ANS TASK FORCE

Guidance for State and Interstate

Aquatic Nuisance Species Management Plans

Aquatic Nuisance Species Task Force

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PREFACE

We encourage State and interstate planning entities to develop management plans describing detection and monitoring efforts of aquatic nuisance species (ANS), prevention efforts to stop their introduction and spread, and control efforts to reduce their impacts. Management plan approval by the Aquatic Nuisance Species Task Force is required to obtain funding under Section 1204 of the Aquatic Nuisance Species Prevention and Control Act. Regardless of financial incentives, plans are a valuable and effective tool for identifying and addressing ANS problems and concerns in a climate of many jurisdictions and other interested entities. Specific benefits of ANS management plans include:

Describing multiple ANS activities underway in the geographic area covered and providing opportunities for improving the coordination of involved organizations and the effectiveness of their activities;

Describing and documenting ANS problems and the respective roles of the involved organizations for systematically prioritizing and resolving those problems;

Informing the public of problems and solutions through participation in the process and by sharing the plan with the public; this should yield more support for addressing problems and for taking actions to reduce ANS impacts;

Encouraging organizations in the same geographic area to share information, develop consistent, coordinated and complementary plans, reduce duplication of effort and collaboratively support implementation;

Improving collaboration between national, regional, state and local efforts.

Sincerely,

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ACKNOWLEDGEMENTS

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This guidance document was built upon previously approved reports and the Great Lakes Panel Model State Plan. Many state plans are referenced as examples to follow, particularly the Washington State Plan whose development was chaired by Scott S. Smith. Other examples used include the Ohio State Plan, the New York State Plan, the Michigan State Plan and the St. Croix Scenic Riverway Interstate Plan. Conversations with Michael Hauser from the Vermont Department of Environmental Quality also contributed to this document.

Comments were also incorporated from a number of reviewers including: the National Oceanic and Atmospheric Administration and the Ohio Department of Natural Resources, Division of Wildlife.

I. INTRODUCTION

A. Background

Aquatic nuisance species (ANS) are causing adverse ecological and economic effects in many states and regions. To address these issues, Congress passed the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA, 16 U.S.C. 4701-4741), which, among other actions, authorized and provided general guidance for the development of State ANS management plans. Interstate plans were authorized in the 1996 amendments to the Act. Section 1204 enables the Governors of States and interstate entities (through Governors of involved States) to submit comprehensive management plans to the ANS Task Force and, if approved, request Federal assistance for up to 75 percent of the cost incurred to implement such programs.

Management plans must identify technical, enforcement, or financial assistance for activities needed to eliminate or reduce the environmental, public health, and safety risks associated with ANS. The content of the plan is to focus on the identification of feasible, cost-effective management practices and measures that will be undertaken by Federal agencies, State and local programs and others to prevent and control aquatic nuisance species infestations in an environmentally sound manner. NANPCA also notes that the Task Force, upon request of a State or interstate planning entity, may provide technical guidance in developing and implementing a management plan.

Under NANPCA, the Task Force must review submitted management plans within 90 days to determine if the plan meets the requirements of Section 1204 and either approve them or return them with recommended modifications. Obtaining approval of an ANS Management plans does not provide or delegate Federal authorities to the States or interstate entities affected by the plan.

B. Purpose

Although several States have prepared plans to address specific ANS problems in the past, few have prepared comprehensive ANS management plans. Until recently, there has been little effort to take advantage of this authority in the Act. Through 1996, only three states submitted plans to the Task Force. By early 1998, however, an additional 14 states and five interstate organizations were preparing plans for approval by the Task Force. Previously, the Task Force relied on the statutory language, standard planning principles and practices, and discussion with each State as guidance for preparing plans. In 1995, a model state ANS management plan was developed by the Great Lakes Commission and endorsed by the Great Lakes Panel on ANS. That model plan was valuable in guiding efforts to develop the Ohio and subsequent plans and was used as a basis for this document.

Although useful, the previous guidance did not fully address a variety of issues that have arisen in the preparation of recent plans, including the need for plans to be comprehensive yet developed in a short time-frame. With the recent surge in plan submittals and the experience of working with several States and interstate organizations to develop management plans, it has become apparent that more complete written guidance would facilitate and streamline management plan development along with the Task Force review and approval process.

This document responds to the need for written guidance from the Task Force. Also, the guidance provides the basis for consistent reviews of submitted management plans. The document explains the Task Force perspective on what information needs to be included in a management plan and the rationale for its inclusion. Real examples are provided to illustrate the concepts. The philosophies and principles for this planning process and the plans desired are outlined. Submitted management plans need to comply with these guidelines in order to meet the requirements of Section 1204 of NANPCA and obtain approval from the Task Force.

Once a management plan is approved, the planning entity is eligible to apply for funding assistance following the process described in Section VIII, Requesting Implementation Funding from Fish and Wildlife Service. While plans are developed as multi-year efforts, funds are awarded on an annual basis.

II. PLANNING PRINCIPLES AND APPROACH

The Task Force, as required under Section 1204 of the NANPCA of 1990, seeks development of comprehensive and effective plans, but recognizes the desire to have plans developed, approved and implemented as soon as possible. Achieving these conflicting goals simultaneously is difficult because development of a comprehensive plan requires substantial time and study. The Task Force approach for implementing the ANS management plan provision of the Act reconciles the conflict between these goals and will lead to the accomplishment of both. This approach is based on the following considerations:

Comprehensive plans must identify and discuss all likely ANS problems, issues, and concerns in the geographical area covered. This should include instances where, at the moment, there may not be consensus about a problem or even as to whether one exists;

To facilitate prompt development of plans, the most immediate and pressing problems and concerns that can be effectively managed should be initially addressed;

A rationale for selecting a subset of problems to address initially, and the general plan for addressing remaining problems, along with new emerging ones should be addressed;

Viable actions that address remaining problems and concerns would be described in subsequent iterations of the management plan. The plan will be updated and expanded annually.

Reasons for not addressing a problem or concern initially might include a lack of viable cost-effective actions, a lack of authority to undertake the action, or incomplete information (i.e., a reason for a "research project").

The content of the plan is critical to ensure that effective and efficient implementation is possible. The plan needs to describe goals and objectives to address problems. The specific strategies developed to accomplish each objective and tasks necessary to

implement each strategy should also be described in detail. This information should provide: 1) viable program goals; 2) clear, quantifiable objectives to be achieved; 3) strategies for attaining the stated goals and objectives; and 4) the existing and proposed management actions and tasks to implement the defined strategies and to achieve the objectives. (see Section III. F).

Consistent with requirements of the Act, all plans must include an implementation table, which clearly summarizes the goals, objectives, strategies and actions of the plan. Section III. H, relating to Implementation Tables, describes this hierarchical approach in more detail.

Finally, a strong program evaluation component is essential to monitor progress toward achieving goals and objectives, evaluating problems and needs encountered, and providing a feedback loop for making appropriate adjustments to the plan. Program evaluation should include identifying and incorporating additional ANS problems and concerns as they are recognized and assessing whether the goals and objectives of the plan remain valid and desirable.

The geographic extent of plans should relate to State or major watershed boundaries. State plans must be written to cover the drainage basins of the vast majority of the State. Plans should complement the efforts of States (or other organizations) in the same drainage basin. The plans of interstate entities need to obtain the approval of the affected state(s) and need to address major watersheds. For instance, in the Washington, DC area it would be appropriate to develop a plan for the Chesapeake Bay drainage basin, but inappropriate to develop a plan for either the Anacostia River or Potomac River watersheds.

Plans should cover the current and past two years of efforts as well as projections for the next five years. They represent a "snapshot" at an instant in time of the goals, objectives, strategies and actions for which consensus has been reached and the proper approach for addressing the problems has been identified. However, all of these elements continuously evolve, so plans must be periodically revised to ensure that all problems and concerns are identified in an effective manner. Previously identified problems and concerns that have not yet been addressed can be addressed in subsequent plans. New information and insights, as well as new or revised strategies and actions, would be incorporated. Periodic review and updating also allow emerging problems and concerns to be added in subsequent iterations.

Annual revisions may be required for several years. As each plan matures, the intervals between systematic review and updating (i.e., iterations) will increase to a maximum of every four or five years. However, a plan should be amended at any time to incorporate newly emerging problems or concerns (such as an infestation by a major new nuisance species that requires prompt attention).

Application of principles described in this document will result in a well-thought out process that addresses the most pressing problems, and will provide the greatest return on

funding invested in preventing and combating ANS invasions. Adaptive management that effectively responds to constantly changing problems and concerns and rapidly expanding knowledge will be integral to ANS programs based on plans developed and periodically updated under this approach. Using this approach, these plans can be effective tools for overcoming ANS problems and concerns. Finally, the Task Force recognizes that each planning entity and situation varies, thus, the Task Force welcomes other approaches as long as comparable results are produced and there is appropriate public and technical review.

III. DESCRIPTION OF PLAN CONTENTS

A. Executive Summary

The executive summary should briefly summarize each management plan section and its major recommendations. The purpose of the plan, the background on ANS problems, the authorities and current programs of involved organizations, and the central focus should be mentioned. In addition, present and proposed management actions to overcome problems along with program goals and objectives should be succinctly outlined. Finally, a summary of the implementation table (to include funding required for implementation in the initial and future years by objectives and major strategies) and program monitoring and evaluation plans should be provided.

A sample "Executive Summary" is shown in Example A.

B. Introduction

Explain the plan’s purpose by describing the ANS problem, the local impacts in the geographic area covered and identify a coordinated suite of flexible and effective management actions. These actions should address the prevention, detection and control of ANS that have invaded or may invade the boundary and inland waters of the State or region. Also, discuss the plan’s potential economic and ecological impacts, and other relevant planning issues.

Describe the plan’s geographic scope. A map of the geographic area showing affected water bodies and major structural features should be the primary focus. For interstate plans, a justification of the plan’s spatial scale (as opposed to larger or smaller) should be included. Also, these interstate plans should include the concurrence of the involved state(s).

