in annual national surveys, duck stamp sales, and/or survey question(s) that are added to existing surveys or included in new surveys. It could also include more in-depth periodic surveys such as the U.S. National Duck Hunter Survey conducted in 2006. The Hunter Satisfaction Think Tank proposed using a panel design to monitor trends. Point-of-Sale license databases provide another tool to monitor hunter participation patterns. The

National Survey of Fishing, Hunting, and Wildlife-Associated Recreation conducted every five years could be used to monitor trends in viewing within the United States. Other possibilities may include coordination of state surveys as was recently done in the U.S. by twelve states to develop a measure of hunter identity.

Tracking levels of support for NAWMP will require a multi-dimensional approach that includes measures of financial, political, social, and human capital. Financial support could include such metrics as partner contributions to NAWCA, duck stamp sales, and individual contributions to private wetland restoration and management. Political support could be measured through voting behavior, contacts with elected officials, or other types of policy engagement. Monitoring changes in social or human capital could include tracking membership numbers in conservation organizations and the amount of time individuals volunteered for achievement of NAWMP objectives.

The ultimate choice in monitoring will depend on participation objectives and management actions. Ideally, U.S., Canada, and Mexico could develop common metrics to provide a continental perspective of participation in hunting and viewing. The key point is that monitoring programs provide data to assess progress toward quantitative objectives and the outcomes of specific management actions.

### **Focusing Resources – A Multi-Scale Problem**

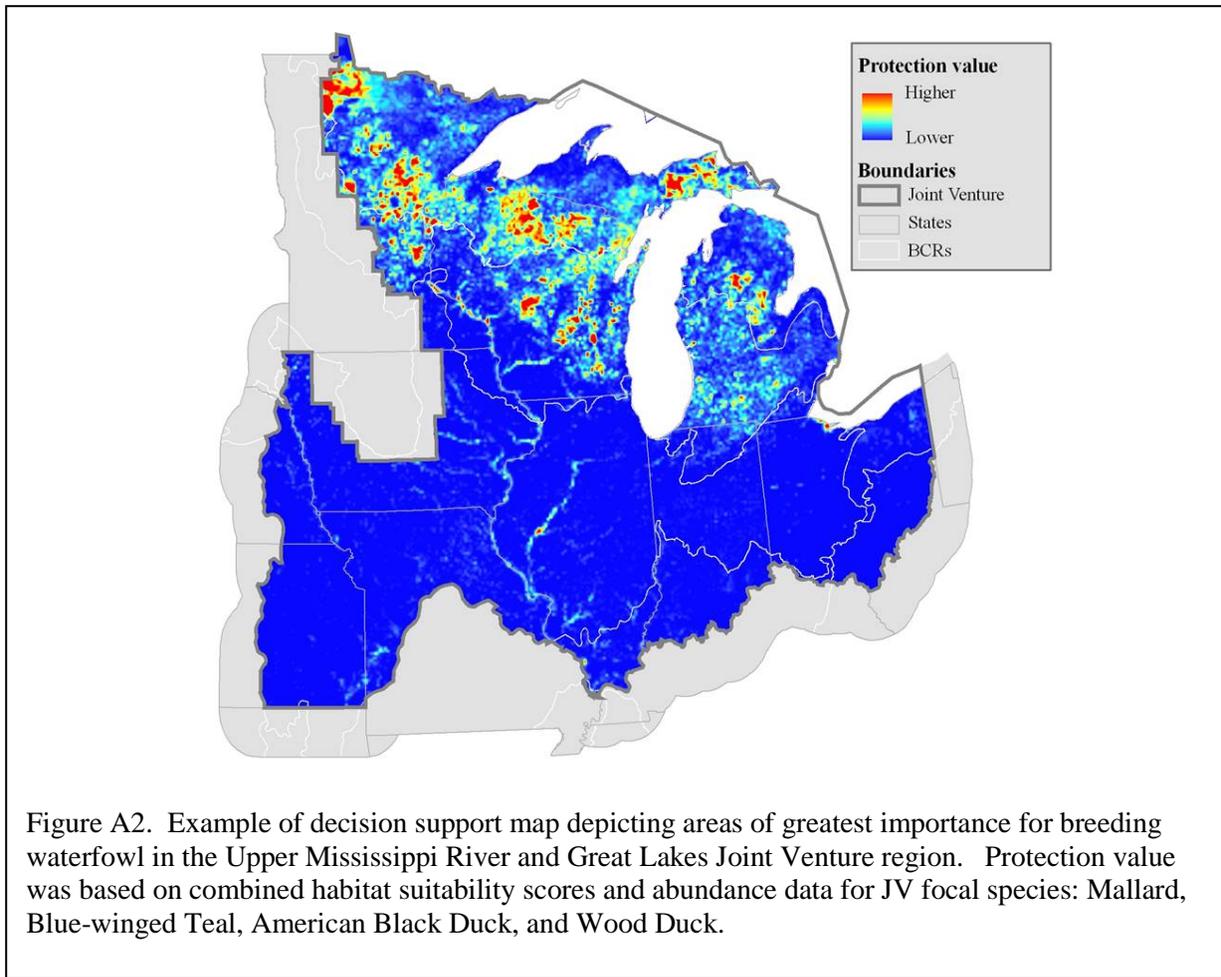
A decision criteria matrix (Table A1) can provide a starting point for discussion on why and how to target conservation resources in a more transparent way. This or a similar effort must seek to transfer knowledge and make the decision process understandable, repeatable, and adaptable over time when new information emerges or priorities change. More than population demography, this example accounts for pertinent habitat features plus social values related to NAWMP goals. In addition, the process allows new or alternative targeting criteria, depending on the decision context. Conservation issues, objectives, and measurable criteria are identified and weighted by perceived importance. “Weights” represent the relative value a decision maker places on different objectives. Thus, adequate stakeholder participation in refining objectives and weighting criteria to prioritize landscape features will be essential and involve diverse expertise and negotiation.

