Aquatic Nuisance Species Management Plans in the Great Lakes States:
Problems, Progress, Future Goals, Assessment Tools

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Table of Contents

Emerging and Future Trends in the Prevention and Control of Aquatic Invasive Species

Great Lakes Regional Collaboration

Aquatic Invasive Species Strategy Team

Aquatic Invasive Species Summit

The International Joint Commission and the Great Lakes Conference and Biennial Meeting

Proposed Legislation from the 109th Congress (2005-2006)

National Aquatic Invasive Species Act of 2005

Ballast Water Management Act of 2005

National Invasive Species Council Act of 2005

National Oceans Protection Act of 2005

Michigan Act No. 32, Public Acts of 2005

What Canada is doing about invasive species

National ANS Management

ANS management in Ontario

Current funding issues and capacity

What is available from the Task Force?

Funding sources that have been used for SMP development

Other potential sources of funding for development and/or to supplement implementation

Coastal Zone Management Act (Section 309 Coastal Zone Enhancement Grants)

Great Lakes Regional Collaboration AIS Strategy Team Action Plan Recommendations / National Aquatic Invasive Species Act of 2005

State Management Program Summaries

Plans of interest

Combining terrestrial and aquatic

Illinois SMP progress

Indiana SMP progress

Michigan SMP progress

Minnesota SMP progress

New York SMP progress

Ohio SMP progress

Pennsylvania SMP progress

Wisconsin SMP progress

Overarching Plan Approaches

Regional Collaboration

Recommendations from the ANS Task Force and the AIS Strategy Team

Factors of Strategic Collaboration

Program Evaluation: Example Program Assessment for state or regional ANS management plans

Problems frequently encountered in planning and implementation

Several methods used for plan evaluation

Executive Summary

Through a grant from the National Oceanic and Atmospheric Administration's National Sea Grant College Program entitled *A Collaborative Approach to Advance Implementation of State Management Plans for Prevention and Control of Aquatic Nuisance Species in the Great Lakes Region*, the Great Lakes Commission has been charged with holding workshops in each of the Great Lakes states regarding their aquatic nuisance species (ANS) state management plans (SMP). These workshops are meant to provide assistance to each state in whatever way it deems necessary in its mission to limit the damage caused by ANS in the inland waters of the state as well as in the Great Lakes.

This briefing paper is meant to serve as background material and a comprehensive reference to all those involved in the development, implementation, evaluation, or updating of an ANS SMP in the Great Lakes Region. The paper begins with a discussion of what ANS are and how they impact the Great Lakes, both ecologically and economically and then begins to discuss the legislation responsible for creating SMPs, the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) of 1990. Under NANPCA the National ANS Task Force (Task Force) was formed and is the entity responsible for developing guidelines for SMPs and funding the ones they approve. The Task Force is capable of providing funding to assist with implementation of a SMP, but the state must find other sources of funding for plan development. This document includes the criteria the Task Force uses to determine if a plan should be accepted and funded for implementation.

Other background provided includes information on the Great Lakes Panel on Aquatic Nuisance Species (Panel), one of six regional panels developed under the Task Force. The Panel focuses on educational, research, and policy initiatives within the Great Lakes Basin, as well as fosters collaboration with the other Panels and the Task Force.

One section of the paper that may be of interest to those states just beginning to develop their SMP is the section on the *Model Comprehensive State Management Plan for the Prevention and Control of Nonindigenous Aquatic Nuisance Species* (Model Plan), prepared by staff at the Great Lakes Commission. The Model Plan serves as an example of potential goals and objectives for a SMP as well as giving a recommended format and list of topics to be discussed to ensure the plan meets the Task Force criteria. Most Great Lakes states that have developed a SMP thus far have used the Model Plan to assist in their plan development.

Also included in the paper are the proposed guidelines for updating a SMP. These guidelines are in the final stages of review by the Task Force. This information is especially useful for those states that already have an approved plan but are interested in revising it due to new information or needs.

Several other topic areas covered in the paper include updates on all the proposed legislation relating to ANS from the current Congress and new initiatives that have been established, such as the Great Lakes Regional Collaboration which was established by an Executive Order. Canadian

ANS control efforts are also reviewed since a sizeable portion of the Great Lakes Basin is within Canada and knowing what the Canadian government is doing can only help to foster consistency and collaboration.

Alternative funding sources for plan development are also discussed, with a few innovative ideas highlighted that states have used or considered. Since money is available for SMP implementation but not development, this is another key area for states in the development process to take a look at so the state natural resource agencies do not have to bear the full cost of developing these plans. These alternative funding sources may also be available to help with implementation as well since many states with approved SMPs have stated that the implementation funds from the Task Force have not been sufficient to carry out all the activities proposed in their SMPs.

One important and useful section of the paper is a summary from each of the Great Lakes states on where they are at with their SMP and where they are hoping to go. This is useful for states just beginning to develop their plans so they can learn what has worked and what has not from other states as well as learn about creative funding or innovative control ideas. This section is also very important for each state to learn about the priorities of the other states, which will hopefully help to foster regional collaboration. Since ANS is not a single state issue, but a Great Lakes issue, a Regional Summit will be held following the culmination of all the individual state workshops for the states to share what they learned at their individual workshops and hopefully develop a dialogue regarding regional priorities and strategies for working together on ANS control and management. This can be done either formally by developing a regional version of a SMP or informally through dialogue and agreement.

One last topic discussed in the paper that is often forgotten in planning initiatives is evaluation. Evaluation is important to ensure that a plan is achieving the results intended and that the goals are periodically reconsidered to ensure they are still relevant based on new findings or priorities. Several methods of evaluation are discussed in the paper and they are all taken and reworked to develop a list of evaluation criteria that seems most appropriate for a plan such as a SMP.

Introduction

Definition of aquatic nuisance species

Aquatic species that are nonindigenous (not native to the waters they have been introduced to) may not necessarily be considered aquatic nuisance species (ANS). Some species are intentionally stocked in water bodies for sport fishing or other purposes, and many that are introduced via other vectors seem to not cause any ecological or economic harm. How to define ANS is difficult and debated, for example, should all nonindigenous species be considered ANS? What about species that have been around for one hundred years and has become part of the ecosystem? What about intentionally stocked species? Or species that appear to be causing no harm by their presence? Then there are management issues, should all ANS be managed or just those causing the most or significant harm?

One definition put out by the National Aquatic Nuisance Species Task Force is "Aquatic Nuisance Species (ANS) are aquatic and terrestrial organisms, and plant species that have been introduced into new ecosystems throughout the United States and the world and are having harmful impacts on the natural resources in these ecosystems and the human use of these resources" (ANS Task Force, 2000). Another definition from an Executive Order signed by President Clinton in 1999 defined ANS as nonindigenous species "whose introduction does or is likely to cause economic or environmental harm or harm to human health" (Office of the President, 1999).

Aquatic nuisance species introduction

Aquatic nuisance species are causing a multitude of problems in waters worldwide. Algae, fish, invertebrates, and plants are all transported to waters where they are nonindigenous through a variety of vectors. One primary source of ANS introductions is through shipping and as the world had gone more and more towards a global economy, shipping has increased. The two primary ways species are introduced through shipping is ballast water exchange and organisms that attach to the hull of the ship. Shipping, along with better means for monitoring and detection, may be why the number of new ANS species discovered in the Great Lakes has steadily increased during thirty year increments from 1810 through 1990. From 1810 to 1839 there was 1 nonindigenous species discovered in the Great Lakes. In the period of 1960 to 1990 there were 41 (Great Lakes Panel on Aquatic Nuisance Species, 1998). Other means of introducing nonindigenous species include recreational boating, fish stocking for sport fishing, aquaculture, bait releases, the aquarium trade, and horticulture (Great Lakes Panel on Aquatic Nuisance Species, 1998). More than 6,500 non-native species have become established in the United States since the early days of colonization with at least 146 in the Great Lakes (Glassner-Shwayder, 2000). It is theorized that part of the reason that the Great Lakes are so susceptible to biological invasion is that the system was isolated after the last major glaciation period an was therefore unable to produce as diverse of a native species base as some other systems were (Glassner-Shwayder, 2000).

Why aquatic nuisance species are a problem

When invasive species are introduced into an ecosystem where they did not formerly exist, they no longer have their naturally coevolved predators, and indigenous species may not prey on them to keep their populations in check. This can alter ecosystem dynamics by significantly reducing certain populations that the ANS prey or on out-compete, thus modifying the entire food web (Glassner-Shwayder, 2000). Studies have shown that worldwide, ANS invasions are threatening biological diversity and ecosystem integrity. Overall, scientists agree that habitat destruction is the leading agent for the worldwide rapid loss of biodiversity. However, it is also agreed that non-native species are the second leading cause (Wilcove et al., 1998). Approximately 49% of threatened or endangered species listed under the Endangered Species Act are in danger at least partly due to ANS (Wilcove et al., 1998). So far, however, this form of biological pollution has not been given the widespread attention it deserves.

About 10% of the 146 non-native species that have thus far been discovered in the Great Lakes have been classified as ANS due to ecological or economic impacts. The other species may also be causing impacts but these impacts are not known or understood. ANS that have been introduced into the Great Lakes also have a high likelihood of spreading to inland waters and other waterways through many of the same means that allowed the Great Lakes to be impacted, therefore yielding an ever-expanding range for many ANS (Glassner-Shwayder, 2000).

In addition to the ecological impacts of ANS in the Great Lakes, the economic consequences have also been staggering. Estimations of the cost of preventing and controlling ANS range from millions to billions of dollars each year (Lovell and Stone, 2005), and it is thought that ANS are the greatest environmental threat to the national economy (City of Chicago Department of Environment and United States Fish and Wildlife Service, 2005). One of the more notorious species that have invaded the Great Lakes ecosystem includes the sea lamprey, indigenous to the Atlantic Ocean, which invaded the Lakes via canal systems (Great Lakes Panel on Aquatic Nuisance Species, 1998). The sea lamprey is an eel-like fish with a round mouth that attaches to large fish and sucks out blood and tissue from the fish, many times killing it (Glassner-Shwayder, 2000). Many of the large sport and commercial fish populations have plummeted since the sea lamprey invasion, severely impacting the sport and commercial fisheries which were valued at over $4.5 billion annually (Great Lakes Panel on Aquatic Nuisance Species, 1998). Additionally, approximately $20 million is spent each year on various methods used in an attempt to control the sea lamprey population (Lovell and Stone, 2005). Another species that has caused great ecological and economic harm is the zebra musse. The zebra mussel is endemic to the Caspian Sea and was brought to the Great Lakes in ballast water. This filter feeder reproduces often and has planktonic larvae, so it spreads quickly once established. It can filter the water almost clean of plankton, the base of the food web. This impacts the larger sport and commercial fisheries as well as the rest of the ecosystem (Glassner-Shwayder, 2000). The zebra mussel has also lead to the near extinction of the native unionid clams in some regions of the Great Lakes ecosystem because they can attach to the established clam beds and smother them (United States Geological Survey Great Lakes Science Center, 2004). Water intake pipes can

also become easily clogged by the zebra mussel. Municipalities that take water from the Great Lakes for drinking water and industries that uptake large volumes of water spend an average of $360,000 per year using various methods to keep their pipes free from zebra mussels (Great Lakes Panel on Aquatic Nuisance Species, 1998). In some instances the uptake pipes are not salvageable and new ones have to be built. There are many other species that have invaded the Great Lakes and other waters of the United States and have caused similar or additional forms of ecological and economic impacts.

The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990

The Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) of 1990 (16 USC, 1001-2009) was passed by Congress in a large part due to the outbreak of the invasive zebra mussel in the Great Lakes discovered in 1988 (Great Lakes Information Network, 2005). This extremely costly outbreak of the zebra mussel was the focusing event needed to help push through this key piece of legislation and make invasive species a recognizable environmental issue similar to issues such as pollution and habitat destruction. There are five main goals of the NANPCA and they are as follows:

- to prevent unintentional introduction and dispersal of nonindigenous species into waters of the United States through ballast water management and other requirements;
- to coordinate federally conducted, funded or authorized research, prevention control, information dissemination and other activities regarding the zebra mussel and other aquatic nuisance species;
- to develop and carry out environmentally sound control methods to prevent, monitor and control unintentional introductions of nonindigenous species from pathways other than ballast water exchange;
- to understand and minimize economic and ecological impacts of nonindigenous aquatic nuisance species that become established, including the zebra mussel; and
- to establish a program of research and technology development and assistance to States in the management and removal of zebra mussels (Nonindigenous Aquatic Nuisance Prevention and Control Act, 1990).

The NANPCA defines nonindigenous species as any species that enters an ecosystem beyond its historic range. It defines ANS as a nonindigenous species that, by entering the ecosystem, may cause harm to any native species, the stability of the ecosystem, commerce, agriculture, aquaculture, or recreation (United States Geological Survey, 2005). The NANPCA also calls for a National Ballast Water Control Program to help prevent introductions of new ANS, a National Aquatic Nuisance Species Task Force (Task Force) to work on preventing new ANS invasions and further dispersal of existing ones, conducting research on ANS, and distributing information. Research is to be conducted in the areas of environmental and economic risks; primary means of introduction and dispersal; methods for prevention, monitoring, and control; and assessment of the prevention, monitoring, and control programs. The NANPCA additionally calls for a Zebra Mussel Demonstration Program to study the species, ways to control it, and prevent future

infestations (United States Geological Survey, 2005). State Aquatic Nuisance Species Management Plans (SMPs) are also called for, and are described below.

National Invasive Species Act of 1996

The NANPCA was updated and reauthorized by Congress in 1996 as the National Invasive Species Act (NISA) of 1996 (16 USC, 4701-4751), but despite the name change, aquatic invasive species are still the focus with no attention paid to terrestrial species (National Invasive Species Act, 1996). The NISA added some additional findings to the original legislation, including sections on how once introduced, ANS are difficult to contain and may spread through various pathways, and even invade inland lakes and rivers through activities such as recreational boating. The NISA points out that a more proactive, preventative approach is needed because, once introduced and established, ANS species are difficult to control and nearly impossible to eradicate (NOAA Coastal Services Center, 2002). The NISA also modifies some of the ballast water requirements and control strategies created under NANPCA, such as requiring record keeping, monitoring, and reporting for vessels (NOAA Coastal Services Center, 2002).

National Aquatic Nuisance Species Task Force

The National Aquatic Nuisance Species Task Force was put into place with the passage of the NANPCA and is the primary body for rulemaking under the guidance of the NANPCA. The NANPCA's goal in establishing the Task Force was to coordinate all governmental and non-governmental activities relating to aquatic invasive species management (ANS Task Force, 2003). The Task Force is co-chaired by the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration (ANS Task Force, 2002). The Task Force is broken down into several Regional Panels including the Great Lakes Panel on Aquatic Nuisance Species, the Western Regional Panel, the Gulf of Mexico Panel, the Northeast Regional Panel, and the Mississippi River Basin Panel (ANS Task Force, 2004). In addition to the Regional Panels, there are also many committees under the direct guidance of the Task Force that gather information and provide feedback to the Task Force. The two Core Focus Area Committees include the Risk Assessment and Management Committee and the Monitoring Committee. Program Support Elements Committees include the Research Protocol and Coordination Committee and the Communications, Education, and Outreach Committee. Three Committees represent specific mandates of the NANPCA which include the Ballast Water and Shipping, Brown Tree Snake Control, and Intentional Introductions Policy Review Committees. Issue Specific Committees are created as determined necessary and have included the following: Zebra Mussel Coordination, Recreational Activities, Ad Hoc Voluntary Ballast Water Guidelines Effectiveness Criteria, Ruffe Control, Ad Hoc Round Goby Control, Ad Hoc Green Crab Control, Chicago Waterways Dispersal Barrier (in cooperation with the U.S. Army Corps of Engineers), and Mitten Crab Control (ANS Task Force, 2001).

The Task Force is made up of 7 federal agency representatives and 11 Ex Officio members. Six of the federal members and 4 Ex Officio members are determined by the NANPCA, with the remaining slots appointed by the co-chairs of the Task Force from the U.S. Fish and Wildlife Service and the National Oceanographic and Atmospheric Administration. There is also a Canadian invited observer on the Task Force. Ex Officio members represent a wide array of programs from non-profit environmental organizations to industry representatives (ANS Task Force, 2003).

State Management Plans

Section 1204 of the NANPCA addresses state management plans for ANS. After a required public comment period, states may prepare and submit a SMP for dealing with ANS to the National Aquatic Nuisance Species Task Force for review. The SMPs are then approved or disapproved by the Task Force based on the criteria outlined below. SMPs should identify areas and activities within the state or interstate region, other than public facilities, that federal support in the way of funding, technical support, or enforcement will help with the prevention and/or spread of ANS. Public facilities should be identified that need technical and financial assistance for control of the zebra mussel only (Nonindigenous Aquatic Nuisance Prevention and Control Act, 1990). The four priority areas that SMPs must address include:

- identify and describe State and local programs for environmentally sound prevention and control of the target aquatic nuisance species;
- identify Federal activities that may be needed for environmentally sound prevention and control of aquatic nuisance species and a description of the manner in which those activities should be coordinated with state and local government activities;
- identify any authority that the State (or any State or Indian Tribe involved in the interstate organization) does not have at the time of the development of the plan that may be necessary for the State (or any State or Indian Tribe involved in the interstate organization) to protect public health, property, and the environment from harm by aquatic nuisance species; and
- a schedule of implementing the plan, including a schedule of annual objectives, and enabling legislation (Nonindigenous Aquatic Nuisance Prevention and Control Act, 1990).

The NANPCA encourages states to collaborate with local and regional governmental organizations, Indian Tribes, and public and private organizations with knowledge of ANS during both the development and implementation phase. Upon request, the Task Force may also provide assistance to the states in the development of their plans (Nonindigenous Aquatic Nuisance Prevention and Control Act, 1990). The *ANS Task Force Guidance for State and Interstate Aquatic Nuisance Species Management Plans* also contains examples of how plans can be laid out and what they should contain (ANS Task Force, 2004a).

States that have SMPs approved by the Task Force may ask the Director of the U.S. Fish and Wildlife Service for plan implementation money. In order to apply for this federal assistance, the states must identify and describe the best management practices they will use in the

implementation of their SMP. The federal share of the implementation funds for a SMP is not to exceed 75% of the total implementation costs; and with regards to zebra mussel control on public facilities, federal funding should not be more than 50% of the total cost. States are able to use in-kind matching for their share against the federal grant. Of the federal grant money given, no more than 5% is allowed to be used for administrative costs. The Task Force may additionally help the states, upon request, with enforcement issues if aid in that area is critical to the successful implementation of the SMP (Nonindigenous Aquatic Nuisance Prevention and Control Act, 1990).