Describe the process for developing a plan, who prepared it, the time frame and the nature and extent of public involvement. If other plans are the basis for substantial parts of this plan, include similar information for the associated plan(s) and fully describe the linkages. Include in the appendix the names, positions and affiliations of members of any steering committees or work groups involved in preparing this and any precursor plans. Also, it should be noted that existing plans may need revisions or amendments that will

show how they are integrated/coordinated with new state or interstate plans with overlapping jurisdiction.

Briefly discuss any scientific review and input along with any public involvement, including any meetings held and public notices (including press releases) issued. Summarize comments on the draft plan as well as associated plans. Indicate how those comments and reactions were addressed in the final plan. Provide more detailed summaries and analyses of public comments (what type of specific guidance) and how they were addressed in the appendix.

The connection of the ANS plan to other plans produced by entities with overlapping jurisdictions or covering shared waters needs to be explained. For example, the relationship between the management plan for the Lake Champlain basin (covering parts of New York, Vermont and Quebec, Canada) to the New York State ANS management plan should be explained. States such as Missouri and Illinois, if addressing Mississippi River ANS problems should explain any agreements between the two states.

A sample "Introduction" section is shown in Example B.

C. Problem Definition & Ranking

This section of the plan should provide an overall perspective of ANS problems and concerns. Summarize the history of invasions, including the number of species or other taxa in various classes, in the geographic area. Describe pathways (e.g., ballast water/sediments, bait, aquaculture, fishery management) by which these species arrived in the State or region. Indicate where these species have been introduced. For species with substantial impacts, describe their behavior or life cycle in relation to the ecological or economic effects. Describe how connecting water bodies outside the plan boundaries may introduce new ANS into the affected area.

Major problems and concerns, such as key introduced species and introduction pathways, lack of scientific knowledge, or limited public knowledge should be discussed. All known and suspected ANS concerns and problems should be identified even if no consensus exists about what species warrant attention. As support, list the following in an appendix:

1. All known ANS that have been introduced into the geographic area covered by the plan. Include Acryptogenic species (i.e., those which have not been determined as clearly native or nonindigenous). To the extent possible, indicate the probable pathway (e.g., ballast water, bait, aquaculture) and timing of each introduction. This latter information will help identify and prioritize pathways of concern to be addressed in the plan.

2. Species that have the potential of finding their way into the State or region’s waters and the pathways of concern. Do not be too conservative in making such predictions.

3. Evaluate the economic and ecological costs and benefits of proposed actions. The Task Force recommends using ecological risk assessment principles to understand and group ANS problems. For large issues with unclear resolutions, conducting an ecological risk assessment may be the most cost-effective means that helps ensure that actions will achieve the desired results ***(ecological risk assessment guidelines are available at: http://www.epa.gov/ncea/ecorsk.htm)***. For smaller scale problems, adopting basic ecological risk assessment principles will improve the likelihood of choosing the most appropriate method to address problems. Some basic principles include:

- Determine and document through stakeholder involvement what biological resources and their services are valued;

- Understand how those valued biological resources and services are exposed to and affected by ANS as well as physical and chemical stressors, and their pathways;

- Estimate the effect of potential management action(s) on addressing the ANS problem.

Developing a conceptual watershed model that links human activities with the resulting eco-logical stressors and impacts is one way to help understand the potential consequences of ANS invasions or proposed ANS control actions. Good examples of such conceptual models are found in Appendix C of the ecological risk assessment guidelines.

The plan should acknowledge that problems and concerns may change over time. If problems and concerns are to be further described in the context of individual objectives, this section can provide a brief overview and summary discussion.

However, as a point-of-departure, problems should be grouped into 3-5 categories (e.g., high, medium, low). Grouping, as opposed to ranking, will allow for a clearer understanding about the ANS issue, without prematurely emphasizing one problem over another, which may change over time. As new problems arise, more information will be gathered about these problems, which could be inserted into the planning process to account for future changes. This mechanism is important for a plan to be truly effective and useful. It must have enough built-in flexibility to address the most current and pressing issues.

A sample "Problem Definition and Ranking" section is shown in Example C.

D. Goal(s)

The goals describe what the designated planners want to accomplish and when. If achieved, goals should clearly result in resolution of the range of problems and concerns identified and address the intent of the Act. One or more goals should be defined. They should be fairly broad, far-reaching, long-term in scope and should require the implementers to stretch their resources if they are to be achieved.

A sample "Goal(s)" section is shown in Example D.

E. Existing Authorities and Programs

Each management plan needs to summarize relevant federal, state, tribal and regional authorities and activities that are or can be used to address the problems and concerns identified in the plan. The Task Force recommends that any gaps in those authorities or implementing regulations that impede or limit attainment of plan goals or the intent of the Act be identified.

The plan should discuss current efforts to amend existing or enact new legislation to address shortcomings in existing authorities and programs. It should also describe the status of these efforts and the likelihood that such changes will occur during the planning period.

A sample discussion of "Existing Authorities and Programs" is shown in Example E.

F. Objectives, Strategies, Actions & Cost Estimates

Objectives – These are the criteria by which an organization measures its progress toward achieving goals. They express intermediate results believed necessary to achieve the stated goals. Objectives should be related to specific goals and be as specific and quantifiable as possible to make clear what will be accomplished. Also, it is important for objectives to facilitate evaluation. A series of related objectives is needed to address different aspects of each goal. Provide descriptions of each objective, which describes how they support the goal and which problems they address.

Strategies- There should be one or more strategy statements describing the general approach that will be taken to attain each objective, and it or they should be included with the respective objective.

Actions- Describe the specific work or task that will be performed to implement a strategy (e.g., inspect trailored boats for zebra mussels and other ANS). Short statements detailing the work required and organizations involved and their respective roles should be prepared for each action.

The expected result should be described. In the event that the authority to undertake the necessary action does not exist, an objective and related strategies and actions may be required to attain the authority to pursue the actions necessary to achieve the goal. This work should have been described in the preceding section but should also be referenced in this section. Actions should be described with the statements for each strategy.

Each action, along with associated strategies, objectives and goals should have a title and be listed in the implementation table. For each action, the names of the implementing and funding organizations and their roles should be specified.

It may be desirable to include additional information about the problems and concerns being addressed to indicate why a particular strategy or set of actions is appropriate.

Cost Estimates - The basis for the cost estimates (i.e., salary of two field biologists 1/3 of the year, plus equipment and travel costs) should be presented here. The estimated contribution of each organization and the total cost for each action should be shown in the implementation table.

A sample "Objectives, Strategies and Actions" section is shown in Example F.

G. Priorities for Action

Priorities for action are established based upon the severity of a problem, the programmatic authority and scientific capability to resolve it, and the cost of the proposed solution.

The plan should discuss the rationale for focusing on certain species, pathways, economic and ecological impacts, or other problems/concerns and not others. It should be explicit about which problems and concerns are to be addressed in this iteration of the plan and why they were included at this time while others were not.

A sample "Priorities for Action" section is shown in Example G.

H. Implementation Table

An implementation table, a feature required by the Act, organizes plan goals, objectives, strategies and actions into a coherent whole and displays the relationships among these elements in the context of the agreed funding and implementation responsibilities and timing of actions. In many respects, it is the key to documenting effective ANS management planning. It displays actions linked to strategies, objectives and goals in a hierarchical fashion.

Implementation tables succinctly list the actions required to address the problem and achieve the identified objectives and goals. For each action they show funding needs, who funds the work, its costs, the organization with the lead responsibility for the action, and others involved in implementing the action. This description includes funding for current efforts to address each action as well as the needs for the next five years. Sequential actions can be displayed. Priorities can also be shown by the fact that some unrelated actions start in later years than others.

Many states have indicated that is very difficult to develop a specific implementation table for a 5-year planning period. An alternative method is to develop a 5-year implementation strategy and a short-term action plan covering a period of not less than two years. States may consider this alternative in preparing the plan. The plan should also disclose the consensus reached among organizations to apportion activities and work collaboratively on addressing ANS problems. The roles and responsibilities of each

participating organization need to be clearly defined and lead organizations need to be identified. Finally, comments from public, scientific and other review and ensuing changes should be documented.

There should be one implementation table per goal and it should include the following columns:

- Brief Title of Action. Each action described in Section F of the plan should be listed.
- Action-Identification Number. The four-digit numbering scheme identifies the goal, objective and strategy associated with each action. This reflects the hierarchal planning approach being employed under this numbering scheme. The first digit, a roman numeral (e.g., "I") indicates the goal the action supports. Next, a capitalized letter will indicate the objective supported ("IA"). The third digit in this scheme is an Arabic number to indicate the strategy supported ("IA1"). The fourth digit is a lower case letter and describes the action itself. Hence ("IA1a"):

  - Goal "I";

  - Strategy "1" supporting objective "IA"; and finally,

  - Action "a" implementing Strategy "IA1".

- Fund Source. Acronyms should be used to indicate the organization providing resources for each action. A listing of the spelled out acronyms should accompany the implementation table. If more than one organization provides funding for a particular action then a separate line should be used for each organization.
- Lead Organization. The organization with the lead responsibility for implementing a particular action.
- Cooperating Organization. Other organizations supporting or involved in an action should be indicated with dollar and FTE (full time equivalent positions) contributions shown in the ensuing columns.
- Funding/Staff. The remaining columns display funding and staffing required to implement each action by fiscal year. Recent efforts to carry out the action, if any, for the past, current, and budget years should be included as well as planned efforts over the next two to five years.
- $000/ FTEs. Amount of funding for recent and planned efforts and the estimated contribution of each organization toward each action should be shown. Funding should be reported to the nearest thousand dollars and staffing to the nearest one-tenth FTE. FTE estimates are valuable indicators of level of effort needed and cost indicators, but are not mandatory. If shown, indicate in the narrative description whether the FTEs are paid, or are volunteers. Dollar cost estimates should include the salaries and estimated overhead costs of employees. For volunteers, include the value of the in-kind services provided.
- Future Needs. Annual operating and maintenance costs of a continuing program after the planning period, if any, can also be displayed.

An excerpt of a sample "Implementation Table" is shown in Example H.

I. Program Monitoring and Evaluation

Include in this discussion the performance measures that will be used to assess the effectiveness of management actions. For instance, on an annual basis this might include:

- whether or not objectives are achieved;
- rate of spread along a river reach or coastline;
- change in total acreage of habitat occupied by the ANS or the displaced native species;
- changes in abundance of an invader and directly or indirectly impacted species;
- changes to Federal and State T&E and extinct species lists due to ANS.