For example, statistical and geospatial data representing each criterion can be used to generate information layers (weighted for importance) using a given grid-cell dimension such as 5 km x 5 km or 10 km x 10 km land units. These layers, or “input maps,” for each criterion could then be overlaid with a resulting “output map” depicting locations representing the combined weighted objectives. The decision-support product could be a color image similar to the “thunderstorm maps” developed and used for conservation planning by some JVs (Figure A2).

Table A1. Examples of issues, objectives, criteria and weights that may be applied to spatial data (e.g., 10 x 10 km grid cells) used in developing decision support maps to focus resources on important landscapes having the greatest influence on waterfowl populations and those who hunt and view waterfowl. A direction (e.g., “maximize”) is provided for each objective, recognizing the net influence of conservation effort may only result in slowing a negative influence in a target area.

Conservation issue	Objective	Weighting criteria (current condition) <sup>a</sup>	Weight
<b>Populations and species</b>			
Limited by breeding habitat			
Species of concern	Maximize recruitment	Abundance or K	0.10
Total population	Maximize recruitment	Abundance or K	0.10
Limited by migration habitat			
Species of concern	Maximize recruitment (spring, cross-seasonal effect)	Abundance or K	0.03
Total population	Maximize recruitment (spring, cross-seasonal effect)	Abundance or K	0.02
Limited by wintering habitat			
Species of concern	Maximize survival	Abundance or K	0.10
Total population	Maximize survival	Abundance or K	0.05
Other	Other	Other	
<b>Habitats and landscapes</b>			
Expand value (acquire)	Maximize habitat quantity	Conservation lands (%)	0.10
Convert value (restoration)	Maximize habitat quantity	Hydric soils (%)	0.10
Increase value (enhancement)	Maximize habitat quality	Degraded habitat (%)	0.02
Acquisition effectiveness	Maximize investment return	Cost (\$) / unit area	0.10
Other	Other	Other	
<b>Stakeholders and social values</b>			
Resource user opportunity			
Hunters	Maximize use / recruitment	Hunter density (or distance)	0.10
Viewers / recreationists	Maximize use / recruitment	Human density (or distance)	0.05
Education / outreach	Maximize use / recruitment	Human density (or distance)	0.05
Ecological goods and services			
Flood abatement	Minimize flood damage	Flood zone and upstream	0.05
Water quality	Minimize runoff (sediment, nutrient/chemical)	Degraded zone and upstream	0.03
Other	Other	Other	
Total			1.00

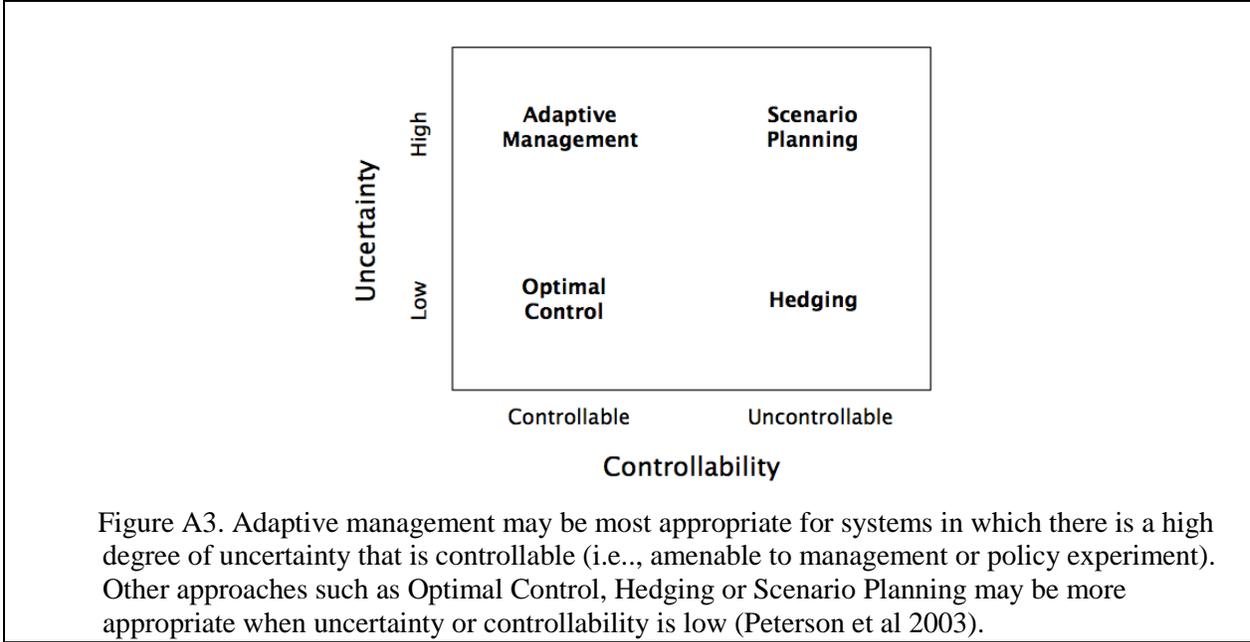
<sup>a</sup>Continently standardized metrics for weighting criteria to be determined by expert committee.



### Adaptive Management and Triple-Loop Learning

The value of AM will further depend on the degree of uncertainty and the extent to which a system can be controlled (Peterson et al. 2003). AM will be most effective when there is a high level of uncertainty, but also a high degree of controllability such that management experiments can be implemented effectively (Fig A3).

Increasing the adaptive capacity of the waterfowl management institution will necessitate attention to each level in the learning process (so-called “triple-loop” learning; Pahl-Wostl 2009; Figure A4). The innermost level focuses on the process of defining decision problems, developing models of understanding, predicting outcomes of management actions, and monitoring to determine if management actions produced predicted results. Harvest management has effectively employed such an approach for nearly two decades. Efforts in the habitat management community have been mixed, as noted in the Continental Assessment Report (Paulin et al. 2007).



