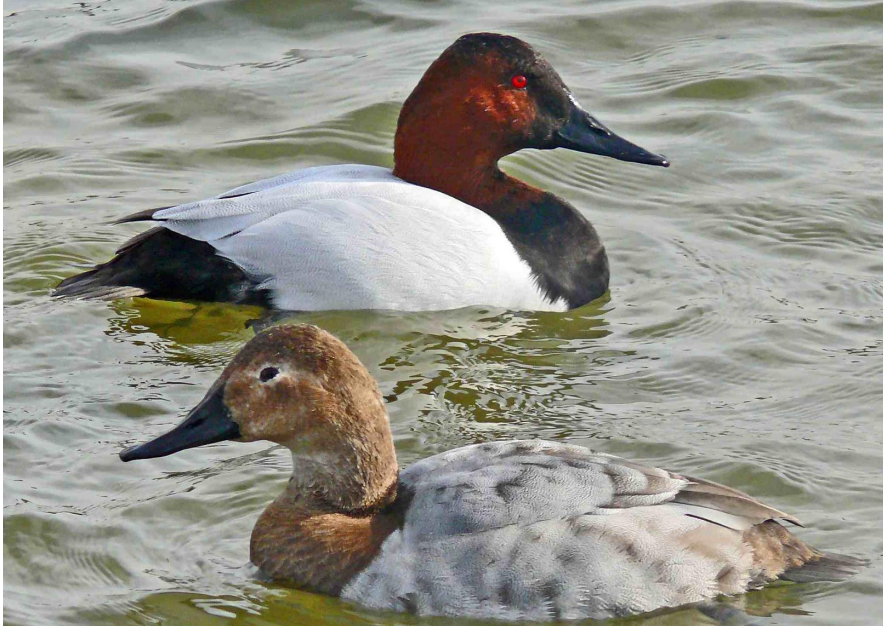

2018
North American Waterfowl Management Plan (NAWMP) Update

Connecting People, Waterfowl, and Wetlands

North American Waterfowl Management Plan

Plan nord-américan de gestion de la sauvagine

Plan de Manejo de Aves Acuáticas de Norteamérica

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The 2018 North American Waterfowl Management Plan (NAWMP) Update—Connecting People, Waterfowl, and Wetlands—continues a legacy of innovation and collaboration that is grounded in 32 years of successful waterfowl and wetlands conservation across the continent. Since its inception in 1986, the Plan has engaged governments, conservation organizations, landowners, and citizens throughout Canada, Mexico, and the United States using a widely acclaimed partnership model of waterfowl management.

The 2012 Plan Revision presented a new strategic direction that challenged the waterfowl community to expand support from our hunters and other citizens to achieve interrelated goals for people, waterfowl populations, and wetland conservation. This 2018 Plan Update presents examples of our countries' combined progress toward achieving the goals of the 2012 Revision. It also establishes important groundwork for incorporating an understanding of people's relationship with nature into the North American waterfowl conservation enterprise.

The people of our nations appreciate and value the natural benefits provided by the habitats conserved under the NAWMP. The 2018 Plan Update emphasizes that understanding people's preferences and perspectives is critical both to meeting their needs and gaining their support for conservation. We must reimagine our waterfowl conservation work in the context of a changing social-ecological landscape that is transforming the connection of people to the natural world. To maintain these links, we must continue to work diligently to engage our citizens, our communities, and our countries in conserving waterfowl, wetlands, and the natural benefits they provide.

We recognize the historic contribution that hunters and other outdoor recreationists have made to conservation efforts continent-wide—most notably those in the waterfowl and wetland conservation community. We remain steadfast in support of this North American model of wildlife conservation and recognize the value of the public-private partnerships for waterfowl and wetlands conservation that form the foundation of the NAWMP.

As we look to the future, the importance of the natural world to the health and welfare of our citizens has never been more important. This Plan continues to advance the legacy of international cooperation toward securing the astonishing diversity and abundance of North American waterfowl for current and future generations. In doing so, we remain committed to promoting the natural connections that exist among people, waterfowl, and wetlands—relationships that will ensure a sustainable future for all our citizens.

Secretary of the Interior
United States

Minister of Environment and Climate Change
Canada

Secretary of the Environment and Natural Resources
Mexico

La mise à jour du Plan nord-américain de gestion de la sauvagine (PNAGS) de 2018 — Relier les gens, la sauvagine et les milieux humides — poursuit un héritage d'innovation et de collaboration qui s'appuie sur 32 années de réussites en conservation de la sauvagine et des milieux humides sur l'ensemble du continent. Depuis sa création en 1986, le Plan a mobilisé les gouvernements, les organismes de conservation, les propriétaires fonciers et les citoyens du Canada, du Mexique et des États-Unis en tirant parti d'un modèle de partenariat pour la gestion de la sauvagine qui a été largement salué.

La révision du Plan faite en 2012 a permis de présenter une nouvelle orientation stratégique qui a mis la communauté de la sauvagine au défi d'augmenter le soutien de nos chasseurs et des autres citoyens et citoyennes afin d'atteindre des objectifs interdépendants pour les gens, les populations de sauvagine et la conservation des milieux humides. Cette mise à jour du Plan de 2018 présente des exemples de progrès réalisés dans les trois pays en cause dans l'atteinte des objectifs énoncés lors de la révision de 2012. Elle permet en outre d'établir des bases importantes pour intégrer la relation qui existe entre les gens et la nature dans notre initiative de conservation de la sauvagine en Amérique du Nord.

Les citoyens et citoyennes de nos nations accordent beaucoup de valeur aux bénéfices naturels que proposent les habitats qui font l'objet de mesures de conservation dans le cadre du PNAGS. La mise à jour du Plan de 2018 insiste sur l'importance de bien comprendre les préférences et les points de vue des gens; il s'agit là d'un élément essentiel pour répondre aux besoins de la population, mais aussi pour obtenir leur soutien aux mesures de conservation. Nous devons modifier notre approche de conservation de la sauvagine pour nous adapter à un paysage socioécologique qui est en changement et qui transforme le lien existant entre les gens et la nature. Le maintien de ces liens passe par un travail dynamique et continu pour amener nos citoyens et citoyennes, nos communautés et nos pays respectifs à déployer des efforts de conservation vis-à-vis la sauvagine et les milieux humides à fin de protéger les bénéfices naturels qu'ils nous procurent.

Nous reconnaissons la contribution historique apportée par les chasseurs et les autres amateurs de loisirs de plein air dans les efforts de conservation déployés à l'échelle du continent – plus particulièrement les efforts déployés par la communauté de la conservation de la sauvagine et des milieux humides. Nous demeurons résolus à appuyer ce modèle nord-américain de conservation de la faune et nous reconnaissons la valeur des partenariats public-privé pour la conservation de la sauvagine et des milieux humides sur lesquels se fonde le PNAGS.

Nous croyons que, dans le futur, la nature aura une importance de plus en plus grande pour la santé et le bien-être de nos citoyens et citoyennes. Ce plan permet de faire progresser l'ensemble des acquis générés par la coopération internationale afin de s'assurer que la diversité et l'abondance étonnantes de la sauvagine nord-américaine soient protégées pour les générations actuelles et futures. Nous démontrons ainsi notre détermination à promouvoir les liens naturels qui existent entre les gens, la sauvagine et les milieux humides : ces relations assureront un avenir durable pour tous nos citoyens et citoyennes.

Secrétaire de l'Intérieur
États-Unis

Ministre de l'Environnement et du Changement climatique
Canada

Secrétaire à l'Environnement et aux Ressources naturelles
Mexique

La Actualización del Plan de Manejo de las Aves Acuáticas de Norteamérica (PMAAN) de 2018 – Conectando a la Gente, las Aves Acuáticas y los Humedales, prosigue con una tradición de innovación y colaboración, que se basa en 32 años de conservación exitosa de los humedales y de las aves acuáticas en todo el continente. Desde su creación en 1986, el plan ha contado con la participación de los gobiernos, organizaciones dedicadas a la conservación, propietarios de tierras y ciudadanos de Canadá, México y Estados Unidos, mediante un modelo de alianza ampliamente reconocido en la conservación y el manejo de las aves acuáticas.

La revisión del plan de 2012 presentó una nueva dirección estratégica que propicia un desafío a la comunidad en torno a las aves acuáticas, para ampliar el apoyo de los usuarios de la vida silvestre y otros ciudadanos para lograr objetivos interrelacionados con las personas, las poblaciones de aves acuáticas y la conservación de los humedales. Esta actualización del Plan de 2018 presenta ejemplos de los avances combinados de nuestros países para alcanzar los objetivos de la actualización del año 2012. También establece una base importante para incorporar una interpretación de la relación de las personas con la naturaleza en la tarea de la conservación de las aves acuáticas de Norteamérica.

Los ciudadanos de nuestros países reconocen y valoran los servicios ambientales que proporcionan los humedales conservados bajo el PMAAN. La actualización del Plan de 2018 pone énfasis en comprender las preferencias y las perspectivas de la gente, tanto para responder a sus necesidades como para conseguir su apoyo para la conservación. Debemos volver a imaginar nuestro trabajo de conservación de las aves acuáticas en un contexto socio-ecológico en evolución, que está transformando la relación de las personas con el entorno natural. Para mantener estos vínculos debemos continuar trabajando diligentemente para que nuestros ciudadanos, comunidades y países participen en la conservación de las aves acuáticas y los humedales, y disfruten de los servicios ambientales que les brindan.

Reconocemos la contribución histórica que los usuarios de la vida silvestre y otras personas que participan en actividades recreativas al aire libre, han hecho a los esfuerzos de conservación en todo el continente, especialmente los socios que integran la comunidad dedicada a la conservación de los humedales y las aves acuáticas. Seguimos firmes en nuestro apoyo a este modelo norteamericano de conservación de la vida silvestre y reconocemos el valor de las alianzas públicas y privadas dirigidas a la conservación de los humedales y las aves acuáticas que constituyen la base del PMAAN.

De cara al futuro, la importancia del entorno natural para la salud y el bienestar de nuestros ciudadanos nunca ha sido tan grande. Este Plan permite avanzar en el legado de la cooperación internacional para proteger la gran diversidad y abundancia de aves acuáticas de Norteamérica, para las generaciones presentes y futuras. De esta manera, seguimos comprometidos en promover las conexiones naturales que existen entre la gente, las aves acuáticas y los humedales, relaciones que garantizarán un futuro sustentable para todos nuestros ciudadanos.

Secretario del Interior
Estados Unidos

Ministro de Medio Ambiente y Cambio Climático
Canadá

Secretario del Medio Ambiente y Recursos Naturales
México

EXECUTIVE SUMMARY

The North American Waterfowl Management Plan stands strong on a contemporary and visionary foundation established with the 2012 Revision and Action Plan. The Revision fundamentally examined the underpinnings of NAWMP and set a new strategic direction for the future. Since 2012, those individuals and organizations committed to the goals, objectives, and recommendations of the 2012 Revision (hereafter, "waterfowl management community" or "NAWMP community") have built upon the legacy of effective, science-informed, and partner-based conservation by rising to the challenge to implement the new "people" goal and revised objectives for waterfowl populations and habitat. This effort meant significant adjustments in leadership, partnerships, and technical expertise to integrate work across goals and objectives and to apply an adaptive framework to it all. The waterfowl management community responded quickly and positively to what has required perhaps the biggest philosophical and strategic change in the history of NAWMP.