State Management Plan Evaluation Criteria

The Task Force judges submitted SMPs based on twelve criteria during a 90 day review process which is required by the NANPCA. The criteria can be found at (www.anstaskforce.gov/state_guidance.htm, Section VII), and are listed as the following:

- Do goals reflect the intent of the Act [NANPCA] and Address the problems within the geographic scope of the plan?
- Do objectives support goals and address priority concerns and problems?
- Are problems defined and described?
- Is an overview of specific problems and issues provided?
- Is a list of problem and potentially problematic species provided?
- Are gaps in Federal, State, local/tribal/non-governmental authorities presented?
- Is the geographic scope of the plan appropriate?
- Is coordination with other ANS management plans in the same drainage basin or adjacent States demonstrated?
- What matching funds are provided by the requesting entity (expressed in terms of a percentage)?
- What portion of the matching funds are cash contributions (as opposed to in-kind contributions)?
- Are the strategies, actions and costs accurate?
- Will they achieve the desired objectives?

Submitted plans are presented at a Task Force meeting. Each Task Force member is given a copy of the proposed SMP as well as a checklist for help in determining if all twelve criteria are met. Task Force members then fill out a form stating whether or not they believe the Task Force should approve the SMP. The checklist and approval form from the Task Force are attached as Appendix A. There is also a section on the approval form for the Task Force member to recommend whether implementation funding should be given or not (Aquatic Nuisance Species Task Force, 2004).

Based on the outcome of the Task Force Assessment, plans will be approved, conditionally approved with areas of the plan that need improvement pointed out, or denied. If a plan is denied it must be redone resubmitted with all lacking areas taken care of. Approved plans are approved for a maximum of five years before they are reexamined and states are encouraged to review

their plans annually to make any necessary updates or revisions. Plans that are approved and funded are regularly monitored to ensure they are being implemented properly. If SMPs are not being adequately implemented, the Task Force may at any time revoke approval and funding of the plan. If the state then corrects its implementation failures, approval and funding may be reinstated (ANS Task Force, 2004a).

Great Lakes Panel on Aquatic Nuisance Species

The Great Lakes Panel on Aquatic Nuisance Species (Great Lakes Panel) is one of the regional ANS Panels that the NANPCA required the National ANS Task Force to create. The five-part mission of the Great Lakes Panel is to: identify ANS priorities; make recommendations to the Task Force; assist the Task Force in collaborating and coordinating with other federal ANS programs; advise the general public and the private sector on ANS prevention and control; and facilitate coordination of ANS programs in Great Lakes, especially with regards to education and research. Regular membership on the Great Lakes Panel made up of U.S. and Canadian federal agencies, the Great Lakes states and the province of Ontario, regional agencies including the Great Lakes Commission, stakeholder groups, local government, tribal authorities, and the university/research community (Great Lakes Commission, 2005). Alternate members can also be appointed to represent an absent regular member at meetings. At-Large members are also appointed for three year staggering terms to ensure there is additional and balanced representation of all stakeholders, and hold the same voting and other privileges afforded to other members. Additionally, Interested Parties and Observers may be designated by member suggestion to the Great Lakes Commission with agreement by the Great Lakes Commission staff and Panel Chair. Interested Parties and Observers may attend any Panel meeting and participate in discussion but have no voting privileges (Great Lakes Panel on Aquatic Nuisance Species, 2005). Officers include a Panel Chair and a Panel Vice-chair. The Panel Chair will be elected from among the state members and the Vice-chair can be elected from among all the members of the Panel (Great Lakes Panel on Aquatic Nuisance Species, 2005).

The Great Lakes Panel is broken down into three committees focusing on information and education, research coordination, and policy and legislation. The Information and Education Committee coordinates educational activities throughout the Great Lakes region and attempts to build a collaborative partnership between all educational entities and promote consistency in the educational messages being given to the public. The Research Coordination Committee attempts to provide a forum for dialogue for those involved in or sponsoring Great Lakes ANS research. The Research Coordination Committee also attempts to enhance regional and inter-regional communication and coordination of ANS research and has developed an ANS research inventory database as well as recommendations regarding ANS research priorities. The Policy and Legislation Committee develops and promotes policy positions on ANS issues, shares information about ANS legislative and appropriations issues, promotes the development and implementation of SMPs, and coordinates the broader Great Lakes Panel's involvement in regional legislative and policy related initiatives addressing ANS prevention and control (Great Lakes Commission, 2005).

Project Background: *A Collaborative Approach to Advance Implementation of State Management Plans for Prevention and Control of Aquatic Nuisance Species in the Great Lakes Region*

This project, funded by NOAA's National Sea Grant College Program, provided the Great Lakes Commission (Commission) with funding to hold workshops in each of the Great Lakes states. Funds are then transferred to each state's Sea Grant office which is charged with organizing the logistics of the workshop with the help of Commission staff. The purpose of the workshops is to assist the states in the development, implementation, evaluation, or revision of their SMP, depending on the state's needs.

Commission staff will document and asses each state's workshop. Written reports will contain a summary and evaluation of the workshop proceedings as well as an assessment of how the workshop fits into the larger, regional ANS perspective. A Regional Summit will also be held after all the state workshops to present findings from each state's workshop and allow for the states to work together to develop regional priorities and incorporate regional considerations into their SMPs. The summaries from the individual state workshops will help prepare participants for the Regional Summit. A final report summarizing all activities, findings, recommendations, and outcomes will follow the Regional Summit.

Model Comprehensive State Management Plan for the Prevention and Control of Nonindigenous Aquatic Nuisance Species

A *Model Comprehensive State Management Plan for the Prevention and Control of Nonindigenous Aquatic Nuisance Species* (Model Plan) was published in 1996 as a report to the Great Lakes states after approval by the Great Lakes Panel on Aquatic Nuisance Species. The Model Plan was developed as an outcome of and presented in the appendix to the workshop proceedings from a workshop entitled *Aquatic Nuisance Species and Coastal Management Programs: Toward a Regional Strategy in the Great Lakes Basin*. The Model Plan and Workshop Proceedings were prepared by Katherine Glassner-Shwayder (1996) of the Great Lakes Commission.

The Model Plan was intended to serve as guidance for states when developing their SMP. The Model Plan contains an introduction and instructions for using the model and then lays out recommended components for any SMP, which include an Executive Summary, ANS background information, policy background, intended management actions, implementation measures and timeframe, program monitoring and evaluation, a glossary, and appendices. Examples and explanations for each of the recommended components are given, and laid out in the suggested SMP format. Most Great Lakes states that have developed a SMP thus far have used the Model Plan to assist in their plan development.

Guidelines for Updating State Management Plans

Before a state begins revising its SMP, they must determine if the revisions they are making fall into the category of minor technical revisions, major technical revisions, or complete plan overhaul. Minor technical revisions do not require approval from the Executive Secretary of the Task Force, and include only very minor changes such as correcting typographical errors, updating contact information, and correcting minor mistakes. Major technical revisions require approval and include changes such as the addition of a priority species, laws, or management techniques; the addition of issues not addressed in the original plan; and new or revised objectives. If a state determines that major technical revisions are necessary, they should conduct a scoping exercise to determine what changes are needed and then provide the Executive Secretary with an outline of the proposed revisions as well as a summary and justification for the revisions. Plan revisions do not require the signature of the governor or a public comment period like new plans.

To be considered a complete plan overhaul, the changes to the original SMP must be extensive in format, content, management approaches, priority species, or a combination of these factors. Most plans will fall into the major technical revisions category unless they no longer resemble the original. If it is determined that the plan falls into the new plan category, the process for submitting it will be identical to the process the state went through in originally drafting a plan, including having gubernatorial signatures (ANS Task Force, 2005).

In addition to the revised plan, a document focusing on only the specific changes made should be submitted to the Executive Secretary. If this requirement is not met, the review will be done as would be done for a new plan. A preliminary response to plans that are considered new will be completed within 45 days, and within 30 days if the plan is only a revision (ANS Task Force, 2005).

Any revised SMP must still include all the requirements set by the Task Force for original plans, and a rapid response component is strongly encouraged if it was not present before. This is not a requirement, but may become one as Task Force criteria are updated (ANS Task Force, 2005). The Great Lakes Commission (2003) prepared a draft *Model Rapid Response Plan for Great Lakes Aquatic Invasions* (Model Rapid Response Plan) that will be useful for states in preparing this portion of their plan. The Model Rapid Response Plan lays out components that should be incorporated into a Rapid Response Plan such as communication/organizational structure, outreach, detection and monitoring, decision support and rapid scientific assessment, management options for control/eradication, implementation, and adaptive management (Great Lakes Commission, 2003).

Emerging and Future Trends in the Prevention and Control of Aquatic Nuisance Species

Great Lakes Regional Collaboration

The Great Lakes Regional Collaboration (Collaboration) was founded in May of 2004 by an Executive Order (EO) from President Bush entitled: "Establishment of Great Lakes Interagency Task Force and Promotion of a Regional Collaboration of National Significance for the Great Lakes" (U.S. Environmental Protection Agency, 2005). The EO refers to the largest freshwater system in the world as a national treasure and states that the EO is necessary to establish collaboration among the numerous federal, state, tribal, local, and intergovernmental bodies that are currently addressing resource management in the Great Lakes ecosystem. The EO also hopes to promote local citizen and community stewardship. The EO established the Great Lakes Interagency Task Force (GLITF) to work with all governmental bodies in the Great Lakes basin and to establish communication with Canada and its provinces. Other aims of the GLITF is to create consistent federal policies and activities for addressing issues within the Great Lakes basin, develop science based goals for the region, and establish a working group to make recommendations (U.S. Environmental Protection Agency, 2005).

The GLITF, governors and representatives of the Great Lakes states, members of the President's Cabinet, mayors, regional bodies, and many other interested parties met in December of 2004 for a Conveners Meeting to officially form the Great Lakes Regional Collaboration. The Collaboration was broken down into two components at that time. The first is the Conveners who signed a declaration of support and laid out the Framework for the Great Lakes Regional Collaboration. The other component, laid out in the Collaboration framework is the Issue Area Strategy Teams. The teams focus on their specific issue while also taking into account human health impacts and priorities, tribal interests and perspectives, and research and monitoring. The eight Issue Area Strategy Teams include: habitat/species, indicators and information, persistent bioaccumulative toxins reduction, invasive species, sustainable development, coastal health, non-point source pollution, and Areas of Concern restoration/sediments (U.S. Environmental Protection Agency, 2005a).

Aquatic Invasive Species Strategy Team

Some primary areas the Aquatic Invasive Species Strategy Team addresses include: implementation of the Nonindigenous Aquatic Nuisance Prevention and Control Act, ballast water management, potential invasive species barriers, outreach and education, rapid response to invasions, prevention and mitigation, and research (Aquatic Invasive Species Strategy Team, 2005). Some of the goals laid out for the proposed Invasive Species Strategy Team include goals regarding terrestrial invasive species, but the Strategy Team that developed uses the name Aquatic Invasive Species Strategy Team and thus far has not considered terrestrial invasive species impacts. Since the EO and the resultant Great Lakes Regional Collaboration call for an ecosystem based approach to collaboration and management, expanding the Strategy Team to include terrestrial invasive species or adding an additional Strategy Team for them may be something that could be used to improve basin-wide management in the future.

Aquatic Invasive Species Summit

In May 2003, the City of Chicago Department of Environment and the USFWS hosted an Aquatic Invasive Species Summit (Summit), with additional sponsorship from the Great Lakes Commission, Illinois-Indiana Sea Grant, the International Joint Commission, the Metropolitan Water Reclamation District of Greater Chicago, the Mississippi Interstate Cooperative Resource Association, the USACOE, the United States Army Engineer Research and Development Center Waterways Experiment Station, the EPA, and the University of Wisconsin Sea Grant Institute. The goal of the summit was to find a solution to the exchange of aquatic invasive species between the historically separate Mississippi River Basin and the Great Lakes. While both systems are currently severely impacted by many invasive species, each system could become more heavily impacted if certain species that are only currently in one of the systems travels to the other (City of Chicago Department of Environment and United States Fish and Wildlife Service, 2005). Asian carp have become established within the Mississippi River and are currently moving north towards Lakes Michigan. As of June 2004, the species was within 50 miles of the lake. Asian carp have the potential to harm the Great Lakes ecosystem by competing for food with native species of fish. Several ANS species that currently inhabit Lake Michigan and are currently advancing toward the Mississippi include the ruffe, round goby, and spiny waterflea (City of Chicago Department of Environment and United States Fish and Wildlife Service, 2005).

Consensus from the summit produced three actions for priority focus which included the investigation and evaluation of hydrologic separation of the two basins, pursue additional control and prevention technologies, and procure broad-based political support and federal funding. In an effort to achieve biological separation of the two water bodies, two electrical dispersal barriers have been installed to keep species from moving back and forth between the two basins. The consensus from the Summit was that this action was a good beginning, but that it was only a short term solution because the barriers could become compromised due to time, human error, accident, or natural disaster (City of Chicago Department of Environment and United States Fish and Wildlife Service, 2005). There also remains question about the impact of this barrier to a person if one were to fall overboard a vessel or end up in the water some other way. Another problem with using this sort of barrier is that it only repels fish, but does nothing to stop species like mussels that attach to vessels or planktonic species like water fleas that are transported via currents (City of Chicago Department of Environment and United States Fish and Wildlife Service, 2005).

Since the two basins were historically separate, connected by the Chicago Sanitary and Ship Canal in the late 1800s, a permanent form of hydrologic separation was discussed as being appropriate to negate the chance of any organism crossing from one basin into the other. The canal used to be used as a receptacle for chemical pollution and a way to divert sewage from Lake Michigan, and therefore no aquatic life existed in the canal. The Metropolitan Water Reclamation District of Great Chicago has subsequently worked to improve the water quality, leading to the unanticipated side-effect of potential for cross-basin species contamination. Since the two basins had no hydrological connection until the canal was constructed and cleaned up, the overall consensus from the Summit is that “the canal provides an opportune location to permanently alter a man-made connection to halt the spread of aquatic invasive species between

these two basins" to prevent ecosystem alteration that will be far-reaching, significant, costly, and most likely permanent (City of Chicago Department of Environment and United States Fish and Wildlife Service, 2005).

The International Joint Commission and the Great Lakes Conference and Biennial Meeting

The International Joint Commission (IJC) is a binational agency with the United States and Canada, formed by the 1909 Boundary Waters Treaty. The purpose of the IJC is to collaboratively work to protect the transboundary environment and prevent and resolve disputes between the two countries with regards to environmental issues. The IJC governs projects that may impact the flow or level of boundary or transboundary waters and monitors them throughout their duration. In addition to water issues, the IJC also attempts to identify transboundary air quality issues (International Joint Commission, 2004).

The IJC also is involved with helping the two countries carry out the Great Lakes Water Quality Agreement of 1978. It serves in a monitoring role and reports on both accomplishments and failures in meeting the stated goals. A sample of other recent activities include publishing an educational brochure on ANS with the Great Lakes Fishery Commission, evaluating plans for regulating water levels on Lake Ontario and the St. Lawrence River, and implementing a Watershed Initiative to enhance the capacity to solve environmental issues at the watershed level (International Joint Commission, 2004).

One major action that the IJC undertakes every other year is holding the Great Lakes Conference and Biennial Meeting (Conference), which is intended to promote education and discussion of Great Lakes initiatives occurring on both sides of the border. At the 2005 Conference in Kingston, Ontario, discussions were held around the significant number of new initiatives that have been proposed or incorporated with regards to the Great Lakes in both countries. Discussions also focused on the review of the Great Lakes Water Quality Agreement with an opportunity for public review through workshops, breakout sessions, and plenary meetings that focused on a variety of applicable topics from the "role of the IJC in the Great Lakes Water Quality Agreement" to "land use and sustainable cities" to "an ecosystem approach to mercury" to "halting the introduction of alien aquatic species (International Joint Commission, 2005).

Proposed Legislation from the 109th Congress (2005-2006)

National Aquatic Invasive Species Act of 2005

In April of 2005, both the Senate and House of Representatives introduced similar legislation entitled the National Aquatic Invasive Species Act (NAISA) of 2005 (S. 770) (H.R. 1591). If adopted, this legislation would reauthorize and expand upon NANPCA as amended by NISA. Some key changes that will be made if NAISA is adopted include more stringent ballast water standards through the National Ballast Water Management Program as well as a review by the

Coast Guard and Environmental Protection Agency to determine how the ballast water management program in the Great Lakes can be improved. All vessels will have to have an Aquatic Invasive Species Management Plan on board, and within 24 months of enactment commence ballast water exchange or treatment that meets performance standards issued by the Coast Guard and Environmental Protection Agency (Aquaculture Network Information Center, 2005). NAISA would also encourage the Coast Guard to cooperate with foreign nations, especially Canada and Mexico to collaborate on efforts to prevent ANS introductions. The bill also calls for more research on pathways and vectors that allow establishment of ANS, a screening process for the live organism trade from other countries, provide funding for rapid response to invasions, ensure monitoring of existing dispersal barriers and assess options for new ones, and increase research and education and outreach (Aquaculture Network Information Center, 2005).

The ANS Task Force has, since NANPCA, been co-chaired by NOAA and the USFWS with membership also including the Administrator of the Environmental Protection Agency, the Commandant of the U.S. Coast Guard, the Secretary of Agriculture, and the Assistant Secretary of the Army (The Nonindigenous Aquatic Nuisance Prevention and Control Act, 1990). With the passage of NAISA, membership would expand to include the Director of the U.S. Geological Survey, the Secretary State, and the Director of the Smithsonian Institute (Aquaculture Network Information Center, 2005). Significantly, NAISA would also encourage states to update and improve existing State Management Plans and begin to provide funding for SMP planning along with the implementation (National Aquatic Invasive Species Act, 2005).

Ballast Water Management Act of 2005

The essence of the Ballast Water Management Act (BWMA) of 2005 (S. 363) is very similar to the section on ballast water called for in NAISA, and would also modify NSNPCA. The BWMA is designed to recognize the immense role ballast water plays in the introduction and spread of ANS. Under the Act, each vessel must design its own ballast water control program that meets predefined standards. Vessels that must follow this program include U.S. flagged vessels, vessels in route to a U.S. port, and vessels departing from a U.S. port but still within the U.S. Exclusive Economic Zone. The regulations do not apply to vessels of the Armed Forces, however the Secretary of Defense, in consultation with the administrator of the U.S. Environmental Protection Agency, are required to create a plan that is reasonable and will achieve similar results (Ballast Water Management Act, 2005). Vessels must have on board at all times a copy of their ballast water management plan as well as a log book of all ballast water management activities (Ballast Water Management Act, 2005).

Some of the standards required by the Act include having a concentration of less than 0.1 living organisms per cubic meter for organisms greater than or equal to 50 micrometers in minimum dimension. Fewer than 0.1 living organisms per milliliter are also required for organisms less than or equal to 50 micrometers in minimum dimension and greater than 10 micrometers in

minimum dimension. Other additional standards are also set for indicator bacteria such as e. coli (Ballast Water Management Act, 2005).

Vessels that are exchanging their ballast water must meet these standards, and exchange at least 200 nautical miles offshore in water that is at least 200 meters in depth. Special areas may be designated for vessels unable to reasonably meet these requirements. Vessels that are using ballast water reception facilities must also be certain that these facilities meet the required standards (Ballast Water Management Act, 2005).

An implementation schedule for these standards is set based on vessel construction date and ballast water capacity. A timeline is also set for reviewing the ballast water standards set in the Act and updating them as deemed necessary through new scientific information or technological advances. The Act also reviews future sedimentation load requirements and promotes international cooperation (Ballast Water Management Act, 2005).