Much progress has been made in the past 5 years, and the Plan community must continue to develop the capacity for AM. The NSST has been actively engaged in moving these AM recommendations forward, and should continue to do so. JVs, individually, must continue to make a concerted effort to ensure that biological planning models are developed, monitoring and evaluation to evaluate accomplishments and success (or failure and hence learning) are given high priority, and structured approaches are implemented to incorporate learning into management and conservation prioritization. This should become the standard business model for all JVs, and should be a basis for evaluation in the next Continental Assessment. Similarly, as the nascent HDWG work gets underway, it will be imperative at the outset that an adaptive management philosophy be a strong guiding principle. Social and policy experiments will be essential to learn more rapidly about the linkages and tradeoffs between human desires and societal support, habitat programs and harvest management policies.

The second level of adaptive learning concerns the processes used to periodically revise NAWMP (management) objectives. This has become a central focus of the current revision and is addressed directly in Recommendation 1. The extensive stakeholder consultation workshops leading up to this revision were unprecedented, and have provided a strong mandate by which to reframe the fundamental goals of waterfowl management to explicitly address population, habitat, and public use objectives. Continuing efforts to revisit and update these objectives periodically should become an established practice (10-15 year intervals) and engage the full NAWMP community, with leadership responsibility by the NAWMP PC.

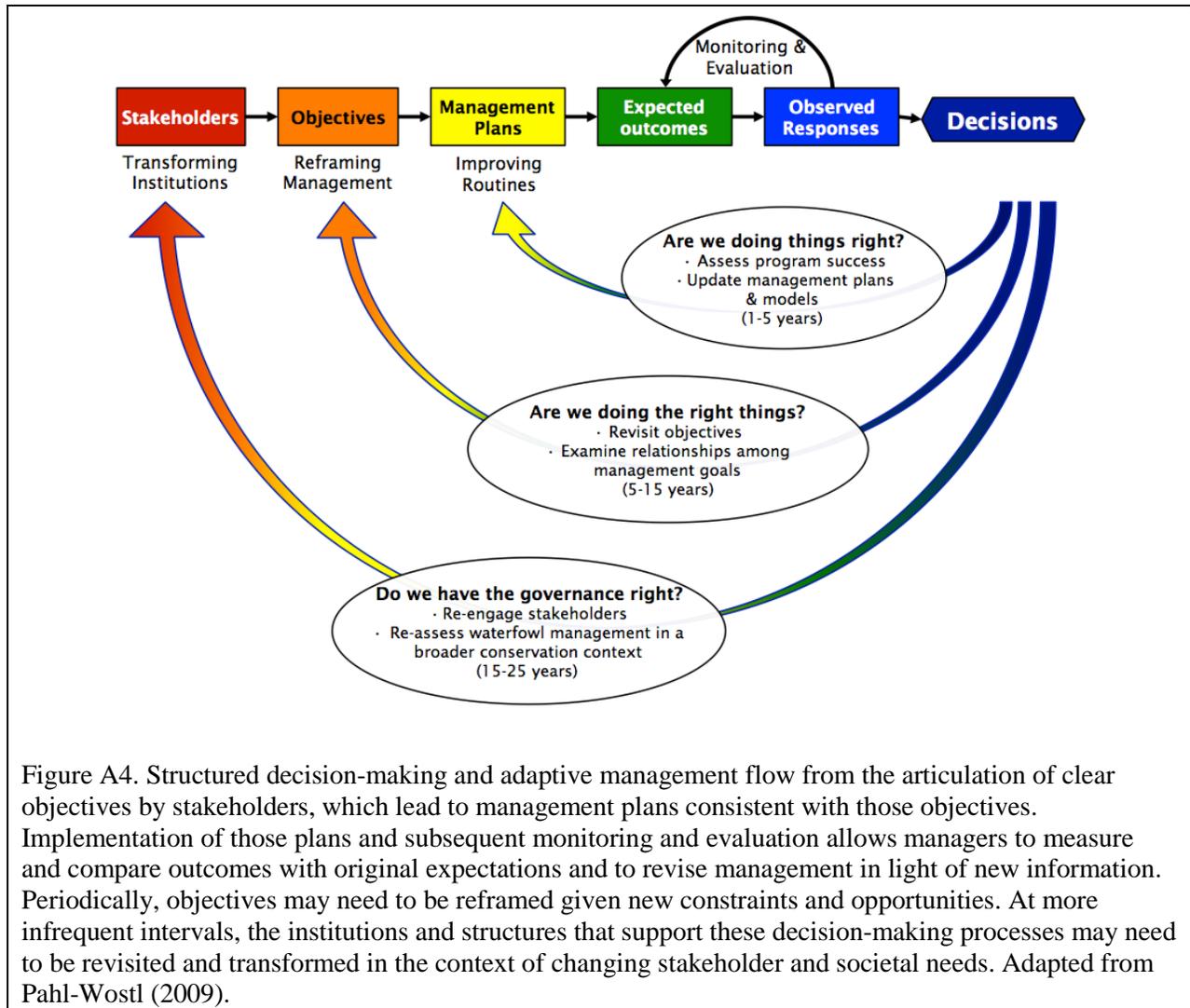


Figure A4. Structured decision-making and adaptive management flow from the articulation of clear objectives by stakeholders, which lead to management plans consistent with those objectives. Implementation of those plans and subsequent monitoring and evaluation allows managers to measure and compare outcomes with original expectations and to revise management in light of new information. Periodically, objectives may need to be reframed given new constraints and opportunities. At more infrequent intervals, the institutions and structures that support these decision-making processes may need to be revisited and transformed in the context of changing stakeholder and societal needs. Adapted from Pahl-Wostl (2009).

Finally, the outermost loop of the adaptive learning cycle focuses on the processes used to review organizational structure to ensure that it provides the capacity to achieve management objectives. This is relatively new territory – a stretch goal – and it will take careful thought and discussion by the entire waterfowl community and all stakeholders. Do existing institutions adequately represent the appropriate stakeholder groups? Do existing bureaucracies have the capacity to integrate elements of all three fundamental goals into their management actions? Are there opportunities to integrate or restructure organizations to increase opportunities and efficiencies for partner involvement? In short, is the organizational structure in place to begin to truly integrate waterfowl management? This will be a major charge to the IIC, outlined in Appendix C.

