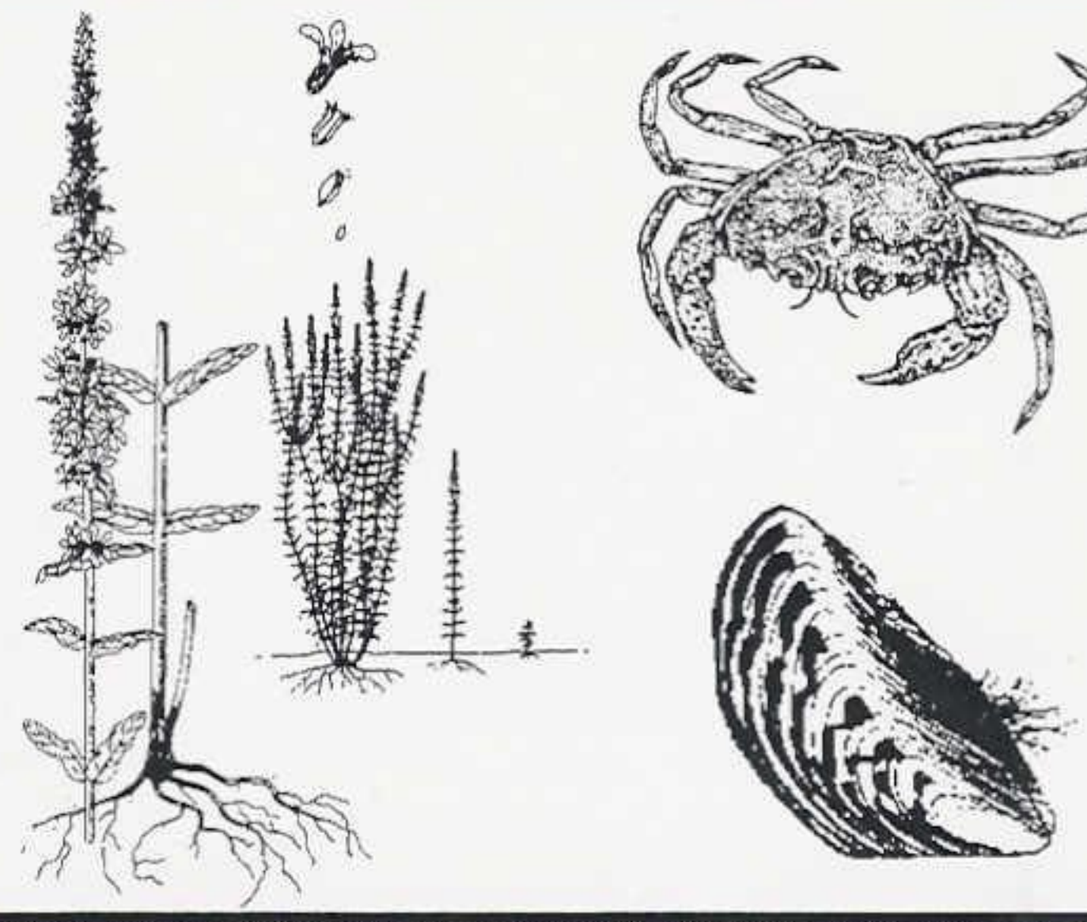
WASHINGTON STATE October 2001

Aquatic Nuisance Species Management Plan



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Washington Aquatic Nuisance
Species Committee

Washington Department of
FISH AND WILDLIFE
Fish Program

WDFW 517

Washington State Aquatic Nuisance Species Management Plan

Coordinated by

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The Washington Aquatic Nuisance Species Coordinating Committee

Acknowledgments

The Washington State Plan Published in December, 1998 was created by the Washington Aquatic Nuisance Species Planning committee and the plan only exists due to the selfless dedication of many individuals who were willing to assist while attending to their regular workload. Numerous tribal, state, federal and private organizations came together in the spirit of a true partnership to create the plan.

Special thanks is justly afforded to the following individuals who were especially generous in supporting the 1998 plan (in alphabetical order): Wendy Sue Bishop, Washington Department of Agriculture; Janie Civille, Washington Department of natural Resources; Kathy Hamel, Washington Department of Ecology; Dave Heimer, Washington Department of Fish and Wildlife; Senator Ken Jacobsen, Washington State Senate; Lisz Lantz, Washington State Noxious Weed Control Board; Annette Olson, University of Washington; Scott Redman, Puget Sound Water Quality Action Team; Derrick Toba, Tulalip Tribe; Cecilia Welch; Bill Zook, Washington Department of Fish and Wildlife.

Many of these same people are now members of the Washington Aquatic Nuisance Species Coordinating Committee, created by the 2000 State Legislature (RCW 77.60.130), and have taken time out of busy schedules to serve on subcommittees, or to review and update the plan on behalf of their agencies. (Refer to Appendix B for a list of Coordinating Committee members.)