National Invasive Species Council Act of 2005

One additional ANS bill has been proposed by Congress in 2005 thus far, the National Invasive Species Council Act (NISCA) of 2005 (S. 507). This act, if passed, would codify Executive Order 13112, signed by President Clinton in 1999. The Executive Order would no longer be in effect and this Act would take its place. This Act would reestablish a National Invasive Species Council (Council) as an independent agency under the executive branch with the purpose of coordinating federal, state, and local ANS management programs, similar to what was done by the Executive Order. The Council's two main goals include minimizing "the environmental, economic, and human health effects caused by invasive species" and reducing "the threat of further invasions of invasive species" (National Invasive Species Council Act, 2005). Council membership will include the Secretary of the Interior, Secretary of Agriculture, Secretary of Commerce, Secretary of State, Secretary of Treasury, Secretary of Defense, Secretary of Transportation, Secretary of Health and Human Services, the Administrator of the EPA, and the Administrator of the U.S. Agency for International Development (National Invasive Species Council Act, 2005). The Chairperson of the Council will be the Secretary of the Interior for the first 3 years, and then rotates to the Secretary of Agriculture and the Secretary of Commerce for the same length of time, continuously rotating among the three agencies. This is the only major change between the Executive Order and NISCA, under the Executive Order all three Secretaries were co-chairs (Office of the President, 1999) (National Invasive Species Council Act, 2005). An Executive Director of the Council will be appointed by the President in consultation with the Secretaries (National Invasive Species Council Act, 2005).

The Council will be responsible for developing a new National Invasive Species Management Plan (Management Plan). The original one, developed after the Executive Order will serve as the functioning Management Plan until a new one is developed, which is required to be no later than December 31, 2005. The original plan developed was entitled "Meeting the Invasive Species Challenge" (National Invasive Species Council, 2001). Management Plans will then be

updated biennially, something that was called for under the Executive Order, but not accomplished, since only one was developed in 2001. Other tasks of the Council include coordinating with other agencies and organizations working on invasive species issues, recommending ways to foster cooperation between federal, state, and foreign governments, developing guidelines for federal programs dealing with invasive species, and facilitating information sharing. The Management Plan will focus on performance-oriented goals and give explicit measures of success. The main mandates for the Management Plan include ANS prevention and pathway identification; international cooperation; rapid response; eradication and controlling the spread of ANS; monitoring; restoration of displaced native species and damaged habitat; research; evaluation of impacts to the environment, economy, and human health; technology advancement; and education. The Act also calls for an Invasive Species Advisory Committee made up of knowledgeable persons to assist the Council (National Invasive Species Council Act, 2005).

National Oceans Protection Act of 2005

The National Oceans Protection Act (NOPA) of 2005 (S. 1224) deals is not solely focused on ANS issues, but deals with them significantly. It is designed to be comprehensive legislation that overhauls the way the oceans and coastal areas are governed in the United States. The legislation covers a broad array of topics including: fisheries management, coastal habitat protection, ocean education, marine mammal and sea turtle protection, ecosystem-based management, and many other topics in addition to the array of ANS topics discussed. One significant goal of this legislation is to remove NOAA from the Department of Commerce and establish it as an independent agency similar to the Environmental Protection Agency in order to give the agency more autonomy (National Oceans Protection Act, 2005).

With regards to ballast water management, NOPA inserted the text of the Ballast Water Management Act of 2005, which was discussed above, into Title VII. Both pieces of legislation were co-sponsored by Senator Lautenberg of New Jersey. Other ANS topics covered by NOPA include early detection; monitoring; rapid response; control; education and outreach; dispersal barriers; environmental soundness of treatment and prevention measures; ecological, pathway, and experimental research; research analysis; compilation and dissemination; technological development, demonstration, and verification; vessel pathway standards research; the promotion of graduate level education and research in systematics and taxonomy; management program coordination; international coordination and collaboration; contaminated sediments; providing funding for the development, in addition to the implementation, of State ANS Management Plans; and authorization for increased appropriations in a wider range of ANS programs (National Oceans Protection Act, 2005). The major change that would be created by this legislation for states working on ANS Management Plans would be the provision for funding for states in the development portion of their SMP or for those who have yet to begin. This would prevent states from having to look elsewhere for planning funding, which may have prevented some states from beginning the SMP process in the past or led to inadequate plans or abandoned planning efforts.

Michigan Act No. 32, Public Acts of 2005

In June 2005 Michigan's Governor Jennifer Granholm signed into law Public Act Number 32 of the Public Acts of 2005. This Act, which will go into effect January 1, 2007, is an amendment of Public Act 451 of 1994, the Natural Resources and Environmental Protection Act (Michigan Public Act 32, 2005). Public Act Number 32 amends Section 324.3109 of the Natural Resources and Environmental Protection Act, which focuses on discharges into state waters such as prohibitions, violations, penalties, and abatement. A phrase focused specifically on ballast water was added, reading "unless a discharge is authorized by a permit, order or rule of the department, the discharge into waters of this state from an oceangoing vessel of any ballast water is prima facie evidence of a violation of this part and subjects the responsible person to the penalties prescribed in section 3115" (Michigan Public Act 32, 2005).

Part of the rational for implementing this Act, introduced by Michigan state senator Patricia Birkholz, is for Michigan to take a proactive step in protecting its waters from ANS since the federal government is moving slowly on adopting ANS regulations (Stine, 2005). Another outcome of this bill is the push for other Great Lakes states and provinces to develop similar legislation, so the region as a whole is working together to stop ANS introductions since ANS is an issue that needs to be managed on an ecosystem level (Stine, 2005).

What Canada is doing about invasive species

National ANS management

In 1995, the Canadian Biodiversity Strategy (CBS) was finalized after a two year process with stakeholders from all over the nation. This plan set a framework for Canada to achieve its goal of sustainable development. The plan realizes that the federal, provincial, and territorial governments all have a responsibility for implementing the visions of the CBS and realizes the importance of inter-jurisdictional cooperation. In response to the CBS, several provinces have created their own plans, such as Ontario (described below). The CBS focused on several key areas including invasive alien species, stewardship, reporting on status and trends, a biodiversity science agenda, and biological information management. An additional management plan entitled *An Invasive Alien Species Strategy for Canada (Strategy)* stemmed from the CBS (Environment Canada, 2005a).

An Invasive Alien Species Strategy for Canada is intended to develop a framework to meet four specific challenges that include

- Integrating environmental considerations into decision-making with economic and social factors;
- Enhancing co-ordination and co-operation to respond more rapidly to new invasions and pathways of invasion;

- Strengthening programs to protect natural resources under pressure from increased global trade and travel; and
- Maximizing collaboration between adhoc and regional/issue specific efforts to ensure the limited resources are used on highest priority issues (Environment Canada, 2005b).

Four working groups were established by the Strategy, centering on aquatic invasive species, terrestrial animals, terrestrial plants, and leadership and co-ordination. Ways of controlling invasive species that are identified include prevention of new invasions, early detection, rapid response, containment, eradication, and control. Specific action items for achieving these goals and objectives have not been finalized yet, but when the action items are agreed upon and finalized, timelines for implementation as well as the agencies or jurisdictions responsible for implementation will be identified (Environment Canada, 2005b).

ANS management in Ontario

In June of 2005, Ontario developed a program entitled: *Protecting what Sustains us: Ontario's Biodiversity Strategy*. This is a recommended action plan developed with recommendations for governmental agencies, non-governmental agencies, and the private sector. The plan was developed by governmental agency representatives, industry, environmental groups, and the general public. According to Natural Resources Minister David Ramsay "this strategy is about protecting that web of life so we will continue to enjoy clean water and air, an abundance of wildlife, and places for recreation" (Ontario Ministry of Natural Resources, 2005a). There is a 21 member Biodiversity Council that has been established to oversee implementation. The areas of focus for the plan include air and water pollution, invasive species, species at risk, genetic diversity, ecosystem representation and integrity, and compliance and enforcement (Ontario Ministry of Natural Resources, 2005a).

The invasive species section of Ontario's plan discusses prevention strategies. The main strategy is to implement Canada's Invasive Alien Species Strategy Plan in the province. Other goals include identifying and eliminating high risk vectors for introduction; banning possession of high risk species like the Asian carp; improving risk assessment; building the capability to quarantine new invasions; enhancing early detection capacity, especially in high risk areas; improve rapid response; limit the spread of established species; and develop a communication and education program (Ontario Ministry of Natural Resources, 2005b).

Current funding issues and capacity

What is available from the Task Force?

The Task Force has had 1.1 million dollars appropriated to it annually from Congress for all of its duties and functions for the past several years. What is left over after other expenses is divided among all states with approved SMPs. With more states having their SMPs approved

each year, the annual amount each state receives has been decreasing, leaving states to look for other sources of funding to fully implement the plans they have developed (Ron Martin, personal communication). In order to receive funding, states with approved SMPs or states that are trying to have their SMP approved must submit a budget request form signed by the governor that indicates how much the state believes it will need to implement its SMP (Sarah Whitney, personal communication). With push from the states, Congress may be convinced of the need to increase the appropriations to the Task Force to accommodate the additional SMPs to better ensure full and adequate implementation.

Funding sources that have been used for SMP development

As discussed below in the State Management Program Summaries section, most states with developed SMPs funded the plan creation process themselves through their state resource management agencies. Two states, Michigan and Ohio, participated in the SMP development process early enough that they were able to obtain small grants to assist them in their SMP development from the Task Force. These small grants are no longer given out and were separate from the implementation funds states can apply for from the Task Force. Pennsylvania is using their workshop as a means of starting to develop their SMP, so initial funding is coming from the Commission via the NOAA grant.

Other potential sources of funding for development and/or to supplement implementation

Coastal Zone Management Act (Section 309 Coastal Zone Enhancement Grants)

One potential source of funding during the SMP planning process for states that have approved coastal management plans under the Coastal Zone Management Act (CZMA) of 1972 (16 USC, 1451-1465) is Coastal Zone Enhancement Grants (Section 309), used for coastal management plan improvement. By obtaining a Coastal Zone Enhancement Grant, a coastal state can involve its state coastal management agency to form a more comprehensive plan and to increase state-wide collaboration. Federal consistency is also a key issue when Coastal Zone Management Act money is given, as it is used as an incentive for states to participate in coastal management. Federal consistency puts federal or federally permitted plans under review if they are inconsistent with the state coastal management program, which the SMP would be part of if partially funded through the CZMA.

Great Lakes Regional Collaboration AIS Strategy Team Action Plan Recommendations / National Aquatic Invasive Species Act of 2005

The Aquatic Invasive Species Strategy Team Action Plan under the Great Lakes Regional Collaboration recommends the passage and full funding of the National Aquatic Invasive Species Act of 2005. The Regional Collaboration Strategy Team believes that funding should be provided for all aspects of ANS control including research, plan development, implementation, evaluation, and more. If this key piece of legislation were passed and fully funded it would give

the Great Lakes states a way to develop their plan with less or no cost to them (Great Lakes Regional Collaboration, 2005).

Other ways states are proposing to fund SMPs

Some states have developed or thought about developing alternative sources of funding for SMP development and/or implementation. A few examples, discussed in more depth below in the individual state summary sections include motor boat gasoline taxes, trailer taxes, fishing license taxes, grants to lake associations, and a voluntary boater decal purchasing program.

State Management Program Summaries

These summaries were obtained by sending a list of questions out to key players in state ANS management in order to obtain an overview of their state's current SMP status and what would help states proceed. The questions were originally sent out via email and were answered either through a written reply or a phone interview. The suggested outline that also served as a guide for the interviews is shown in Appendix B.

Plans of interest

Two states have been suggested as states with excellent ANS Management Plans. An example from the Great Lakes region is Indiana, and a summary of their plan is provided below. An example from outside the Great Lakes region is Hawaii, and an overview of that plan is provided in Appendix C. It is interesting to note that both of these states took a Steering Committee approach to developing their SMPs and a wide array of stakeholders were included. The Steering Committee not only included state resource agencies, but also environmental groups (The Nature Conservancy put a lot of work into the Hawaii Plan and also participated in Indiana), aquaculture groups, aquarium groups, museums and zoos, pet retailers, shipping associations, universities, and community foundations. Possibly one reason these two plans are viewed as effective is that all the players were brought to the table, not just those doing the regulation. This approach may provide an opportunity to educate the groups that may be responsible for part of the invasive species problem and allow them to think of ways they can change their practices voluntarily with little or no financial impact. This may also educate them about ways invasive species are currently damaging their industry. For example, a tourism association may be made aware of how ANS is impacting them, and this may bring another proponent for ANS control to the table.

Combining terrestrial and aquatic

Three states that are currently developing their SMPs, Minnesota, New York, and Pennsylvania, are focusing on terrestrial invasive species as well as aquatic invasives. Pennsylvania is doing so because an Executive Order from the governor calls for it, and the other states are doing so because they believe invasive species can be managed more comprehensively this way. These

states are still eligible to apply for Task Force funding, but can only request implementation funds for the aquatic portion of their plans.

Illinois SMP progress

This summary was provided in letter form by Mike Conlin, Director, Office of Resource Conservation, Illinois Department of Natural Resources.

Dear Ms. Butch:

This letter is a summary of the Illinois State Comprehensive Management Plan for ANS (Plan) as requested in your recent email. Comments follow the suggested outline provided in the aforementioned email.

INTRODUCTION:
Development of the plan began in 1998 when funding was made available through the US Fish and Wildlife Service and closely followed the model plan developed by the Great Lakes Panel under the federal ANS Task Force. The development stage took over a year and was submitted on October 25, 1999 for approval.

PLAN DEVELOPMENT:
During the process of developing the plan, a committee was used which was comprised primarily of Department of Natural Resources (DNR) and Illinois Natural History Survey (INHS) personnel. Illinois - Indiana Sea Grant personnel also played an important role in the committee and development of the plan. Staff time was the major contribution as implementation of the plan didn't begin until after acceptance by the Task Force. The major obstacle in this process was the lack of information available and limited coordination among other state and federal agencies.

GOALS AND OBJECTIVES:
The Illinois' plan has three main goals: 1) preventing new introductions of ANS; 2) limiting the spread of established ANS; and 3) abating harmful ecological, economical, social, and public health impacts from ANS infestations. Reaching these goals and objectives has been challenging. Several aspects of the program have been addressed through legislation and administrative rule development. The most significant obstacle to successful and complete implementation is the lack of available funds at both the state and federal level.

IMPLEMENTATION:
Again, the lack of funds is the greatest obstacle for successful implementation. However, in the past year, there has been an increase in the amount of associated paperwork which must be completed in order to spend the limited funds available. This presents a significant and growing obstacle as well.

EVALUATION:
The electric barrier in the Chicago Sanitary and Ship Canal is being evaluated by use of fish stocked with implanted transmitters. Several lakes (treated through a program to control Eurasian Water milfoil) are being evaluated for percentage of reduction (coverage) of the invasive species. These data will be published when available. Outreach portions of the plan have measurable outcomes such as numbers of control plans developed (HACCP), number of organizations / societies which help spread the message through partnerships, and direct boater surveys. Further, there is a model study by Daniel Schneider that predicts where zebra mussels should be in throughout the state, and in reality they're not as widespread as predicted. Whether this is a result of a successful outreach campaign cannot be predicted with certainty, but a survey of anglers has shown an increase in the number of anglers/boaters that take some sort of action to reduce the introduction and spread of invasive species, including zebra mussels. In fact, 84% of recreational water users now take proactive steps to reduce the spread of ANS, which is an increase of 15 percent over the past three years.

FUNDING:
Funding implementation of the plan presents continuing challenges. In addition to funds provided by the Task Force through the US FWS, the State of Illinois provides additional funds through staff time, equipment, purchase of supplies and outreach materials, and direct costs for many projects. The DNR's Office of Water Resources has contributed over $1.8 million to construction of the permanent electric barrier. State funds have been used to evaluate the existing barrier and provide design updates for the new system. The State of Illinois also contributes to regional programs, panels, rapid response, control and management plans, all of which make the ANS program a significant expense. Future funding sources have been discussed, but their potential to absorb the growing costs of the program are unknown.

STATUS OF THE SMP PROCESS:
The SMP process has been completed for the State of Illinois. As a result of a thorough legal review, the legislature has recently passed legislation which gives DNR better control on various introduction pathways and provides for increased penalties. The next major undertaking in the program is a five-year update to the existing management plan. Many of these areas will be addressed during the revision process.

I hope this brief overview provides you with sufficient information on the development of the Illinois Comprehensive Management Plan for ANS and assists in the development of successful regional collaboration. If you require further information, please feel free to contact me.

Sincerely,

Mike Conlin, Director
Office of Resource Conservation

Indiana SMP progress

This summary was provided by Doug Keller from the Indiana Department of Natural Resources.

Summary of Indiana Aquatic Nuisance Species Management Plan

Indiana's ANS Management Plan was developed by D.J. Case and Associates under contract to Indiana DNR, Division of Fish and Wildlife. The plan was developed by a multi-agency task force. There were 44 members on the work group who assisted in developing the plan including members from six DNR Divisions, U.S. Fish and Wildlife Service, Sea Grant, environmental consultants, The Nature Conservancy, three Indiana universities, ANS task force, Sierra Club, Aquaculture, Aquarium groups, Indiana Department of Environmental Management, Army Corps of Engineers, U.S. Dept of Agriculture, Bass Angler Sportsman Society (BASS), IN Dept of Transportation, IN Dept of Health, IN State Chemist, parks departments, and IN Lake Management Society.

Indiana's ANS Management Plan was completed and approved by Governor Kernan on November 1, 2003. The plan was approved by the National ANS task force on November 5, 2004 which made the state eligible for federal funding. Once all approvals of the plan were received, an Aquatic Invasive Species Coordinator position was sought in order to implement the plan. That position was filled in January of 2005. To view the Indiana ANS Management Plan you can go to http://www.in.gov/dnr/invasivespecies/inansmanagementplan.pdf.

There are seven goals listed in the management plan:

1. Coordinate all efforts among agencies and organizations both within Indiana and with other states and nations to manage ANS.
2. Prevent new introductions of ANS into the Lake Michigan and Mississippi River basins of Indiana.
3. Conduct monitoring programs to enhance early detection of introductions or invasions.
4. Institute rapid response objectives to limit the cost of controlling new introductions.
5. Limit the spread of established populations of ANS into uninfested waters of the state.
6. Mitigate harmful ecological, economic, social, and public health impacts resulting from infestations of ANS.
7. Evaluate the effectiveness of the plan and use adaptive management strategies to update the plan during initial implementation and after the five-year period of use.

Implementation of the ANS management plan hinged on the creation of a position fully dedicated to coordinating ANS activities. Funding was also necessary to pay for AIS activities, including funding the coordinator position. As mentioned earlier, an AIS coordinator position was approved and filled. The first year funding was approved by the Fish and Wildlife Service for $72,023 and the second year funding is $70,303.