## Appendix B

### Draft Terms of Reference for the Human Dimensions Working Group

Note: These Terms of Reference are included in draft form and but are pending final resolution between the Plan Committee and the National Flyway Council.

#### Background

Decker et al. (2001) defined human dimensions of wildlife management as "*how people value wildlife, how they want wildlife to be managed, and how they affect or are affected by wildlife and wildlife management decisions.*" They go on to say ..."*Human dimensions covers a broad set of ideas and practices, including economic and social values, individual and social behavior, public involvement in management decision making, and communication.*"

Human dimensions considerations are increasingly recognized as critical to waterfowl management and conservation. This importance is evident in efforts during the past decade to identify and implement effective methods for incorporating human dimensions information into waterfowl management:

- In 2002, the USFWS granted the Wildlife Management Institute a Multistate Conservation Grant to convene a Waterfowl Hunter Satisfaction Think Tank. The Think Tank reviewed available information and concluded that significant, long-term financial commitments are needed in order to gather information on human dimensions of waterfowl hunters; and waterfowl managers must become more familiar with human dimensions (Case 2004).
- Also in 2002, the International Association of Fish and Wildlife Agencies established an AHM Task Force. In 2005, the AHM Task Force recommended that the National Flyway Council, in partnership with Wildlife Management Institute, and with participation by the USFWS, establish a Strategy Team to develop a plan for gathering information on waterfowl hunters. Specifically, the Strategy Team was requested to develop a system for gathering systematic information on waterfowl hunters as described in the Think Tank report, and identify sources of funding for implementing these approaches. The Strategy Team met in May 2005 and identified seven strategies for meeting this goal:
  1. Conduct a national survey of duck hunters
  2. Conduct panels/surveys of avid-influential waterfowl hunters
  3. Establish waterfowl hunter focus groups
  4. Conduct waterfowl hunter "point-of-sale" data-mining
  5. Communicate results of strategies 1-4 to waterfowl stakeholders
  6. Update and implement of the AHM communications strategy
  7. Develop a waterfowl hunter recruitment and retention (HRR) strategy

- The four Flyway Councils convened a group of representatives of state and federal agencies and human dimensions experts to develop and conduct a national duck hunter survey in 2005 (Strategy 1).
- Subsequently, the Strategy Team charged the formation of a HDWG to assist with the development of a waterfowl HRR strategy (Strategy 7). A draft HRR strategy was completed in 2008.
- The JTG for clarifying NAWMP objectives and their use in harvest management recommended the formation of a HDWG. The final report of the JTG (Anderson et al. 2007) reiterated the need to more explicitly clarify this relationship and the linkage between the human dimension component and the elements of harvest management and habitat conservation. The JTG recommended that a new HDWG should be convened to refine an assessment of waterfowl stakeholder values and the approach for more explicitly incorporating this information into management decisions.
- The 2008 Future of Waterfowl Management Workshop recommended expanded capacity for survey, assessment, and modeling of social attitudes related to waterfowl hunting and habitat conservation to assure the necessary and appropriate consideration of human dimensions elements in a unified framework for waterfowl management. Progress to date, including the work of the Strategy Team for Waterfowl HRR and the National Duck Hunter Survey, has provided initial results that identify important factors for consideration. Further work is needed to develop reliable metrics of hunter participation, satisfaction, and other elements of social support for harvest and habitat management that can be integrated with population and habitat data to support coherent goals for waterfowl management. A human dimensions group should include the additional expertise necessary for an expanded focus in support of a unified framework.
- The Service and flyways created Flyways.us to improve communications about waterfowl management and conservation.
- All Flyway Councils have established their own HD committees: Mississippi Flyway Technical Section 2005; Central Flyway Technical Committee 1996 (Hunter recruitment and retention), 2010 (Human Dimensions); Atlantic Flyway Technical Section (**date**); and Pacific Flyway (**date**).

These efforts have culminated in a fundamental shift in waterfowl management from treating people as passive recipients of waterfowl population and habitat management, to the focal point of one of the three goals of NAWMP. The third NAWMP Goal calls for “*Growing numbers of waterfowl hunters, other conservationists, and citizens who enjoy and actively support waterfowl and wetlands conservation.*” For the first time, the waterfowl management community recognizes the need to explicitly develop people-related objectives, consider the impacts of traditional habitat and population management strategies on hunting and viewing participation and support for conservation, and consider novel approaches to address the influence of the changing social landscape on participation and support for conservation. Recognizing that this effort will require sources of scientific and technical support at a level greater than currently

available within the waterfowl management community, one of the seven NAWMP recommendations is to form a HDWG to provide the scientific and technical support necessary to achieve the third NAWMP Goal.

Here we describe the composition and function of a new HDWG for waterfowl management. The HDWG will use social science tools to assist in establishing objectives, delineating models, identifying alternative actions, and using monitoring programs to evaluate and update policies and programs that will contribute to maintaining or increasing participation in waterfowl hunting and viewing and increase support for wetland and waterfowl conservation. This Terms of Reference document describes the administrative structure, roles, membership, and responsibilities for the HDWG.

### Mission

*To serve in an advisory capacity to the USFWS, CWS, Mexican General Directorate of Wildlife of Secretaria de Medio Ambiente Y Recursos Naturales, Mexico (SEMARNAT), Flyway Councils, Joint Ventures, the NAWMP Committee, and supporting technical groups by providing scientific and technical guidance for obtaining and incorporating human dimensions information to achieve NAWMP goals and objectives.*

### Organizational Structure

The HDWG will include a Steering Committee, a HD Technical Group, and a supporting Human Dimensions Specialists Subcommittee. This structure is similar to the ad hoc human dimensions group that assisted the Strategy Team in developing the 2008 Draft WH RR strategy. The intent is to provide a strong connection among waterfowl program and policy decision makers (HDWG Steering Committee), individuals with human dimensions technical expertise (HDWG Specialists Subcommittee), and a broader group with technical expertise in waterfowl and wetland management (HDWG Technical Group).