It is recognized that unforeseen factors may impact the progress of remedying a problem and this would be evident through program monitoring and evaluation. The discussion should address how other physical, chemical and biological stressors are impacting the effectiveness of management actions and the success of objectives.

Describe the process that will be used to accumulate information about results (outcomes and outputs), compare them against planned results, evaluate effectiveness of efforts, and provide feedback. Monitoring and evaluation actions should be included as multiple line items in the Implementation Table.

An excerpt from a sample of an "Implementation Table" is shown in Example I.

J. Glossary

Include biological, planning or other terms that have a special meaning as used in the plan for reference, even if defined in the text. The definitions in the Glossary could be more detailed than those in the text. You may wish to include items such as ANS and pathways.

A sample "Glossary" is shown in Example J.

K. Literature Cited

There should be references to other published materials.

A sample "Literature Cited" section is found in Example K.

L. Appendices

Appendices should be used to incorporate detailed support for items addressed in the plan, such as:

- Listing of names, positions and affiliations, and addresses of members of any steering committees or work groups involved in preparing both plans (as described in section III.B);
- Comments received on the plan, responses to them, and how they were addressed (III.B.);
- Annotated lists of known NIS, cryptogenic species, species that may find their way to the geographic area, pathways of concern and detailed discussions of other problems and concerns as required under section III.C; and
- Prior analyses or reports providing relevant background on ANS problems (III.C).

IV. PUBLIC FACILITIES

The U.S. Army Corps of Engineers is developing this section and will be available when completed.

V. TECHNICAL ASSISTANCE

As authorized in section 1204(a)(3)(b) of the NANPCA, upon request the Task Force may provide technical assistance to entities developing and implementing a management plan. This guidance document was developed with the intent of providing this type of general assistance. Additional assistance can be provided on issues related to specific plans, subject to availability of Task Force staff resources. In addition, dependent upon interest from the planning organizations and Task Force resources, the Task Force would be willing to sponsor and organize workshops periodically on ANS management plans.

Experience has demonstrated that a Task Force review prior to an official plan submission can benefit both the organization and the Task Force. Once a draft plan that addresses the basics of this guidance is prepared, planning entities are encouraged to discuss them with and submit them to the Executive Secretary of the Task Force for preliminary review. These discussions should occur before any public reviews are held.

Please contact the Executive Secretary of the Task Force for additional technical assistance or if you have questions about the guidance document. Suggestions for improving the guidance document are also encouraged, as it will be periodically updated. While the Task Force's preference is electronic mail, replies can also be made via written correspondence or phone calls. The Executive Secretary can be reached at:

- sharon_gross@fws.gov, 703 358-2308 phone, 703 358-2210 FAX, and
- Sharon Gross, Executive Secretary
- Aquatic Nuisance Species Task Force
- 4401 N. Fairfax Drive, Suite 840
- Arlington, VA 22203-1622

VI. TRANSMITTAL OF PLANS TO ANS TASK FORCE

Management plans requesting approval from the Task Force should be submitted to the Task Force via letter on official letterhead and signed by the Governor in the case of State plans or the Governors and heads of other involved jurisdictions and organizations, including Indian Tribes, in the case of interstate plans.

The transmittal memorandum should request approval by the Task Force, briefly describe how the submitted plan adheres to the requirements of the Act and Task Force guidance and indicate that the State or region is intent on implementing the management plan and undertaking the specified actions that will cost-effectively address ANS problems. It should also indicate the organizations prepared to invest the necessary resources to implement the plan.

Example L provides a transmittal letter that accompanies a management plan submitted for approval.

VII. ANS TASK FORCE REVIEW DECISIONS & PROCESS

The Task Force will promptly conduct a full review of submitted plans. The 90-day review period required under the Act will begin upon receipt of the formal submission by the Executive Secretary. Submitted management plans will be circulated to the Task Force members and staff for general comment and response to specified review questions (listed below). Based on this review the Task Force will decide to approve the plan, accept it subject to specified conditions, or modify it as indicated and require another submittal.

The Task Force encourages and will attempt to accommodate presentations of ANS management plans at Task Force meetings. Plans that are nearly ready for submission to the Task Force, as well as those formally submitted can be presented. Contact the Executive Secretary of the Task Force to have the presentation included on the agenda of a Task Force meeting. Depending on whether they can be accommodated during the 90-day review period, presentations about a submitted plan will also be included during regularly scheduled meetings.

To assess the adequacy of a plan and to help identify areas needing correction, Task Force members and staff will specifically consider how the following questions are addressed:

- Do goals reflect the intent of the Act 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 selected 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?

Task Force members will review the submitted plans by using a checklist that addresses the questions shown above and will then complete an approval or disapproval form. Both of these documents are included in Example M. Plans are approved for a maximum of five years, but as stated previously, annual revisions are strongly encouraged.

In the event a plan is approved and funds are provided, the Task Force will monitor the activities of the planning entity to ensure the plans are implemented. If the plan is not being implemented, the Task Force may withdraw approval of the plan and no longer provide funds. Funding could be reinstated if the planning entity can demonstrate the plans are being implemented.

VIII. REQUESTING IMPLEMENTATION FUNDING FROM FWS

In addition to establishing the ANS Task Force and the framework for a comprehensive ANS Program, NANPCA, as amended, provided the Director of the U.S. Fish and Wildlife Service with the authorization to make grants available to states, tribes or interstate organizations for the implementation of approved ANS Management Plans. Section 1204 of NANPCA, "State Aquatic Nuisance Species Management Plans," outlines the necessary requirements for an approved entity to receive a federal cost-share grant.

Preceding sections of this document provide suggestions for developing a comprehensive ANS management plan that meets these requirements. This section describes the general process by which a State/Interstate organization can apply for a grant to fund implementation of approved plans.

As of May, 2000, the Task Force has approved eight plans for which funding may be made available. Annually, Congress provides appropriations to the Fish and Wildlife Service, a portion of which is allocated to provide cost-share grants to State/Interstate entities with approved State ANS Management Plans. A total of $4,000,000 is authorized under the Act to be appropriated each year through 2002. Unfortunately, annual appropriations have been substantially less than the amount authorized and are not anticipated to meet the needs identified by the States in their implementation plans. As such, the Service will annually evaluate requests for funding from the State/Interstate entities with approved ANS Management Plans in making funding decisions.

Administrative costs for activities and programs carried out with the grant in any fiscal year may not exceed five percent of the amount of the grant for that year.

When requesting funding, State/Interstate entities should ensure that the document addresses the questions outlined in Section VII: ANS Task Force Review Decisions and Process. The last three questions are particularly important to the Service in evaluating funding requests.

It is incumbent for the State or requesting entity to address their annual activities and prioritize their funding request. In addition to the questions identified previously, general criteria that the Service will use when evaluating requests for funding include:

- Consistency with the tenets of the invasive species legislation;
- Inclusion of an annual time line outlining the proposed accomplishments;
- Evidence of bringing partnership dollars which helps to leverage the requested amount;
- Description of succinct program activities that highlight the goals of an ANS program: prevention, detection & monitoring, and control elements of the plan.

The following flowchart outlines the generalized process and timeframe that the Service will follow in evaluating ANS plans submitted for funding requests. Included in each box are approximate dates of when various actions will occur.

Two Phase Evaluation & Funding Process

Phase I

I. ANS Management Plan signed by the state Governor must be submitted to the Aquatic Nuisance Species Task Force (ANSTF) for approval prior to request for funding.

II. ANSTF has 90 days to review, comment and return the document to the Governor.

III. If the Plan is approved, the State must submit a separate request for funding to the USFWS per phase II.

Phase II

I. State submits request for funding for annual implementation of ANS management plan to USFWS by December 15 of year prior to that for which funding is requested.

II. USFWS reviews and approves or denies grant requests by February 1.

III. USFWS sends notification letters to states by February 15.

IV. Funding allocations made available to states by March 15.

IX. EXAMPLES

This final section of the guidance provides examples of the type of information that should be contained in a submitted ANS Management Plan. Submitting a plan that is more consistent with the format of the examples increases the likelihood of having it approved.

The examples are taken from materials submitted to the ANS Task Force. The examples may have been altered slightly and may include comments preceded by the bolded comment "**Note that**" on how it could be modified to fit the "ideal" model of structure and content.

Example A. Executive Summary

Example from St. Croix National Scenic Riverway Comprehensive Interstate Management Plan for the Prevention and Control of Nonindigenous Aquatic Nuisance Species, with minor alterations and comments.

The St. Croix River is a border water between Minnesota and Wisconsin. The St. Croix National Scenic Riverway includes the Namakagon and St. Croix Rivers, from their headwaters to St. Croix Falls. The Lower St. Croix National Scenic Riverway includes the portions of the river from St. Croix Falls to its confluence with the Mississippi River. The Riverway is threatened by invasions of nonindigenous aquatic nuisance species that may permanently change the high quality of this exceptional resource.

The purpose of this comprehensive interstate management plan is to establish management actions to address the prevention, control, and impacts of nonindigenous aquatic nuisance species that have invaded or may invade the St. Croix River. The Plan will also serve to pursue an opportunity for Federal cost-share support for implementation of the plan.

Note that a listing of authorities and programs of involved organizations is missing. Something similar to the following should appear in the Executive Summary:

Federal authorities and organizations with ANS related activities in the St. Croix River basin include:

- *Nonindigenous Aquatic Nuisance Species Prevention and Control Act (NANPCA) and the associated coordinating efforts of the ANS Task Force;*
- *St. Croix National Scenic Riverway as established by Congress in 1968 through the Wild and Scenic Rivers Act;*
- *National Park Service;*
- *US Army Corps of Engineers; and*
- *US Fish & Wildlife Service.*

Organizations with interstate roles include:

- *St. Croix Zebra Mussel Task Force;*
- *Minnesota-Wisconsin Boundary Area Commission; and*
- *Great Lakes Panel.*

At the state level, both Minnesota and Wisconsin are involved, and the Great Lakes Indian Fish and Wildlife Commission represent tribal governments with relevant authorities. Finally, marina managers have authorities at the local level.