In order to effectively implement the Indiana ANS Management Plan, some partnerships must be developed as most of the ANS issues cannot be solved by one state working alone. Rather, they should be dealt with on a regional or national level. The northern portion of the state lies in the Great Lakes drainage. Indiana will participate with the Great Lakes ANS panel to address issues facing that region. The largest portion of Indiana lies within the Mississippi River drainage, so Indiana will also participate in the Mississippi River ANS panel. The coordinator will also stay abreast of national AIS issues and legislation as they arise. One area where Indiana still needs to foster a relationship to create dialogue is in the area of the aquarium/water garden industry. Some of the AIS introductions are a result of these vectors, so discussions are necessary to figure out how to lessen this threat. Partnerships must also be developed with universities to help guide necessary research projects that relate to AIS.

Over $70,000 of federal money has been made available in the first two budget years to implement the Indiana ANS Management Plan. This funding requires a 25% state match which will likely come from the state Fish and Wildlife Fund and other non-federal reimbursable projects that deal with AIS. Another funding source (and match money if necessary) for dealing with aquatic invasive plants comes from the Lake and River Enhancement Program. Over $400,000 is available each year for lake associations to develop and implement vegetation management plans to control exotic plants in their bodies of water.

Indiana's ANS Management Plan will be evaluated annually to monitor the progress toward prevention, limitation, and abatement of AIS. Recognizing the volatile and unpredictable nature of AIS, it is reasonable to believe that the plan will require periodic mid-course changes. An interagency advisory council will be formed to examine the progress on strategic management actions. An annual review will also attempt to identify funding needs to successfully accomplish goals and associated tasks. Performance measures will be used to assess the effectiveness of management objectives. For instance, this might include:

- Rate of spread along a river reach or coastline;
- Change in total acreage of habitat occupied by the AIS or the displaced native species;
- Changes in abundance of an invader and directly or indirectly impacted species;
- Changes to federal and state threatened, endangered, extirpated, and extinct species lists due to AIS.

It is recognized that unforeseen factors may impact the progress of remedying a problem and this would be evident through program monitoring and evaluation. This information will prove useful in future program planning processes. Evaluation should also incorporate information from those groups affected by plan implementation. These include organizations or individuals involved with the responsibility of implementing management actions and resource user groups.

Michigan SMP progress

This summary was compiled based on information from the original Michigan ANS State Management Plan from 1996 as well as the updated version from 2002. Additional input was provided by Roger Eberhardt from the Michigan Department of Environmental Quality.

Introduction and Plan Development

The Michigan ANS State Management Plan was originally completed in 1996 and was updated in 2002. The original plan was prepared by the Michigan Department of Natural Resources and the Michigan Department of Environmental Quality. The updated version was a collaborative effort among the Michigan Department of Environmental Quality, the Michigan Department of Natural Resources, and the Michigan Department of Agriculture in consultation and partnership with other interested parties.

The original SMP served as a preliminary document, outlining the things that needed to be researched, such as funding sources for implementation beyond that provided by the ANS Task Force. The 1996 plan was based on and developed concurrently with the Model Plan prepared by Glassner-Shwayder (1996). According to Eberhardt, no real obstacles were faced in the development of the original plan or the update due to widespread and strong support.

Goals and Objectives

The objectives listed in the original SMP include: prevent new introductions of ANS into the Great Lakes and inland waters of Michigan; limit the spread of established populations of ANS into uninfested waters of Michigan; and abate harmful ecological, economic, social, and public health impacts resulting from infestation of ANS. These objectives were based off the suggestions in the Model Plan. More specific goals were laid out along with plans for implementing them. The goals include information and education, research and monitoring, and regulation and policy. The updated plan contains the goal of prevention and control of all ANS in Michigan's waters. The implementation measures, however, are much more specific in the updated plan, even though the goal is vague.

Implementation

The goals discussed above are listed in conjunction with implementation tables that discuss specific implementation activities, the lead agency in charge of implementation, cooperating organizations, and the needed funds. Also included is a goal timeline for each action item to be completed.

Implementation of the new plan also circles around the three key ideas of information and education, research and monitoring, and regulation and policy. These three areas are then broken down into sub-goals underneath each category and specific implementation action items are then listed under each of these sub-goals.

Though no obstacles were faced during the SMP development process, the implementation phase has proven to be another story, for both financial and political reasons. Funding is always a limiting factor in implementation, and Michigan is consistently seeking out new funding options. Political limitations are based on what is currently seen as an important issue within the state as a

whole. Eberhardt mentioned that ballast water management is currently a major issue politically within the state, and one the governor is concerned about. Therefore, legislation has recently been passed developing standards for ballast water within Michigan waters. Other issues that are also important in controlling ANS have not received as much attention, but those agencies working on ANS issues within the state are constantly pushing for legislation on these issues seen as current gaps, and Eberhardt believes that some legislation will be introduced and passed giving DEQ and other agencies more authority and funding on some of these issues that have been ignored, such as rapid-response.

Evaluation

Michigan's original plan contained no process for plan evaluation. Michigan's updated SMP calls for monitoring, under its list of implementation measures, as a way to determine if management actions are having an impact. Other than this, the new plan also does not contain a detailed outline for evaluating the plan through either performance measurement or program evaluation.

Funding

Though the Task Force no longer provides funding for development of a SMP, Eberhardt said a small amount of grant money was available back when Michigan was developing its plan. This money was separate from the implementation money that a state could apply for after having an approved SMP.

The 1996 Michigan SMP requested $466,700 for implementation over a 3 year period. It is interesting to note that Michigan's original SMP mentions that the passage of NANPCA and the prospect of federal funding facilitated their SMP development, but after the plan was developed it was going to be a plan that Michigan would follow, even if federal funding fell through. It also states that an increase in both federal and state funding is necessary to get ANS under control and that other sources of public and private funding will be sought.

The revision of the plan was funded by both Task Force implementation funds as well as state funding. In addition to the federal money being received, the revised plan lists several other sources of funding that have been established as well as plans for seeking additional funding through privates sources, fees, and taxes. The Michigan Department of Agriculture has provided money to Michigan State University for research on biological control of Purple Loosestrife, and the Michigan Great Lakes Protection Fund has provided funding for a variety of research projects. Grants are also actively sought from sources such as the Environmental Protection Agency's Great Lakes National Program Office and NOAA.

One creative initiative that was put forth in October of 2004 was the creation of a voluntary boater decal program for boaters registering or re-registering their boat. For a $35 fee, boaters can obtain a decal that they can place on their boat showing that they are aware of ANS issues

and take care to ensure they do not transport them. Non-boaters that are interested in supporting the program are also welcome to purchase a decal.

Regional Planning, Interaction, and Collaboration

Michigan has made an effort to collaborate with other Great Lakes states when possible. Some examples include the electrical barrier separating the Mississippi River basin from the Great Lakes basin that all Great Lakes states worked on and provided funding for. Another example is a collaborative information and education program with Wisconsin that focused on controlling the spread of the spiny water flea. Michigan agreed to place a decal, designed by Wisconsin, warning about the spiny water flea and its pathways for spread on all boat launch signs in the state.

SMP Workshop

Michigan has put planning for its workshop temporarily on hold. Many pieces of ANS related legislation have either recently been passed in the state or may be passed in the near future. All the state agencies want to work out how these pieces of legislation will be handled internally before proceeding with a state workshop. After the legislation is sorted out the workshop will be held. The workshop will be used to help rewrite the SMP based on the new legislation.

Minnesota SMP progress

This summary was provided by Doug Jensen of Minnesota Sea Grant.

Currently, a draft Minnesota Comprehensive Invasive Species State Plan is under review by an ad hoc committee of the Minnesota Invasive Species Advisory Council (MISAC). This group has been meeting to develop the draft plan framework and implementation plan since January. To further develop the plan, we will hold a workshop of MISAC members and special invited stakeholders from across the state. A copy of the draft plan will be distributed in advance of the workshop to invitees. The workshop will involve discussions about the plan's framework, gaps and needs, timing and responsibilities, and ways to leverage community support to implement the plan. The workshop will be held in the Twin Cities on September 28, 2005.

New York SMP progress

This summary was provided by Tim Sinnott of the New York Division of Fish, Wildlife, and Marine Resources, Bureau of Habitat.

1. Introduction and Plan Development

Upon passage of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA), the New York Legislature passed Chapter 456 of the Laws of 1991 (see Appendix

A). That bill required the New York State Department of Environmental Conservation (NYSDEC) to develop the Aquatic Nuisance Species (ANS) state management plan (SMP) and public facilities management plan described in NANPCA. The task of producing the SMP was assigned to the NYSDEC's Bureau of Habitat (BoH) of the Division of Fish, Wildlife, and Marine Resources [1] (DFWMR).

Work was begun by creating an ad hoc committee of parties interested in and/or affected by ANS, particularly zebra mussels. The ad hoc committee included representatives from the NYSDEC Bureau of Fisheries [2], NYS Department of Health, Monroe County Water Authority, City of Rochester Water Authority, New York State Power Pool (electrical generation industry), Great Lakes United (NGO environmental group), State University of New York at Brockport (research and academic interests), U.S. Fish and Wildlife Service, and New York Sea Grant. From the ideas advanced by the ad hoc committee, a draft plan was produced. It was reviewed by the ad hoc committee, then internally by the NYSDEC. After the comments received were addressed, the draft plan was released for public review and comment. The public comments received were addressed in a responsiveness summary which was appended to the draft plan. The plan was completed in November 1993, and submitted to the Federal Aquatic Nuisance Species Task Force. In March 1994, the NYSDEC Nonindigenous Aquatic Species Comprehensive Management Plan was approved by the Federal Aquatic Nuisance Species Task Force, making it the first SMP to be approved under NANPCA.

In 1995, New York State received its first funding grant from the ANS Task Force via the U.S. Fish and Wildlife Service. Since that time to the present, New York State has received a total of $422,070 from the ANS Task Force for implementing the ANS SMP. Some of the projects funded include:

[1] Those are the current names. At the time (July 1991), organizations were known as the Bureau of Environmental Protection in the Division of Fish and Wildlife. The Division of Fish and Wildlife was merged with the Division of Marine Resources in January 1997. The Bureau of Environmental Protection was renamed the Bureau of Habitat in July 1997.

[2] Michael Gann was the leader of the Pubic Access Section of the Bureau of Fisheries, and in that role, represented the boating community as well as Fisheries interests.

- Development and/or purchase of numerous brochures, pamphlets, watch cards for education and outreach, to include the producing signs for use at boat launch sites;

- Funding two ANS research studies by Cornell University;

- Purchase of and subsequent release of herbivorous insects for purple loosestrife control;

- Funding development of an ANS display in the New York State Museum;

- Funding travel for BoH staff to participate in regional ANS activities, to include the Grant Lakes Regional ANS Panel, and the Northeast ANS Panel, and working with Vermont staff to develop the Lake Champlain Basin ANS Management Plan;

- Purchase of equipment used by the NYSDEC for ANS management activities, including diving gear for monitoring zebra/quagga mussel colonization of spawning reefs, microscope for veliger and plant identification;

- Funding support to New York State Museum Science Service staff involved in a project of developing a biological control agent for zebra mussels from common soil bacteria (Dr. Daniel Molloy);

- Contracting for revision and update of the New York State ANS management Plan (discussed below);

- The biggest single item funded with ANS money was the Finger Lakes Zebra Mussel Monitoring and Ecological Assessment Project (FLZMMEAP). This program was a 10 year study to collect baseline ecological water quality from New York States Finger Lakes. The Finger Lakes are a series of morphologically similar long, narrow, generally oligotrophic - mesotrophic lakes across central New York that resemble "fingers" on a hand. At the onset of the project, only a few of the lakes were colonized by zebra mussels. The purpose of the project was to monitor the lakes for water quality changes as zebra mussel colonization progressed in order to determine if changes in fisheries management strategies were warranted. The project was also able to capture the effects of two invasive cladocerans (spiny waterflea, *Bythotrephes longimanus*; fishhook waterflea, *Cercopagis pengoi*) as well as those from zebra/quagga mussels.

It is important to bear in mind that when New York State was in the process of developing the ANS SMP, there was no federal guidance available regarding the form or substance of state ANS management plans. In March 1998, the Federal Aquatic Nuisance Species Task Force released draft guidance for SMPs. It was necessary to revise New York's SMP to bring it into compliance with the Federal ANS Task Force's draft guidance. DFWMR leadership determined that it was not possible to commit staff to a full-time project of revising the ANS SMP, so permission was requested from the ANS Task Force to request federal ANS funds to revise and update the ANS SMP. This action was authorized, and a contract was let to find a consultant to

make the necessary revisions. Unfortunately, the contractor that won the bid proved to be largely ineffective, and DFWMR did end up committing a large amount of staff time to revising the plan.

Work on revising the plan was begun by conducting a series of public meetings at three different locations across the state. The ANS issue was explained to attendees, and their input was sought regarding what should be included in the revised ANS SMP. The input was then used to develop a draft. The draft was reviewed, accepted, and modified by a BoH staff committee. After the revised draft ANS SMP was finalized, it was reviewed internally by the DFWMR. After DFWMR comments were addressed, the revised draft ANS SMP was reviewed by a select group of other NYSDEC divisions, and other state and federal agencies (see Appendix B). The external agency review was completed in January 2003.

In the summer of 2003, the New York State Legislature passed Chapter 324 of the Laws of 2003 (see Appendix C). This legislation called for the establishment of a state Invasive Species Task Force (ISTF). The purpose of the task force is to:

> prepare a report to the governor and the legislature that provides specific recommendations regarding: existing state laws, regulations, programs, policies, practices, and resources available to prevent the introduction of invasive species; the detection and rapid response to and control of populations of such species in a cost-effective and environmentally sound manner; the monitoring of invasive species populations accurately and reliably; the restoration of native species and habitat conditions in ecosystems that have been invaded; research on invasive species and development of technologies to prevent introduction and provide for environmentally sound control of invasive species; the promotion of public education on invasive species; and the means to foster greater coordination between state agencies, and the public.

Because of the broad mandate of the ISTF, the leadership of the DFWMR decided to suspend work on the revised Draft ANS SMP. This decision was made in order to insure that when the draft ANS SMP was submitted to the Federal ANS Task Force, it would be entirely consistent with the recommendations of the ISTF. The final report of ISTF is due no later than December 2005. Once the report is released and approved/accepted by the Governor and the State Legislature, the revised draft ANS SMP will be revised further to insure consistency with the ISTF report. After public review, it will be submitted to the Federal ANS Task Force as a revision of the current existing, 1994 ANS SMP.

2. Goals and Objectives

Further discussion of New York's ANS SMP presents a quandary. New York's current ANS SMP is out of date, and inconsistent with the 1998 draft Federal Guidance. The revised draft ANS SMP has not yet been approved by the Federal ANS Task Force, and is likely to undergo at

least some additional revisions to make it consistent with the ISTF report. So which one should be discussed?

The current ANS SMP will be replaced. The current revised draft ANS plan is consistent with federal guidance, and is much more likely to be implemented eventually than the current plan. So, unless stated otherwise, references to New York's ANS SMP will refer to Version 3.2 of the revised draft ANS SMP rather than the existing, approved, 1994 ANS SMP.

The draft revised ANS SMP states: Five specific goals have been identified for New York State's ANS management program. These are:

Goal 1. Provide effective and efficient ANS program management

Objectives:

A. Identify and describe the staff and resource requirements needed to implement an ANS management program and achieve the goals identified in the revised New York State ANS Management Plan.

B. Create an ANS Advisory Council (ANSAC) to provide citizens and representatives of groups interested in or affected by ANS the opportunity for ongoing dialog and input into ANS management decisions, directions, and priorities.

C. Organize an Interagency ANS Task Force (IANSTF) with participants from other state agencies (NYSDA&M, NYSDOT, NYDOS, NYSCC, etc) for developing interagency coordination of ANS management efforts.

D. Develop and implement effective performance measures and feedback mechanisms in order to quantify effectiveness of the ANS program and modify or adjust objectives and tasks as needed.

E. Provide New York representation at the Federal ANS Task Force, Great Lakes Panel for Aquatic Nuisance Species, Northeast Aquatic Nuisance Species Panel, and Mid-Atlantic Aquatic Nuisance Species Panel (when formed).

F. Establish and document short term and long term species priorities for prevention, control, and mitigation research actions and update as required.

Goal 2. Prevent the introduction of new ANS into the waters of New York State and enforce ANS Laws and Regulations

Objectives:

A. Participate in national or regional task forces, ANS Panels, or other coordinating groups working to propose actions to reduce the introduction of ANS via ballast water and/or other transoceanic vectors.

B. Institute a water quality standard prohibiting the discharge of viable ANS in ballast water (or other ship-borne water) originating from outside New York State.

C. Identify appropriate revisions or additions to state laws and regulations for preventing the introduction of ANS species and for limiting the spread of ANS already introduced.

D. Prepare species-specific prevention plans for preventing the introduction of ANS not already present in New York waters and for the detection of and rapid response to the species should it become introduced.

E. Utilize the IANSTF and ANSAC to identify proposals for preventing introduction of ANS species through bait industry, aquaculture, sea food industry, aquarium trade, nursery industry, and the importation of ANS, especially plants, via the internet trade. In conjunction with the task force, propose new or revised regulations and legislative initiatives as necessary to implement comprehensive State ANS management proposals.

Goal 3. Control the spread of ANS species to new water bodies within the state, and mitigate adverse ecological, societal, and economic impacts resulting from an ANS introduction

A. Prepare species-specific plans for controlling the spread of ANS already introduced into the waters of New York State, to include limiting their further spread within the water body(ies) already colonized and reducing or eradicating the population to the extent possible.

B. Involve the public in efforts to monitor ANS introductions.

C. Monitor the distribution of ANS in New York waters in order to assess ANS range, colonization success, control needs, and to evaluate the success of controls.

D. Identify and document the extent of ecological, societal, and economic impact. Identify, describe, and disseminate possible means of mitigating those impacts. Prepare mitigation plans/proposals as necessary.

E. Evaluate the possible impact of ANS introductions on any strategic management plans or commercial/recreational fisheries management goals and objectives that might exist for those waters.

Goal 4. Involve and motivate the general public to take steps to prevent new ANS introductions and control the spread of ANS through education

Objectives

A. Develop a public information, education, and outreach program to:

   1. Increase the level of general knowledge and awareness of what ANS are and how they are introduced and spread;

   2. Inform the public about the potential harmful ecological, societal, and financial impacts of ANS;

   3. Motivate the public to take action to reduce new ANS introductions and the spread of ANS already introduced;

   4. Support funding of ANS programs and activities.

B. Establish an information, extension, and distribution network for reaching interested and impacted groups and individuals as well as students and the general public.

C. Provide an early warning system to warn the public about impending ANS introductions, how they can monitor for the species, and how they can minimize potential adverse impacts.

D. Coordinate education efforts with national, state, regional, and municipal organizations and programs.

Goal 5. Encourage, promote, and support ANS research in New York State

Objectives

A. Identify ANS research priorities for New York State.

B. Develop a network of researchers involved with ANS issues throughout the state.

C. Establish a small grants program for funding short-term research projects into ANS issues of high state priority

3. Implementation

The ANS Coordinator was allocated about 15% (approximately 33 days per year) of available staff time on the workplan for ANS-related activities. The corresponding salary made up in-kind service for match for federal ANS grants, which were generally in the range of $40,000 - $60,000 annually. New York State's ANS SMP was successfully implemented to the extent possible given the resource limitations described above.