Implementing the 2012 Revision entailed substantial foundational work to reassess technical and institutional tools. While laudable progress has been made in carrying out the Action Plan, much remains to be done. Consequently, the purpose of the 2018 Plan Update is to summarily document the achievements under the 2012 Revision, reaffirm and provide fresh focus on what remains to be accomplished in light of the lessons learned, and rekindle the professional passion and resilience needed to advance the NAWMP over the next five to ten years. This Update retains the same goals and objectives as stated in the 2012 Revision and its 2014 Addendum.

In the six years since 2012, the waterfowl management community, under the leadership of the Plan Committee, developed revised objectives, wrestled with the concept of integrated decision making, and recommitted to adaptive management. The biggest achievement has been applying social sciences toward the third goal of increasing the numbers of waterfowl hunters and other conservationists across North America—to effectively connect people with waterfowl habitat. Due in large part to the guidance and diligence of the Interim Integration Committee, the Human Dimensions Working Group,[1] and the Public Engagement Team, this embryonic effort emerged while the professional community unwaveringly continued to build on the success of the NAWMP in conserving waterfowl populations and their habitats. The 2018 Plan Update outlines examples of progress toward the NAWMP goals and objectives at various geographic scales. These case studies demonstrate successful, innovative, partnership-based approaches by Joint Ventures and other groups and demonstrate the spirit and direction of the 2012 Revision.

In the years ahead, the waterfowl management community's work must build on the accomplishments of NAWMP and be responsive to the important short and long-term challenges it faces. Looming threats to habitat function and capacity underscore needs for relevant research and enhanced policy endeavors. Current population levels of certain geese and duck species call for creative research and management strategies to address either overabundance that results in negative impacts to people, to habitat, or to bird numbers that remain lower than objectives. The professional community must reimagine this work in the context of directly delivering the benefits of waterfowl populations and their habitats to the citizens of the United States, Canada, and Mexico. Recent results from stakeholder surveys have set the stage for better understanding and connecting with people who can support waterfowl conservation. NAWMP leadership must convey the public's expectations and pave the way for applying adaptive frameworks and integrated decisions to these challenges at appropriate geographic scales.

[1] The term human dimensions refers to how and why humans value natural resources, how humans want resources managed, and how humans affect or are affected by natural resources management decisions. (Decker, Brown & Siemer, 2001)

Building on the successful history of the NAWMP, the Plan Committee, its working groups, and the broader NAWMP community should refocus their efforts on pursuing the eight recommendations provided in the 2018 Plan Update, namely:

1. Focus conservation actions on waterfowl habitat and population management objectives and incorporate social science into planning and program delivery.
2. Help people understand the opportunities for conservation and outdoor recreation resulting from NAWMP and how society benefits from waterfowl habitat.
3. Compel people to take action to conserve waterfowl habitat.
4. Identify key geographic areas where the best opportunities exist to meet the needs of waterfowl and people.
5. Establish a process to review and update Plan objectives every 10 years and provide guidance on implementation.
6. Share knowledge from all work to integrate and balance The needs of habitat, waterfowl, and people.
7. Bolster training programs for future waterfowl management professionals.
8. Replace the Interim Integration Committee (IIC) with a new system of liaisons between the Plan Committee and the working groups and appoint ex-officio members from the working groups to the Plan Committee.

2012 NAWMP GOALS

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.

Over its 32-year history, the NAWMP purposefully evolved through regular updates that reflect the waterfowl management community's consistently high standards for conservation planning, delivery, and evaluation. The waterfowl community continually improves by periodically assessing progress, reviewing its science, and adjusting its strategic direction to remain contemporary and visionary. The conservation professionals across North America collaboratively and diligently pursue conservation opportunities and creatively adapt as new challenges arise. The NAWMP community, the many partner organizations, private landowners and citizens have been energized by the goals and objectives of the 2012 Revision. While the learning curve for integrating the three NAWMP goals has been steep, the NAWMP community is well equipped to undertake innovative, inclusive, and critically important waterfowl and wetland conservation over the next five to ten years.

PLAN COMMITTEE CO-CHAIR ACKNOWLEDGMENTS

The creation of this 2018 North American Waterfowl Management Plan Update document began in August 2016. Since that time, many individuals and organizations in Canada, the United States, and Mexico have contributed their knowledge and ideas about what has been accomplished since the release of the 2012 Revision and what has been learned in the process. The 2018 Plan Update reflects this broad and thoughtful assessment of what remains to be done as well as the course corrections needed to be truly adaptive. On behalf of the North American Waterfowl Management Plan Committee, we gratefully recognize all who have contributed their expertise, time, and support to the assessment and writing efforts. In particular, we wish to thank everyone who participated in the Future of Waterfowl II Workshop that was held in September 2017.

We appreciatively acknowledge all those individuals who participated on the committees, working groups, and other teams that gave their time to the preparation of this 2018 Plan Update. These individuals are listed in Appendix A, and we apologize to contributors we may have unintentionally omitted. Dave Case and Rick Clawson contributed to and assisted with coordinating much of the work of these many groups involved preparing this Update. Jessica Shea and Roxanne Bogart provided copyediting support during several phases of the Update production process.

The individuals listed below served on the Update Steering Committee and deserve special recognition.

Bob Clark
Jim Devries
John Eadie
Diane Eggeman
Jim Gammonley
Eduardo Carrera González

David Gordon
Karla Guyn
Sarah Mott
Paul Padding
Ed Penny
Lyle Saigeon

Barry Smith
Dave Smith
Dean Smith
Alberto Lafón Terrazas
Dan Yparraguirre

We acknowledge the dedication of all members of the NAWMP Community for their contributions to the implementation of the North American Waterfowl Management Plan. In particular, we wish to thank the members of the Interim Integration Committee, the Human Dimensions Working Group and Public Engagement Team, the NAWMP Science Support Team and the Harvest Management Working Group for their contributions to this 2018 Plan Update. We support and applaud your outstanding efforts to maintain momentum in achieving and integrating the habitat conservation, population management, and people goals of the Plan.

Co-Chair, United States
Jerome Ford
Washington, DC

Co-Chair, Canada
Silke Neve
Gatineau, Quebec

Co-Chair, Mexico
José Luis Pedro Funes Izaguirre
Mexico City

PREFACE

For 32 years the North American Waterfowl Management Plan (NAWMP; Plan) has stood as **a model of waterfowl conservation and as a beacon of success for wildlife conservation practitioners and enthusiasts worldwide.** Through innovative partnerships combining science, boots-on-the-ground conservation delivery, and public and policy engagement, the Plan has demonstrated to the world how continental-scale conservation can be achieved. Critical to the success of the Plan is a legacy of international collaboration underpinned by dedicated service from federal, state, provincial, and non-governmental organizations in Canada, the United States, and Mexico working toward common goals and objectives. This Plan is focused on waterfowl, their habitats, and the people who benefit from them.

The time-tested resilience of the Plan is a testament to the trans-boundary vision, culture, and commitment of all the organizations and individuals who have guided and delivered the Plan since 1986. **No plan survives a generation unless it remains relevant to changing values, priorities, and economic and political pressures.** To that end, the Plan has embraced an adaptive cycle of reviews and updates that are responsive to lessons learned through science and conservation delivery experience. Previous updates focused on expanding the scope and habitat objectives of the original Plan and including Mexico in 1994, broadening partnerships and focusing on landscape conservation in 1998, and strengthening the biological foundation of the Plan in 2004. In 2007, the first continental biological assessment of the Plan was conducted (see https://nawmp.org/documents for the reports and all other documents relating to the implementation of the Plan).

In 2012, the first major re-visioning of the NAWMP was undertaken based on wide-ranging consultations within the continental waterfowl management community. As a result, the NAWMP community took far-reaching and visionary steps to adapt the Plan to address current and future conservation challenges. **Paramount among these was the realization that, despite our successes, the relationship between people and the natural world is changing— challenging the essential connections that have sustained conservation efforts in the past.**

As a result, the 2012 Revision identified the need to expand and activate a broad-based community in support of waterfowl and wetland conservation. For the first time, a new goal recognized the role of North American citizenry in conserving wetlands. By purposefully acknowledging the need to increase the number of hunters, other conservationists, and citizens who actively support waterfowl and wetland conservation, we ensure this important objective receives sustained attention.

Rather than presenting a prescriptive path for the waterfowl management community to follow, the 2012 Revision (NAWMP 2012a) and associated Action Plan (NAWMP 2012b) envisioned innovative conservation approaches connecting waterfowl, their habitat, and people. Seven recommendations rallied the community to:

1. Revise or develop NAWMP objectives to meet the new goals;
2. Ensure programs are complementary under the goals;
3. Increase adaptive capacity so learning improves efficiency;
4. Build support for waterfowl conservation by connecting people with naturethrough waterfowl and their habitat;
5. Engage human dimensions[2] experts to develop science-based objectives for supporters;
6. Focus resources on landscapes that have the greatest influence on waterfowl and people; and
7. Adapt waterfowl harvest strategies in support of NAWMP objectives.

This 2018 Plan Update advances the legacy of previous updates and highlights some recent achievements of the NAWMP community toward the goals, objectives, and recommendations of the 2012 Revision. It focuses on achievements that integrate management decisions and engage new supporters of waterfowl conservation while reflecting on input from the waterfowl management community. This Update presents highlights from all three nations of specific actions used to engage people in waterfowl habitat conservation, noting advancements in response to Plan recommendations. It reviews the challenges and opportunities related to changing societal values and peoples' attitudes toward, and engagement with, the natural world. Lastly, it provides recommendations to accelerate NAWMP conservation efforts and continue our legacy of adaptive progress as called for in the 2012 Revision.

In renewing the commitment of the Plan to restore and conserve wetland and waterfowl resources throughout North America, this Update encourages the waterfowl management community to "**think continentally, integrate locally.**" This Update is targeted to all waterfowl management practitioners and partners who carry out activities that contribute to the goals of NAWMP. We salute their efforts and achievements and look forward to future innovations in this work. We hope you find inspiration in the following pages.

[2] The term human dimensions refers to how and why humans value natural resources, how humans want resources managed, and how humans affect or are affected by natural resources management decisions. (Decker, Brown & Siemer, 2001)

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1. Introduction

Consider for a moment the state of North American waterfowl populations and habitat leading up to the creation of NAWMP in the early 1980s. Waterfowl populations were declining, and critical breeding and wintering habitats were under threat like never before. Joint Ventures (JV), with their professional staff and unique partnerships, had yet to emerge as foundational institutions for habitat conservation. Advances in conservation planning that we now find indispensable, such as GIS, system modeling, and decision analysis, were not part of the waterfowl conservation vocabulary. Other tools we deem essential today—like GPS and satellite imagery—were just on the horizon.

But waterfowl management professionals, as stewards of an international migratory resource, were already well connected across North America. This connectedness spawned the vision of NAWMP as an international conservation plan to address declines in waterfowl populations and the critical habitats on which they depend. **The architects of NAWMP could not have anticipated how much their Plan would transform continental waterfowl conservation—but their timing was perfect.** What emerged was a continental system of public and private waterfowl conservation and management partnerships working toward habitat protection, restoration, and enhancement that has resulted in over 50 million acres of habitat secured[3]. This continental system of partnerships continues to foster important conservation actions and research, and today most waterfowl populations are at or near their highest recorded abundance.

Today, the NAWMP community finds itself in the midst of another transformative period defined by the changing social landscape of North America. **A growing disconnect between society and nature erodes traditional sources of support and challenges us to address changes in both social and ecological systems.** In response, the NAWMP community recognized the need for transformative changes by expanding and revising the fundamental goals of NAWMP in the 2012 Revision. Now, in an adaptive process, we are assessing our progress, considering new organizational arrangements, embracing new areas of expertise, and employing a greater range of tools than ever before.