The goals of the interstate management plan are:

I. Prevent or slow the spread of nonindigenous aquatic nuisance species into and within the St. Croix River.

II. Abate harmful ecological, economic, social and public health impacts resulting form infestations of nonindigenous aquatic nuisance species within the St. Croix River.

The management plan identifies areas or activities within the interstate region, other than those related to public facilities, for which technical, enforcement or financial assistance is needed to eliminate or reduce the environmental, public health, and safety risks associated with aquatic nuisance species particularly the zebra mussel. Key actions to achieve Goal I include:

- *establish, publicize and enforce regulations;*
- *monitor for zebra mussels and other aquatic nuisance species problems; and*
- *conduct public awareness activities about the actions the public can take to avoid spreading aquatic nuisance species.*

Key actions to achieve Goal II include:

- *continue functioning of the St. Croix Zebra Mussel Task Force to establish and coordinate control plans;*
- *direct removal and cleaning of boats with zebra mussels; and*
- *monitor, support and coordinate research for possible control methods.*

The content of this plan recommends feasible, cost-effective management practices and measures to be taken on by Federal, state and local programs to prevent and control aquatic nuisance species infestations in a manner that is environmentally sound.

The Governors of the States of Wisconsin and Minnesota, and the governments of the involved Indian tribes will submit this plan to the national Aquatic Nuisance Species Task Force, as allowed by section 1204 of the Federal Nonindigenous Aquatic Nuisance Prevention and Control Act, on behalf o f the St. Croix National Scenic Riverway (the interstate organization) for the purpose of seeking Federal grants to implement the plan.

Note that a summary of the funding required for implementation is missing. Something similar to the following should appear in the Executive Summary:

The implementation table summarizes the plan's funding from all sources. Existing funds that are dedicated to ANS related tasks total $229,775 and 6.5 FTE's. Of this amount $204,500 and 6.0 FTE's will be carried forward for the next five years. The Plan requests additional funding of $42,500 annually from the Federal Task Force.

Example B. Introduction

Example from Washington State Plan with minor alterations and comments.

The introduction of non-indigenous aquatic nuisance species (ANS) into the marine and fresh waters of Washington threatens the ecological integrity of the state's water resources, as well as economic, social and public health conditions within our state. Because they have few natural controls in their new habitats, ANS spread rapidly, destroying native plant and animal habitat, damaging recreational opportunities, lowering property values, clogging waterways, and impacting irrigation and power generation. The impact of existing ANS on salmonids is poorly understood and the potential impact from the introduction of the zebra mussel is high. In 1996, freshwater and salt water sport fishing anglers in Washington spent over $1.3 billion pursuing their sport and created over 16,000 jobs (U.S. Fish and Wildlife Service, 1996). Washington's marine and shellfish fisheries (tribal and non-tribal) yield an estimated $120 million annually in wholesale value alone (Morris Baker, personal communication). The coordinated efforts contained within this plan are designed to protect the citizens of Washington from the multitude of losses associated with freshwater and marine ANS animals and plants. This plan focuses on eliminating the threat of accidental ANS introductions. The intentional introduction of nonindigenous species for aquaculture, commercial or recreational purposes is addressed to insure that these beneficial introductions do not result in accidental ANS introductions, and to improve information sharing among those agencies responsible for regulating intentional introductions.

Washington has the opportunity to prevent or prepare for the introduction of two destructive ANS; the freshwater zebra mussel (Dreissena polymorpha) and the salt water European green crab (Carcinus maenas). Both are well suited for survival in Washington. States where zebra mussel and green crab are present have reported severe environmental and economic damage resulting form their accidental introduction. Live zebra mussels have been found on boats entering California. The green crab has spread from California to Oregon, and on June 1, 1998 a

molt exoskeleton of a green crab was found in Washington's Willapa Bay. Washington must act quickly and in concert with Canada and our neighboring states, to avoid or reduce major impact from these ANS.

Our state did not act quickly to eradicate the salt water grass (Spartina alterniflora) when it first started spreading in Willapa Bay. Today over 5,000 acres of Spartina alterniflora exist in Willapa Bay alone, and it continues to spread. Without a major multi-million dollar effort, there will be a continued loss of habitat for many native species of fish, clams, oysters, shorebirds, migratory waterfowl as well as further impacts of the shellfish aquaculture industry. We must learn from our past mistakes. The coordinated efforts and cooperative funding outlined in this plan can enable us to prevent, eradicate or control new introductions more effectively, before they cause major environmental and economic damage.

Note that a map showing Willapa Bay, other major water bodies and the entire state should be referenced here and the map should included in the introduction.

The Washington State Aquatic Nuisance Species Planning Committee developed this plan. Members of the planning committee assumed an active role in writing the plan, while advisors reviewed draft plans and provided guidance. A list of the members and advisors is provided in Appendix B. Washington Department of Fish and Wildlife was the lead agency assigned to coordinate the drafting of the plan and the Washington State Aquatic Nuisance Species Coordinator served as the committee chair. A meeting of the planning committee was convened on April 7, 1998 in Olympia, Washington to review a draft of the plan. A list of attendees along with the organizations they represent, and their general comments on the draft plan are provided in Appendix B.

The Washington Exotic Species Work Group of the Puget Sound-Georgia Basin International Task Force represented an important part of the planning committee. Much of their previous work in creating an implementation plan to address ANS issues in the Puget Sound and Georgia Basin was used in the creation of this plan.

The planning committee reviewed draft plans, and there was a 30 day public review and comment period. The review process for the State Environmental Policy Act (SEPA), Chapter 43.21 RCW, determined the plan to have no significant environmental impact.

Washington's ANS Management Plan will be reviewed and revised annually, or more frequently if necessary. New ANS threats can arrive unexpectedly. Advances in our knowledge of ANS management techniques could warrant alterations in our management strategies. The specific tasks employed to accomplish our goals and objectives must remain flexible to assure efficiency and effectiveness. This version of the Washington State ANS Plan is a good first step towards identifying and integrating existing ANS programs, and implementing new programs, but future editions will be necessary to fully achieve our goal.

Example C. Problem Definition

Example from Washington State Plan.

Non-indigenous Species Problems and Concerns in the State of Washington

A growing number of non-indigenous aquatic plant and animal species have adversely impacted the productivity and biodiversity of Washington' s native species, and altered a variety of aquatic ecosystems. Most introductions are the result of human activities. There are many ways organisms may be transported. For example: shipments of live oysters from one area to another can carry oyster predators and diseases; marine organisms can be transported to new waters by attaching to the ship or in its ballast water. Major pathways through which nonnative species are introduced into inland and coastal waterways include aquaculture, aquarium trade, biological control (shoreline stabilization, agricultural uses), transport via vessel fouling and ballast water discharge, recreational boating and fishing, research activities, and movement of nonnative species through channels, canals and locks. Some pathways, such as the aquaculture industry, are currently regulated to minimize the risk of new ANS introductions, while other pathways have developed few or no precautions. Additional information regarding regulated pathways is listed in Appendix D.

Potential threats may be evidenced by the degree of negative impact these species have upon the environment, industry and the economy. Negative impacts include:

- *loss of biodiversity;*
- *threaten ESA listed species like salmon;*
- *change estuary ecology;*
- *alterations in nutrient cycling pathways;*
- *decreased habitat value of infested waters;*
- *decreased water quality;*
- *stunted fish populations due to dense biomass of introduced species;*
- *decreased recreational opportunities;*
- *economic impact to the shellfish industry;*

- *increased safety concerns for swimmers;*
- *decrease in property values;*
- *fouled water intakes;*
- *frequently burned out irrigation pumps;*
- *impacts on power generation;*
- *increased risk of flooding due to increased biomass in water or clogging lake outlets;*
- *impeded water flow and interference with efficiency of water delivery systems.*

The following two sections on freshwater animals and plants, and marine animals and plants provide information on non-indigenous species and discuss priority species. Draft lists for each category (freshwater and marine) are intended to provide a basis for discussion and further work identifying the presence, distribution, status, and threat of non-indigenous species. They will be updated, maintained, categorized and standardized as new information is received and assimilated.

Freshwater Animals and Plants

Freshwater Animals

A draft list of freshwater non-indigenous animals in Washington is included in Appendix C. The list is incomplete, since little information is available on non-indigenous aquatic animals in Washington. In general, aquatic plants in Washington have received far more research and management attention than ANS animals. Currently, more funding and research is needed regarding the management and control of ANS animals. The freshwater ANS animals which are presently of most concern for Washington include:

Chinese mitten crab (Eriocheir sinensis), is considered to be a priority species. In 1997, a single Chinese mitten crab was identified from the lower Columbia River near Portland. This individual specimen was captured on hook and line by a recreational sturgeon angler. A population of mitten crab exists in California, but there have been no other confirmed reports of mitten crab in Washington or Oregon waters to date.

The zebra mussel (Dreissena polymorpha) has not been found in Washington waters to date, but is considered to be a priority species because of the degree of impact it imposes once it is introduced, as based on the Great Lakes experience. Live zebra mussels have been found on boats entering California.

More detailed information on these priority species is included in appendix C.

The spiny water flea (Bythotrephes cederstroemi), round goby (Neogobius melanostomus) and ruffe (Gymnocephalus cernuus) are not currently found in Washington. Asian clam (Corbicula fluminea), and New Zealand mudsnail (Potamopyrgus antipodarium) are found in Washington waters. These species are not considered to be priority species at this time, but they are considered species of concern.

Freshwater Plants

Invasive and aggressive non-indigenous freshwater weeds pose a serious threat to Washington State waters. Many non-indigenous freshwater species are currently present in Washington. Some cause serious problems; the impacts of others are still yet to be determined; while yet another small group of species appears to cause no adverse impacts. The freshwater non-indigenous plant species found in Washington are listed in Appendix C, along with information on pathways of introduction, more detailed information on priority plant species and their impacts.

Eurasian water milfoil (Myriophyllum spicatum), hydrilla (Hydrilla verticillata), Brazilian elodea (Egeria densa), and Parrot feather (Myriophyllum aquaticum) are priority freshwater submersed species in Washington.