Obstacles to Implementation

A. ANS management and control was never adopted as a NYSDEC or DFWMR high program priority. Instead it was viewed as an outside mandate. At the time (mid-1990's), the concept of ANS was largely synonymous with zebra mussels, and the departmental mindset was that introductions could not be stopped once they occurred, and that most of the effort aimed at addressing ANS issues should be directed at prevention at the Federal level

B During the mid 1990s to the present, New York State government entered a period of grater fiscal austerity, and programs were continuously assessed and reassessed. New programs, such as ANS, had to compete with existing programs and staff. Staffing and resource availability have declined continuously to the present day. New initiatives had to be accompanied by new funding sources to have a hope of becoming established. Concurrently, the availability of federal ANS funds continuously decreased as well, as more and more states came on board with approved plans, and eligibility for funds.

C. Limited staff and Resources. As stated above, the general programmatic commitment of the NYSDEC to ANS was approximately 33 days of staff time for a part time ANS coordinator [3]. A large portion of that time was spent managing the Federal ANS grant, and participating in regional ANS panels. Little time was left for ANS SMP implementation.

D. Lack of coordinated public support or interest. Many different groups are interested in and/or affected by ANS. However, in New York, this concern was never coordinated. The most vocal groups are local lake associations concerned about aquatic plant issues in their local lake. Such groups tend to talk to their own legislative representatives about their own problems, and no "critical mass" of public concern is achieved. The concerns of other groups, such as the boating and angling communities, are seldom assessed or communicated to policymakers. The state legislature as a whole does not have an appreciation as to how the public is affected by and concerned about ANS statewide.

E. Public support is not fostered by programs that do not actually control ANS. The public is disillusioned by programs that focus on research, education and outreach,

[3] Other NYSDEC staff have been involved with ANS. For example, the Division of Water has full time staff involved with aquatic vegetation management, which in New York, is largely Eurasian watermilfoil. Also, Regional biologists have been involved with ANS management as part of routine activities. In one region, fisheries biologists and technicians accomplished a limited level of water chestnut hand pulling. Other DFWMR biologists were involved with purple loosestrife control. These actions were part of routine operations, and happened regardless of the existence of the ANS SMP.

regional coordination, etc. They want to see ANS, primarily plants, removed from "their" lake.

Partnerships.

New York has not utilized partnerships in the implementation of the ANS SMP. Partnerships are an important component of the revised draft ANS SMP which is currently in a state of suspension. The State Invasive Species Task Force is in itself a partnership, as it is made up of representatives from at least 15 different agencies or groups.

The most successful partnership developed from regional ANS management activities independent of the statewide ANS SMP. Region 5, the Adirondack Mountains, developed a partnership between NYSDEC Region 5, NYS Department of Transportation, The Nature Conservancy, and the Adirondack Park Agency. This effort evolved into the successful Adirondack Park Invasive Plant Project (APIPP, see http://www.adkinvasives.com/documents/APIPPFactSheet2004.pdf).

Given the general lack of staff and resources, and the lukewarm attitude of policymakers to the ANS problem, effective partnerships are the only way any effective ANS management is likely to occur in New York State.

The factors most likely to facilitate full ANS SMP implementation in New York State are: a long term commitment to addressing ANS issues at the executive/policy maker level of government; and the commitment of full time staff with more than minimal resources to ANS issues. Levels of staffing and resources needed have been described in both the current, existing ANS SMP as well as the revised draft ANS SMP.

4. Evaluation

Effective means and measures for measuring success have not been integrated into either the current or revised draft ANS SMP. The revised draft ANS SMP discusses the need for measures of success, evaluation, reassessment, and deletion of programs that are ineffective.

The revised draft ANS SMP was developed using the 1998 Federal ANS Task Force Draft Guidelines for SMPs. It does not include the most recent requirements, such as the need for a rapid response plan.

5. Funding

New York's ANS program has been suspended until the report of the State Invasive Species Task Force is published. Thus, no funding is currently being applied to ANS SMP implementation.

Appendix A. Chapter 456 of the Laws of 1991

STATE OF NEW YORK

5122--A

Cal. No. 1026

1991-1992 Regular Sessions

IN SENATE

May 1, 1991

Introduced by Sens. SHEFFER II, DALY, FARLEY, HANNON, HOLLAND, JOHNSON, KEHOE, LARKIN, MALTESE, MARCHI, McHUGH, PRESENT, SALAND, STAFFORD, VELELLA, VOLKER -- read twice and ordered printed, and when printed to be committed to the Committee on Environmental Conservation -- reported favorably from said committee, ordered to first and second report, ordered to a third reading, amended and ordered reprinted, retaining its place in the order of third reading

AN ACT to amend the environmental conservation law, in relation to the submission of a state management plan for the control of nonindigenous aquatic species

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

Section 1. Subdivision 2 of section 3-0301 of the environmental conservation law is amended by adding a new paragraph w to read as follows:

w. Shall prepare and submit to the federally appointed "Aquatic Nuisance Species Task Force" two comprehensive management plans, after notice and opportunity for public comment, for funding of New York state activities under the Federal Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990, Public Law 101-646, by January 1, 1992. One such plan shall identify those areas or activities within the state, other than those related to public facilities, where technical and financial assistance is needed within the state to eliminate or reduce environmental, public health and safety risks and to mitigate the financial

impact upon the state associated with non-indigenous aquatic species, particularly zebra mussels. The other plan shall be a "public facility management plan" which is limited solely to identifying those public facilities within the state for which technical and financial assistance is needed to reduce infestations of zebra mussels. Each plan shall identify the

EXPLANATION--Matter in italics (underscored)is new; matter in brackets
[ ] is old law to be omitted

LBD10458-03-1

S. 5122--A 2

management practices and measures that will be undertaken to reduce infestations of aquatic nuisance species, especially zebra mussels, and include the following: (1) a description of the state and local programs for environmentally sound prevention and control of the target species; (2) a description of federal activities that may be needed for environmentally sound prevention and control of aquatic nuisance species and a description of the manner in which those activities should be coordinated with state and local government activities and (3) a schedule for implementing the plan, including a schedule of annual objectives. In developing and implementing these management plans, the
department shall, to the maximum extent practicable, involve local governments, regional entities, and public and private organizations that have expertise in the control of aquatic nuisance species. Copies of these plans shall also be submitted to the temporary president of the
senate and the speaker of the assembly, and the department shall annually, on or before January first, submit to the temporary president of the senate and speaker of the assembly a report on the activities of the department under these plans.

§2. This act shall take effect immediately.

NOTE: SCANNED version - line numbering, font, and spacing may differ from the original.

Revised ANS Management Plan -

Plan for internal review

Technical letter from ANS Coordinator to counterparts requesting review and technical comment. Not formal sign-off. Not an interagency plan, NYSDEC plan.

Other State Agencies

- Department of State, Coastal Zone Management Program
- Department of Health
- Department of Agriculture and Markets
- Adirondack Park Agency
- Office of Parks, Recreation and Historical Preservation
- Department of Transportation
- New York Thruway Authority - Canal Corporation

Inside DEC

- Hudson River Estuary Program
- Great Lakes Program
- DFWMR Division Director
  - Bureau of Fisheries
  - Bureau of Habitat
  - Bureau of Wildlife
- Office of Legal Affairs
- Division of Water
- Bureau of Pesticides Management
- Division of Lands & Forests
- Division of Environmental Permits

Other

New York Sea Grant
New York State Education Department, NY State Museum Science Service
US Fish & Wildlife Service
New York Power Authority

Appendix B. Review Plan for Revised Draft ANS Management Plan

New York State Department of Environmental Conservation
Division of Fish, Wildlife & Marine Resources
Bureau of Habitat, 5th Floor
625 Broadway, Albany, New York 12233-4756
Phone: (518) 402-8970 • **FAX:** (518) 402-8925
e-mail: txsinnot@gw.dec.state.ny.us

Erin M. Crotty
Commissioner

M E M O R A N D U M

October 7, 2002

TO: SEE DISTRIBUTION

FROM: Timothy J. Sinnott

SUBJECT: Review of the 2002 Revised DRAFT Aquatic Nuisance Species (ANS) Management Plan

In November 1993, the Bureau of Habitat completed work on New York State's first Nonindigenous Aquatic Species Comprehensive Management Plan. That plan was approved by the Federal Aquatic Nuisance Species Task Force in March 1994, and became the nation's first approved state ANS Management Plan under the provisions of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990.

In 1998, the Federal ANS Task Force published new guidance for state ANS management plans. The ANS plan envisioned in the Federal guidance was considerably different than New York's existing ANS management plan. Also, due to much greater knowledge and experience in ANS management, New York's plan was outdated and in need of revision. The Bureau of Habitat has been working to revise and update the plan to make it consistent with the content requirements of the 1998 Federal guidance. The draft revised plan was just completed and is ready for internal state agency review.

With this memorandum I would like to provide you with a copy of the draft revised ANS plan and request that you or appropriate designated staff review it. Please review the plan in regards to its technical and policy proposals for the management of ANS in New York and provide any comments, suggested changes, or recommendations that might improve the plan or its' likelihood of success.

I would appreciate it if the review could be completed and comments returned to me no later than December 2, 2002. If you feel that someone else should also review this draft plan, please let me know as soon as possible and I will forward this request to them.

If you would like a copy of the November 1993 Nonindigenous Aquatic Species Comprehensive Management Plan to assist your review, contact me and I would be glad to send you a copy, or a PDF version can be downloaded from: www.dec.state.ny.us/website/dfwmr/habitat/hoa1b3.htm .

Please note that this plan is a draft for internal review by state agencies and select external reviewers, and should not be released to the public.

Thank you very much. I appreciate your assistance, and look forward to hearing your thoughts and ideas about this proposal and ANS management in general, and integrating your suggestions into the plan.

Biologist 2 (Ecology)
Ecotoxicology and Standards Unit Leader

Attachment
as

Distribution:

Great Lakes Program Coordinator
Hudson River Estuary Management Program Coordinator
Director, Division of Fish, Wildlife and Marine Resources
Director, Division of Lands and Forests
Director, Division of Environmental Permits
Director, Division of Water
Chief, Bureau of Fisheries
Chief, Bureau of Wildlife
Chief, Bureau of Marine Resources
Fish and Wildlife Program Attorney
Chief, Northern Watershed Management Section, Division of Water

Information addressees w/o attachment:
Chief, Bureau of Habitat

Appendix C. Chapter 324 of the Laws of 2003

S T A T E O F N E W Y O R K

6988--A

Cal. No. 333

2003-2004 Regular Sessions

I N A S S E M B L Y

March 17, 2003

Introduced by M. of A. DiNAPOLI, ENGLEBRIGHT, GRANNIS, SWEENEY, GLICK, WEISENBERG, SMITH, PAULIN -- Multi-Sponsored by -- M. of A. COLTON -- read once and referred to the Committee on Governmental Operations -- passed by Assembly and delivered to the Senate, recalled from the Senate, vote reconsidered, bill amended, ordered reprinted, retaining its place on the order of third reading

AN ACT creating the New York state invasive species task force

THE PEOPLE OF THE STATE OF NEW YORK, REPRESENTED IN SENATE AND ASSEMBLY, DO ENACT AS FOLLOWS:

Section 1. Legislative intent. The Legislature finds that invasive plant and animal species pose an unacceptable risk to New York State`s environment and economy and that this risk is increasing through time as more invasive species become established within the state.

The Legislature additionally finds that invasive species are having a detrimental effect upon the state`s fresh and tidal wetlands, water bodies and waterways, forests, meadows and grasslands, and other natural communities and systems by out-competing native species, diminishing biological diversity, altering community structure and, in some cases, changing ecosystem processes. Moreover, the Legislature recognizes that the ecological integrity of an increasing number of publicly and privately-owned parks and preserves is being adversely affected by invasive plants and animals, challenging the ability of land management agencies to effectively manage these sites.

The Legislature further recognizes that nearly half (forty-six percent; fifty-seven percent of the plants, thirty-nine percent of the animals) of the species on the federal list of endangered species are declining, at least in part, due to invasive species.

The Legislature additionally finds that invasive species have an adverse impact on the New York State economy. Particularly affected by these species are the water supply, agricultural, and recreational sectors of the state economy. The economic impact to the national econo-

EXPLANATION--Matter in ITALICS (underscored) is new; matter in brackets { } is old law to be omitted.

my has been estimated to be as high as one hundred thirty-seven billion dollars annually.

S 2. The New York state invasive species task force is hereby established. The role of the task force includes, but is not limited to:

(a) assess the nature, scope and magnitude of the environmental, ecological, agricultural, economic, recreational, and social impacts caused by invasive species in the state;

(b) identify actions taken by members of the task force, state and local governments and the public to: prevent the introduction of invasive species; detect and respond rapidly to and control populations of invasive species in a cost-effective and environmentally sound manner; monitor invasive species populations accurately and reliably; provide for restoration of native species and habitat conditions in ecosystems that have been invaded; conduct research on invasive species and develop technologies to prevent introduction; provide for environmentally sound control of invasive species; promote public education on invasive species; and the means to address invasive species;

(c) prepare a report to the governor and the legislature that provides specific recommendations regarding: existing state laws, regulations, programs, policies, practices, and resources available to prevent the introduction of invasive species; the detection and rapid response to and control of populations of such species in a cost-effective and environmentally sound manner; the monitoring of invasive species populations accurately and reliably; the restoration of native species and habitat conditions in ecosystems that have been invaded; research on invasive species and development of technologies to prevent introduction and provide for environmentally sound control of invasive species; the promotion of public education on invasive species; and the means to foster greater coordination between state agencies, and the public.

S 3. The task force shall issue its findings, in the form of a report, no later than November 30, 2005.

S 4. The task force shall consist of a total of 17 members and shall include the commissioners of environmental conservation, agriculture and markets, transportation, the office of parks, recreation and historic preservation, secretary of state, the chairperson of the New York state thruway authority, the director of the New York state canal corporation, the chairperson of the Adirondack Park agency, and the program manager of the New York natural heritage program, or a designee of such agencies, public authorities or programs. The commissioners of environmental conservation and agriculture and markets shall select the task force`s 8 at-large members from each of the following: New York biodiversity research institute, New York state`s land grant university, New York sea grant, a statewide organization formed to address invasive species, a statewide land conservation organization, a statewide agricultural organization, a nursery

business and a boating organization.
  S 5. The commissioner of agriculture and markets and the commissioner of environmental conservation or their designees shall serve as joint chairs of the task force.
  S 6. The task force may consult with any organization, educational institution, governmental agency, or person including, but not limited to, the United States Department of Agriculture, the United States Coast Guard, the Port Authority of New York and New Jersey, and the National Invasive Species Council.
  S 7. The commissioners of environmental conservation and agriculture and markets may reconvene the task force, with the same or different members, after issuance of the report, to address any invasive species issues.
  S 8. The members of the task force shall serve without compensation, except that at-large members shall be allowed their necessary and actual expenses incurred in the performance of their duties under this act.
  S 9. This act shall take effect immediately.

.SO DOC A 6988A *END* BTXT
2003

Ohio SMP progress

This overview was completed with the help of a phone interview with Joe Mion of the Ohio Department of Natural Resources (ODNR) as well as the Ohio ANS State Management Plan (1997).

Introduction and Plan Development

Ohio's ANS State Management Plan was completed in 1997. The Ohio SMP was developed based on the Model Plan prepared by Glassner-Shwayder (1996) in both content and format. Many agencies were involved in the SMP creation process including the ODNR Divisions of Wildlife, Natural Areas and Preserves, Real Estate and Land Management, and the Ohio Lake Erie Office, as well as Ohio Sea Grant; the Ohio Environmental Protection Agency; and the Ohio Cooperative Fish and Wildlife Research Unit of the United States National Biological Service. Funding for the SMP development came primarily from the ODNR Division of Wildlife.

Joe Mion indicated that there were few, if any, real obstacles to developing the Ohio SMP. Since the plan was based on the Model Plan it was not a difficult task for the agencies involved to coordinate and complete the plan with relative ease.

Goals and Objectives

Three main goals were identified in the SMP and include preventing new introductions of nonindigenous ANS into the Great Lakes and inland waters of the state; limiting the spread of established populations of nonindigenous ANS into uninfested waters of the state; and abating harmful ecological, economic, social, and public health impacts resulting from infestation of nonindigenous ANS. Ohio has identified a lack of resources, including financial and personnel resources, as the biggest impediment to reaching their goals.

Mion indicated that Ohio has decided the goals they set out in the original SMP were too vague, general, and all-encompassing. Ohio is interested in updating their plan and focusing on more specific goals so that they have specific areas to focus their limited resources and implementation efforts on.

Implementation

Some examples of implementation factors present in the current Ohio SMP include research, promoting legislation and regulation, enforcement actions, monitoring, and assessment of ecological and economic impacts of ANS. As with the goals of the Ohio SMP, the implementation measures are broad and will be made more specific when the plan is updated.

Ohio has faced many obstacles while attempting to implement their SMP. They feel that the money available is extremely limited relative to the funding needed to implement their plan. Not having or being able to work on getting the amount of research and monitoring data needed to best know how to meet the specified goals has also been an impediment to implementation. Mion also indicated that Ohio has become frustrated with the lack of action at the federal level being taken with regards to updating of NANPCA and the passage of other introduced legislation. They are also frustrated with the fact that they believe that the legislation that is being introduced is not strong enough. The concern is that they do not provide enough funding for SMP implementation and other ANS related activities and are not strong enough in the standards being proposed.

Ohio is very interested in working on a regional level with all the other Great Lakes states as they move forward in updating their plan. Mion indicated that they believe ANS is a region-wide issue and not a state issue, and that the best results will come when states begin implementing the same types of programs and working together on their common problems.

Evaluation

Ohio's current SMP has an evaluation component built in, that focuses on periodic review and adaptive management. The evaluation process laid out includes oversight, evaluation, and dissemination of information. For the oversight process, the plan proposes putting together an oversight committee with appropriate state agencies, interested parties, a representative from the governor's office, and the authors of the SMP. The Oversight Committee's purpose is to examine the progress the Plan is making towards achieving its goals. The evaluation component includes examining progress and identifying funding needs. The dissemination of information portion takes place in the form of an annual report to include successes, failures, and future plans.

Funding

Like Michigan, Ohio received a small amount of federal money to help develop its SMP, though this money is no longer offered and plans must be created with funds found elsewhere. The primary source of funding for implementation has been from the Task Force. As mentioned previously, Ohio believes that this funding is inadequate to meet the needs of their program.

Regional Planning, Interaction, and Collaboration

The current Ohio SMP discusses regional issues and roles as well as issues and roles specific to Ohio. It also has some implementation measures specific to regional planning and coordination, but Mion stated that Ohio is interested in creating a regional plan for the Great Lakes because they believe that ANS issues are a regional issue and not a state issue, and that nothing can be solved if all the states are not working towards the same goals and objectives.

SMP Workshop

What the Ohio SMP Workshop will entail has not been entirely decided yet. Since Ohio has already completed a plan and is interested in regional collaboration so much, the workshop may focus on ways to incorporate those issues into Ohio's own plan as well as creating a Regional Plan. Mion also mentioned that it may be helpful if Commission staff reviews the Ohio Plan and makes suggestions on issues that need to be worked on in the updated plan.