The NAWMP community continues to build the capacity to integrate social science into population and habitat management decisions and to inform public engagement efforts. **Our efforts represent one of the first continental-scale wildlife management plans to recognize that successful conservation, today and in the future, depends upon strong connections between society and nature.** The following pages update our progress toward the goals and objectives of the 2012 Revision.

[3] Involves the protection of habitat through land transfer or binding legal agreements with landowners (10-yr minimum).

2. NAWMP Objectives – Waterfowl Populations, Habitat, and People

As a recommendation of the 2012 Revision, NAWMP waterfowl population and habitat objectives were revised, and objectives for increasing the number of people supporting waterfowl conservation were developed in 2014 (NAWMP 2014; hereafter, 2014 Addendum). **Thus, the Plan maintains the original focus on waterfowl population and habitat objectives while challenging the NAWMP community to broaden and increase its base of conservation support.**

The 2012 Revision extended a further call-to-action to waterfowl management practitioners to *integrate* waterfowl management decisions by more fully understanding how they contribute to all NAWMP goals and objectives. While adding people-centered objectives adds complexity to integrated decision making, **gaining an understanding of the human dimensions of our enterprise will provide a powerful, versatile, and far-reaching tool to make progress on all objectives.** This recognizes that human dimension insights are required to effectively address most of the waterfowl management challenges we face, from understanding factors contributing to both habitat loss and conservation, to managing harvest, to dealing with issues surrounding human conflicts with overabundant species.

The NAWMP community has risen to the challenge. Joint Ventures continue to scale continental waterfowl population objectives down to the local or regional level in response to revised population objectives. This informs the most important work of on-the-ground habitat management and planning decisions that are integrated locally to meet continental objectives. Efforts are underway to integrate habitat and population objectives through habitat-linked carrying capacity and biological models. Flyway Councils and agencies have incorporated human dimensions into harvest management planning and begun coordinating efforts to recruit, retain, and reactivate waterfowl hunters. More attention is needed to build capacity for adaptive multi-objective management (see 3.1) during project planning and implementation, including objectives for increasing the number of active supporters of waterfowl conservation. An increased understanding of stakeholders' interests and motivations is fundamental in this regard.

The waterfowl management community widely and strongly supports the NAWMP objectives articulated in the 2014 Addendum, which are reaffirmed here. The following summarizes these objectives, outlines where continuing progress is needed, and provides an update on efforts to pursue multiple objectives under the Plan.

2.1 Waterfowl Populations

Quantitative objectives for waterfowl populations have been the foundation of the Plan since its inception. These objectives are largely based on operational monitoring programs and provide common benchmarks for assessing conservation needs and guiding habitat and population management decisions. Recognizing the significant environmental and social changes that have swept across North America since 1986, the 2012 Revision recommended updating the waterfowl population objectives.

In response, the 2014 Addendum provided "working objectives" for the most common duck species in the form of dual objectives calculated as the long-term average (LTA) and the 80th percentile of breeding population estimates. Thus, the updated objectives for the most common duck species in the Traditional and Eastern Survey Areas as presented in the 2014 Addendum as:

"*Maintain long-term average populations of breeding ducks [1955 to 2014 in the Traditional Survey Area (TSA) and 1990 to 2014 in the Eastern Survey Area (ESA)] and periodically, 40 million or more total breeding ducks and 2.7 million or more breeding ducks in the TSA and ESA, respectively.*"

This Update reiterates objectives for these duck populations as articulated in the 2014 Addendum (Appendix B) and updates current population status (2008–2017). Note that surveys in the ESA were expanded in geographic scope in 1998 and objectives in the 2014 Addendum should be considered subject to change. Objectives (where established) and current population status for other ducks, geese and swans are provided in Appendices C–E. New objectives for several populations of geese have been established as provided through consultation with the Flyway Councils and the Arctic Goose Joint Venture (Appendix D).

The dual nature of the revised duck population objectives from the TSA and ESA urged a fundamental change in how the NAWMP community viewed and interpreted population objectives. **The dual objectives provided guidance for habitat objectives capable of supporting population abundance under average environmental conditions, while also providing for periodic population "booms" that might occur in about 20 percent of the years when environmental conditions result in the best habitat.** This dual nature is important for developing habitat goals and conservation strategies that are ecologically appropriate and economically feasible. However, some debate remains concerning how the working objectives are interpreted and applied within conservation planning, monitoring, and evaluation efforts of the JVs. Clarifying the interpretation and use of the current population objectives should be a near-term priority for the entire NAWMP community, and the Plan Committee should direct its appropriate working groups toward this task (see recommendation 5).

Updating Waterfowl Population Objectives

The 2014 working objectives approximate the values of stakeholders, however rigorous social science analyses are needed to further validate this assumption. Moreover, ecological and social change could affect the strength of this assumption. Additional work, particularly in engaging stakeholders, is necessary to establish a process for revising duck population objectives in a consistent and timely manner. Updating these objectives and estimates using current research and data should remain a priority of the Plan Committee and its working groups for the next NAWMP Update.

Due to expansions in the ESA, objectives have been revised and adopted for harvest management considerations within the Atlantic Flyway; however, like the objectives for the TSA, more work may be needed to finalize duck population objectives in the ESA for habitat management objectives.

2.2 Habitat

The ability to achieve NAWMP population objectives depends principally on a habitat base that supports waterfowl populations throughout the annual cycle and is resilient to variable environmental conditions. Further, support for that habitat base will depend on a citizenry that recognizes and acts to conserve the societal benefits provided by waterfowl habitat. The 2012 Revision identified habitat conservation and the associated social benefits as the primary means through which broader segments of society would support NAWMP goals. Specifically, the 2014 Addendum articulated a revised habitat objective:

"*Conserve a habitat system with the capacity to maintain long-term average waterfowl population levels, to periodically support abundant populations, and to consistently support resource users at objective levels.*"

The 2012 Revision and 2014 Addendum encouraged explicit consideration of human/societal interests along with waterfowl demographics when evaluating outcomes of habitat-related decisions. No single habitat strategy will accommodate the many unique biological and social landscapes across North America. Deliberate acknowledgment and assessment of trade-offs among NAWMP objectives at decision-relevant scales (e.g., management area, JV, flyway, continental) will be required. **Ideally, regional-scale habitat objectives will address both biological and social goals and support continental-scale objectives and priorities.** Tools to assist in this effort are in development (see 2.4).

While efforts to formulate and apply scalable social objectives are in their infancy, more tangible progress has been made in linking regional habitat objectives to continental population objectives. For more than two decades, several JVs have

used a variety of methods to down-scale continental population objectives to regional habitat objectives. However, application of consistent methods has remained elusive, most notably for conservation planning during the nonbreeding period. The NAWMP Science Support Team (NSST) has recently made advancements in this realm. Petrie et al. (2011) reviewed methods and recommended guidelines for establishing regional population objectives, and further described the application of bioenergetics models in a conservation planning framework to translate population objectives into quantitative habitat objectives. More recently, Fleming et al. (2017, see also Koneff 2002) used common datasets to calculate regional duck population objectives for the nonbreeding period. Together, these efforts advance the linkage of population and habitat objectives for waterfowl, taking us closer to the vision of coherent objectives and integrated decision making set forth in the 2012 Revision.

Since its inception, the Plan has emphasized the need to target conservation resources to regions and habitats most important to waterfowl. The 1986 Plan included a map of "Waterfowl Habitat Areas of Major Concern". Each Update that followed included an iteration of a map identifying important waterfowl habitat areas (1994 and 1998) or areas of continental significance to waterfowl populations (2004, 2012 Revision). Given work in progress to update Priority Landscape objective layers, the map provided in the 2012 Revision remains as the current guide (see Integrated Planning – Priority Landscapes in section 2.4).

2.3 People

The 2012 Revision differed from previous plans in its visionary articulation of a third goal: to expand the numbers of waterfowl hunters, other conservationists and citizens who enjoy and actively support waterfowl and wetlands conservation. To achieve this goal, the 2014 Addendum established the following objective:

"*Increase waterfowl conservation support among various constituencies to at least the levels experienced during the last two decades*"

The 2014 Addendum distributed this objective among three constituent groups:

- active waterfowl hunters;
- North American citizens who appreciate and take action to support wetlands and waterfowl conservation; and
- landowners participating in habitat conservation programs.

The 2014 Addendum identified initial quantifiable objectives for these groups because these metrics exist and can be tracked over time. These objectives are based on:

- the average number of hunters in the U.S. and Canada from 1999 to 2013 (1.2 million and 178,000, respectively);
- the average number of waterfowl viewers traveling more than 1 mile from home from 1996 to 2011 (14.4 million; comparable data not available for Canada or Mexico) or out of state (4.6 million);
- the number of birdwatchers in Canada (4.7 million; 18% of the population), and
- the 1999–2013 sales of Migratory Bird Hunting and Conservation Stamp (commonly referred to as the Federal Duck Stamp) in the U.S. (1.6 million; $23.5 million revenue) and Migratory Game Bird Hunting Permits in Canada (~178,000; $3.2 million revenue).

Objectives for increasing the populations of constituent groups have been established based on national trends in participation. However, refined objectives will better account for the diversity that exists in state, provincial, and regional trends in participation— especially participating landowners. This will require developing a common framework for use by states, provinces and/or JVs to establish participation objectives that make the most sense for the implementation area. More work remains to understand the connections between management decisions related to birds, habitat, and people's support of waterfowl conservation.

As a first step, the Human Dimensions Working Group (HDWG) coordinated surveys in 2017 to better understand the motivations and behaviors of constituency groups related to waterfowl and wetland conservation (hereafter, NAWMP Stakeholder Surveys). These surveys provide information from hunters and birdwatchers in the U.S. and Canada, and from the general public in the U.S. Similar general public survey information is available in Canada from the 2012 Canadian Nature Survey (Federal, Provincial, and Territorial Governments of Canada 2014). The results of these surveys are being finalized; initial findings and next steps are provided in section 3 and 4.

2.4 Integration

Waterfowl populations, habitat, and the people who support and derive benefits from them are inextricably linked. Effective and efficient management actions under the Plan are informed by understanding how management decisions affect progress toward all three objectives—an integrated system. **Specifically, "*integration*" means considering the impact of specific management decisions on all objectives and learning about the effects of those actions on the attainment of multiple objectives through monitoring and evaluation.** Results then feed the adaptive modification of management decisions to improve management performance.

The Joint Task Group Report (Anderson et al. 2007) outlined steps for one way of harmonizing NAWMP population and habitat objectives. However, the technical aspects of considering people objectives remain challenging. Experience since the release of the 2012 Revision has revealed that most decisions relevant to NAWMP implementation are regional or local. **Therefore, integration is expected to be more successful at regional (e.g., state, provincial or JV) scales, when pursuing the interrelated NAWMP goals.** An early step should be to identify specific issues that require the pursuit of multiple objectives since many decisions in habitat, harvest, or population management may not require a formal integrated approach.

More widespread adoption of integrated decision making will depend on identifying appropriate methods and assessing and communicating the efficiencies of this process. Among the more promising opportunities is the work of the NSST and partner researchers in developing decision frameworks that will enable explicit incorporation of waterfowl and people objectives into spatial habitat conservation decisions at multiple scales.