Purple loosestrife (Lythrum salicaria), and saltcedar (Tamarix ramosissima) are priority freshwater emergent species.

Marine Animals and Plants

A draft list of non-indigenous marine species known or suspected to occur in the shared waters of Washington State and British Columbia, Canada is included in Appendix C. Much remains to be learned about the status and threats posed by these species. The difficulty of identifying field specimens leads to uncertainty about which species should be classified as invaders. The site, date, and mechanism(s) of introduction for most marine non-indigenous species are unknown, as are the extent of their present range and their rate of spread. Little is known about the threats posed by most introduced marine species.

The draft list will be made available to experts on the identification and ecology of marine species for their review and recommendations. These experts, in turn, will be invited to serve as contacts for their areas of expertise. Comments from these experts, and information gathered from further review of the scientific literature will be incorporated into our current information on each species.

The draft list will be posted on the Washington Department of Fish and Wildlife ANS web site. The updated list will allow users to quickly identify which non-indigenous species are known to occur in Washington, and which invaders are likely to arrive in the near future. Given sufficient additional resources, the list can become the centerpiece of an information system linking information on each species, including: its taxonomy, distribution, and ecology in its native and host ranges, the impacts on other regions it has invaded, and a list of experts on its identification, ecology, and control.

The European green crab (Carcinus maenas) is a priority marine animal species that may already exist in Washington. The molt exoskeleton of a green crab was discovered in Willapa Bay on June 1, 1998 and live green crab have been found in waters as close as Oregon's Coos Bay. The Japanese oyster drill (Ceratostoma inornatum) is a marine animal species of concern that has been introduced into Washington waters, but will not be specifically addressed in this edition of the state plan due to the Plan's focus on the more urgent threat of the zebra mussel and green crab.

Spartina alterniflora and Spartina anglica are priority marine plant species present in Washington and described in Appendix C.

Example D. Goal

Example from Washington State Plan

By the year 2002, fully implement a coordinated strategy designed to minimize the risk of further ANS introductions into Washington waters through all known pathways; and where practical, stop the spread of ANS already present; and eradicate or control ANS to a minimal level of impact.

Example E. Existing Authorities and Programs

Example from Washington State Plan

Nonindigenous Species Authorities and Programs

This section provides a brief discussion of non-indigenous species authorities and programs in Washington State, as well as federal law and international agreements. Washington State laws relating to non-indigenous species cannot be discussed without a basic understanding of federal and international authorities. The policies regarding non-indigenous species are controlled and enforced by a network of regulatory agencies and organizations. Not all state and federal laws relating to ANS are included in this section of the plan. A more complete listing of relevant state and federal laws relating to ANS will be compiled by Washington Department of Fish and Wildlife.

State Authorities and Programs

State and local efforts play a large role in controlling the spread of non-indigenous species. States have authority to decide which species can be imported and/or released. However, the United States Constitution vests the power to regulate international and interstate commerce to Congress. Federal law may preempt state law, but states retain almost unlimited power to define which species are imported and/or released. In Washington State, the aquaculture and aquarium trade are regulated at both the state and federal levels, with aquaculture being the most heavily regulated pathway of non-indigenous introductions. Commercial marine vessels are regulated primarily by federal law, as is the governance of ballast water under the National Invasive Species Act of 1996, 16 United States Code Section 4701, et seq. Additional information on regulated pathways of introduction for non-indigenous species can be found in Appendix D.

Washington Animal Programs and Regulations

Currently few state regulations and programs exist concerning the regulation of non-indigenous animals. Washington State regulations addressing the introduction of non-indigenous species include regulations protecting against introduction of the zebra mussel, WAC 232-12-01701 and WAC 232-12-168. WAC 220-77 deals with aquaculture disease control, but it is very pertinent to the exclusion of non-indigenous species that could be accidentally introduced. Additionally, Washington Session Law, Chapter 153, Law of 1998, created legislation for the prevention and control of zebra mussel and green crab.

Washington Plant Programs and Regulations

The Washington State Noxious Weed Control Board

Washington has a strong weed law and local infrastructure (most counties have county noxious weed control boards) to enforce compliance with the weed law (RCW 17.10). Washington's State Noxious Weed Control Board sets state policy and determines the noxious weed list for the state. Washington's most problematic exotic aquatic species are listed on this list (Available by request from the Washington State Noxious Weed Control Board.).

Washington Department of Agriculture Quarantine List

The Washington Department of Agriculture Quarantine List identifies plants known to be invasive and a detriment to the state's natural resources. This regulation prohibits the sale and transport of these species, and serves to prevent the continued introduction of these problem plants into Washington. Washington's most problematic aquatic plants are listed on the State Quarantine List (available by request from the Washington Department of Agriculture, Plant Services Division).

Washington Department of Ecology Aquatic Weeds Program

The Department of Ecology Freshwater Aquatic Weeds Management Program is a nonregulatory program established in 1991 by the Washington State Legislature. This program offers technical and financial assistance for the management of freshwater aquatic weeds in Washington. Further details of the Aquatic Weeds Program can be found in Appendix D.

Washington Department of Ecology Aquatic Plant Management Program

The Aquatic Plant Management Program of the Washington Department of Ecology is a regulatory, herbicide–permitting program for the management of aquatic plants (both native and noxious). Herbicide permits are issued for control projects based on the control options allowed in two Environmental Impact Statements (EIS) prepared for this program (Noxious Emergent EIS and Aquatic Plant Management EIS).

Current Known Gaps in Washington State Programs

Although these programs are essential for the management of ANS, some gaps in these programs do make them less effective. A description of some of the known gaps and impediments that hinder the implementation of the Washington State Noxious Weed Program, Aquatic Weeds Program, and the Aquatic Plant Management Program are discussed in Appendix D.

Federal Regulations

The current federal effort regarding the management of ANS is a patchwork of laws, regulations, policies, and programs. At least twenty agencies currently work at researching and controlling non-indigenous species. The Federal Agencies Table in Appendix D outlines the responsibilities of a number of these government agencies and summarizes their current role in the control of introduced species.

Federal laws which apply directly to the introduction of non-indigenous species include the Lacey Act, the Federal Noxious Weed Act, the Federal Seed Act, the Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990, and the National Invasive Species Act of 1996. (The full text of these laws will not be included in this report, though copies may be requested from the Washington Department of Fish and Wildlife.) The Clean Water Act could have an indirect application to ANS if the discharge of ballast water were considered pollution. The Endangered Species Act could also have indirect application if an ANS was shown to threaten the survival of a federally listed species, such as a salmon.

International Agreements

In addition to state and federal regulations, a number of international agreements address the issue of non-indigenous aquatic species. In the Pacific Northwest, the Washington/British Columbia Environmental Cooperation Agreement of 1992 established the Puget Sound/Georgia Basin Task Force to identify, research, and establish policy priorities in this joint Canadian/American coastal region. The management priorities identified by the task force include minimizing the introduction of exotic species into the shared waters of British Columbia and Washington. The Puget Sound Exotic Species Work Group was formed to study the issue and make recommendations to the task force. Additional international agreements addressing the issue of exotic species may be found in Appendix D.

Of increasing importance on the international level and impacting the national front as well, is the work accomplished by the International Maritime Organization regarding the management and control of ballast water as a major vector for the transport of exotic or non-indigenous species in ocean trade and transport vessels. The most recent International Maritime Organization Resolution passed in November of 1997, sets forth current international guidelines suggested for the control of ballast waters. These guidelines are currently being implemented and coordinated on a national scale via the United States Coast Guard as required under the National Invasive Species Act of 1996, 16 U.S.C.4701, et seq., as implemented via 33 Code of Federal Regulations, part 151).

Example F. Objectives, Strategies, Actions & Cost Estimates

Example from Washington State Plan with comment

Note that the example provided below is an excerpt from the 38 pages of descriptive information in this section of the Washington Plan

Objective 2: Prevent the Introduction of New ANS Into Washington Waters.

Education is an important component of this objective and is addressed in Objective 4.

2A. Problem: *New introductions of ANS into Washington waters can cause major economic and environmental damage. Prevention is the most cost effective and environmentally sensitive method of eliminating this problem. Washington currently has no coordinated, comprehensive program to prevent new ANS introductions.*

2A1. Strategic Action: *Coordinate with other states and nations to prevent the spread of ANS into Washington either from or through areas outside of Washington jurisdiction. Washington Department of Fish and Wildlife is requesting $5,000 to fund travel expenses necessary to implement the following tasks.*

2A1a Task: *Washington Department of Fish and Wildlife will coordinate participation in regional conferences, in cooperation with Washington Sea Grant, to increase awareness of ANS issues in cooperation with other state agencies.*

2A1b Task: *Washington Department of Fish and Wildlife will participate in the Western Regional Panel on Aquatic Nuisance Species in cooperation with our state appointed representative on the panel.*

2A1c Task: *Washington State will participate in the Pacific States Marine Fisheries Commission effort to coordinate and implement regional ANS activities. Washington Department of Fish and Wildlife and Washington Department of Ecology have each dedicated $2,500 to partially fund the Regional ANS Coordinator.*

2A1d Task: *Washington Department of Fish and Wildlife will chair the Puget Sound Exotic Species Work Group of the Puget Sound/Georgia Basin International Task Force.*

2A1e Task: *Washington Department of Fish and Wildlife will request $5,000 of state funding to support the 100th Meridian Project. This funding will be combined with other federal and state dollars to help stop the spread of zebra mussels past the 100th meridian and into Washington's waters.*

2A1f Task: *Washington Department of Fish and Wildlife will assist in the distribution of ANS information to tribes within Washington and explore new opportunities to increase tribal awareness and involvement in ANS issues. Each of the 27 federally recognized tribes within Washington will be contacted and provided with support to identify ANS management needs on their lands. Washington Department of Fish and Wildlife is requesting $5,000 per tribe for a total of $135,000 to implement this task.*

2A1g Task: *Washington Department of Fish and Wildlife will support the enhanced use of the Pacific States Marine Fisheries Commission Shellfish Transport Subcommittee (WAC 220-770-040) to facilitate information exchange and to promote uniformity of biological criteria used to regulate invertebrate species movement among Pacific states and British Columbia.*