Pennsylvania SMP progress

This summary was developed by Sarah Whitney of Pennsylvania Sea Grant and Jim Grazio of the Pennsylvania Department of Environmental Protection.

Pennsylvania Plan of Work and History

Proposal

Use the funds from the Great Lakes Commission grant *A Collaborative Approach to Advance Implementation of State Management Plans for Prevention and Control of Aquatic Nuisance Species in the Great Lakes Region* to support the initial convening of the Pennsylvania Invasive Species Council and beginning discussion of a Pennsylvania Invasive Species Management Plan.

Background

The Pennsylvania Invasive Species Council (Council) was established through Executive Order 2004-1 in January 2004. The Council is comprised of representatives from the departments of Agriculture, Conservation and Natural Resources, Environmental Protection, Health, and Transportation; and the Fish and Boat Commission and the Game Commission. In addition, 10 members of the public representing agriculture and natural resource organizations and educational institutions conducting invasive species research and outreach are also appointed by the Governor to the Council (*List of state agency and members of the public available below*).

The Commonwealth has struggled with implementation of the Council, and as of July 2005 the Council has not formally met. This funding source will be used as a way to jumpstart the Council and begin development of a Pennsylvania Invasive Species Management Plan. While there are a number of activities occurring throughout the Commonwealth to prevent the introduction and spread of invasive species, Pennsylvania does not have a comprehensive plan to direct this work. It would be useful for Pennsylvania to develop and implement an invasive species management plan to coordinate and fund prevention and control actions that will augment those programs already in place.

Under Section 1204 of the *National Aquatic Nuisance Prevention and Control Act*, states are encouraged to develop and seek federal approval of comprehensive management plans for the prevention and control of aquatic invasive species. The Great Lakes Panel on Aquatic Nuisance Species developed *A Model Comprehensive State Management Plan for the Prevention and Control of Nonindigenous Aquatic Nuisance Species* to provide an outline and consistent format for states to follow during plan development. Building on this effort, the federal Aquatic Nuisance Species Task Force has developed *Guidance for State and Interstate Aquatic Nuisance Species Management Plans*, further refining the components in the management plan. Once a plan has been approved by the Aquatic Nuisance Species Task Force, it is eligible to apply for funds to implement the management plan.

Using Funding for Initial Workshop

This funding source would be most useful in Pennsylvania to convene an initial meeting of the Pennsylvania Invasive Species Council and begin development of the state's invasive species management plan. The funds will be used to pay for staff time, meeting costs, supplies, and materials as well as travel and hotel accommodations to the regional follow-up workshop (organized by the Great Lakes Commission as proposed in their grant). Additional funds, as available, will be used to support meetings to continue work on management plan development.

The Great Lakes Commission's *Model Comprehensive State Management Plan for the Prevention and Control of Nonindigenous Aquatic Nuisance Species* could be shared, as well as an overview of lessons learned by other states in the development of statewide invasive species management plans (ISMP), to lay the groundwork for development of a Pennsylvania Invasive Species Management Plan. This will also be an opportunity for Council members to agree to organizational responsibility for specific parts (e.g., aquatic, terrestrial, bacterial, etc) within the management plan.

A possible format for the longer workshop to begin development of the management plan, as a two-day meeting, is:

Day 1

Council members and interested parties meet in the morning of the first day to introduce concept of an invasive species management plan, highlight the successes, failures, and lessons learned from efforts in other states, discuss goals of state plan and assign/agree to agency leads for specific parts (e.g., aquatic, terrestrial, bacterial, etc).

Other topics:

- Presentations about what activities state agencies are conducting regarding invasive species research and management in Pennsylvania
- Presentation of what non-agency groups (such as non-governmental organizations or academic institutions) are doing regarding invasive species research and management in Pennsylvania
- Overview of national and regional efforts with which Pennsylvania can participate (for example: funding, regional panels, national legislation, monitoring and reporting efforts)
- Brainstorming session for activities and actions that would ideally exist to support invasive species management in Pennsylvania

Afternoon: Devoted to working groups to develop a timeline and outline of the management plan's different sections.

Day 2:
Continue working groups to develop a timeline and outline of the management plan's different sections, and identify the next steps for process. Report out in late afternoon.

Next steps

In order for the workshop to be successful, a number of activities must be accomplished beforehand. These activities include the following:

- Compile preliminary list of invasive species currently documented in Pennsylvania.
- Identify and confirm project commitments (financial and/or staffing resources) from agencies and organizations for invasive species management plan development
- Agencies and organizations develop list of current invasive species prevention and control activities (building on work by Kirstin Wakefield).

PENNSYLVANIA INVASIVE SPECIES COUNCIL

Established by Governor's Executive Order 2004-1
January 27, 2004

Chair: Dennis C Wolff, Secretary Pennsylvania Department of Agriculture (Alternate:	
State Agency Members:	
Dr. Douglas J. Austen, Executive Director Pennsylvania Fish & Boat Commission (Alternate: John Arway)	Allen D. Biehler, P.E., Secretary Pennsylvania Department of Transportation (Alternate: Joseph S. Demko)
Michael DiBerardinis, Secretary Pennsylvania Department of Conservation & Natural Resources (Alternate: Sally Just)	Dr. Calvin G. Johnson, Secretary Pennsylvania Department of Health (Alternate:)
Kathleen McGinty, Secretary Pennsylvania Department of Environmental Protection (Alternate: John T. Hines)	Vernon R. Ross, Executive Director Pennsylvania Game Commission (Alternate: Anthony Ross)
Members of the Public (Two Year Appointment)	
Dr. D. James Baker, President & CEO Academy of Natural Sciences of Philadelphia	Charles W. Bier Western Pennsylvania Conservancy 209 Fourth Avenue Pittsburgh, PA 15222
Charlie Conklin, President Pennsylvania Aquaculture Association	Karen Budd The Nature Conservancy in Pennsylvania 15 East Ridge Pike, Suite 500 Conshohocken, PA 19428
Eric Obert Pennsylvania Sea Grant Penn State Erie – The Behrend College 5091 Station Road Erie, PA 16563	Walt Peechatka, Executive Vice-President PennAg Industries Association
James MacKenzie Pennsylvania Landscape & Nursery Association 1707 South Cameron Street Harrisburg, PA 17104	Ed Golomb, III Pennsylvania Farm Bureau 510 S. 31st Street P. O. Box 8736 Camp Hill, PA 17011
Dr. Bruce A. McPheron 217 Agricultural Administration Building Penn State University University Park, PA 16801	Dr. Sue A. Thompson Pennsylvania Biodiversity Partnership 16 Terminal Way Pittsburgh, PA 15219

Invasive Species in Pennsylvania

The following lists of invasive species found in Pennsylvania, or of concern to the Commonwealth, were compiled at the request of the Great Lakes Commission. The information is strictly preliminary, and by no means comprehensive. It should be noted that several species are a concern in some watersheds but are native in others (e.g. flathead catfish, rusty crayfish). In addition, sometimes species were not included in any of these lists – for example, the quagga mussel, which is invasive in Pennsylvania.

1. A 2002 survey of resource managers by Pennsylvania Sea Grant identified numerous animal and plant invasive species in the Delaware Estuary, listed below. The top five animal and plant species of highest concern to respondents were *Phragmites*, purple loosestrife, *Hydrilla*, Eurasian watermilfoil, Japanese knotweed, zebra mussels, resident Canada goose, nutria, grass carp, and flathead catfish.

Animal Species:
Resident Canada Goose *Branta canadensis*
Spiny Water Flea *Bythotrephes spp.*
Northern Snakehead *Channa argus*
Goldfish *Carassius auratus*
European Green Crab *Carcinus maenas*
Asiatic Clam *Corbicula fluminea*
Grass Carp *Ctenopharyngodon idella*
Mute Swan *Cygnus olor*
Zebra Mussel *Dreissena polymorpha*
Japanese Shore Crab *Hemigrapsus sanguineus*
Silver Carp *Hypophthalmichthys molitrix*
Bighead Carp *Hypophthalmichthys nobilis*
Black Carp *Mylopharyngodon piceus*
Nutria *Myocastor coypus*
Rusty Crayfish *Orconectes rusticus*
Tilapia *Oreochromis spp*.
Flathead Catfish *Pylodictus olivarus*
Veined Rapa Welk *Rapana venosa*

Plant Species:
Garlic Mustard *Alliaria petiolata*
Fanwort *Cabomba caroliniana*
Japanese Hops *Humulus japonicus*
Hydrilla *Hydrilla verticillata*
Purple Loosestrife *Lythrum salicaria*
Eurasian Watermilfoil *Myriophyllum spicatum*
Reed Canary Grass *Phalaris arundinaceae*
Phragmites *Phragmites australis*
Japanese Knotweed *Polygonum cuspidatum*
Curly-leaf Pondweed *Potamogeton crispus*

Water Chestnut *Trapa natans*
Narrow-leaved Cattail *Typha angustafolia*
Hybrid Cattail *Typha x glauca*

2. Juniata College, *Field Guide to Common Invasive Species in Pennsylvania*. Using references from the departments of Conservation and Natural Resources (DCNR) and Environmental Protection (DEP), and other scholarly sources Juniata College compiled 30 species found in Pennsylvania or of concern to Pennsylvania. This information is available online at http://projects.juniata.edu/ess300/Invasives/fieldguide.html

Asian Longhorned Beetle - *Anoplophora glabripennis*
Mile a Minute Weed - *Polygonum Perfoliatum L.*
Autumn Olive - *Elaeagnus umbellate Thunberg*
Morrow's Honeysuckle - *Lonicera morrowii*
CanadaThistle - *Cirsium avrense*
Multifora Rose - *Rosa multifora*
Common Carp - *Cyprinus carpio*
Norway Maple - *Acer platanoides*
Common Reed - *Phragmaites australis*
Oriental Bittersweet - *Celastrus orbiculatus*
Eurasian Water Milfoil - *Myriopyllum spicatum L.*
Purple Loosestrife - *Lythrum Salicaria L*
European Starling - *Sturnus vulgaris*
Round Goby - *Neogobius melanostomus*
Garlic Mustard - *Alliaria petiolata*
Ruffe - *Gymnocephalus cernuus*
Giant Hogweed - *Heracleum mantegazzianum*
Sea Lamprey - *Petromyzon marinus*
Gypsy Moth - *Lymantria dispar*
Small Hive Beetle - *Aethina tumida*
Hemlock Woolly Adelgid - *Adelges tsugae*
Tartarian Honeysuckle - *Lonicera tatarica*
Hydrilla - *Hydrilla verticullata*
Tree of Heaven - *Ailanthus altissima (Mill.) Swingle*
Japanese Knotweed - *Polygonum cuspidatum*
Varroa Mite - *Varroa destructor*
Japanese Stilt Grass - *Microstegium vimineum (Trin.) Camus*
White Perch - *Morone americana*
Kudzu - *Pueraria Montana*
Zebra Mussel - *Dreissena polymorpha*

3. The Pennsylvania Department of Conservation and Natural Resources has identified the species below as the most serious terrestrial threats or worst offenders to the Commonwealth's native ecosystems. Many have been designed as "Noxious Weeds" by the Pennsylvania

Department of Agriculture and are also a major concern to our agricultural community. This information is available online at: www.dcnr.state.pa.us/forestry/wildplant/serious.aspx

Scientific Name	Common Name	Plant Form	Pennsylvania Distribution
Alliaria petiolata	Garlic mustard	Flower	Freq: SE, SC, SW, NW; Occ: NE
Notes: Invasive in many states; spreading aggressively in woodlands by seed			
Carduus nutans	Musk thistle	Flower	Freq: SE, SC, SW, NE, NC, NW
Notes: PA noxious Weed			
Cirsium arvense	Canada thistle	Flower	Freq: SE, SC, SW, NE, NC, NW
Notes: PA noxious Weed			
Cirsium vulgare	Bull thistle	Flower	Freq: SE, SC, SW, NE, NC, NW
Notes: PA noxious Weed			
Datura stramonium	Jimsonweed	Flower	Freq: SE, SC, SW; Occ: NE
Notes: Sometimes cultivated; spreads by seed, PA Noxious Weed			
Galega officinalis	Goatsrue	Flower	Rare: SE
Notes: PA and Federal Noxious Weed, on location in SE PA			
Heracleum mantegazzianum	Giant hogweed	Flower	Rare: NW
Notes: PA and Federal Noxious Weed, sap can cause burning blisters			
Lythrum salicaria, L. virgatum	Purple loosestife	Flower	Freq: SE; Occ: SC, SW, NE, NC, NW
Notes: Garden escape which has become invasive in many states; PA noxious Weed			
Microstegium vimineum	Japanese stilt grass	Grass	Freq: SE; Occ: SC
Notes: Annual grass; invasive in many states; spreading through woodlands by seed			
Phragmites australis	Common reed	Grass	Freq: SE; Occ: SC, SW, NE, NW
Notes: Native and introduced strains; wetland grass which can form huge colonies			
Polygonum (Falopia) cuspidatum	Japanese knotweed	Flower	Freq: SE; Occ: SC, SW, NE, NW; Rare: NC
Notes: Invasive in many states; difficult to control; spreads by roots and seeds			
Sorghum bicolor ssp.	Shattercane	Grass	Freq: SE; Occ: SC, NC

drummondii			
Notes: Grass; PA noxious Weed			
Sorghum halepense	Johnson grass	Grass	Freq: SE; Occ: SC, SW, NE, NW
Notes: Grass; PA noxious Weed; spreads by roots and seeds			
Elaeagnus umbellata	Autumn olive	Shrub	Freq: SE, SC; Occ: SW; Rare: NE, NW
Notes: Escaped from plantings and invasive in many states; rapidly spread by birds			
Lonicera maackii	Amur honeysuckle	Shrub	Occ: SE, SC, NW
Notes: Escaped from plantings; seeds spread by birds			
Lonicera morrowii	Morrow's honeysuckle	Shrub	Freq: SE, SC, SW; Occ: NE, NC, NW
Notes: Escaped from plantings and invasive in many states; seeds spread by birds			
Lonicera standishii	Standish honeysuckle	Shrub	Occ: SE
Notes: Escaped from plantings; seeds spread by birds			
Lonicera tartarica	Tartarian honeysuckle	Shrub	Freq: SE, SC, SW; Occ: NE, NW
Notes: Escaped from plantings; seeds spread by birds			
Rosa multiflora	Multiflora rose	Shrub	Freq: SE, SC, SW; Occ: NE, NC, NW
Notes: Invasive in many states; seeds spread by birds; PA noxious Weed			
Acer platanoides	Norway maple	Tree	Freq: SE; Occ: SE, SW
Notes: Commonly planted and escaped; invasive in many states; wind spreads prolific seeds			
Ailanthus altissima	Tree-of-heaven	Tree	Freq: SE, SC; Occ: SW
Notes: Invasive in many states; wind spreads prolific seeds			
Celastrus orbiculatus	Oriental bittersweet	Vine	Freq: SE, SC, SW; Rare: NE, NW
Notes: Escaped from cultivation and invasive in many states; spreading rapidly (by birds)			
Lonicera japonica	Japanese honeysuckle	Vine	Freq: SE, SC; Occ: SW, NE
Notes: Invasive in many states			
Polygonum perfoliatum	Mile-a-minute vine	Vine	Freq: SE; Rare: SW
Notes: Range expanding; PA Noxious Weed			

Pueraria lobata	Kudzu	Vine	Freq: SE; Rare: SW
Notes: Invasive in many states; PA Noxious Weed			

4. The U.S. Geological Survey Nonindigenous Aquatic Species group has identified the following sightings of aquatic invasive species in Pennsylvania:

Group	Family	Scientific Name	Common Name	Exotic / Native Transplant
Coelenterates-Hydrozoans	Olindiidae	*Craspedacusta sowerbyii*	freshwater jellyfish	**Exotic**
Crustaceans-Cladocerans	Cercopagidae	*Bythotrephes longimanus*	spiny water flea	**Exotic**
Crustaceans-Cladocerans	Cercopagidae	*Cercopagis pengoi*	fish-hook water flea	**Exotic**
Crustaceans-Cladocerans	Bosminidae	*Eubosmina coregoni*	water flea	**Exotic**
Crustaceans-Crayfish	Cambaridae	*Orconectes immunis*	calico crayfish	Native Transplant
Crustaceans-Crayfish	Cambaridae	*Orconectes rusticus*	rusty crayfish	Native Transplant
Crustaceans-Crayfish	Cambaridae	*Orconectes virilis*	virile crayfish	Native Transplant
Ectoprocts	Vesiculariidae	*Lophopodella carteri*	freshwater bryozoan	**Exotic**
Fishes	Clupeidae	*Alosa aestivalis*	blueback herring	Native Transplant
Fishes	Clupeidae	*Alosa pseudoharengus*	alewife	Native Transplant
Fishes	Clupeidae	*Alosa sapidissima*	American shad	Native Transplant
Fishes	Centrarchidae	*Ambloplites rupestris*	rock bass	Native Transplant
Fishes	Ictaluridae	*Ameiurus catus*	white catfish	Native Transplant
Fishes	Amiidae	*Amia calva*	bowfin	Native Transplant
Fishes	Anguillidae	*Anguilla rostrata*	American eel	Native Transplant
Fishes	Gasterosteidae	*Apeltes quadracus*	fourspine	Native

			stickleback	Transplant
Fishes	Sciaenidae	*Aplodinotus grunniens*	freshwater drum	Native Transplant
Fishes	Cichlidae	*Astronotus ocellatus*	oscar	**Exotic**
Fishes	Cyprinidae	*Carassius auratus*	goldfish	**Exotic**
Fishes	Channidae	*Channa argus*	northern snakehead	**Exotic**
Fishes	Belontiidae	*Colisa fasciata*	banded gourami	**Exotic**
Fishes	Characidae	*Colossoma or Piaractus sp.*	unidentified pacu	**Exotic**
Fishes	Salmonidae	*Coregonus artedi*	cisco	Native Transplant
Fishes	Cyprinidae	*Ctenopharyngodon idella*	grass carp	**Exotic**
Fishes	Gasterosteidae	*Culaea inconstans*	brook stickleback	Native Transplant
Fishes	Cyprinidae	*Cyprinella spiloptera*	spotfin shiner	Native Transplant
Fishes	Cyprinidae	*Cyprinus carpio*	common carp	**Exotic**
Fishes	Clupeidae	*Dorosoma cepedianum*	gizzard shad	Native Transplant
Fishes	Clupeidae	*Dorosoma petenense*	threadfin shad	Native Transplant
Fishes	Centrarchidae	*Enneacanthus gloriosus*	bluespotted sunfish	Native Transplant
Fishes	Esocidae	*Esox americanus americanus*	redfin pickerel	Native Transplant
Fishes	Esocidae	*Esox lucius*	northern pike	Native Transplant
Fishes	Esocidae	*Esox lucius x masquinongy*	tiger muskellunge	Native Transplant
Fishes	Esocidae	*Esox lucius x reicherti*	northern pike x amur pike	**Exotic Hybrid**
Fishes	Esocidae	*Esox masquinongy*	muskellunge	Native Transplant
Fishes	Esocidae	*Esox niger*	chain pickerel	Native Transplant