Integrated Planning – Priority Landscapes

In 2015, the NSST, in collaboration with the Interim Integration Committee (IIC), formed a Priority Landscapes Committee (PLC). One goal of the PLC is to identify methods for identifying priority areas to deliver habitat conservation at multiple spatial scales while incorporating both waterfowl population and human dimension considerations. The PLC has made good progress and preliminary results were presented during the Future of Waterfowl II Workshop in September 2017. The PLC proposes maps with weighted attributes (e.g., breeding waterfowl abundance, non-breeding waterfowl abundance, and potential human dimensions layers) be used to help guide the process of multi-objective decision making. This framework demonstrates how conservation decisions can be evaluated with trade-offs weighted for habitat, waterfowl, and people objectives. The PLC is continuing to develop structured decision support tools for guiding integrated management actions.

3. Achievements – Integrating People in Waterfowl Habitat Conservation

A fundamental call to action in the 2012 Revision was for the NAWMP community to strengthen the connections between people, waterfowl, and the habitats on which they depend. Waterfowl habitat provides not only vital breeding and non-breeding areas for waterfowl and other species but also opportunities for hunters, birdwatchers, anglers, educational groups, photographers, and anyone seeking inspirational natural environments. **Waterfowl habitats contribute to the economic and social well-being of North America by providing clean air and water, recreational opportunities, biodiversity processes like pollination, habitat for species at risk, greenhouse gas storage, and flood prevention** (Olewiler 2004).

In the landmark report *The Nature of Americans*, the authors revealed that people value nature in remarkably diverse ways, regardless of age, race, ethnicity, residential location, educational attainment, income level, or gender (Kellert et al. 2017). Value systems include affection and attraction, intellectual development, spirituality, and symbolism. **Thus, the areas we see as waterfowl habitat can serve a powerful role in uniting all citizens— regardless of background— in working toward conservation.**

Since the 2012 Revision, a major goal has been to build our capacity to connect people with waterfowl habitat. A pivotal first step, as recommended, was the formation of the HDWG by the National Flyway Council and the Plan Committee. The HDWG and Public Engagement Team (PET) have organized forums with JVs, Flyways, government wildlife agencies, NGOs, and other partners. The forums helped identify strategies to integrate social science perspectives into waterfowl habitat and harvest management objectives, decisions, and implementation. A central goal of these forums is connecting waterfowl management professionals with experts in social sciences, outreach, education, and communication.

One key objective for the HDWG has been to address the recruitment, retention, and reactivation of waterfowl hunters. A second key objective has been to focus on understanding the needs of birdwatchers and the general public. Stakeholder survey results revealed that while these groups hold different perspectives, they all recognize the benefits of nature. In the case of healthy wetland habitats, the recognized societal benefits include flood reduction, groundwater recharge, water quality improvement, and open spaces for recreation. These findings highlight the opportunity to pursue waterfowl conservation in concert with human well-being and livelihood needs while promoting the critical importance of habitat conservation to citizens and governments alike.

The NAWMP community continues to evolve. Our progress toward incorporating human dimensions is the most recent evidence of this. **We need to understand how people view the societal benefits of waterfowl habitats and how we can use this knowledge to increase support for conservation.** Achievements in the few short years since 2012 include community achievements in specific NAWMP landscapes and continental achievements that encompass the waterfowl management enterprise as a whole.

3.1 Community Achievements

Innovative advances in conservation—with an eye to achieving the goals of the 2012 Revision—demonstrate the value of integration at relevant scales. **Joint Ventures are using local approaches to maintain and recruit hunters and birdwatchers and capitalize on the benefits of wetlands to people.** Some examples from across the continent are highlighted below, representing the "think continentally, integrate locally" concept.

City of Clovis and Playa Lakes Joint Venture (PLJV) formalize their partnership.

"Playas play an important role in aquifer recharge, and the City's partnership with Playa Lakes Joint Venture will greatly assist with our water conservation efforts as we continue to implement the City's Master Water Assurance Plan," stated Mayor Lansford. "I am excited the City of Clovis is partnering with PLJV to encourage playa restoration and education regarding the importance of playas in our area."

PLJV Playa Post - June 2018

Managing for Social and Ecological Goals through Expanded Partnerships

Playa Lakes Joint Venture

Covering parts of Colorado, Kansas, New Mexico, Oklahoma, and Texas, the Playa Lakes Region is important to North American waterfowl. More than 80,000 seasonal ponds, known as "playas," scattered across the region provide habitat for 20 waterfowl species during wintering and migrating seasons. Playas are also a primary source of recharge for the vast but diminishing Ogallala Aquifer—a vital source of groundwater for life and agricultural sustainability on the semi-arid plains. Recognizing the importance of the aquifer for agricultural, rural, and municipal water supplies, the Playa Lakes Joint Venture (PLJV) used social science research to better understand the relationship between playas and people. This understanding led to a unique PLJV partnership that helps ensure producers, local communities, and wildlife prosper and thrive in this landscape.

City leaders and prominent landowners in Clovis, New Mexico, assisted by the PLJV, embarked on a visionary plan. With more than 300 playas surrounding the town, the community is working to restore playas by diverting storm water into playas to enhance recharge and retiring irrigation wells that are competing for aquifer water. Stakeholders are developing management zones (areas above the aquifer that are managed for recharge and agricultural production) and a land trust to offer associated easements on conserved playas. This innovative PLJV community partnership is restoring and securing critical surface water habitat for waterfowl and other wildlife. At the same time, it is conserving sustainable water sources for communities and future generations. This municipal playa conservation model could serve many other communities across the Great Plains. http://mbjv.org/recharging-new-mexico-community-playa-restoration

Intermountain West Joint Venture

The Southern Oregon-Northeastern California (SONEC) region is an important area for migratory birds and a priority landscape for the Intermountain West Joint Venture (IWJV). Waterfowl in the SONEC region depend on the food in privately owned, flood-irrigated wet meadow habitats on working ranches. Traditional agricultural practices (e.g., flood irrigation of historic floodplains, haying, and grazing) mimic the seasonal flooding and former natural habitat. Unfortunately, these habitats are increasingly threatened by changing irrigation practices, water availability, aging water conveyance infrastructure, and fragmentation.

To address these threats, the IWJV partners are working cooperatively with livestock producers to implement projects that conserve wet-meadow habitats, enhance agricultural irrigation infrastructure, and improve the drought resiliency of working lands. The SONEC partnership understands the needs of agricultural producers and builds innovative conservation funding models to benefit waterfowl habitat conservation, agricultural profitability, and ultimately stronger rural communities. This endeavor achieves wildlife habitat conservation within the context of working agricultural lands while supporting societal needs for food production. https://iwjv.org/sonec-southern-oregon-northeastern-california

Mexico

In 2008, Mexico's federal Ministry of Environment and Natural Resources launched the National Strategy for the Conservation, Management, and Rational Use of Waterfowl and their Habitat in Mexico. This public policy document guides management and conservation decisions regarding wetlands and waterfowl in Mexico, in part to fulfill objectives and responsibilities under the NAWMP. Mexico recognizes the need to implement conservation and management strategies and human dimensions programs distinct from those in the U.S. and Canada because of differences in culture and socio-economic circumstances.

The strategy analyzes threats and opportunities and outlines several achievements gained from projects created to help habitats and species. Several workshops and training sessions have been implemented to increase the professional skills of people working for the conservation and management of wetlands and waterfowl in Mexico. Among other initiatives, the Sonoran and Rio Grande JVs are partnering with organizations in Mexico and providing funding opportunities to specific projects within their boundaries in both countries.

NAWMP HABITAT ACCOMPLISHMENTS

"Joint Ventures and NAWMP partners have helped conserve, enhance, and restore over 50 million acres of essential habitat across North America for people and wildlife."

Habitat Conservation to Recruit and Retain Waterfowl Hunters

Rainwater Basin Joint Venture

The Rainwater Basin Joint Venture (RWBJV) is considering drivers of hunter recruitment and retention in habitat planning goals. One factor identified during human dimension surveys is that hunters are more likely to participate when they live closer to lands open to hunting. One of the RWBJV's goals is the protection of 44,600 acres of wetlands and associated uplands under public ownership in the Rainwater Basin region. These acres will provide critical habitat for about 4.3 million spring-migrating waterfowl in areas that will also receive significant public use during the hunting seasons. Nearly 75 percent of Nebraska's residents live within 90 minutes of a public Rainwater Basin wetland. Based on current hunter-use levels, the RWBJV expects to provide 115,000 hunter-use days on public lands with this habitat objective. To achieve their objective, the RWBJV is focusing effort on targeted acquisition of privately-owned portions of wetlands that are partially under public ownership. http://rwbjv.org/usfws-approves-new-land-protection-plan-in-rainwater-basin

Habitat Conservation to Maintain and Recruit Waterfowl Viewers

San Francisco Bay Joint Venture

The San Francisco Bay Joint Venture (SFBJV) is the most urban of the U.S. JVs. Providing waterfowl habitat in a high-cost-of-living area is expensive, and human support for this endeavor is enhanced when people have opportunities to visit these habitats. The SFBJV used an outreach strategy that proved critically important to Bay Area voters voluntarily supporting an annual parcel tax specifically for wetland restoration in June 2016. This ballot initiative generates $25 million annually for wetland restoration and public access. It also provides a potential match for funding sources over the next 20 years. Polling revealed that voters appreciate birds and other wildlife, validating JV messaging around these issues. Conclusions from polling results became key messages in the promotional campaign for the ballot initiative. The SFBJV learned that understanding how local people appreciate the benefits of nature is instrumental to all aspects of JV wetland habitat conservation. http://scc.ca.gov/webmaster/ftp/pdf/sccbb/2016/1609/20160929Board10_SFBRA_Joint_Powers_Agreement_Ex2.pdf

Incorporating Hunter Objectives in Harvest Management

Mississippi and Central Flyways

When Adaptive Harvest Management (AHM) was adopted in 1995, duck harvest management objectives *implicitly* addressed social considerations by assuming that maximizing long-term harvest levels in relation to population goals would maintain or increase hunter satisfaction. Mississippi and Central Flyways used a structured decision making process in 2014 to evaluate a new suite of objectives that not only address mallard harvest levels and population sustainability, but also *explicitly* consider the human dimensions of hunter satisfaction and the administrative costs of regulation development. A final set of updated objectives is anticipated in 2019. After formal adoption, the resulting harvest management strategy will be more responsive to hunter desires— helping to ensure sustainable populations of waterfowl and hunters.

Incorporating Human Dimension Goals into Waterfowl Habitat Planning and Delivery

Black Duck Joint Venture

Understanding social factors in waterfowl and wetland conservation can lead to land management that achieves both biological and social objectives. For example, Black Duck Joint Venture partners recently used publicly available waterfowl harvest, band encounter, and birdwatcher (eBird) databases to identify where people hunt and/or observe waterfowl in the Atlantic Flyway. Then, using New York and Georgia as case studies, the JV described characteristics of all outdoor recreational sites available to waterfowl hunters and birdwatchers. The analysis illustrated which characteristics had the greatest influence on where people chose to hunt and view birds.

The most important site attributes were proximity, location in a coastal county, total area of wetlands at the site (New York), and total area of public land at the site (Georgia). The results help predict how proposed management actions, like land acquisition and habitat restoration, will change the number and distribution of recreational trips in a region. The expected increase in recreational trips can help prioritize habitat conservation activities that benefit people. These data and methods show promise for incorporating human dimension objectives into habitat delivery and understanding potential trade-offs relative to biological objectives. For more information, see Devers et al. (2017).

Integrating Social and Biological Objectives at the Regional Scale

Upper Mississippi River and Great Lakes Region Joint Venture

The 2012 NAWMP Action Plan inspired the Upper Mississippi River and Great Lakes Region Joint Venture (UMGLRJV) to develop a unique decision support tool (DST) for integrating social and biological objectives at the regional scale. Starting with a matrix of six relevant objectives, JV scientists used biological and social data to create a family of six model-based maps. Maps included factors such as conservation of habitat areas with greatest importance to breeding and nonbreeding ducks, retention and recruitment of waterfowl hunters and birdwatchers, and reducing watershed impairments contributing to Gulf Hypoxia and lost function of Great Lakes coastal wetlands.