*HDWG Steering Committee.* – The Steering Committee will provide guidance to the HD Technical Group to ensure efforts are focused on priorities identified by NAWMP partners and stakeholders including Flyways and JVs. They will serve as the focal point to incorporate HDWG efforts into waterfowl management programs and policies, including the coordination of human dimensions projects among partners. The Steering Committee should assist in developing a work plan, budget, and resourcing plan to advance the integration of human dimensions into waterfowl management. The roles and responsibilities of the HDWG are ambitious; however, fulfilling them will likely depend on the ability of the Steering Committee to secure commensurate levels of support. To facilitate communication within the waterfowl management community, the Steering Committee should be comprised of 6-8 individuals jointly appointed by the National Flyway Council and the NAWMP Committee. Continental representation should include administrators from state/provincial agencies, federal agencies, and non-governmental organizations.

*HD Technical Group.* – The HD Technical Group will identify and prioritize human dimensions technical work that needs to be completed to address Steering Committee priorities and they will

serve as the liaison to NAWMP supporting technical groups. The HD will design effective approaches to address uncertainties associated with human dimensions issues, monitor trends in participation and support, and evaluate the effectiveness of management actions focused on garnering participation and support. The combination of participants with human dimensions expertise and waterfowl management expertise will ensure that human dimensions perspectives generated through both science and management experience will inform future decisions. This group will alert the Steering Committee of opportunities to gather technical information through collaborative efforts that dovetail with ongoing national, regional, and state efforts when possible. Finally, they will seek opportunities to engage partners involved in broader efforts to connect people with nature through hunting and other forms of wildlife-related recreation.

The HD Technical Group will consist of 26-28 members, including 4-6 human dimensions experts (Human Dimensions Specialists Subcommittee), 12 individuals from states/provinces (2 appointed representatives from each Flyway Council and a state agency human dimensions or public engagement specialist from each Flyway), 8 individuals from federal agencies (1 Joint Venture Science Coordinator from each flyway, the chair of the HMWG, the chair of the National Science Support Team (NSST), a Service Flyway Representative, and a CWS representative), and 2 representatives from national wetland/waterfowl conservation organizations. The composition of the group is designed to provide a broad array of geographic and management expertise rather than specific representation from individual agencies or NGOs.

*HDWG Specialists Subcommittee.* – The Specialists Subcommittee will provide expertise to assist with the integration of social science, communication, and marketing perspectives into management actions focused on achieving NAWMP goals and objectives. They will apply social science theory to aid in the development of conceptual models; lead efforts to identify, develop, and apply appropriate metrics and analytic tools for monitoring and evaluation; and assist with developing adaptive frameworks among flyways, JVs, and/or states/provinces to address uncertainties about what influences participation in hunting, viewing, and conservation. Where appropriate, they will invite others with unique human dimensions skills and expertise to assist with specific tasks assigned to HDWG. The Steering Committee will appoint 4-6 human dimensions experts to serve on this subcommittee who specialize in participation in hunting and wildlife recreation, institutional capacity building, and participation in conservation. Ideally, the USFWS and CWS will each hire a individual with human dimensions expertise to participate on this subcommittee.

#### HDWG Chair

The HDWG will select a chair and chair-elect to serve 2-year appointments. Funding may be provided for a facilitator for the HDWG if deemed appropriate. After 5 years, the chairmanship should be reviewed; a permanent chair or a permanent advisory member from the Service or the U.S. Geological Survey would provide more long-term consistency. The Chair will participate in meetings of the Steering Committee, the Technical Group, and the Specialists Subcommittee.

#### Roles and Responsibilities

- (1) Identify and advocate actions that will incorporate human dimensions information and approaches needed to achieve NAWMP goals and objectives.
- (2) Develop and implement strategies to synthesize and communicate new human dimensions information; develop analytical techniques, technical assessments, and retrospective analyses to inform management actions intended to address the changing social landscape and its influence on participation in waterfowl-related recreation and support for conservation as well as to assess the impacts of traditional habitat and harvest management on achieving the third NAWMP goal and related objectives.
- (3) Assist with the development of adaptive implementation frameworks to achieve people-related NAWMP objectives that explicitly link objectives, models of understanding, management actions, and monitoring.
- (4) Acquire and analyze baseline information necessary to inform the objective-setting process for people-related NAWMP objectives, including modeling demographics of hunter participation, assessing trends in waterfowl viewing and other associated waterfowl-related recreation, and identifying current levels of support for waterfowl and wetland conservation.
- (5) Develop conceptual models guided by social science and stakeholder input that reflect a shared understanding of what influences participation in hunting and viewing and support for wetland and waterfowl conservation and explicitly identify associated sources of uncertainty.
- (6) Coordinate inventories of management practices focused on people-related objectives and conduct periodic GAP analysis to more strategically target resources to address key sources of variation in participation and support posited in the conceptual models.
- (7) Assist the public engagement team with the development and coordination of strategies to promote participation in hunting, viewing, and other waterfowl-related recreation and to increase support for waterfowl and wetland conservation.
- (8) Guide monitoring and evaluation efforts targeting participation and support using or modifying existing monitoring tools, creating new instruments, or providing the coordination and support for collaboration among on-going state or regional management practices.
- (9) In cooperation with NAWMP partners and stakeholders, design approaches to address key sources of uncertainty associated with participation and support, including the influence of harvest and habitat management.
- (10) Collaborate with NAWMP partners and stakeholders in developing general approaches for planning, monitoring, and assessing an integrated strategy for achieving the three NAWMP goals focused on populations, habitat, and people.

(11) Provide reports and presentations as needed by Flyway Councils and Technical Committees to inform harvest management decisions and by the NAWMP PC and JVs to inform habitat management decisions.