Fishes	Esocidae	*Esox reicherti*	Amur pike	**Exotic**
Fishes	Percidae	*Etheostoma zonale*	banded darter	Native Transplant
Fishes	Fundulidae	*Fundulus diaphanus*	banded killifish	Native Transplant
Fishes	Fundulidae	*Fundulus diaphanus diaphanus*	eastern banded killifish	Native Transplant
Fishes	Fundulidae	*Fundulus heteroclitus*	mummichog	Native Transplant
Fishes	Poeciliidae	*Gambusia affinis*	mosquitofish	Native Transplant
Fishes	Poeciliidae	*Gambusia affinis*	western mosquitofish	Native Transplant
Fishes	Loricariidae	*Hypostomus plecostomus*	suckermouth catfish	**Exotic**
Fishes	Loricariidae	*Hypostomus sp.*	suckermouth catfish	**Exotic**
Fishes	Ictaluridae	*Ictalurus punctatus*	channel catfish, graceful catfish	Native Transplant
Fishes	Centrarchidae	*Lepomis cyanellus*	green sunfish	Native Transplant
Fishes	Centrarchidae	*Lepomis gibbosus*	pumpkinseed	Native Transplant
Fishes	Centrarchidae	*Lepomis gulosus*	warmouth	Native Transplant
Fishes	Centrarchidae	*Lepomis macrochirus*	bluegill	Native Transplant

Group	Family	Scientific Name	Common Name	Exotic / Native Transplant
Fishes	Centrarchidae	*Lepomis megalotis*	longear sunfish	Native Transplant
Fishes	Centrarchidae	*Lepomis microlophus*	redear sunfish	Native Transplant
Fishes	Cyprinidae	*Leuciscus idus*	ide	**Exotic**
Fishes	Gadidae	*Lota lota*	burbot	Native Transplant

Fishes	Centrarchidae	*Micropterus dolomieu*	smallmouth bass	Native Transplant
Fishes	Centrarchidae	*Micropterus salmoides*	largemouth bass	Native Transplant
Fishes	Moronidae	*Morone americana*	white perch	Native Transplant
Fishes	Moronidae	*Morone chrysops*	white bass	Native Transplant
Fishes	Moronidae	*Morone chrysops x saxatilis*	wiper	Native Transplant
Fishes	Moronidae	*Morone saxatilis*	striped bass	Native Transplant
Fishes	Gobiidae	*Neogobius melanostomus*	round goby	**Exotic**
Fishes	Cyprinidae	*Nocomis biguttatus*	hornyhead chub	Native Transplant
Fishes	Cyprinidae	*Notropis hudsonius*	spottail shiner	Native Transplant
Fishes	Cyprinidae	*Notropis rubellus*	rosyface shiner	Native Transplant
Fishes	Cyprinidae	*Notropis volucellus*	mimic shiner	Native Transplant
Fishes	Ictaluridae	*Noturus insignis*	margined madtom	Native Transplant
Fishes	Salmonidae	*Oncorhynchus gorbuscha*	pink salmon	Native Transplant
Fishes	Salmonidae	*Oncorhynchus kisutch*	coho salmon	Native Transplant
Fishes	Salmonidae	*Oncorhynchus mykiss*	rainbow trout	Native Transplant
Fishes	Salmonidae	*Oncorhynchus nerka*	kokanee	Native Transplant
Fishes	Salmonidae	*Oncorhynchus tshawytscha*	Chinook salmon	Native Transplant
Fishes	Cichlidae	*Oreochromis aureus*	blue tilapia	**Exotic**
Fishes	Osmeridae	*Osmerus mordax*	rainbow smelt	Native Transplant
Fishes	Percidae	*Perca flavescens*	yellow perch	Native Transplant
Fishes	Petromyzontidae	*Petromyzon marinus*	sea lamprey	Native Transplant

Fishes	Cyprinidae	*Pimephales promelas*	fathead minnow	Native Transplant
Fishes	Centrarchidae	*Pomoxis annularis*	white crappie	Native Transplant
Fishes	Centrarchidae	*Pomoxis nigromaculatus*	black crappie	Native Transplant
Fishes	Characidae	*Pygocentrus nattereri*	red piranha	**Exotic**
Fishes	Characidae	*Pygocentrus or Serrasalmus sp.*	unidentified piranha	**Exotic**
Fishes	Ictaluridae	*Pylodictis olivaris*	flathead catfish	Native Transplant
Fishes	Salmonidae	*Salmo salar*	Atlantic salmon	Native Transplant
Fishes	Salmonidae	*Salmo salar sebago*	landlocked Atlantic salmon	Native Transplant
Fishes	Salmonidae	*Salmo trutta*	brown trout	**Exotic**
Fishes	Salmonidae	*Salmo x Salvelinus trutta x fontinalis*	tiger trout	**Exotic Hybrid**
Fishes	Salmonidae	*Salvelinus fontinalis*	brook trout	Native Transplant
Fishes	Salmonidae	*Salvelinus namaycush*	lake trout	Native Transplant
Fishes	Percidae	*Sander canadense x vitreum*	saugeye	Native Transplant
Fishes	Percidae	*Sander vitreum*	walleye	Native Transplant
Fishes	Cyprinidae	*Scardinius erythrophthalmus*	rudd	**Exotic**
Fishes	Salmonidae	*Thymallus arcticus*	Arctic grayling	Native Transplant
Fishes	Cyprinidae	*Tinca tinca*	tench	**Exotic**
Mollusks-Bivalves	Corbiculidae	*Corbicula fluminea*	Asian clam	**Exotic**
Mollusks-Bivalves	Dreissenidae	*Dreissena bugensis*	quagga mussel	**Exotic**
Mollusks-Bivalves	Dreissenidae	*Dreissena polymorpha*	zebra mussel	**Exotic**
Mollusks-Bivalves	Pisidiidae	*Pisidium amnicum*	greater European peaclam	**Exotic**

Mollusks-Gastropods	Bithyniidae	*Bithynia tentaculata*	mud bithynia	**Exotic**
Mollusks-Gastropods	Viviparidae	*Cipangopaludina chinensis malleata*	Chinese mysterysnail	**Exotic**
Mollusks-Gastropods	Lymnaeidae	*Radix auricularia*	big-ear radix	**Exotic**
Reptiles-Crocodilians	Alligatoridae	*Alligator mississippiensis*	American Alligator	Native Transplant

Group	Family	Scientific Name	Common Name	Exotic / Native Transplant
Reptiles-Crocodilians	Alligatoridae	*Caiman crocodilus*	Common Caiman	**Exotic**
Reptiles-Turtles	Emydidae	*Malaclemys terrapin*	Diamond-backed Terrapin	Native Transplant
Reptiles-Turtles	Emydidae	*Trachemys scripta elegans*	Red-eared Slider	Native Transplant

Wisconsin SMP progress

The following was composed based on a phone interview with Ron Martin of the Wisconsin Department of Natural Resources (DNR) on July 11, 2005, regarding the Wisconsin ANS State Management Plan status.

Introduction and Plan Development

The Wisconsin ANS State Management Plan began development six years ago within the Department of Natural Resources. Various interested departments within the DNR such as the Endangered Resources Department, Fisheries Management and Habitat Protection, and the Bureau of Watershed Management all worked together on the initial draft of the plan with the help of the Model Plan. After the initial draft, the plan went through several more stages of draft and review with the help of Wisconsin Sea Grant and the Great Lakes Indian Fish and Wildlife Commission. After a public comment period, the plan was finalized in September 2003.

Goals and Objectives

The three overarching goals that were set in the Wisconsin SMP include preventing the introduction of new species, limiting the spread of species already established, and abating any ecological, economical, or human health related problems that have or may stem from ANS introductions. Another goal of the SMP that is beginning to be sought after during the newly

entered implementation phase is to collect the information required to achieve the three main goals. One way Wisconsin is attempting to do this include forming a collaborative state-wide data management program that will allow all agencies and organizations within the state that collect ANS data to enter it into an online database to improve information sharing and scientific knowledge. The other way Wisconsin is attempting to increase their knowledge base is by hiring a consultant for a two year time period. The consultant will be responsible for identifying additional threats of ANS in Wisconsin waters as well as research the main vectors and pathways of introduction and suggest strategies for how to mitigate these introductions.

Implementation

Wisconsin is just beginning the implementation of its SMP. The plan, approved for five years by the ANS Task Force, is planning on dedicating the first two years to the sub-goal of additional data collection for better management decisions, as mentioned above. Educational materials will also be developed during the first two years of implementation. One educational publication that is currently being developed is a handbook on ANS issues that will be given to agency representatives, educators, lake association members, and other concerned citizens. This publication focuses on actions that can be taken to protect lakes and other waterbodies from ANS and how concerned individuals and citizen groups can build an effective coalition.

The plan for the next three years of implementation, before the plan must be re-approved by the Task Force, is currently uncertain and will depend largely on the information gathered in the first two years. Possibilities mentioned include beginning to develop prevention strategies related to introduction as well as legislation. Wisconsin hopes to expand and update its plan during this time as well.

Evaluation

Currently, evaluation criteria are not integrated into the Wisconsin SMP.

Funding

All funding for the design of the SMP came from the state of Wisconsin in the amount of $550,000. In addition to ongoing state funding, implementation funding is available from the Task Force. This totaled $72,000 for the first year of implementation. State cost share for this amount must match the federal funding provided. The total annual Task Force budget is 1.1 million, out of which implementation funding and other Task Force expenses come. Wisconsin is concerned that as more and more states begin to develop plans, the amount of implementation money available will steadily decrease. They already feel that $72,000 for a year is far too little and as a result of this local jurisdictions are paying a disproportionate amount for ANS control activities.

As a result of insufficient federal funding, Wisconsin has looked for additional funding elsewhere. The DNR budget request to the state has increased, and they are trying to get a higher percentage of the motor boat gasoline tax going towards ANS issues. The DNR is also looking at the possibility of a trailer tax or fishing license tax to go towards ANS management and

control. Additionally, the state Coastal Zone Management office, within the Department of Administration, has grants available periodically for use related to coastal concerns, so the DNR is interested in applying for those as they become available.

Regional Planning, Interaction, and Collaboration

In developing the SMP, Wisconsin did not have a lot of interaction with the ANS Task Force due to concern that at the national level it was too removed from the state to be able to address its needs and concerns. Instead, Wisconsin relied heavily upon the regional U.S. Fish and Wildlife Service office for support because they believe the regional offices have a better sense of the needs of the region.

Besides the agencies mentioned, Wisconsin has had few interactions and opportunities for collaboration with other agencies on the local, state, regional, or national level. Once the consultant is hired and the data management program is in place, they hope this will change. Wisconsin is very interested in reviewing the plans of the other Great Lakes states and trying to collaborate to meld their plans together for a strong regional plan with parallel state plans. For example, they would like boat cleaning or bait disposal requirements to be standardized throughout the region to avoid confusion and keep a consistent message.

SMP Workshop

Representatives from Wisconsin DNR, Sea Grant, and the University of Wisconsin Extension are planning a series of workshops held around the state to gain comment on the educational handbook they are developing, the main implementation factor currently being focused on. They feel that this approach is more useful to them now because they are not far into their implementation process and that more general workshops focusing on the broader plan would be of more benefit when they are further along with the implementation of their plan.

Overarching Plan Approaches

As of now, most states that have already completed their plans have closely followed the guidelines laid out in the Model Plan. States that have had approved plans for a while and are ready to update their plans seem interested in taking the lessons they have learned so far, as well as examples of lessons learned from other states, and use this knowledge to develop more specific plans with a timetable for implementation measures that will allow them to reach more specific goals and objectives. Prioritization also seems to be an overarching theme among states that have approved since there seems to be consistent funding shortages. Other states that have recently had their plans approved have mostly followed the Model Plan, so it is possible that they may find out in a few years that they have the need to develop more specific goals so that they can prioritize as well due to funding and other resource shortages. It seems possible that as ANS becomes a bigger and bigger issue that appropriations for the Task Force as well as from the individual states may increase due to increased knowledge about AIS impacts and resultant political pressure. It remains to be seen how states that are just beginning to develop their plans will approach the process and whether or not they will follow the Model Plan closely. One issue that is consistent among these three states in the process of developing their plans as of now

(Minnesota, New York, and Pennsylvania) is that they are all focusing on developing a plan that focuses on terrestrial invasive species in addition to aquatic invasives, so it will be interesting to discover how this newly emerging approach plays out once the plans are implemented.

Regional Collaboration

Recommendations from the ANS Task Force and the AIS Strategy Team

The *ANS Task Force Guidance for State and Interstate Aquatic Nuisance Species Management Plans* (ANS Task Force, 2004a) makes several recommendations for the development of effective regional ANS plans. Recommendations include fostering interjurisdictional cooperation and collaboration during the planning process with participation and support from any applicable stakeholder groups, prioritization of issues to be focused on, determination of what agency or organization is responsible for specific implementation actions, public education and participation, information sharing, and collaboration with national, state, and local ANS control efforts (ANS Task Force, 2004a). The approval and funding requirement for a regional ANS management plan are the same as for a state plan. Besides more coordinated ANS control efforts, another benefit of regional collaboration, if it results in an approved region-wide management plan, will be the additional federal money flowing into the Great Lakes region for ANS control and prevention.

The new *Aquatic Invasive Species Strategy Team Action Plan* under the Great Lakes Regional Collaboration suggests that regional collaboration should focus on 5 main areas which include maritime commerce; canals and waterways; live organism trading; early detection, rapid response, control, and management; and education and outreach (Great Lakes Regional Collaboration, 2005). More specific measures for implementing these goals are found in the Appendices of the Regional Collaboration document.

Factors of Strategic Collaboration

More specific goals or adoption of the goals and actions laid out in the ANS Task Force Guidance for State and Interstate Aquatic Nuisance Species Management Plans or AIS Strategy Team Action Plan may be adopted at the culminating Regional Summit or during the individual state workshops. Methods of interjurisdictional collaboration, cooperation, and coordination may also be discussed and established at the Regional Summit. States may decide to develop a region-wide ANS management plan, or prefer to informally adopt measures for region-wide collaboration and cooperation. Some issues that will need to be addressed in order to foster cooperation include bureaucratic turf, jurisdictional barriers and fragmentation, the role of the federal, state, and local governments, responsibility, and accountability.

If the Great Lakes states reach consensus on developing either a formal or informal region-wide ANS management plan, several other factors will have to be considered, such as the planning horizon. The entire plan will probably not be able to be developed at the Regional Summit, so a timeline and plan for plan development should be set. In the plan, issues such as specific

implementation measures for the established goals and periodic plan evaluation should be included, just like in any good state management plan.

Program Evaluation: Example Program Assessment for state or regional ANS management plans

Problems frequently encountered in planning and implementation

One problem commonly seen in any type of plan, as Weiss (1972, 25) has noted, is that "program goals are often hazy, ambiguous, hard to pin down. Occasionally, the official goals are merely a long list of pious and partly incompatible platitudes." Calkins (1979) noted similar findings, stating that typical goals of a plan may be described as "simply utopian," and in order to be effective must be broken down into sub-goals that state how the goals will be achieved, as well as a timeline for accomplishing them. Calkins goes on to say that when plans fail to achieve the desired results they are frequently modified or updated instead of examined so that the planners understand why the plan failed. Calkins referrers to this as "new plan syndrome."

Plans are many times vague, and one reason may be a lack of collaboration, as discussed above. Collaboration may not happen because there are many times no incentives, at least explicit and immediate incentives, for agencies to cooperate. There may even be stronger or more explicit incentives for non-cooperation. Agencies also have varying constituencies, responsibilities, authority, and experience. Cooperation also requires institutional changes that may come at economic and political expense and be inconsistent with other mandates or interests of the agency. Cooperation and coordination between agencies is also time consuming, expensive, and may have political ramifications, leading to a lack of collaboration during the planning process (Imperial and Hennessey, 2000). This lack of coordination and cooperation, however, can be dangerous because "uncoordinated action amounts to no policy, at best, and to expensive and even paralyzing conflicts, at worst" (Innes et. al, 1994). Imperial and Hennessey (2000) state that in order to overcome these problems, incentives to participate need to be made, or made explicit, and incentives that lead to non-cooperation need to be minimized.

Several methods used for plan evaluation

Performance Measurement and Evaluation, U.S. Government Accountability Office

A guidance document provided by the U.S. Government Accountability Office (GAO), formerly the General Accounting Office, provides insight on how governmental programs should be run to yield the most efficiency and effectiveness. The information is meant for Congress and the Executive Branch to apply to programs they oversee, but can be used for a SMP as well that includes not only federal, but state and local governmental agencies, the private sector, non-governmental organizations, etc. The document includes both performance measures and program evaluation to assess a program (U.S. Government Accountability Office, 2005). According to the document, performance measurement should be conducted by the lead agency regularly and on an ongoing basis to determine if the program is moving sufficiently towards its

goals. Performance measurement should address the process, outputs, and outcomes of a program. Performance measurement is generally less in depth than program evaluation, however it gives ongoing information on the successes and failures of a program in order to keep it on the right track (U.S. Government Accountability Office, 2005).

Program evaluation can be done internally, but is usually done by external experts and is much more in depth and less frequent than performance measurement should be (U.S. Government Accountability Office, 2005). Program evaluation generally measures program performance in relation to the goals and objectives of a program. There are four different types of program evaluation that are process (or implementation) evaluation, outcome evaluation, impact evaluation, and cost-benefit and cost-effectiveness analyses. Process evaluation attempts to determine if a program is being carried out in the way it was intended. This differs slightly from outcome evaluation, which examines whether or not the goals and objectives were achieved and the reasons for success or failure (U.S. Government Accountability Office, 2005). Impact evaluation compares the outcomes of the program with what probably would have happened in the absence of the program in order to determine if there is a benefit, as well as isolate the program from all other external factors. Cost-benefit and cost-effectiveness analyses compare the cost of implementing the program with the benefit of the program. Cost-benefit focuses on all relevant costs and benefits while cost-effectiveness focuses on the alternative that will yield the lowest cost, usually in monetary terms (U.S. Government Accountability Office, 2005).

Adaptive management

Adaptive management is the ability of resource managers and other users of plans to revise and update a given plan as needed due to changes in needs, knowledge, and experiences. According to Brody (2003), this ability for a plan to be adaptive must be included in a plan for it to be fully comprehensive. This is because a plan must be flexible due to ever-present ambiguity and uncertainty, allowing for managers to change the course of action when new information becomes available. Resource managers also must consistently make management decisions with uncertain science, and adaptive management plans gives them the ability to react quickly when new information is discovered.

Therefore, "planners must be able to react to constantly changing environmental conditions, sudden shifts in political interests and objectives, and a continuous barrage of new and often ambiguous information" (Brody, 2003, 192), and plans with adaptive management considerations written into them allow for this process to occur naturally without excessive lag-time which would potentially allow a problem to get worse before it is dealt with. This is important for plans focusing on ANS since a newly introduced species, or a species that is found to cause harm, may establish itself beyond the eradication or control point if managers are not equipped to respond to the new or newly discovered threat rapidly.