Output maps depicting individual objectives were weighted based on discussion with the Joint Venture Management Board and then combined, resulting in an aggregate DST to target habitat conservation for waterfowl and people in the JV region. Multiple models of the DST using different objective weights were produced to compare outcomes with varied emphasis on biological versus social values. Finally, the system also allows individual JV partners to down-scale the decision matrix, with adjustments to better reflect more specific or localized partner priorities (e.g., breeding waterfowl within a state, endangered species). www.uppermissgreatlakesjv.org/MapsGIS.htm

Developing a Business Case for the Economic, Ecological, and Societal Value of Conservation

Prairie Habitat Joint Venture

Wetlands in the Canadian Prairie Pothole Region (PPR) continue to be lost through agricultural drainage, resulting in less habitat for waterfowl and other wildlife. Finding new ways to engage the public and communicate the value of waterfowl habitat conservation has been a priority for the Prairie Habitat Joint Venture (PHJV). The PHJV has taken steps to quantify the environmental costs of wetland drainage as well as the economic and societal benefits from habitat restoration and conservation efforts.

By partnering with organizations and universities, the PHJV has established four prairie watershed-based hydrologic research sites. Through detailed mapping of wetland drainage and hydrologic modeling, the PHJV has demonstrated a clear link between prairie wetland drainage and downstream flooding, infrastructure damage, and eutrophication of lakes and streams in urban and recreational areas.

Additionally, PHJV partners have developed a business case analysis of the economic, ecological, and societal benefits of waterfowl conservation programs. In 2014, the PHJV hired a resource economist to quantify the level of economic and societal returns on investment (ROI) from federal and provincial government conservation funding initiatives. Analysis revealed conservation expenditures resulted in significant benefits to Canada's economy, including: $77.1 million (CDN) in Gross Domestic Product, 969 person-years of employment, $59.6 million in employment income, and $15.8 million in operating profits for Canadian business. The monetary value of nature-related recreation on these conservation lands is about $208.5 million a year.

The ROI and economic importance are being noticed by federal, provincial, and municipal governments, downstream landowners, and the general public. This information provides tangible data for analysis by policy-makers when weighing investments in conservation. It has also provided the PHJV with leverage as each of the Canadian Prairie Provinces either has, or is in the process of developing, wetland and drainage policies. Quantifying the ecological and societal impacts of habitat loss and conservation activity has provided the PHJV with a unique opportunity to engage non-traditional conservation partners. For more information, see Anielski et al. (2014), Pattison-Williams et al. (2018).

3.2 Continental Achievements

Connecting People to Nature through NAWMP: Public Engagement Team/Human Dimensions Working Group

The 2012 Revision challenged the NAWMP community to strengthen the emotional and pragmatic ties of people to waterfowl and wetlands while recognizing the waterfowl hunting legacy that connects people with the outdoors. The Revision also acknowledged that people develop emotional ties to waterfowl and their habitat through a wide range of other activities. The common thread is personal experience. **Conservation is about much more than simply sustaining waterfowl and wetlands.** It's about providing for human experiences that can sustain the relationships between people, waterfowl, and the habitats where they are found. **The waterfowl management community faces a dual challenge to catalyze people's connection with nature and transform it into support for waterfowl conservation.**

The NAWMP community has taken the first steps in this direction. In 2015, the HDWG and PET[4] jointly developed a Public Engagement Strategy that identified three priority actions:

- Further develop and implement the 2008 Waterfowl Hunter Recruitment and Retention Strategy;
- Engage wildlife viewing communities and other related conservation interests in actions that contribute to NAWMP goals and objectives; and
- Increase landowner participation in conservation programs.

To address these priorities, the NAWMP community initiated what will become a long-term conversation with traditional and new audiences using the latest and most rigorous social science tools. JVs, Flyways, NGOs, and federal agencies held 24 workshops in the U.S. and Canada in 2010 and 2011 to better understand what waterfowl hunters and birdwatchers desire in their outdoor experiences. This was followed up in 2017 by the NAWMP Stakeholder Surveys of waterfowl hunters and birdwatchers in the U.S. and Canada, and the general public in the U.S. Results from the workshops and surveys will aid the NAWMP community in understanding the preferences and expectations of these priority audiences. This improved understanding will aid in developing communication strategies and management actions to advance progress toward the NAWMP goals and objectives (see section 4).

The HDWG-PET also worked with the four Flyway Human Dimension Committees to conduct waterfowl hunter recruitment, retention, and reactivation workshops in 2016, to address the first priority action. The workshops were a collaboration between the Wildlife Management Institute (WMI), the Council to Advance Hunting and the Shooting Sports (CAHSS), and the individual Flyways. **A striking finding was that while many states were already engaged in waterfowl hunter recruitment and retention activities, very few were taking an adaptive, coordinated approach.** Going forward, the HDWG-PET will assist partners in identifying ways to more effectively target on-going waterfowl hunter recruitment and reactivation efforts, including sharing more of the information from the NAWMP Stakeholder surveys.

To engage the broader viewing and conservation communities, the HDWG-PET reached out to the North American Bird Conservation Initiative (NABCI) Human Dimensions Subcommittee to explore potential NAWMP birdwatcher engagement activities. At the same time, the HDWG-PET is working with Flyway nongame technical committees to help states garner support for waterfowl habitat through participation in bird-watching and bird conservation activities.

Lastly, to increase landowner participation in NAWMP activities, the HDWG-PET is working closely with JVs to develop flexible, coordinated approaches through small-scale trials (some of these are summarized in section 3.1). **The economic, social, and political circumstances faced by landowners in North America vary greatly from one region to another, and a one-size-fits-all approach is not appropriate.** JV efforts are focused on applying adaptive management to regional landowner engagement.

[4] The HDWG and PET are functioning as one working group, and the Plan Committee formally acknowledged their amalgamation on April 11, 2018, therefore the combined working group is referred to as the HDWG-PET.

Engaging the Professional Waterfowl Community

In 2008, the first Future of Waterfowl Management Workshop was held in response to one of six specific recommendations for improving waterfowl management in the 2007 Joint Task Group Report (Anderson et al. 2007). Among several outcomes of the 2008 Workshop was a sense that:

- resources for conservation were not optimally allocated;
- goals for habitat and populations were not necessarily complementary; and
- increasing support from hunters and non-hunters was necessary.

> ***"While much has been achieved, much remains to be done."***

The waterfowl community has continued the discussion, facilitated by special sessions at North American Duck Symposia in 2009, 2013, and 2016 (Humburg and Anderson 2014, Humburg et al. 2018).

A second Future of Waterfowl Workshop was held at the National Conservation Training Center in West Virginia in September 2017. The purpose of the Workshop was to assess progress toward achieving the goals of the 2012 Revision and to identify remaining challenges to be addressed. In order to expand perspectives, several conservation groups representing birdwatchers (e.g., National Audubon Society, American Bird Conservancy) and social scientists were invited. Workshop participants from the U.S., Canada, and Mexico represented federal, state, and provincial government agencies, JVs, NGOs, academic institutions, organizations with land management responsibilities, and hunter-oriented and other conservation groups.

Participants identified partnerships, the use of science in decision making, land conservation expertise, and supportive constituents and stakeholders as primary strengths of the waterfowl management enterprise. A lack of resources and capacity (especially human dimensions expertise), inertia in our organizations and institutions, and insufficient communication were identified as the greatest organizational weaknesses. A full report on the Workshop is available here: https://nawmp.org/nawmp-udpate/future-waterfowl-management-workshop-2.

Workshop participants generally supported the direction of the 2012 Revision and several key messages emerged to consider for future NAWMP efforts:

- The diverse benefits provided by natural habitats conserved by NAWMP resonate with virtually all facets of society. Effective messaging about these benefits could increase support from citizens in all three nations.
- The resilience and strength of JV partnerships were reaffirmed. JVs represent a tractable scale for advancing full integration of management decisions to achieve NAWMP objectives; the mantra "think continentally, integrate locally" had broad support.
- The NAWMP should strongly encourage JVs to broaden partnerships and demonstrate the benefits of multiple-objective decision making. Conversely, some concern exists that this could reduce the focus on waterfowl. The NAWMP community must address this topic soon and seek ways of strengthening support for conservation from a wider range of partners while ensuring that objectives for waterfowl and wetlands are met.
- The NAWMP community requires additional expertise in social sciences and communications; leadership is needed to provide guidance about how to balance these needs with those for biological expertise, as both are essential.

Institutional Review

The Plan Committee is positioned to significantly influence the future of the NAWMP, but to do so requires well-coordinated technical support to develop science-based recommendations for which it can advocate and the NAWMP community can implement. The fundamental need is to manage effectively and efficiently toward multiple Plan objectives in an adaptive manner. As part of the 2012 Revision, the Action Plan recommended a review of the institutional structures and processes established to support integrated decision making for waterfowl management. The Plan Committee and 2018 Plan Update

Steering Committee have begun this effort by assessing: (1) the roles and responsibilities assumed by the Plan Committee and how it actually undertakes these functions; and (2) the structure and function of the IIC to advocate for and facilitate integration among the various technical work groups and the Plan Committee.

The Report on the Review of the Plan Committee – Achieving NAWMP Objectives provides results from recent surveys of waterfowl professionals, interviews with conservation leaders, and reviews of numerous related documents. In summary, there was consensus that the Plan Committee plays a valuable role in delivering the mission and vision of the NAWMP and that it should provide high-level guidance to the waterfowl and wetland community. In contrast, there were differing views on the structure and function of the Plan Committee, ranging from the current structure and composition being adequate to suggestions that its scope and composition should be broadened beyond waterfowl management.

The surveys revealed strong views that the Plan is first and foremost about waterfowl. One interviewee offered the perspective that the intent is not to change the objectives of NAWMP, but to change the way we achieve those objectives. There was consensus that strong and visionary leadership from the Plan Committee is vital. Thus, the Plan Committee should be structured and motivated to anticipate and adapt to changing habitat and waterfowl population issues. Most interviewees pointed to the need for continued Plan Committee attention to guiding the people-related goal of the NAWMP to ensure the Plan remained relevant. Additionally, the need for greater communication and collaboration between and among the Plan Committee, JVs, working groups, Flyway Councils, North American Wetland Conservation Councils, partner agencies and NGOs was identified as being essential to move forward and to integrate all three goals of the 2012 Revision.

The report provided three strategic recommendations regarding the Plan Committee's structure and function that direct the Plan Committee to:

- Engage in a focused and strategic effort to identify a small number of specific responsibilities for the Committee, related to NAWMP implementation, over the period covered by the 2018 Update, and refocus efforts on these primary responsibilities;
- Undertake a focused strategic planning meeting in 2018 with high-level input from across the NAWMP community, to identify objectives, tasks, and responsibilities related to the three fundamental goals outlined in the 2012 Revision; and
- Determine what, if any, changes in the institutional structures of NAWMP will be necessary to successfully implement the efforts derived from the strategic planning process.

The report also recommended that the IIC be replaced and its function moved to the Plan Committee by structurally incorporating the roles and responsibilities as follows:

- Improve "vertical" communication by assigning liaison responsibility to identified Plan Committee members and appointing ex-officio representation to the Plan Committee from waterfowl working groups (e.g., NSST, Harvest Management Working Group (HMWG), and HDWG-PET); and
- Assign primary responsibility for coordinating "horizontal" integration among the working groups and facilitating communication at all levels to a permanent position (at least half time) formally associated with the NAWMP.