2A1h Task: *Washington Department of Fish and Wildlife will consult with the British Columbia Transplant Committee to discuss cooperative measures designed to address concerns arising from the intentional introduction of non-indigenous aquatic species into our shared waters.*

2A2. Strategic Action: *Washington Department of Fish and Wildlife will appoint chairs to several sub–committees of the Zebra Mussel and Green Crab Task Force (described in strategic action 7A2) and coordinate with each sub–committee. These sub–committees will work with representatives of organizations that have been identified as potential pathways for ANS introductions and other affected groups to identify voluntary or regulatory measures to prevent new ANS introductions. Recommendations from each sub–committee will be completed by December 1, 1998. Washington Department of Fish and Wildlife is requesting $25,000 to support the sub–committee chairs, organizational expenses and travel for the combined tasks in this strategic action.*

2A2a Task: *Establish a sub–committee with maritime cargo vessel representatives and other affected groups to prevent further introductions of ANS into Washington's marine waters through all commercial shipping practices, such as ballast water exchange and ANS infested anchor chains.*

2A2b Task: *Establish a sub–committee with representatives of the recreational boating industry, seaplane associations and other affected groups to prevent further introductions of ANS into Washington waters through these pathways.*

2A2c Task: *Establish a sub–committee with representatives of Washington boat yards and marinas, the Washington Department of Ecology, and other affected groups to prevent the introduction of ANS, especially zebra mussels, into Washington waters through this pathway.*

2A2d Task: *Establish a sub–committee with representatives of the aquarium trade, biological supply catalogs, aquatic garden suppliers, aquatic mail order catalogs, plant importers, and other affected groups to prevent further introductions of ANS into Washington waters through this pathway.*

2A2e Task: *Establish a sub–committee with representatives of the live seafood industry and other affected groups to prevent further introductions of ANS into Washington waters through this pathway.*

2A2f Task: *Establish a sub–committee with representatives of the aquaculture industry, Washington Department of Fish and Wildlife shellfish biologists and other affected groups to prevent further introductions of ANS into Washington waters through this pathway.*

2A3. Strategic Action: *As directed by the Washington State Laws of 1998, Chapter 153, Washington Department of Fish and Wildlife shall prepare, maintain and publish a list of all lakes, ponds, or other waters of the state and other states infested with zebra mussels and European green crab. Washington Department of Fish and Wildlife is requesting $3,000 for printing and miscellaneous expenses needed to implement this task.*

Example G. Priorities for Action

Example from Washington State Plan with comment.

The purpose of the Washington State Aquatic Nuisance Species Management Plan is to coordinate all ANS management actions currently in progress within Washington, and to identify and provide funding for additional ANS management actions, especially those relating to priority ANS animals. This plan focuses on the priority species identified below, but the major focus will be to develop and implement new programs designed to prevent or control the introduction of the zebra mussel and European green crab. Washington has many ongoing projects to control ANS plants, whereas prevention and control projects for ANS animals are lacking.

Priority Species *– Non-indigenous species considered to be priority species and worthy of immediate or continued management action include:*

- *European green crab (Carcinus maenas);*
- *zebra mussel (Dreissena polymorpha);*
- *Chinese mitten crab (Eriocheir sinensis);*
- *Eurasian water milfoil (Myriophyllum spicatum);*
- *hydrilla (Hydrilla verticillata);*
- *Brazilian elodea (Egeria densa);*
- *Parrot feather (Myriophyllum aquaticum);*
- *purple loosestrife (Lythrum salicaria);*
- *saltcedar (Tamarix ramosissma);*
- *smooth cordgrass (Spartina alterniflora);*
- *common cordgrass (Spartina anglica).*

The management actions outlined herein focus on these priority species. By addressing the pathways of introduction for priority species, the introduction of other lower priority, or perhaps unidentified ANS, may also be prevented, since many share common pathways of introduction

Note that*: There should also be more specific discussion on which priority species the planning organization plans to address either in the distant future or if more resources were available.*

Example H. Implementation Table

Example from Ohio State Plan with minor alterations.

ANS Management Plan

IMPLEMENTATION TABLE

					Recent Efforts ($000/FTEs)	Planned Efforts ($000/FTEs)		

TASKS/ACTIONS		Funds Source	Impl. Entity	Coop Orgs	FY95	FY96	FY97	FY98	FY99	FY00	FY01	FY02	Future Needs	
IA1	**Reg/Natl. Coord.**													
IA1a	Attend Mtgs./Conf.	OH	DOW					6.9						
		FWS	DOW		0/0	0/0		5.0						
IA1b	Midwest Conf. ANS Session	OH	DOW		0/0	0/0	0/0	1.0						
		FWS	DOW		0/0	0/0	0/0	5.0						
IB1	**Interag/Constit. Coord.**													
1B1a	Interag/Constit. Coord.	OH	DOW					5.7						
		FWS	DOW		0/0	0/0		5.0						
IIB1	**Inform. Assess. & Develp.**													
IIB1a	Reprint/Develp. New I&E Materials	OH	DOW					6.1						
		FWS	DOW		0/0	0/0		15						
IIB1b		OH	OSGR		0/0	0/0		5.0						
		FWS	OSGR		0/0	0/0		5.0						
	TOTALS													

Legend:

OH- Ohio OEPA- Ohio Environmental Protection Agency

FWS- U.S. Fish and Wildlife Service

OSGR- Ohio Sea Grant Program - The Ohio State University

Ohio State Agencies

DOW- Ohio Division of Wildlife- Ohio Department of Natural Resources (ODNR)

DNAP- Division of Natural Areas and Preserves (ODNR)

DOWt- Division of Watercraft (ODNR)

CMP- Coastal Management Program - Division of Real Estate and Land Management (ODNR)

Example I. Program Monitoring and Implementation

Example from Ohio State Plan

The evaluation process of Ohio's State Management Plan will enable us to monitor our progress toward prevention, limitation and abatement of ANS. We will be able to ensure appropriate implementation of our management actions as well as make the necessary "mid-course" corrections (i.e., adaptive management). In essence, by incorporating the best scientific and management knowledge with periodic public evaluation, we will be implementing an adaptive management program (sensu Lee, 1993). The process will involve three components : 1) oversight, 2) evaluation, and ultimately, 3) dissemination of information. The following will briefly discuss each of these components.

Oversight

An oversight committee will be composed of external publics (identified as interested parties during the review process), other state entities (e.g., ODNR, OEPA, OGS, etc.), a representative from the governor's office, and members from the original task force who authored this document. The role of this interagency committee will be to examine progress on management actions focused on three goals of the state management plan. The committee can evaluate the success of each strategic action by examining the level of achievement of the tasks clearly defined within each action.

Evaluation

The evaluation effort should not only examine progress, but also place a special emphasis on identifying funding needs to successfully accomplish goals and associated tasks. 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 people) involved with the responsibility of implementing management actions and resource user groups.

Dissemination

An annual report will be produced highlighting the progress of our management actions. This report will include information on the successes in achieving the goals (prevention, limitation, and abatement) of the ANS plan as well as future plans and directions. Successes, failures, and new directions within Ohio will be evaluated in comparison with other regional plans. The annual report will be available to the members of the general public and local, state, and Federal decision-makers.

Example J. Glossary

Example from Washington State Plan

Accidental introduction: *an introduction of non-indigenous aquatic species that occurs as the result of activities other than the purposeful or intentional introduction of the species involved, such as the transport of non-indigenous species in ballast water or in water used to transport fish, mollusks, or crustaceans for aquaculture or other purposes.*

Aquatic nuisance species*: a plant or animal species that threatens the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, aquacultural, or recreational activities dependent on such waters. (Note: for the purposes of the State management plans, reference to an aquatic nuisance species will imply that the species is non-indigenous.)*

Baitfish*: fish species commonly sold for use as bait for recreational fishing.*

Ballast water*: any water and associated sediments used to manipulate the trim and stability of a vessel.*

Control*: limiting the distribution and abundance of a species.*

Cryptogenic species*: A species that may or may not be indigenous to an area.*

Ecological integrity*: the extent to which an ecosystem has been altered by human behavior; an ecosystem with minimal impact from human activity has a high level of integrity; an ecosystem that has been substantially altered by human activity has a low level of integrity.*

Ecosystem*: the biological organisms in an ecological community and the non–living factors of the environment.*

Environmentally sound*: methods, efforts, actions, or programs to prevent introductions or to control infestations of ANS that minimize adverse environmental impacts. The impact of management actions should be less than the impact of the ANS.*

Eradicate*: the act or process of eliminating an aquatic nuisance species.*

Exotic*: (same as non-indigenous) any species or other variable biological material that enters an ecosystem beyond its historic range, including such organisms transferred from one country to another.*

Federal consistency*: the requirement under the Coastal Zone Management Act that stipulates that federal actions that are reasonably likely to affect land or water use or natural resources of the coastal zone be consistent with the enforceable policies of a coastal state's federally approved coastal management program (CMP). A coastal state reviews the federal action to determine if the proposed action will be consistent with the CMP.*

Intentional introduction: *all or part of the process by which a non-indigenous species is purposefully introduced into a new area.*

Non-indigenous species: *any species or other variable biological material that enters an ecosystem beyond its historic range, including such organisms transferred from one country to another.*

Pioneer infestation*: A small ANS colony that has spread to a new area from an established colony.*

Priority species*: An ANS that is considered to be a significant threat to Washington waters and is recommended for immediate or continued management action to minimize or eliminate their impact.*

Watershed*: an entire drainage basin including all living and nonliving components.*

Example K. Literature Cited

Example from Ohio State Plan

Carlton, J. T. 1985. Transoceanic and Interoceanic Dispersal of Coastal Marine Organisms: The Biology of Ballast Water. Oceanography and Marine Biology, An Annual Review: volume 23.

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Ohio Sea Grant College Program. 1995. Sea Grant Zebra Mussel Report: An Update of Research and Outreach: 1988-1994. The Ohio State University.

Ruiz, G.M., A.H. Hines, L.D. Smith, J.T. Carlton 1995. A Historical Perspective on Invasion of North American Waters by Nonindigenous Aquatic Species. ANS Digest, volume 1, number 1.