One potential problem with adaptive management, however, may be a lack of accountability or input from stakeholders. If an advisory group helped formed a plan, they may want to approve plan changes if the resource manager deems they are needed. Thus, adaptive management needs to be balanced out with stakeholder interests as well as accountability, and a provision for this balance should be explicit in the plan so response is not hampered. One possibility of balancing

these issues is to form a sub-committee of the advisory group to examine and approve or disapprove changes to the management plan.

Several suggested criteria for plan assessment

Baer (1997) has suggested several different sets of criteria for judging plans. The set of criteria chosen will generally depend on the type of plan being examined and what qualities it is being examined for. The various sets of criteria include the following:

Seven principles of procedural validity

One way to judge a plan, according to Baer (1997) is to judge the validity behind the procedure that created the plan. To help measure this, he gives Seven Principles of Procedural Validity. If these criteria are followed, it does not guarantee that a successful plan will ensue, however it will help create buy-in and form a collaborative plan, therefore making successful implementation more likely. The seven criteria for procedural validity include:

1. Who was involved in the plan formulation (e.g., staff from different agencies or department, citizens groups, politicians)?
2. How were they chosen (e.g., on the basis of expertise, interest, volunteering, or other self-selection)?
3. How were they involved (e.g., discussion groups, internal staff memos or papers, public meetings)?
4. How were data, models, goals, and other pertinent information used in recommending policy or action?
5. How were technical matters transformed into recommended policy (e.g. through "ordinary knowledge," experience, "scientific" training, design training)?
6. Was an advisory group used?
7. Were preliminary drafts circulated for public comment?

Rational considerations

This set of criteria from Baer (1997) considers how rational the plan is and how rational the approach is taken by the planners. This set of criteria is useful for determining if a plan is specific enough to ensure that everyone can understand the goals and implementation measures, as well as who is responsible for them. This set of criteria will probably be useful for most types of plans, because vague plans will be much more difficult to see through to implementation.

1. Given the type of plan to be prepared, are the plan formulators clear about the criteria they will use to assess its progress while being formulated?
2. Have these criteria been made explicit in the plan?
3. Are problems specifically identified (or only implied)?
4. Are goals and objectives explicitly identified?
5. Is the tone of the plan commensurate with the planning approach recommended (e.g., comprehensive, incremental, advocacy, etc.)?

a. If the plan is intended to be comprehensive, does it relate substantively to a larger whole (e.g., horizontal relation to other agencies and adjacent governing bodies)?
b. Does the plan consider the regional or next higher level of government or context (e.g., vertical relation)?
c. Is there planning for procedural coordination with other plans and agencies?

6. Is the capacity or adequacy of existing infrastructure and organizational systems described?
7. Are alternatives listed, or at least considered?
8. Are the alternatives identified as "variations on a theme," or as radically different?
9. Are tradeoffs permitted?

Adequacy of scope

This set of criteria from Baer (1997) questions how feasible the plan is and how it will be accepted within the broader political, environmental, economic, etc. frameworks. The criteria include:

1. Have all possible or pertinent issues been considered (e.g., physical, social, economic, political, psychological, cultural, or design)?
2. Have issues of efficiency and equity and predictability been considered?
3. Has the distribution of costs and benefits among different groups and interests been considered?
4. Have relocation/displacement implications been considered?
5. Have financial/fiscal implications been considered?
6. Have the legal implications been considered?
7. Has feasibility in the larger political context been considered?

Guidance for Implementation

Implementation is often an important factor in the planning process that gets left out or is not given the attention it deserves. If the plan does not lay out specifics with regards to implementation, then what the plan was intended to do may never be done. The criteria that Baer (1997) identifies include:

1. Are implementation provisions appropriate in the plan?
2. Are there priorities for implementation?
3. Is cost of implementation vs. nonimplementation considered?
4. Is there a time span for plan implementation?
5. Is there provision for scheduling and coordinating of implementation proposals?
6. Can proposals accomplish their intended purpose if implemented?
7. Is there a program or proposal for an impact analysis?
8. Is the agency or person responsible for implementation identified?
9. Can the responsible agency realistically be expected to implement the plan?

Approach, Data, and Methodology

This set of criteria by witch to judge a plan from Baer (1997) points to the accuracy of the information used and the flexibility for adaptive management when new information presents itself. The criteria include:

1. Is the plan based on a wide spectrum of data where feasible?
2. Is the plan sufficiently flexible to permit new data and findings to be fed in?
3. Are the data sources cited?
4. Are the methodology sources cited?
5. Are the levels of data aggregation relevant or meaningful to the study?

Quality of communication

These criteria from Baer (1997) help to assess if the language and format of the plan help communicate the ideas presented in a clear manner. Effective communication is necessary to ensure there is no ambiguity in the plan and each player knows what their role is. The criteria include:

1. Is the client or reading public identified (e.g., public at large, other professionals)?
2. Are the ideas convincingly presented, given the nature of the audience?
3. Are the rationales behind the decisions effectively presented?
4. Are the proposals/recommendations/conclusions consistent with objectives?
5. Is the tone of the document consistent with the message conveyed (e.g., not presented in the past tense as an accomplished fact when the plan is for study and review)?
6. Are the criteria indicated by which the plan is intended to be judged?

ANS Task Force Criteria

Of course, one set of criteria that each ANS SMP must meet is the National ANS Task Force Criteria if a state wants a share of the federal funding to implement its plan. The actual bulleted list of criteria is provided above under the *State Management Plan Evaluation Criteria* subheading. This set of criteria is relatively brief and less specific compared to the several lists of criteria above from Baer (1997). However, several criteria are specific to ANS management plans, and are therefore important considerations when evaluating an ANS SMP.

Seeking success

In a publication entitled *Seeking Signs of Success: A guided approach to more effective watershed programs* by Beyer et al. (2001), the authors discuss how to build a watershed management plan from the ground up and incorporate evaluation measures into the design, as well as how to evaluate a management plan that is already established to determine if it is on the path to success. The book is laid out in an interactive workbook format to help managers or planners plan their activities on a step by step, guided basis. Though the workbook is designed for watershed management programs, it can be used as assistance in developing any type of successful environmental management program.

Success is easily defined in many settings, such as the business setting, where profits are the definition of success. However, success can be measured in an environmental management plan if it starts out with a clear vision (Beyer et al., 2001). In an effective plan, a clear vision will lead to specific goals, which in turn lead to specific actions, which lead to the outcomes and impacts hoped for. Success in this instance is when this path from vision to outcomes leads to the outcomes hoped for. To ensure that a program is on the right track, evaluation is necessary. Evaluation includes defining, measuring, assessing, and valuing the outcomes, impacts, and actions of a program in order to document success more clearly (Beyer et al., 2001). Scientific data on changes in the ecosystem is one way to evaluate the success of plans; however it is generally difficult because it is slow, expensive, and difficult to say for certain if the changes were based on actions taken or natural fluctuations. In order to determine if a goal has been reached, specific guidelines must be available to measure success. This can be done using quantitative, qualitative, or descriptive methods. Specific actions include monitoring, observation, focus group discussions with stakeholders, stakeholder interviews, and surveys. The method that best and most easily allows the success of activities to be measured should be used (Beyer et al., 2001).

Ohio review guidelines

Ohio, as part of their planning for their SMP workshop, asked to have their original plan evaluated by Great Lakes Commission staff. The following guidelines, based on the evaluation literature reviews above, will be used to evaluate Ohio's plan. Since this plan is being reviewed externally and as in depth as possible, it fall under the category of a program evaluation and not performance measurement, as specified by the GAO Report (2005).

1) Does the plan meet the Task Force Criteria for federal funding listed above?
2) If the plan is a revision of a preexisting SMP, has it followed the new updating guidelines set by the Task Force?
3) Is there a clear vision for what the plan will accomplish on an ongoing basis?
4) Are specific goals and objectives laid out, or are they vague and unclear?
5) Are the problems or issues leading to the goals and objectives laid out clearly?
6) Are the goals relevant and appropriate?
7) Has the best available science been utilized in helping to shape the goals, objectives, and action items?
8) Has a consensus-based process been used, with all stakeholder groups represented, to develop these goals and objectives?
9) Were ideas from all groups listened to and considered before determining consensus on a specific idea?
10) Was public comment heard?
11) Were new and potentially innovative ideas from non-traditional participants carefully considered? For example, the aquarium trade may not realize the dangers of ANS and by their participation in the plan creation process they may have ideas for minimizing their contribution to the ANS problem with little or no cost to them. If they are in agreement and understand the dangers of ANS, they will be more likely to comply than with seemingly arbitrary regulations put on them without their prior knowledge or input.

12) Does the plan allow for adaptive management and plan for how it will occur, as well as plan for how accountability will be maintained?
13) Does the plan address regional or ecosystem based issues and address jurisdiction both horizontally and vertically?
14) Has a funding strategy been thought out?
15) Are specific action items listed that can be implemented to achieve the desired goals?
16) Is there a specific agency or organization that is given the responsibility for carrying out each action item listed with each goal.
17) Does that agency or organization have the resources and authority necessary to carry out the actions assigned to it?
18) Is there an identified way to hold each agency or organization responsible for fulfilling their duty of carrying out the action items assigned to them?
19) Are the implementation actions specific and able to achieve the desired goals?
20) Is a detailed timetable given for implementation of action items?
21) Are specific milestones, measurements, or other evaluation tools built into the plan to help measure progress and success on a continuous basis?
22) Is rapid response built into the plan, either as an already prepared plan or as an implementation step with a timeframe and action items for development?
23) Is there a plan to promote any necessary legislation to give more power to an agency to implement any part of the plan?
24) Are goals and implementation actions prioritized based on urgency, need, funding, and other available resources if the resources and/or legislation are not available to implement all action items at once?

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Appendix A
Taken from (www.anstaskforce.gov/state_guidance.htm; Section IX, Examples, Example M).

Sample ANS Task Force Management Plan Review Checklist

Name:

Submitted by: Date submitted:

Contact: Phone: E-mail:

General Information Complete Limited None

goals:

objectives:

elaboration of problems:

overview of specific problems and issues:

identification listing of species

description analysis

Existing programs discussion: Complete Limited None

Federal

State

local/tribal/non-governmental

scope/effectiveness analysis:

gaps identified/analyzed:

geographic scope: too large? too small? appropriate?

For interstate: covers entire drainage basin that plan addresses

For state: drainage basin covers entire jurisdiction

Coordination with other ANS management plans in same drainage basin:

AQUATIC NUISANCE SPECIES TASK FORCE

STATE/INTERSTATE MANAGEMENT PLAN

APPROVAL FORM

APPROVAL

_____Approve as submitted.

_____Approve with stipulations listed below:

(Continue on reverse or separate sheet if necessary)

_____Disapprove.

Indicate changes necessary for the plan to be approved below:

(Continue on reverse or separate sheet if necessary)

FUNDING RECOMMENDATION

-

- Implementation funding should be provided. Funding level and focus appear appropriate and costs are reasonable.
- Implementation funding should **not** be provided. Funding level and focus are **not** appropriate and costs are reasonable.

Comments:

(Continue on reverse or separate sheet if necessary)

Signature: _____ Date:_____ Print Name:

Non-response will be interpreted as "Approval as submitted" and "Implementation funding should be provided."

Appendix B
Questions for state ANS representatives that were answered either by a phone interview or through written response.

Guidance for Summary of State Management Plan for Aquatic Nuisance Species Prevention and Control

We ask that you consider the following questions in the outline below as guidance in developing a summary of the status of the state management plan (SMP) in your jurisdiction. You are encouraged to cover any other relevant issues not identified below.

- Introduction
  - Describe the basis of the state management plan, including history and background.
- Plan Development
  - Describe the processes utilized in the development of the SMP.
  - Identify the entities involved in the plan development (e.g., state natural resource agencies, Sea Grant agencies, national ANS Task Force (ANSTF), National Invasive Species Council, other groups (formal and informal).
  - What resources (e.g., financial, staff and others) are being (will be) used in the development of the SMP?
  - What obstacles have you faced in this process thus far?
- Goals and Objectives
  - What are the primary goals and objectives for the SMP?
  - What would help your state in reaching these goals and objectives?
  - What criteria have been established to determine if the goals and objectives address the challenges of ANS prevention and control in your jurisdiction?
- Implementation
  - What are the perceived obstacles and constraints?
  - Partnership interactions (government, public, private)
    - What partnerships have been pursued or intend to be pursued in the state planning process?
    - If pursued, how have the partnerships been helpful?
  - What factors would facilitate SMP implementation (e.g., stronger partnerships; state, regional, and/or national coordination; research; funding)?
- Evaluation
  - Is SMP implementation being measured for success? If so, what mechanisms and/or criteria will be applied to measure success?
  - Have the guidelines of the national ANSTF (www.anstaskforce.gov/state_guidance.htm, section VII) been integrated into the SMP?
- Funding
  - Is funding available for SMP planning? If so, what is (are) the source(s) of the funding?

- Is funding available for implementation processes in addition to funding provided by the ANSTF? If so, what is (are) the source(s) of alternative funds?
- Have prospective funding sources been identified and/or pursued for further plan development/updating and implementation?

❖ Status of the SMP process:
- What is the timeframe of SMP development?
- What is the planning horizon for implementation?
- Describe the level of communication between the state agencies involved in the SMP process and the ANSTF.
- What factors could strengthen the relationship between your state and the national ANSTF?
- Describe the next steps in the SMP process.
- How could institutional, economic and/or political factors contribute to successful SMP development and implementation?
- What priorities in areas of outreach, research and policy/legislation could support the SMP planning and implementation process (e.g., invasive species life history, ecosystem function and food web disruptions, information/education, management/control options, vector analysis, regional coordination of invasive species policy)?

❖ Regional Planning
- Has communication been established with neighboring jurisdictions in the process of SMP development and implementation?
- If so, how have these regional perspectives been included in the development of your SMP?

To assist with planning the SMP workshops, please indicate the areas that your state considers most important to address. Please elaborate as appropriate and suggest other areas for consideration.

- Plan development and associated funding
- Goal development
- Implementation issues:
  Financial
  Political
- Other Priorities in areas of outreach, research, policy legislation to support SMP development and implementation
- Evaluation criteria development
- Partnership development
- Regional collaboration

Appendix C
An overview of the State of Hawaii Aquatic Invasive Species Management Plan.
Available at <http://www.anstaskforce.gov/HAWAII%20AIS%20FINAL%20PLAN.pdf>

Introduction and Plan Development

The Hawaii Aquatic Invasive Species Management Plan, recently approved for funding in 2003, was an extremely collaborative project funded by the Hawaii Community Foundation. The main agencies that facilitated the SMP process included the State of Hawaii Division of Aquatic Resources, Department of Land and Natural Resources, and the Nature Conservancy of Hawaii.

Hawaii took a Steering Committee approach to developing the SMP. Agencies and organizations with representatives on the Steering Committee include The Nature Conservancy; the Hawaii Tourism Authority; the USFWS; the Hawaii Department of Agriculture; Bishop Museum; Matson Shipping; the University of Hawaii; the Department of Land and Natural Resources, Division of Aquatic Resources; Pets Pacifica/Petland; Hawaii Audubon Society; Pacific Fisheries Coalition; the Aquaculture Development Program; and the Hawaii Aquaculture Association.

Many aquatic invasive species have impacted Hawaii, threatening native ecosystems, public health, and the economy- especially with impacts to tourism. One particular species, the Giant Salvinia (*Salvinia molesta*) impacted a single reservoir and cost over a million dollars to control and clean up. These issues led Hawaii to choose and approach utilizing coordination and collaboration when designing its SMP. In order to create an effective state plan, Hawaii focused on the activities that each level of government or type of organization could do to help implement the SMP. The plan looks at practical ways to implement programs through state, federal, county, non-governmental, private, and volunteer entities. It is also stated repeatedly throughout the SMP that care was taken to ensure that the Plan met the ANS Task Force guidelines so that federal funding could be requested.

Goals and Objectives

The goal of the Hawaii SMP is "to minimize the harmful ecological, economic, and human health impacts of AIS through the prevention and management of their introduction, expansion, and dispersal into, within, and from Hawaii." Objectives identified as necessary to achieve this goal include coordination and collaboration; prevention; monitoring and early detection; response, eradication, and control; education and outreach; research; and policy actions. The SMP lays out more detailed strategies specific to each of the objectives. For example, one strategy listed under the objective of coordination and collaboration is "set priorities for the management of existing AIS so that local, state, and Federal resources can be directed to manage Hawaii's highest priority AIS in a cost-effective manner."

Implementation

The implementation portion of the Hawaii SMP takes these strategies one step further by providing specific tasks to help see the recommended strategies through. In this regard, the Hawaii SMP starts with a broad overarching goal and keeps narrowing down the focus until specific, implementable tasks are identified. The SMP is written for incremental implementation and as a dynamic plan so that updates can be made easily if new priorities or information become available. The implementation table is also a separate document from the SMP itself so that it can be updated even more frequently and with much more ease.

Specific tasks listed for the strategy given as an example above in the *Goals and Objectives* section include "establish a subcommittee to formally assess the priority species to focus on, using the species presented in the AIS Management Plan as a starting point for discussion;" "develop an objective and testable risk-assessment strategy based on ecology, biology, economics, and other parameters to use as a tool in identifying priority species for management;" and "develop and implement a method to identify priority sites of concern regarding Aquatic Invasive Species." These specific tasks also have a timetable for implementation and the parties that are responsible for implementing them are listed.

Evaluation

The Steering Committee that was charged with developing Hawaii's SMP recommends that it be formally evaluated on a regular basis. Items that it lists for review not only include the implementation of the plan, but the objectives, strategies, and tasks as well since the plan is intended to be dynamic in responding to new information or circumstances. As part of the SMP, Hawaii intends to hire a state AIS Coordinator and establish and long term AIS Advisory Council. The Coordinator and Advisory Council will be charged with an annual report on the SMP and AIS as well as regularly make recommendations for updating the plan.

The Steering Committee suggests that the plan is evaluated yearly at a minimum and include both public and agency input. It is also suggested that copies of the changes are given to key individuals such as the governor, legislature, agency staff, the Task Force, and other relevant stakeholders, as well as being available to the general public.

One strength of the Hawaii plan is that it is much more specific than many other SMPs. It also discusses evaluation, which many plans do not even consider. The SMP discusses what should be evaluated, which is an excellent start, but one weakness found in the SMP is that it does not discuss a methodology for how this evaluation will be done.

Funding

The Hawaii SMP states that the planning process was funded from a grant from the Hawaii Community Foundation, and that it is being submitted to the ANS Task Force in an attempt to receive federal funding, though the specific amount being requested is not identified. Several strategies and tasks are also focused on securing funding for implementation and primarily focus on identifying potential sources and then taking advantage of those sources. The SMP mentions not only applying for short-term grants, but trying to secure long-term funding sources, such as appropriations from the Hawaii State Legislature.

Regional Planning, Interaction, and Collaboration

National, regional, and international collaboration is frequently mentioned as strategies of Hawaii's SMP. Hawaii is currently loosely affiliated with the Western Regional Panel on Aquatic Nuisance Species, and wants to remain involved. However, they are also interested in creating a Pacific Island Regional Panel and developing partnerships with other nations to collaboratively address ANS issues. One specific task mentioned is to create a centralized AIS database in addition to the specific databases that Hawaii and other states and nations keep.