Overall, the institutional review identified five areas requiring oversight and attention by the Plan Committee:

1. Commitment to energetic and visionary leadership;
2. Increased attention to strategic thinking and planning;
3. Clarity and focus in NAWMP roles and responsibilities;
4. Creative responses to limits and reductions in resources; and
5. Communication among the technical advisory groups involved in implementing NAWMP.

4. Continued Challenges – New Opportunities

4.1 Continued Challenges

In many ways, the efforts of the waterfowl management community under NAWMP have been a resounding success. Although some species, like the northern pintail and lesser scaup, remain below their NAWMP population objectives and the status of some sea ducks remains uncertain, many waterfowl populations are currently at their most abundant levels since monitoring began in 1955. While habitat conservation efforts and careful harvest management have no doubt played a role, recent population increases for several duck species have coincided with an unprecedented span of wet years on prairie breeding grounds in concert with increased nesting cover (Parks Canada 2014, Morefield et al. 2016). At the same time, resources in many non-breeding regions have been sufficient to sustain these populations.

But these favorable conditions are unlikely to persist. Indeed, the combined influences of a growing world population, increasing and changing demands for agricultural commodities, changing agricultural practices, and climate change will continue to deplete the upland and wetland resources on which North American waterfowl depend (Alexander et al. 2015). For the first time in several decades, cropland is once again on the increase in prairie regions at the expense of grasslands (Morefield et al. 2016, Statistics Canada 2016). Wetland loss through drainage and filling continues largely unabated in many parts of North America, affecting critical breeding and non-breeding regions (Dahl 2011, Watmough et al. 2017). Water management decisions for endangered fish may limit water availability for rice agriculture in California, and changes in rice agriculture in California and Texas are expected to reduce availability of this critical winter foraging resource (Miller et al. 2010, Fleskes et al. 2012). Effects of climate change are projected to impact wetland abundance in key breeding regions (Sofaer et al. 2016, Thompson et al. 2017), threaten coastal wintering habitat through sea-level rise (Craft et al. 2009), and affect the frequency of drought in California and elsewhere (Diffenbaugh et al. 2015). Arctic regions are now experiencing some of the most rapid and severe climate change on earth. As a result, arctic breeding waterfowl in particular, including significant portions of many goose and sea duck populations, face an uncertain future.

Further research to understand the potential impact of the above changes and explore potential causes behind the persistently low populations of some species, will serve to inform future actions by the NAWMP community. Together, these challenges underscore the importance of continued habitat conservation and management efforts. In addition, the national and global scale of many of these conservation issues calls for action in the public policy arena.

Complex challenges posed by overabundant species continue, most notably the population explosion of Ross's and Snow geese and temperate-nesting Canada geese. Although large goose populations provide unique opportunities for people to view and harvest these birds, management efforts are complicated by resulting conflicts in urban areas, crop depredation, breeding habitat degradation, and potential impacts on other species.

Geese and some sea ducks especially are an important component of subsistence harvest for northern indigenous communities who co-manage these resources. Given the important benefits of these waterfowl populations to northern communities, managers need to continue to focus on these populations. The Sea Duck and Arctic Goose JVs are the primary NAWMP connections to waterfowl management issues in this region, playing critical partnership roles in identifying information needs and coordinating research and monitoring.

Overshadowing habitat and population concerns, waterfowl conservation continues to face an underlying threat from North Americans' growing disconnect with nature (Louv 2006, Parks Canada 2014, Kellert et al. 2017). This is reflected not only in long-term declines in waterfowl hunters, but from broader changes in societal perceptions of wildlife use as well (Decker et al. 2017). **North Americans are increasingly urban, have many competing demands on their time, are less dependent on nature for their livelihood, and are increasingly distracted by electronic and social media** (Kellert et al. 2017). For example, American children now devote 52 hours each week to electronic media indoors while spending less than 40 minutes outside (Kellert 2012). Social science research is needed to examine potential impacts of these trends and develop effective opportunities to re-engage people with nature and garner conservation support.

Clearly the above challenges affect opportunities for the waterfowl management community to address the goals and objectives of NAWMP. **While the NAWMP community has many years of experience in addressing waterfowl population and habitat goals, it faces a steep learning curve in addressing goals for the engagement of people.** But it is also clear that the NAWMP community must—and is—rapidly engaging experts and developing the information, knowledge, and skills to meet these evolving issues.

4.2 What we are learning

Through understanding changing societal values, the waterfowl management community has the opportunity to explore new ways to catalyze society's connection with nature. **The good news is that people *are* concerned about—and place great value and importance on— nature.** Indeed, three-quarters of American adults think contact with nature is very or extremely important for their physical health and emotional outlook, and they support increased funding for nature-related programs (Kellert et al. 2017). Similarly, about 97 percent of adult Canadians see natural areas as important to their family's well-being (Ipsos Reid 2013). The NAWMP Stakeholder Surveys indicate that the majority of citizens recognize the societal benefits that wetlands provide, especially clean water. The surveys also indicated that waterfowl hunters and birdwatchers share a common interest in conservation.

People's separation from nature is not due to a lack of knowledge about, interest in, or enjoyment of nature's benefits. Rather, all citizens face widespread societal forces that decrease their perceived connection to the natural world and their time spent outdoors. Our task is to understand and harness these forces to achieve the NAWMP goal of using waterfowl habitat to reconnect people with nature. By being a part of the natural world—instead of apart from it—we reinforce and deepen our connections to nature and recognize that impacts to nature affect people as well. This can occur through waterfowl and wetland-related outdoor activities and greater understanding and appreciation of the broad benefits waterfowl habitat provides—leading to investment and participation in conservation activities.

In the past, many waterfowl management and conservation actions were based on assumptions about how these activities would affect stakeholders. **It is imperative that we use the latest social science tools and adaptive learning to test these assumptions and identify approaches that are most likely to succeed in reaching our objectives.** To that end, the NAWMP Stakeholder Surveys have informed four widely held assumptions:

1. Waterfowl harvest management is largely based on the assumption that hunters desire maximum opportunity. Results from the NAWMP Hunter Survey suggest that hunters may be more concerned about the "quality" of hunting experiences, and less about larger bag limits or more days afield. Both hunters and birdwatchers viewed increased travel distance as a disincentive to participation. These results call for consideration of efforts that provide populations, habitat, and access for hunting and viewing experiences in closer proximity to users.

2. Many hunter recruitment, reactivation and retention efforts are based on the assumption that most people start hunting as youth. Yet the NAWMP Hunter Survey indicated that 42 percent of hunters started hunting as adults. As license sales data reveal, the general hunter population is aging, and their window of opportunity as mentors to the next generation of waterfowl hunters and conservationists is closing. Current hunters are at an ideal life stage to support recruitment into hunting and conservation. They are also potential resources for recruitment, retention, and reactivation efforts targeting peers and young adults.

3. It is commonly assumed, and some surveys suggest, that birdwatchers are a larger and more stable (or growing) population than waterfowl hunters. But the *North American Birdwatching Survey* indicated that the average age of birdwatchers is 59, compared to 47 for waterfowl hunters. It is unclear whether birdwatchers simply begin this activity later in life, or whether their numbers will face an even steeper rate of decline than hunters. While recruiting the next generation of birdwatchers is important, recruiting other nature enthusiasts may be equally, if not more important, to translate enthusiasm for nature into support for waterfowl habitat conservation.

4. Many assume that educating the public about the many benefits wetlands provide may spur people to action and support. The NAWMP General Public Survey indicated that while approximately 90 percent of respondents felt wetlands play an important role in providing clean water and air, few indicated that they engaged in any activities to support wetland conservation. This disconnect between stated importance and behavior is not uncommon (Kellert 2012, Case 1989). Thus, to develop public engagement strategies that compel action, we need to better understand what drives human behavior in the conservation context. For example, what are the barriers that impede the transition from appreciating a resource to actively supporting its conservation? And what factors motivate people to support conservation both monetarily and through behavior?

The contrast between these four commonly held assumptions and the survey results highlights the value of social science in laying the foundation for public engagement strategies. Exploration of the NAWMP Stakeholder Survey results is just beginning, and further stakeholder insights and new avenues of inquiry will undoubtedly emerge. The resonance of ecosystem services provides a rallying point for engaging multiple stakeholders in wetland conservation, as a case in point. Thus, diverse conservation interests may benefit from supporting this type of research. (Preliminary NAWMP Stakeholder Survey results are available under the "2012 Implementation" tab at www.nawmp.org)

4.3 A Need for Developing Skills and Training

Effective waterfowl and wetland habitat conservation is driven by the close relationship between management and applied research. The academic programs and institutions producing waterfowl and wetland management professionals have been key to this relationship (Williams and Castelli 2012). Further, the formation of many state programs in waterfowl research and management have been bolstered by university-based programs, including some U.S. Geological Survey Cooperative Research Units (CRUs) whose students have produced some of the insights informing management activities.

However, the number of universities offering specialized training in waterfowl and wetland management has been in a long-term decline (Kaminski 2002, 2013). To reverse this decline and maintain capacity, it has been suggested that: "*Academics be encouraged to be part of the technical and strategic teams of every Joint Venture and Flyway Council to ensure that the key management research needs are communicated. Reciprocally, State, Provincial, and non-governmental agency partners could likewise be invited to participate on academic planning efforts to review, revise, and update curricula in wildlife sciences*" (Roberts et al. 2018). Kaminski (2013) offered three suggested areas to target: (1) USGS CRUs, (2) endowed chairs in wetland and waterfowl conservation, and (3) enhanced undergraduate research.

Some steps have been taken to reinforce the link with CRUs, and strides have been made towards expanding the number of endowed chairs at U.S. universities. However, university capacity for waterfowl and wetland conservation and management training is limited in Canada and Mexico, and more progress needs to be made with student involvement, field experience, and curricula in wildlife sciences.

Furthermore, a diversity of professional skillsets is required to effectively tackle the complex challenges now facing the waterfowl management community. **Advancement of interdisciplinary science has elevated the complexity of waterfowl management as well as broadened the spectrum of skills and knowledge needed by today's waterfowl professionals.** Not the least of these is an understanding of the human dimensions of wildlife management and the ability to effectively communicate conservation topics to varied audiences using the most effective tools available.

The need for basic hands-on field courses (e.g. identification and taxonomy, biology and ecology) remains foundational, but the multi-faceted nature of waterfowl conservation demands interdisciplinary training in both the biological and social sciences. Engagement of academic institutions in providing the necessary knowledge and skills is critical to the waterfowl conservation enterprise. **The future rests in the depth, breadth, and relevance of professional training.**

5. Where We're Going

The waterfowl management community is clearly at a crossroads similar to that experienced during the 1980s. The greatest challenge before us is to seize the opportunity posed by a changing social landscape and apply it to our objectives. We embrace our traditional roots in ecological systems, but if we are to maintain the necessary public support, we need to consider, understand, and be responsive to today's social systems. Furthermore, the future hinges on our ability to understand and integrate the dynamics of social-ecological systems.

5.1 Pathways to Participation

Many organizations were engaged in habitat management prior to NAWMP. However, most worked in isolation and focused on individual parcels of land rather than broader ecological systems. The founders of NAWMP recognized that to manage and conserve waterfowl populations at desired levels, it would take everyone working together to effect system change—and the concept of JV partnerships was born.