### Decision Making

The HDWG 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 harvest management ultimately need formal endorsement by full flyway technical committees and councils before being considered official flyway input to the Service on these issues. Consensus issues affecting habitat conservation ultimately need formal endorsement by the NAWMP PC. On issues where the HDWG does not reach consensus, the meeting report will offer a majority recommendation with a description of the differing viewpoints for future resolution. The HDWG will provide an annual update report to the Steering Committee, Flyway Councils, Service, CWS, and NAWMP PC.

### Meetings

The Steering Committee will meet at least once a year to review HDWG recommendations, identify funding sources, and prioritize work objectives. The HDWG Specialists Subcommittee will meet independently once a year to reach consensus on the most appropriate applications of human dimensions science to achieve HDWG objectives. The Human Dimensions Specialists Subcommittee will lead at least one meeting per year with the Human Dimensions Technical Group to integrate human dimensions science into waterfowl management. Meetings should be coordinated with the HMWG and NSST. Additional meetings by sub-groups may be required. The HDWG will attempt to use teleconferencing, webinars, and other technology to conduct its business whenever possible to reduce annual operational costs.

### Funding

The Steering Committee will make the decision to administer funds through the National Flyway Council, the NAWMP PC, or other entities. The HDWG will not be directly responsible for funding human dimensions projects; funding sources for individual projects will be developed by participating agencies and organizations. All costs of participation for Steering Committee and the HDWG will be covered by their respective organizations with the exception of some members of the Specialists Subcommittee. Support funding will be required to cover time and travel expenses for members of the Specialists Subcommittee not affiliated with a state or federal agency. The division of funding to provide this support will include 60% from Flyways and JVs and 40% from the Service and CWS.

### Human Dimensions Working Group Priorities

The focus of work by the HDWG will be largely determined by the directives of the funding organizations (e.g. Steering Committee, NFC, NAWMP PC). The following represent immediate next steps that will be necessary to achieve NAWMP goals and objectives. The order they are completed will depend on direction provided by the Steering Committee and

the sources of funding they secure. Below are some examples of the role a HDWG could play in achieving NAWMP goals and objectives with a discussion of potential alternatives for funding activities.

- 1) Assist with the integration of human dimensions information in harvest and population management decisions (e.g., evaluation of zones and splits, assessments of impacts of harvest management decisions on hunter participation, etc.).
- 2) Assist with the integration of human dimensions information in habitat management decisions (e.g., how much habitat and where should it be located to support waterfowl and waterfowl-related recreation).
- 3) Finalize the Draft HRR Plan and begin implementing it.
- 4) Utilize the framework developed for the Draft HRR Plan as a template to develop a plan to increase support for waterfowl and wetland conservation.
- 5) Utilize the framework developed for the Draft HRR Plan as a template to develop a plan to address participation in waterfowl viewing and associated waterfowl-related recreation.

## Appendix C

### Terms of Reference for the Interim Integration Committee (IIC)

The PC is an international body that provides leadership and oversight for activities undertaken in support of the NAWMP. The PC was responsible for the 2012 NAWMP Revision that called for integrating the major elements of waterfowl conservation, including population and harvest management, habitat conservation and goals related to people. This effort was designed to support a strategy of making NAWMP even more relevant, efficient and adaptable in the challenging years ahead.

The PC has assumed an interim facilitation role in the integration process, as described in the 2012 Revision, in order to maintain momentum achieving greater coherence within the waterfowl conservation community. To ensure steady progress and the engagement of the major sectors of waterfowl management, the PC's federal co-chairs are appointing an Interim Integration Committee (IIC) to provide active leadership in this matter in Canada and the United States. The purpose of the IIC will be to advance the integrated management of North American waterfowl populations, harvest, habitat conservation, and associated user and conservation supporters.

The IIC will report to the PC through the federal co-chairs and focus on technical assessments and solutions, process and institutional matters, and leadership and marketing efforts related to closer integration. Critical technical work will be pursued as required with established harvest, habitat and human-dimension working groups: HMWG, NSST, and HDWG (HDWG). Various short-term *ad hoc* technical teams may be commissioned by the IIC to address specific technical challenges that may arise.

#### Primary Tasks (to be completed by December 2014)

More specifically, the IIC will:

- 1) Serve as a focal point for gathering, vetting and synthesizing ideas from the waterfowl management community and advise on the evolution of integrated management.
- 2) Prepare a work plan, budget and resourcing strategy to advance the technical aspects of integration.
- 3) Develop and help implement a process to set explicit, measurable objectives for waterfowl populations, harvest opportunity, habitat conservation, and users and supporters. This likely will require an iterative consultation process in which IIC members play a supporting role with the Flyways, JVs and other existing institutions.
- 4) Support development of decision-support tools with linkages between suites of objectives at varying spatial and temporal scales, and consider how these tools can be

- implemented and the administered. In addition, resolve the challenges presented by the simultaneous management of multiple species and stocks with differing life-history characteristics, population statuses, threats and conservation challenges.
- 5) In collaboration with the NSST, HDWG, and HMWG, help develop scale-specific monitoring and assessment approaches to support adaptive implementation of the linked decision frameworks for population, habitat and user/supporter management.
  - 6) Develop a communication strategy to support continued stakeholder awareness and engagement in the advancement of waterfowl management. Monitor progress and foster frequent communications between the IIC and the PC, and support the PC in communicating with other waterfowl management entities.
  - 7) When the nature of an appropriate integrated technical framework is better defined, begin the task of coordinating a comprehensive, inclusive, international review of the institutional structures and processes in place to conduct waterfowl management. The IIC will help develop understanding and support amongst the JVs, Federal/Provincial Wildlife Directors, Service Regulations Committee, Flyway Councils, LCCs and others for any necessary new processes, procedures or institutional arrangements to conduct these management activities in an effective, efficient and adaptable manner. The IIC will formulate recommendations to the PC, and through them to the federal wildlife agency directors.