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U.S. Fish and Wildlife Service, Department of the Interior. 1994. Great Lakes Fishery Resources Restoration Study: Report to Congress. (Draft Report). ANS Digest: volume 1, number 1.

Weathers, Katherine and Eric Reeves. 1996. The Defense of the Great Lakes against the Invasion of Nonindigenous Species in Ballast Water. Marine Technology, Volume 33, Number 2, pages 92- 100.

Example L. Letter transmitting management plan for approval

Example from St. Croix National Scenic Riverway Plan with minor alterations.

April 14, 1998

Gary B. Edwards, Co-Chair, Aquatic Nuisance Species Task Force U.S. Fish and Wildlife Service Interior Building, Room 3245 1849 C Street, N.W. Washington, D.C. 20240

Sally J. Yozell. Co-chair, Aquatic Nuisance Species Task Force National Oceanic and Atmospheric Administration Herbert C. Hoover Building, Room 5804 14th Street & Constitution Avenue, N.W. Washington, D.C. 20230

Dear Mr. Edwards and Ms. Yozell:

It is our pleasure to submit to the Aquatic Nuisance Species Task Force the enclosed interstate management plan, which addresses the threat of aquatic nuisance species in the St. Croix National Scenic Riverway. A multi-agency interstate task force prepared the plan, with tribal input through the Voigt Intertribal Task Force and the Great Lakes Indian Fish and Wildlife Commission (GLIFWC). The plan follows the guidance provided in Public Law 101-646, as amended by the National Invasive Species Act of 1996. A public input and review process was conducted and is summarized in the plan.

For the past several years, the St. Croix Zebra Mussel Task Force has worked to protect the St. Croix River against introduction of zebra mussels, however there are limited state and tribal resources available. We request ANS Task Force approval of the plan so that the states of Minnesota and Wisconsin and the involved Indian Tribes will be eligible for grants to assist in actions to protect the unique national resources of the interstate riverway. The enclosed plan identifies actions where federal support would be used by the states and tribes. The current actions for which federal support is requested total $20,000 per year for each state and $2,500 per year for the involved tribes.

Please direct the ANS Task Force's comments regarding the plan to the following individuals who were responsible for the state's efforts to develop the plan:

Tom Lovejoy, Wisconsin Dept. of Natural Resources, 1300 Clairemont Ave, Eau Clair, WI 54702

Jay Rendall, Minnesota Dept. of Natural Resources, 500 Lafayette Rd.,PO Box 4001 St. Paul, MN 55155-4020

Questions regarding GLIFWC involvement in the plan may be directed to the following individual who facilitated tribal involvement during the development and review of the plan.

Neil Kmiecik, Great Lakes Indian Fish and Wildlife Commission, P.O. Box 9, Maple Lane, Odanah, WI. 54861

We look forward to Task Force approval of the plan and the potential awarding of Federal funds to help implement the plan.

Respectfully,

signed by:

Governor, State of Minnesota

Governor, State of Wisconsin

Chairman, Bad River Band of the Lake Superior Tribe of Chippewa Indians

Chairperson, Mille Lacs Band of Chippewa Indians

Chairman, Fond du Lac Band of Lake Superior Chippewa Indians

Chairman, Red Cliff Band of Lake Superior Chippewa Indians

Chairman, Lac Courte Oreilles Band of Lake Superior Chippewa Indians

Chairman, Sokaogon Chippewa Community of the Mole Lake Band

Chairman, Lac du Flambeau Band of Lake Superior Chippewa Indians

Chairman, St. Croix Chippewa Indians

Example M. Task Force Checklist and Approval Forms

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."

Example N. Planning Committee (Appendix)

Example from Washington State Plan.

Note that example below is a partial listing. Advisors should also be included.

Washington Aquatic Nuisance Species Planning Committee

Members

Bishop, Wendy Sue, Washington Dept of Agriculture, Olympia, WA

Matthews, Evan, Adopt-A-Beach, Seattle, WA

Civille, Janie, Washington DNR, Olympia, WA

Mumford, Tom, Washington DNR, Olympia, WA

Cook, Anita, Washington Department of Fish and Wildlife, Pt. Whitney, WA

Olson, Annette, University of Washington, School of Marine Affairs, Seattle, WA

Copping, Andrea, Washington Sea Grant, Seattle, WA

Redman, Scott, Puget Sound Water Quality Action Team, Olympia, WA

Hamel, Kathy, Washington Department of Ecology, Washington Lake Protection Association, Olympia, WA

Example O. Comments on Plan (Appendix)

Example is an excerpt from New York State Plan- December 1993, section VII. Responsiveness Summary. To see the example in its entirety see

http://www.dec.state.ny.us/website/dfwmr/habitat/noninsp.pdf

VII. Responsiveness Summary

On November 12, 1993, the draft Proposal for a Nonindigenous Aquatic Species Comprehensive Management Plan was made available for public review and comment. Notice of the availability of the plan was announced in a state-wide press release, and in the State Environmental Notice Bulletin (ENB). Five hundred copies of the plan were printed, and approximately three hundred were subsequently distributed. Comments were received from the following individuals or organizations:

A: Gary Edwards, Federal Aquatic Nuisance Species Task Force, US Fish and Wildlife Service; David Cottingham, National Oceanic and Atmospheric Administration.

B: Nancy Beard, NYDEC, Hudson River Program

C: Max Herrington, Lake Kiwassa Shore Owners Association

D: Kenneth C. Pickering, US Fish and Wildlife Service, Lower Great Lakes Fisheries Resource Center

E: Alexander C. Gabriels, Mary-Arthur Beebe, The Lake George Association

F: Michael Gann, NYDEC Bureau of Fisheries

G: Coalition of Lakes Against Milfoil

H: Wayne Elliot, NYDEC, Region 3, Fisheries

I: Sharon Neuman, New York City Department of Environmental Protection

J: Larry Richardson, Upper Delaware Council; John Hutzky, National Park Service, Scenic and Recreational River

K: J. Joseph Homburger, Otsego County Conservation Association

M: Richard A. Smith, Great Lakes Sport Fishing Council

N: Timothy Preddice, NYDEC, Hale Creek Field Station

0: L.R. Tuttle, New York State Electric and Gas Corporation

The comments received were excellent, and have played an important role in improving the proposed plan. The comments have been summarized below, and following each summarized comment, is a response as to how that comment was addressed. Following each comment

in parentheses, is a letter which identifies the commenter from the list above. If the comment was integrated into the text of the document, the page number where the comment was addressed or included follows the response, in brackets. Neither the commentors above nor the comments themselves are placed in any particular order.

1. COMMENT: There is inadequate discussion or differentiation between intentional and unintentional introductions of nonindigenous aquatic species. (A, I)

RESPONSE: This plan is intended to address only unintended, unsanctioned introductions. This point has been clarified in the text. A discussion of what constitutes an intention introduction vs. an unintentional introduction has been added. The role of assessing risks from intentional, proposed introductions has also been assigned to the proposed program. [31]

2. COMMENT: There is no discussion on the need to coordinate with Canada and adjacent states. (A, M)

RESPONSE: The plan now indicates the need to coordinate with Canada and other states. Furthermore, the Great Lakes Panel on Exotic Species is proposed as the appropriate channel for that coordination to occur. [221

3. COMMENT: Additional measures for limiting the spread of nonindigenous aquatic species that have been introduced into New York waters were proposed. These were:

a. Tracking boat launches at marinas; (A)

b. Make high pressure wash hoses available at boat launches; (A, C)

c. Reports and records of private stockings; (A)

d. Distribute literature through boating registration channels; (A, F)

e. Use volunteer for monitoring. (A, G)

RESPONSE:

a., c. Both a and c require establishing an extensive record-keeping system that does not exist at present, These measures seem to be re-active instead of proactive. They might be useful in determining when and how an introduction occurred, but not particularly useful in preventing or controlling introductions. It was decided not to attempt to establish these systems at this time.

b. This comment has been included in the plan, for launch sites where it can be practicably accomplished. [10]

d. This comment has been included in the plan. [17]

e. This point was addressed in the plan originally, but the wording has been strengthened. [11, 24]

4. COMMENT: The two plans described in the Aquatic Nuisance Species Prevention and Control Act of 1990, and the New York State Chapter 456 of the Laws of 1991 are distinctly different and cannot be addressed by the single plan. (A, D).

RESPONSE: Federal government commentors explained more clearly the intended differences between the two plans. This plan is intended to be solely the comprehensive management plan. Wording has been revised to reflect that single role. It is beyond the capability of the Division of Fish and Wildlife to develop the public facility management portion of the two plans. [2]

5. COMMENT: There is too much focus on zebra mussels, particularly for examples of nonindigenous aquatic species issues and concerns. (A, E, G)

RESPONSE: Several examples that used zebra mussels have been deleted or changed.

Example P. List of Known NIS (Appendix)

Example from Washington State Plan.

Note since the list shown below is used for illustrative purposes only it just shows freshwater animals. The Washington plan, as others should, also includes plants and marine organisms (if applicable).