"*The fundamental premise of the North American Waterfowl Management Plan is that the cumulative effect of many local and regional conservation actions will result in dynamic but sustainable landscapes capable of providing for the physiological needs of waterfowl at prescribed population levels.*" (2004 Action Plan)

Today, NAWMP is taking this approach and applying it to the social landscape as well. A second developing premise of NAWMP is that **the cumulative effect of many local and regional public engagement actions will result in dynamic but sustainable social landscapes capable of attaining waterfowl conservation support at objective levels through pragmatic and emotional ties to waterfowl and their habitats.** To operationalize this concept, the NAWMP community will need to reach out to partners, new and old, that share common goals to increase the connections between people and nature, much like JVs reach out to partners to achieve habitat objectives. The resulting conservation support can reap benefits at varying geographic and time scales through human behaviors and actions that directly and indirectly promote waterfowl populations and habitats. Such a vision of sustainable social-ecological landscapes aids in achieving integrated waterfowl and wetlands conservation at objective levels.

We can create pathways to participation through hunting, wildlife viewing, and conservation activities. **Waterfowl conservation is about much more than waterfowl. It has natural links to clean water, clean air, and maintaining the food and energy systems that sustain us all.** Promoting hunting and wildlife viewing and getting people outside is about more than recreation. It's about maintaining the mental and physical health of individuals, and it's about providing positive social experiences that strengthen bonds to nature. Simply, it is about quality of life. To increase relevance, NAWMP must connect waterfowl habitat conservation to issues of broader societal concern such as healthcare, education, transportation, food systems, and energy production. It is in these areas where decisions are made that have large-scale impacts on society.

Federal, provincial, state, tribes/first nations, municipal agencies, NGOs, and industry all play different roles in social systems. **By working together, we can create pathways that provide the cumulative experiences needed to help individuals transition from *potential* stakeholders to *active* stakeholders with a vested interest in supporting waterfowl conservation.**

5.2 Leveraging Ecosystem Services

Our conservation work provides much more than waterfowl habitat and diverse members of society are beginning to recognize the benefits. This message should be inspirational to all members of the NAWMP community; the opportunity presented for leveraging support is immense. Wetlands and associated habitat recharge groundwater, sequester and store carbon, improve water quality by cycling nutrients, provide biodiversity services like pollination, attenuate runoff and reduce flooding, and provide places for recreational and spiritual enjoyment.

The NAWMP community has begun to leverage these values and many more opportunities are on the horizon. In both Canada and the U.S., federal funding is available for "Green Infrastructure"—natural systems such as wetlands that process water and collectively provide society with a multitude of economic, environmental, and social benefits. At a time when worldwide concern over declining pollinators is in the headlines almost daily, wetland ecosystems provide habitat for pollinators in all three nations. In Canada, the insurance industry is taking note of the role wetland drainage has played in increasing downstream flood risk. Further, a growing trend for sustainably sourced food provides opportunities for the maintenance of wetlands in agroecosystems as a component of sustainable commodity production. **We must continue to seek out these opportunities to leverage ecosystem services for waterfowl and wetland conservation.**

Societal concerns regarding ecosystem services present an opportunity to link in waterfowl conservation by quantifying and highlighting the benefits of wetland habitats to potential partners and interests and find common ground for collaboration. Moving forward, we can achieve the waterfowl goals of the 2012 Revision by continuing to engage hunters as well as developing and capitalizing on the numerous benefits to society provided by conservation of waterfowl habitats.

5.3 Adaptive Capacity for Public Engagement

The waterfowl management community has embraced adaptive harvest management and adaptive habitat management, which formally link management actions to population outcomes through the use of model-based strategic planning and evaluation. We now have the imperative to take lessons learned from these efforts and apply them to setting public engagement objectives and measuring our progress toward them. With the completion of the NAWMP Stakeholder Surveys in 2017, the HDWG-PET began to use hunter and birdwatcher survey results to engage the NAWMP community in an adaptive framework. Key steps in the process include:

- engaging stakeholders early;
- developing models that depict our understanding of the systems;
- conducting assessments of current status;
- establishing objectives;
- specifying predictions about potential outcomes of alternative management actions;
- monitoring outcomes of management actions; and
- making adjustments and repeating the cycle based on lessons learned.

Further work by the HDWG-PET will identify common metrics so model-based objectives can be identified at scales that match management decisions and implementation.

While this work has only just begun, the NAWMP community is well positioned to learn from previous adaptive resource management frameworks. The work is not trivial— it will demand an integrated effort at both technical and policy levels. The NAWMP community needs to consider the question of whether the people, processes, resources, and reporting pathways are in place to achieve the work, especially given that appropriate management application will likely occur at smaller (e.g., JVs) rather than larger scales.

6. Reflections

The NAWMP has a long and successful history of conserving North American waterfowl. This hard-won success is the result of a commitment to science-based adaptation in the delivery of habitat conservation and understanding population-management linkages. In keeping with this approach, the 2012 Revision sought to expand the base of supporters for waterfowl conservation and challenged the NAWMP community to consider the intersection of waterfowl, habitat, and people in management decisions. While this is new ground for many, the NAWMP community has made remarkable strides in a few short years. We have developed ways to focus resources on important landscapes, to integrate conservation decisions, to address JV-level population objectives, and to engage hunters, birdwatchers, and the general public in conservation actions. The highlighted achievements of the NAWMP community demonstrate the adaptation and resilience that has made the Plan a success for over 30 years.

Perhaps most importantly, we have learned that multiple stakeholders share an interest in waterfowl habitat conservation and this shared interest can provide the foundation on which to build and maintain broader support. While substantive guidance on integrating management decisions continues to develop, the Plan Committee is committed to making rapid progress and fostering timely communication of the results within the NAWMP community.

As the NAWMP community becomes more aware of limitations in expertise, resources, and future capacity, we are focusing attention to address these shortfalls. Like those that came before, this 2018 Plan Update builds on the strong foundation established by the Plan in 1986, its numerous updates, and the Revision in 2012. **The NAWMP community is poised and motivated to address the new challenges facing waterfowl conservation. The Plan is strong, the partnerships are growing, and the future is bright.**

7. Recommendations

Ultimately, our intention is to advance wetland and waterfowl conservation continentally, regionally, and locally by building upon the many successes of the NAWMP and adapting to social, economic, and environmental changes. To that end, the NAWMP community including the Plan Committee and its working groups must:

1. Focus conservation actions on waterfowl habitat and population management objectives and incorporate social science into planning and program delivery.

The conservation of wetlands and associated upland habitats, in concert with managing waterfowl populations through monitoring and harvest regulation, are foundational to the NAWMP enterprise. Many of the challenges facing waterfowl managers, including engagement and support from a wide range of stakeholders, require insight into human dimensions of conservation. The NAWMP community must remain committed to its habitat conservation focus while also acquiring and developing the knowledge and capacity to integrate social science into the conservation planning and decision-making processes.

2. Help people understand the opportunities for outdoor recreation resulting from NAWMP activities and how society benefits from waterfowl habitat conservation.

People can reap the many rewards of wetlands and waterfowl habitat by better understanding the recreational opportunities created by conservation actions and the natural benefits such as clean water and air. The NAWMP community must objectively understand and continually communicate the benefits of waterfowl habitat to hunters, birdwatchers, landowners, and the general public. It must create and fortify support for wetland conservation by increasing outdoor recreational activities, including hunting and bird-watching, and building an engaged community of advocates for waterfowl habitat through strategic communications. The NAWMP community needs to strategically identify target audiences and key messages at the national, regional, and locals by September 2019 to communicate more effectively about wetland benefits and the accomplishments of the NAWMP.

3. Compel people to take action to conserve waterfowl habitat.

Additional analysis of existing social data will help us understand how to transform attitudes of people who care about waterfowl and wetlands into active advocates for and participants in conservation.

(a) The NAWMP community, and specifically the HDWG-PET, must fully analyze stakeholder survey results and develop a comprehensive public engagement strategy by January 2020. Adaptive processes will allow us to assess the effectiveness of the strategies employed and to identify ways to measure the results of communication efforts. The intent is to use the stakeholder survey results and other social and biological science evidence to inform efforts to develop an actively engaged community of hunters, birdwatchers, landowners, and the general public in support of waterfowl conservation.

(b) The NAWMP community also should use social science to inform decision-making processes that will help achieve the NAWMP goals.

4. Identify key geographic areas where the best opportunities exist to meet the needs of waterfowl and people.

Create and effectively employ tools that help focus management actions on landscapes that have the most chance for successfully meeting NAWMP's multiple goals. The NAWMP community should support the work of the Priority Landscapes Committee (PLC) to develop a scalable decision support tool or system to focus resources in geographic areas that strategically achieve the NAWMP goals. The tool should be flexible enough to accommodate geographically specific parameter weights or other regional factors. The system or tool should use datasets and socioecological considerations relevant to Canada, Mexico, and the United States. The tool development process should be explicit and well documented and must include input from the entire NAWMP community and partners and a thorough review by the Plan Committee by June 2019.

5. Establish a process to review and update Plan objectives every ten years and provide guidance on implementation.

Throughout the Plan implementation, give continuous guidance on how to set and scale down the Plan objectives to regional and local levels. (a) The Plan Committee must establish a process or work group to review the Plan objectives and revise them at least every decade. (b) Additionally, the Plan Committee, with input from the NSST, HDWG-PET, and HMWG, should provide guidance to the NAWMP community by September 2019, on how to consistently interpret the existing NAWMP objectives for conservation planning, harvest management, monitoring, and evaluation efforts within the Joint Ventures.

6. Share knowledge from all work to integrate and balance the needs of habitat, waterfowl, and people.

Learn from our collective experience and adjust our decision making by:

- The NAWMP community continuing the innovative conservation efforts demonstrated by JVs, Flyways, and working groups and by embracing deliberate integrated decision making that addresses and weighs decision trade-offs for all objectives.
- The NAWMP community building an integrated, adaptive management framework, and consider monitoring and evaluation to be as critical as planning and delivery. An important step is to identify and integrate recurring decisions that require consideration of multiple objectives by building a comprehensive adaptive framework.
- All partners participating in efforts to implement adaptive management across the entire NAWMP community.
- The NAWMP community identifying additional resources (e.g. people, funds, processes) to accomplish these undertakings.

7. Bolster training programs for future waterfowl management professionals.

Encourage universities and colleges to maintain and build waterfowl management training programs—ensuring we have the expertise to guarantee the continued success of the NAWMP. The NAWMP community should form strategic alliances to help establish public and private funding sources and other instruments to enhance academic and professional training programs[5]. The NAWMP community requires strong professional capacity to deliver and communicate the broad benefits of NAWMP, strengthen adaptive management, and ensure coherent decisions. The professional capacity for this work arises from academic institutions and professional training, including social science training. Building the next generation of waterfowl and wildlife professionals by strengthening academic leadership is particularly critical in Canada and Mexico.

8. Clearly define the roles and responsibilities of the Plan Committee and how it strategically structures itself and its functions to facilitate integration among the various technical work groups.

Replace the Interim Integration Committee (IIC) with a new system of liaisons between the Plan Committee and the working groups and appoint ex-officio members from the working groups to the Plan Committee. The Plan Committee should undertake a focused and strategic effort to identify and refine a small number of primary responsibilities to be accomplished by the Committee. Ultimately, the structure, composition, and processes of the Committee should be revisited. The technical and governance-level structures, processes, and responsibilities of the Plan Committee need to remain efficient, contemporary, and well-positioned to deliver on the goals of the Plan. The Plan Committee should consider additional actions by undertaking a strategic planning session and communicate the outcomes to the NAWMP community by February 2019.