### Membership

IIC membership should include about 10-12 people with combined expertise in harvest management, habitat management, human dimensions and/or natural resource administration. Some members should have strong, current linkages to the Flyway Councils (state and provincial wildlife agencies), the PC, NAWMP JVs, and federal wildlife agencies. Some should have contemporary technical expertise and others strong leadership/administrative experience. Membership must also include linkages with the HMWG and the Canadian equivalent, the NSST, and the new HDWG. Ideally, subject matter expertise including modeling, monitoring and assessment, habitat conservation on the breeding grounds, habitat conservation on non-breeding areas, and social and economic science also will be represented amongst the members. The IIC should consider assigning specific tasks to ad hoc committees who would report to the IIC with work products. Financial and institutional support may be necessary to ensure that ad hoc committees are populated with the necessary personnel who can devote time to the tasks at hand.

The PC Co-Chairs will be designated as *ex officio* members of the IIC. The IIC Chairperson will be appointed by the PC when the IIC is created. He or she will serve through December 2014 unless a change in chairmanship is desired by a majority of the PC or the IIC, in which case a new chair shall be appointed by the PC.

### Technical Support

The IIC will require a significant commitment of staff time and financial resources to complete its work as outlined in the 2012 NAWMP AP. These needs will be detailed in the IIC work plan and budget/resourcing strategy (task #2), but it's anticipate that at least a half-time technical coordinator and operating money for contract analyses will be required. As noted above, the engagement and support of members on existing waterfowl management technical bodies (NSST, HMWG, and HDWG) will also be necessary to the completion of the work of integration envisioned in the NAWMP AP.

### Reporting

The IIC, through its Chair or designate, will report to the Plan Committee at each PC meeting and occasionally at other times by teleconference at the request of PC. The PC, in turn, reports to the federal wildlife directors in each country. Close communication with the Flyway Councils, JVs and others will be essential for success. CWS, USFWS and perhaps other agencies will pay for meeting expenses of the IIC.

### Nature and Frequency of Meetings

In its first year the IIC will organize, formulate and launch its own work plan and interact with the PC, the NSST, HMWG and HDWG. That will probably require two or three face-to-face meetings and multiple conference calls, plus a significant amount of liaison work with other committees. In addition, whatever iterative objective setting process is chosen under each Plan goal, at least a subset of IIC members will need to be engaged in that process. Thereafter, the IIC likely will need to meet about 2-3 times per year; once each with the PC and various temporary technical support groups as the IIC may commission. At other times the team will communicate electronically (emails, conference calls, webinars, etc.) and will do so monthly in order to foster steady progress.

## Appendix D

### Public Engagement Framework

The public engagement framework is about using waterfowl and wetlands to *engage* people – wetland managers, legislators, teachers, youth, urban residents, etc. – to build appreciation, and ultimately support, for waterfowl and wetlands conservation. The framework continues engagement of the waterfowl management community during the transition from NAWMP revision to implementation, and outlines a process for planning and designing a public engagement strategy for the NAWMP.

The idea of engaging the public to accomplish NAWMP goals can be overwhelming. On one hand, it has been successfully accomplished in many ways. Considerable progress has been made since the first Plan was adopted in 1986. The entire Joint Venture (JV) concept was born and has evolved in many areas to include all bird conservation. Many JVs have communications specialists and have been engaging various publics for many years. While much of those communications are related to all-bird conservation, JVs provide a strong, existing network within which waterfowl and wetlands values can be communicated.

On the other hand, challenges abound, not the least of which is the need to find a balance between NAWMP-focused efforts versus engagement of people in broader conservation efforts. Is NAWMP's role to engage the public through waterfowl to focus attention on larger conservation efforts, including wetlands conservation (focus on conservation)? Is it to use larger conservation issues to engage people with waterfowl and therefore enhance support (focus on waterfowl)? Likely it is some of both.

Public engagement goes beyond news releases and articles, beyond communications networks within the waterfowl management community, beyond landowner education, beyond rallying support for wetlands conservation policy and funding. Yet it includes all of those things and more. Fortunately, there are a host of existing networks and initiatives onto which NAWMP can build, including JVs, state agencies, non-governmental organizations, and federal programs such as the new Junior Duck Stamp curriculum.

Development and delivery of public engagement strategies will not be easy, nor are all of the strategies likely to yield immediate results. Some efforts can be more easily implemented, and impacts measured, than others. For example, it is relatively easy to track media coverage, but tracking resulting *impacts* is much more difficult. It is easy to count the number of people using an urban nature trail that interprets the values of wetlands and waterfowl conservation. It is nearly impossible to draw direct correlations between use of the urban nature trail and any given person's motivation to provide financial support to wetlands and waterfowl conservation.

#### Guidelines

The following guidelines should be used to guide development and implementation of a public engagement strategy for NAWMP.

- Use an adaptive approach. An effective public engagement strategy for NAWMP will include development of explicit objectives, approaches based on research, and evaluation to measure impacts and effectiveness of delivery in achieving objectives.
- Maintain a “waterfowl and wetlands centric” mindset. Given the vast scope of conservation issues, it will be all too easy for efforts to become diluted. For example, what is the relationship of recruitment and retention for waterfowl hunters and the broader HRR effort? In the end, all of the public engagement efforts must focus on achieving the goals of NAWMP.
- Coordinate efforts throughout North America, leveraging existing public engagement networks and systems. Many of the public engagement needs of the NAWMP can and have been undertaken by state, provincial and federal conservation agencies, JVs, NGOs and other partners. This presents both an opportunity and a challenge. The opportunity is that as strategies are identified that fit with the agendas of specific organizations, those organizations can fund and implement them. Strategies that overlap between partners, however, can create confusion and even competition, leading to missed opportunities. A coordinated effort will identify and use the strengths of these multiple organizations in concert to achieve NAWMP goals.
- Inform actions using social science research facilitated by the NAWMP HDWG. Human Dimensions research will inform engagement, and likewise, engagement will help identify questions to be addressed through Human Dimensions research. Behavior change research spans multiple disciplines including sociology, psychology, economics, philosophy and education.
- “Capture people’s hearts” through messaging that underscores the values of wetlands and the importance of conserving wetlands and waterfowl. Actions should create emotional connections that will help move target audiences toward stewardship. Awareness is important; however, the purpose of NAWMP public engagement is to move people to DO something in support of NAWMP goals, whether that is to hunt, watch waterfowl, support policy, or provide financial support.
- Use cutting edge engagement tools, including social media. As noted previously, NAWMP public engagement goes beyond news releases and public service announcements. It will be important to “meet people where they are” using media and activities appropriate to their lifestyles.