Freshwater Animals

List of Non-indigenous Freshwater Animal Species		
	Common name	**Species name**
Amphibians		
	Bull Frog	*Rana catesbeiana*
	Green Frog	*Rana clamitans*
Fish		
	American Shad	*Alosa sapidissima*
	Arctic Grayling	*Thymallus acticus*
	Atlantic Salmon	*Salmo salar*
	Black Bullhead	*Ictalurus melas*
	Black Crappie	*Promoxis nigromaculatus*
	Blue Catfish	*Ictalurus furcatus*
	Bluegill Sunfish	*Lepomis macrochirus*
	Brook Trout	*Salvelinus fontinalis*
	Brown Bullhead	*Ictalurus nebulosus*
	Brown Trout	*Salmo trutta*
	Channel Catfish	*Ictalurus punctatus*
	Common Carp	*Cyprinus carpio*
	Flathead Catfish	*Pylodicticis olivaris*
	Golden Trout	*Salmo aquabonita*
	Goldfish	*Carassius auratus*
	Grass Carp	*Ctenopharyngodon idella*
	Grass Pickerel	*Esox americanus*
	Green Sunfish	*Lepomis cyanellus*
	Lahontan Cutthroat Trout	*Oncorhynchus clarki henshawi*
	Lake Trout	*Salvelinus namaycush*

	Lake Whitefish	*Coregonus clupeaformis*
	Largemouth Bass	*Micropterus salmoides*
	Mosquito Fish	*Gambusia affinis*
	Northern Pike	*Esox lucius*
	Pumpkinseed Sunfish	*Lepomis gibbosus*
	Rock Bass	*Ambloplites rupestris*
	Smallmouth Bass	*Micropterus dolomieui*
	Striped Bass	*Marone saxatilis*
	Tadpole Madtom	*Noturus gyrinus*
	Tench	*Tinca tinca*
	Tiger Musky	*Esox hybrid*
	Walleye	*Stizostedion vitreum*
	Warmouth	*Lepomis gulosis*
	White Crappie	*Promoxis annularis*
	Yellow Bullhead	*Ictalurus natalis*
	Yellow Perch	*Perca flavescens*
Invertebrates		
	Asian Clam	*Corbicula fluminea*
	Asiatic clam	*Corbicula sp.*
	Big-ear radix	*Radix auricularia*
	Chinese Mitten Crab	*Eriocheir sinensis*
	Chinese mysterysnail	*Cipangopaludina chinensus malleata*
	Japanese mysterysnail	*Cipangopaludina japonicus*
	Mimic lymnaea	*Pseudosuccinea columella*
	New Zealand Mud Snail	*Potamopyrgus antipodarium*
Reptiles		
	Common Slider	*Trachemys scripta*
	Snapping Turtle	*Chelydra serpentina*

-

Example Q. Descriptive Information on ANS (Appendix)

A couple of examples from the Washington State Plan are provided below. For a more complete listing, see Washington State Plan-June 1998, Appendix C., Non-indigenous Species of Washington pages 91-108. Available at

http://www.wa.gov/wdfw/fish/ansplan.pdf

Descriptive Information on Freshwater Plant Priority Species

Eurasian Watermilfoil (Myriophyllum spicatum)

The first herbarium record of Myriophyllum spicatum in Washington is from Lake Meridian in King County, collected in the mid 1960s. In the mid 1970s, M. spicatum was recognized as a problem by the state when the British Columbia Ministry of the Environment notified Washington officials that Eurasian watermilfoil was present in the Okanogan chain of lakes in British Columbia. In spite of the placement of fragment barriers, Eurasian watermilfoil moved downstream into Lake Osoyoos (straddles the Canadian/Washington border), into the Okanogan River and eventually to the Columbia River.

At the same time as Eurasian watermilfoil was moving into central Washington from British Columbia, an infestation was reported in Lake Washington, a large, heavily–used lake near Seattle in King County, Washington. The pathways of initial introduction are unknown, but we suspect that Eurasian watermilfoil was introduced to Lake Meridian and the British Columbia lakes by the discarding of the contents of an aquarium. From established populations in British Columbia, water movement carried Eurasian watermilfoil into central Washington. We believe that recreational boaters transported Eurasian watermilfoil into Lake Washington from nearby Lake Meridian.

Thirty years later, Eurasian watermilfoil continues to spread and has moved into most of the major river systems in Washington and into many popular recreational lakes. The major mode of movement after the original introductions is by recreational boating. New infestations of milfoil are often reported at boat ramp sites. Milfoil locations in western Washington closely follow the Interstate 5 corridor and milfoil continues to find its way into new sites each year.

Because of its widespread distribution and mat–forming growth habit, milfoil is considered to be the most problematic freshwater invasive plant in Washington. It costs the federal, state, local governments, private industry, and lake and river property owners millions of dollars each year for control and for dealing with other impacts caused by Eurasian watermilfoil. Since the Eurasian watermilfoil infestation, dam operators now spend thousands of dollars each year cleaning fragments from the trash racks of dams on infested rivers.

Eurasian watermilfoil has been eliminated from some previously infested lakes by treating the entire lake with the aquatic herbicide Sonar. Overstocking a lake with triploid grass carp may also lead to the eradication of Eurasian watermilfoil, although this method is not recommended because it also results in the elimination of many native species.

Eurasian watermilfoil is a Class B weed on the State Noxious Weed List and is on the Washington Department of Agriculture Quarantine List.

Life Cycle of Eurasian Watermilfoil: *Although Eurasian watermilfoil produces many seeds, these do not appear to be an important mode of reproduction for this species. Instead, Eurasian watermilfoil, like the other exotic submersed species discussed in this report, reproduces efficiently and rapidly via the formation of fragments. Any fragment containing a node can grow into a new plant. Fragments can be produced through wind and wave action and by boating and other water activities. At certain times of the year, Eurasian watermilfoil also produces autofragments (easily abscised plant parts with dangling roots). A plant with autofragments can shatter into hundreds of viable plant parts. Each fragment will disperse; sink, and if in a suitable location take root and form a new plant. Eurasian watermilfoil also reproduces through the production of stolons.*

Eurasian watermilfoil reproduces extremely rapidly and can completely colonize an infested lake within one to three years after the original introduction. We find that Eurasian watermilfoil tends to initially "ring" the lake with plants at the three to nine feet depth. Over time, the other depths are colonized depending on water clarity, although wave action generally prevents Eurasian watermilfoil from colonizing very shallow areas.

Eurasian watermilfoil has a broad tolerance for a wide variety of environmental conditions and grows well in moderately alkaline eastern Washington lakes and equally well in the soft water lakes of western Washington. Eurasian watermilfoil grows very well in nutrient–poor lakes such as Lake Chelan in central Washington, but will also grow in moderately to nutrient–enriched waterbodies. If water levels recede, Eurasian watermilfoil can form terrestrial plants that can survive a few weeks until water levels rise. Eurasian watermilfoil has been observed growing in water 45 feet deep in pristine Lake Chelan.

In the mild western Washington conditions, Eurasian watermilfoil generally overwinters in an evergreen state. In the harsher eastern Washington climate, Eurasian watermilfoil tends to die back to the fleshy rootcrowns each winter. In spring, Eurasian watermilfoil starts growing rapidly toward the water surface. As it nears the surface, it forms lateral shoots. The formation of lateral shoots tends to shade out native species and allows Eurasian watermilfoil to form large monotypic stands. In both climates, Eurasian watermilfoil has generally reached the water surface by early July, forming dense tangled mats of vegetation on or near the surface. It flowers in July sending up flower spikes that are pollinated by wind. The seeds do not appear to be particularly viable in Washington waters. Eurasian watermilfoil also forms autofragments at certain times of the year, and fragments are continually produced via wind and wave action and by boating activities.

Eurasian watermilfoil, like other submersed species, can be readily spread between waterbodies on boats. Often plants remain on boat trailers, motors, or fishing gear and when boaters or fishers move between lakes or waterbodies these plants enter the new waterbody.

Chinese Mitten Crab (Eriocheir sinensis)

General Information: *The Chinese mitten crab is native to estuaries and rivers along the coasts of Korea and Southern China, from the Yellow Sea to south of Shanghai. It is a catadromous species, migrating to coastal estuaries in the fall to mate, spawn, and die. Females are capable of producing from 250,000 to over one million eggs, which hatch the following spring. The larvae develop through six planktonic stages. After the final larval molt, the juvenile crabs settle to the bottom, and soon after that begin to move upstream, spending most of their adult life in freshwater.*

The mitten crab is known to migrate great distances, readily moving overland to avoid obstructions like dams and irrigation diversions. In Europe, they have been reported to swarm by the millions over canal and stream banks onto shore, sometimes wandering onto city streets and even into houses. The mitten crab digs burrows into levees that weaken and eventually cause these structures to fail. They also clog water intake and diversion screens, and would probably have major implications for hydroelectric and irrigation projects in the Columbia River Basin if they were to become established there. Their impact on native fish and wildlife species in North America is not yet known, but it is suspected that they would compete with and prey on many species of native finfish and shellfish.

North American/Washington Distribution: *The Chinese mitten crab has been reported sporadically from various sites in North America this century. A number of individuals have been reported from the Great Lakes area as early as 1965. They have not expanded in this region, however, because salt water is required for reproduction. A single individual was collected from the lower Mississippi River in 1987, but there have been no reports of populations establishing in that area to date.*

The first reports of mitten crab on the west coast of North America came from shrimp fishers in the south end of San Francisco Bay in the early 1990s. By 1994, breeding populations had been observed at various locations in the bay, and they are currently found in very large numbers throughout San Francisco Bay and the Sacramento and San Joaquin River systems.

In 1997, a single Chinese mitten crab was identified from the lower Columbia River near Portland. This individual specimen was captured on hook and line by a recreational sturgeon angler. There have been no confirmed reports of mitten crab being found in any other Washington water to date.

Pathways of Introduction: *The most likely pathway for introduction of the Chinese mitten crab into western North America is from the release of untreated ballast water from Asian or European cargo ships. The reported introductions into the Great Lakes area were almost certainly the result of ballast water, since all reported occurrences came from major port cities along Lake Erie.*

The other North American introductions described earlier were also likely the result of ballast water discharge, however, there is another important pathway that could be responsible for their introduction at any or all of these sites. That is the intentional introduction of the mitten crab for its food value. In 1986, the California Department of Fish and Game found Chinese mitten crab available for sale in a number of Asian food markets in San Francisco and Los Angeles at prices ranging from $12.50 to $14.50 per pound. Although the importation of live mitten crab was banned in California in 1987 and from the United States in 1989, the high price they command encourages smuggling. The U. S. Fish and Wildlife Service has reported intercepting numerous shipments of live mitten crab in recent years at the San Francisco, Los Angeles, and Seattle airports.

A third pathway for the introduction of mitten crab into Washington would be with a shipment of live shellfish from Asia or San Francisco Bay that was contaminated with crab larvae.

Other Management Considerations: *The catadromous life history of the Chinese mitten crab offers some protection from rapid ocean dispersal. Since the species resides primarily in estuaries and rivers, it is less likely that ocean currents to adjacent estuaries will carry larvae as rapidly as some marine ANS like the green crab. On the other hand, this species has an unusual ability to migrate great distances, sometimes over land, increasing the possibility of contaminating adjacent watersheds.*