[5] See: "Who Will Mind the Marsh" by the Endowed University Waterfowl and Wetlands Programs, Delta Waterfowl Foundation, Ducks Unlimited Inc., and Ducks Unlimited Canada (https://deltawaterfowl.org/wp-content/uploads/2017/12/2017_Who-Will-Mind-The-Marsh.pdf accessed May 25, 2018)

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APPENDIX A

Committee, Working Group, and Task Team Members Involved in the 2018 NAWMP Update

Future of Waterfowl – II Planning Committee

Gray Anderson
Mike Anderson
Mike Carter
Bob Clark
Anne Glick
Eduardo Carrera González
David Gordon
Howie Harshaw
Dave Howerter
Dale Humburg
Holly Miller
Silke Neve
Paul Padding
Tasha Sargent
Paul Schmidt
Jay Slack
Tim Sopuck

Update Writing Team

Michael Brasher
Stephen Carlyle
Jim Devries
Kathy Fleming
David Gordon
Andy Raedeke
Christian Roy
Kyle Spragens
Dan Yparraguirre

Survey Development Working Group

Dave Case
David Fulton
Jim Gammonley
David Gordon
Andy Raedeke
Dean Smith

Organization Assessment Working Group

John Eadie
Ed Penny
Barry Smith
Dean Smith
Dan Yparraguirre

Objectives & Priority Landscapes Committee

Michael Brasher
Jennie Duberstein
James Dubovsky
David Gordon
David Howerter
Barry Wilson
Mark Vrtiska

Plan Committee Review Team

John Eadie
Diane Eggeman
Keith McKnight
Dave Morrison
Seth Mott
Tasha Sargent

Institutions Subcommittee

Mike Anderson
Brad Bortner
John Eadie
Diane Eggeman
Dale Humburg
Chris Smith
Jeff Ver Steeg

APPENDIX B

Revised NAWMP population objectives (Long-term average population size; in 1,000s) for select duck species. Objectives and 80th percentile values are sourced from "Revised Objectives: An Addendum to the 2012 North American Waterfowl Management Plan (September 2014)" and are based on long-term average population estimates (TSA: 1955-2014; ESA 1990-2014). Recent population size estimates represent the average count during 2008–2017.

Traditional Survey Area			
Species	**Long-term average**	**80th percentile**	**Population Size**
Mallard	7,726	9,297	9,965
Gadwall	1,921	2,977	3,449
American Wigeon	2,596	3,048	2,660
Green-winged Teal	2,059	2,631	3,473
Blue-winged Teal	4,949	6,329	7,794
Northern Shoveler	2,515	3,592	4,434
Northern Pintail	4,003	5,722	3,235
Redhead	701	918	1,187
Canvasback	581	691	689
Scaup	5,026	5,984	4,425
TSA Total	**34,703**	**40,748**	**45,421**
Eastern Survey Area[a]			
Species	**Long-term average**	**80th percentile**	**Population Size**
Mallard	409	426	1,156[b]
American Black Duck	628	648	701
Green-winged Teal	263	281	382
Ring-necked Duck	515	529	682
Goldeneyes	433	449	559
Mergansers	436	462	594
ESA Total	**2,685**	**2,783**	**4,074**

[a] The estimate for total ducks includes only the 6 species/species groups reported in the annual waterfowl status report for the Eastern Survey Area. ESA objectives should be considered subject to change given they currently do not incorporate all data from the expanded survey area. Efforts are underway to update these estimates, and some planning efforts are using these updated preliminary estimates.

[b] Recent population size estimates are based on an expanded survey area and are not comparable to the working objectives established in 2014 from a smaller survey area.

Note: Thank you to Paul Padding (FWS), Nathan Zimpfer (FWS) and Guthrie Zimmerman (FWS) for their efforts to update these duck species numbers.

APPENDIX C

Objectives and estimates for North American duck populations other than those provided in Appendix B. Objectives and mean population size estimates are for total birds in spring or early summer unless otherwise noted. Population size is the mean of annual 2008–2017 estimates unless otherwise noted.

Species/Subspecies/Subpopulation	Objective	Population Size
Mottled duck, Florida	42,000	53,000[a]
Mottled duck, Western Gulf Coast[b]	106,000	68,000
Mexican duck	Not established	56,000[c]
Hawaiian duck	2,000	900[d]
Laysan duck	1,800	700[e]
Cinnamon teal	Not established	Not available
Wood duck, Eastern	Not established	Not available
Wood duck, Western	Not established	Not available
Muscovy duck	Not established	30,000[c]
Fulvous whistling duck	Not established	Not available
Black-bellied whistling duck	Not established	Not available
Ring-necked duck	[f]	2,024,000[g]
Ruddy duck	[h]	751,000[i]
Masked duck	Not established	6,000[c]
Harlequin duck, Eastern	3,000	4,000[j,k]
Harlequin duck, Western	Not established	250,000[j,k]
		254,000
Long-tailed duck	Not established	1,000,000
King eider, Eastern	Not established	200,000[k]
King eider, Western	Not established	400,000[k]
		600,000
Common eider, American	165,000 breeding pairs	250,000[k]
Common eider, Northern	400,000	260,000[j,k,l]
Common eider, Hudson Bay	275,000	260,000j[,k]
Common eider, Pacific	Not established	150,000[k]
		1,100,000
Steller's eider	Recovery from threatened status	1,000[k,l]
Spectacled eider	Recovery from threatened status	20,000[k,l]
Black scoter, Eastern	Not established	200,000[k]
Black scoter, Pacific	160,000	300,000[k]
		500,000
Surf scoter	Not established	700,000[j]
White-winged scoter	Not established	400,000[k]
Goldeneyes[m]	[f]	1,239,000[g]
Common goldeneye[m]	[f]	

Note: Thank you to Paul Padding (FWS), Thomas Rothe (AK DFG), Tim Bowman (FWS, retired), Christine Lepage (CWS), Francois Bolduc (CWS), Eduardo Carrera (DUMAC), Brad Bales (PBHJV), Jim Dubovsky (FWS) and Andrew Fanning (FL FWC) for their efforts to update these duck species numbers.

Species/Subspecies/Subpopulation	Objective	Population Size
Barrow's goldeneye, Eastern	7,500	8,500[j,k]
Barrow's goldeneye, Western	Not established	260,000[j,k]
Bufflehead	[h]	1,306,000[i]
Mergansers[m]	[n]	1,331,000[g]
Hooded merganser[m]	[o]	
Red-breasted merganser[m]	[o]	
Common merganser[m]	[o]	

[a] 2008 spring population estimate.

[b] Objective and population estimate are both for winter counts.

[c] Same as 2012 estimate; no new information available since then.

[d] Estimate based on average Biannual Waterbird Survey counts from 2011-2015.

[e] Based on estimates from Laysan Island during 2012 and Midway Atoll during 2015 (Reynolds et al. 2017).

[f] See Appendix B for ESA objective; included in total ducks objective for TSA (Appendix B).

[g] Sum of TSA and ESA estimates.

[h] Included in total ducks objective for TSA (Appendix B); ESA objective not established.

[i] Estimate for TSA only.

[j] Index derived from winter surveys.

[k] Estimate from most recent surveys.

[l] Eastern Canada winter component only.

[m] North American breeders only.

[n] Species not differentiated in TSA and ESA surveys.

[o] See Appendix B for ESA objective; TSA objective not established.

APPENDIX D

Objectives and estimates for North American goose populations. Objectives and mean population size estimates are for total birds in spring or early summer unless otherwise noted. Population size is the mean of annual 2008-2017 estimates unless otherwise noted.

Species and population	Objective	Population Size
Canada goose		
Atlantic (Ungava Peninsula)[a]	225,000 pairs	181,951 pairs
Atlantic Flyway resident	650,000	978,697
North Atlantic	50,000 pairs	50,834 pairs
Southern Hudson Bay[b]	Stable population	Stable
Mississippi Flyway giant	1,200,000 – 1,400,000	1,597,154
Western Prairie and Great Plains	Not yet established	1,238,902
Hi-Line	150,000 – 350,000	345,253
Rocky Mountain	117,000	155,836
Pacific[c]	Not yet established	280,571
Lesser	Not yet established	5,065
Vancouver	Not yet established	No estimate
Dusky	20,000	12,219
Cackling goose		
Cackling (Yukon-Kuskokwim Delta)[d]	250,000	276,367
Aleutian[e]	60,000	138,295
Mid-continent[f]	1,000,000 adults	3,382,615 adults
Taverner's	Not yet established	44,946
Snow goose		
Greater	500,000 – 750,000	867,000
Mid-continent lesser[g]	5,000,000 adults	13,024,041 adults
Wrangel Island lesser	120,000	202,938
Western Arctic lesser[h]	200,000	432,682
Ross's goose[i]		
	Not yet established	1,742,568 adults
White-fronted goose		
Mid-continent[j]	600,000	806,977
Tule[e]	10,000	11,155
Pacific[d]	300,000	619,941
Brant		
Atlantic[k]	150,000	142,596
Pacific[l]	162,000	158,787
Eastern High Arctic[m]	Not yet established	32,000
Emperor goose		
	34,000	25,738
Hawaiian goose[n]		
	Recovery from endangered status	2,855

[a] Objective and population size are for pairs in the Ungava Region only. An additional objective exists for 25,000 pairs in boreal Quebec.

[b] Comprised of former Southern James Bay, Mississippi Valley, and Eastern Prairie populations. Population status determined from annual surveys conducted 2005-2015; "stable" is defined as <15%, <10% or <5% decline in breeding pairs over 3, 6, and 9 years, respectively. Objective also includes sustainable harvest rate threshold.

[c] Population size is the mean of annual 2010–2017 estimates.

[d] Fall population size estimate based on projection from spring survey.

[e] Winter population size estimate, based on mark-resight method, 2008–2016.

[f] Also known as Central Flyway Arctic Nesting population. Population size is the mean of annual 2007–2016 Lincoln estimates.

[g] Includes former Western Central Flyway population. Population size is the mean of annual 2007–2016 Lincoln estimates. Objective also includes harvest rate target to reduce population size.

[h] Population size is the mean of breeding colony estimates (total birds) at Egg River, Anderson River, and Kendall [l]sland in 2002, 2007, 2009, 2013.

[i] Population size is the mean of annual 2007–2016 Lincoln estimates.

[j] Fall population size estimate. Objective also includes sustainable harvest rate threshold.

[k] Winter population size estimate.

[l] Includes black brant and Western High Arctic brant. Winter population size estimate.

[m] 2014 fall population estimate.

[n] Population estimate based on various counts and surveys conducted in 2016.

Note: Thank you to Josh Dooley (FWS), Jim Leafloor (CWS) and Paul Padding (FWS) for their efforts to update these goose species numbers.

APPENDIX E

Objectives and estimates for North American swan populations.

Species and population	Objective	Population Size
Tundra swan[a]		
Eastern population	80,000 total birds	106,612 total birds
Western population	60,000 total birds	121,024 total birds
Trumpeter swan[b]		
Pacific Coast population	25,000 total birds	31,793 total birds
Rocky Mountain population[c]	10,000 adults and subadults	11,721 adults and subadults
Interior population[d]	2,000 total birds	27,055 adults and subadults

[a] Objective is total winter population (eastern) or breeding population (western). Population size estimates are 2008-2017 means of annual winter survey counts (eastern population) or breeding ground surveys (western population).

[b] Objective is total autumn population. Population census and surveys are conducted spring through fall across species range, at 5-year intervals. Population size estimates are the results of the most recent (2015) census and survey.

[c] Population objective for the combined U.S. and Canadian breeding population.

[d] Population objective was established in 1998; has not been updated since then.

Note: Thank you to Paul Padding (FWS) and Jim Dubovsky (FWS) for their efforts to update these swan numbers.

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