### Strategy Development Process

The following steps will be involved in planning and designing a public engagement strategy for NAWMP.

#### *Planning:*

- Identify collaborators to be involved in developing the strategy.

- Establish specific objectives for public engagement. What are the desired outcomes of NAMWP public engagement? What do we want people to know, feel and do? How do public engagement objectives relate to population and management objectives?
- Identify and prioritize target audiences. Those engaged in the waterfowl management enterprise have been the targeted audience throughout the NAWMP revision process. They will remain an important target audience throughout development of the AP, and as integrated goals and management are stepped down to the regional, state/provincial and local levels.
- With the very broad *goal* “growing numbers of waterfowl hunters, other conservationists, and citizens who enjoy and actively support waterfowl and wetland conservation,” it is imperative to carefully identify target audiences. “The public” is in fact many publics, each with different levels of awareness, interest and influence. It is unrealistic to expect NAWMP to invest resources in connecting everyone to nature through wetlands and waterfowl. Audiences will need to be chosen with care in a way that maximizes benefits to wetlands conservation and NAWMP.

Additional audiences will include at least some of the following:

- Leaders and staffs of organizations and agencies involved in implementation of the NAWMP, who are not themselves involved in the enterprise
- Public officials at the community, county, state/provincial and national levels
- Members of conservation organizations
- Waterfowl hunters
- Wildlife viewers and birders
- Landowners
- Urban dwellers
- Teachers/youth leader
- Work with the HDWG to identify information and research needs and conduct appropriate research to inform and help target public engagement efforts.

*Design:*

Using the results of research and information gathering, develop key messages and experiences that will resonate with each target audience, and encourage them to take desired actions to achieve NAWMP public engagement objectives.

The revised NAWMP identifies a number of key overarching themes that provide a sound foundation on which to build. These include the following:

- Were they a landscape instead of living organisms, waterfowl would surely be a national park, because the way they connect us with nature is just as powerful.
- Waterfowl gauge the well-being of the environment. The presence and abundance of waterfowl are indicative of the health of wetlands.

- Conserving and restoring waterfowl habitat provides numerous ecological benefits including sustained biodiversity, improved water quality, moderation of flooding events and carbon sequestration.

The current NAWMP communications team has drafted a number of additional messages that can be incorporated.

- Identify existing engagement opportunities, as well as existing work on which to build. Examples of opportunities include:
  - JV communications and education efforts
  - New U.S. Fish and Wildlife Service Jr. Duck Stamp curriculum
  - International Migratory Bird Day
  - North American Conservation Education Strategy
  - Master Naturalist (adult natural resource education and volunteer service) programs (usually partnerships between a statewide extension program and a state fish and wildlife agency)
  - Web resources including NAWMPrevision.org and ResourceCommons.org
  - State agency HRR programs as well as agency outreach and education channels
  - The National Initiative to Understand and Connect Americans to Nature
- Develop approaches to build on the existing opportunities identified, as well as new approaches, to engage target audiences using key messages and experiences.
- Develop actions for implementation. As noted earlier, multiple entities are already engaged with target audiences, and development and delivery of engagement tools may best be accomplished locally through those entities. It will be important to plan and coordinate actions to maximize exposure while avoiding duplication of effort.

### *Staffing:*

Following is a recommended process for development and delivery of NAWMP public engagement, as described below.

1. Public Engagement Team. A Public Engagement Team would be convened, consisting of representatives from state/provincial fish and wildlife agencies, JVs, federal agencies and key NGOs, with at least one representative from the HDWG.

- Team members would have expertise in public engagement including communications, marketing and education.
- The Team would be accountable to the PC or whatever governing body emerges.
- Representation of the HDWG and possibly other groups such as the National Science Support Team (NSST) on the Team will be important to insure integration of current research into content and delivery methodologies.
- It is recommended that a member of the Team serve on the HDWG.

2. Groups would be formed as needed to work on specific aspects of public engagement. For example, one group may focus on engagement related to HRR, while another would focus on core concepts or messages, and another on a continent-wide marketing campaign.

3. A coordinator will coordinate, and carry out as appropriate, the work of the Team. The coordinator should have coordination experience, be knowledgeable in public engagement methods including communications and education, and have a working knowledge of human dimensions. The coordinator would:

- Create and maintain communication networks such as an online collaborative workspace.
- Organize and facilitate regular online meetings and conference calls.
- Be aware of and coordinate as appropriate the myriad actions and opportunities of multiple entities including state/provincial and federal fish and wildlife agencies, JVs, organizations and NGOs
- Participate with the Team and groups in development and dissemination of engagement tools.

## Appendix E

### Acronyms Used in this Action Plan

AHM	Adaptive Harvest Management
AP	NAWMP Revision Action Plan
AM	Adaptive Management
CWS	Canadian Wildlife Service
HDWG	Human Dimensions Working Group
HMWG	Harvest Management Working Group (formerly AHMWG - Adaptive Harvest Management Working Group)
HRR	Hunter recruitment and retention
JTG	Joint Task Group
LCC	Landscape Conservation Cooperative
LFCWG	Leadership, Funding, and Communications Work Group
NAWMP	North American Waterfowl Management Plan
NGOs	Non-government Organizations
NSST	NAWMP Science Support Team
NSWG	NAWMP Science Work Group
PC	NAWMP Plan Committee
SEMARNAT	Secretaria de Medio Ambiente Y Recursos Naturales, Mexico
USDA	U.S. Department of Agriculture
USFWS	United States Fish and Wildlife Service

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