There are seven working groups or subcommittees within the committee. Each subcommittee reviewed and suggested updates to specific sections of the plan. Special thanks to Andrea Copping, Washington Sea Grant; Harry Hutchins, Puget Sound Steamship Operators Association; Cindy Moore, Washington Department of Agriculture; Bernard Murray, Recreational Boating Association; Blain Reeves, Washington Department of Agriculture; Russell Rogers, Washington Department of Fish and Wildlife served as subcommittee chairs.

Special thanks goes to Kevin Aitkin of the U.S. Fish and Wildlife Service for assistance in updating the lists of ANS in Washington; Kathy Hamel, Washington Department of Ecology Aquatic Plant Program; Dave Heimer, Washington Department of Fish and Wildlife Weeds Program; Lisa Lantz, Washington Noxious Weed Control Board; Blain Reeves, Washington Department of Agriculture Spartina Program; Mary Toohey, Washington Department of Agriculture; and all those who contributed to the revision of the Washington State Aquatic Nuisance Management Plan.

RCW 77.60.130

Aquatic nuisance species committee.

(1) The aquatic nuisance species committee is created for the purpose of fostering state, federal, tribal, and private cooperation on aquatic nuisance species issues. The mission of the committee is to minimize the unauthorized or accidental introduction of nonnative aquatic species and give special emphasis to preventing the introduction and spread of aquatic nuisance species. The term "aquatic nuisance species" means a nonnative aquatic plant or animal species that threatens the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, or recreational activities dependent on such waters.

(2) The committee consists of representatives from each of the following state agencies: Department of fish and wildlife, department of ecology, department of agriculture, department of health, department of natural resources, Puget Sound water quality action team, state patrol, state noxious weed control board, and Washington sea grant program. The committee shall encourage and solicit participation by: Federally recognized tribes of Washington, federal agencies, Washington conservation organizations, environmental groups, and representatives from industries that may either be affected by the introduction of an aquatic nuisance species or that may serve as a pathway for their introduction.

(3) The committee has the following duties:

(a) Periodically revise the state of Washington aquatic nuisance species management plan, originally published in June 1998;

(b) Make recommendations to the legislature on statutory provisions for classifying and regulating aquatic nuisance species;

(c) Recommend to the state noxious weed control board that a plant be classified under the process designated by RCW 17.10.080 as an aquatic noxious weed;

(d) Coordinate education, research, regulatory authorities, monitoring and control programs, and participate in regional and national efforts regarding aquatic nuisance species;

(e) Consult with representatives from industries and other activities that may serve as a pathway for the introduction of aquatic nuisance species to develop practical strategies that will minimize the risk of new introductions; and

(f) Prepare a biennial report to the legislature with the first report due by December 1, 2001, making recommendations for better accomplishing the purposes of this chapter, and listing the accomplishments of this chapter to date.

(4) The committee shall accomplish its duties through the authority and cooperation of its member agencies. Implementation of all plans and programs developed by the committee shall be through the member agencies and other cooperating organizations.

[2000 c 149 § 1.]

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Executive Summary

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 additional ANS management actions, especially those relating to ANS animals. The development of a state management plan is called for in Section 1204 of the National Invasive Species Act of 1996 (Appendix A), which provides an opportunity for federal cost–share support for the implementation of state plans approved by the National Aquatic Nuisance Species Task Force. Management actions are undertaken and funded by the responsible state agencies.

The Washington State Plan published in December, 1998 was developed by the Washington State Aquatic Nuisance Species Planning Committee. 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 the1998 plan. The draft of the 1998 plan was reviewed by the Task Force, followed by 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.

The Washington ANS Management Plan is focused on the identification of feasible, cost effective management practices to be implemented in partnership with tribes, private, and public interests for the environmentally sound prevention and control of ANS. The objectives identified in the plan are structured to achieve the goal through the implementation of strategic actions and tasks designed to solve specific problems. The plan is periodically revised and adjusted based upon the practical experience gained from implementation, scientific research, and new tools as they become available. The current revision has been developed with the assistance of the Aquatic Nuisance Committee formed by 2000 Washington Legislature for the purpose of fostering state, federal, tribal and private cooperation to prevent the introduction and spread of ANS. The coordinated efforts and cooperative funding outlined in the State ANS Management Plan can enable us to prevent, eradicate or control new introductions more effectively, before they cause major environmental and economic damage.

The management actions outlined in the 1998 plan concentrated on stopping the spread of ANS already present and minimizing the risk of further ANS introductions into Washington waters through all known pathways, particularly animal species. An overview of the implementation of these actions is included in this update under “Accomplishments.” This revision identifies new and ongoing actions and broadens the focus to address more species.

The implementation table summarizes the funding, both existing and requested, needed to implement the plan. Implementing the programs outlined in the plan will require a coordinated tribal, Federal, State and private effort, and the dedication of significantly greater funding than is currently available.

Introduction

Nonindigenous species (NIS) may be released or 'introduced' into the marine, freshwater, or terrestrial environment intentionally or unintentionally. Most nonindigenous or nonnative species are unable to form self-sustaining populations. However, if such species become established and thrive, they will influence the native flora and fauna and their habitats, and may affect the local economy. Nonnative species often out-compete, prey upon or bring diseases or parasites to economically and ecologically valuable native species, often adversely changing the ecosystem in the process. Such species are considered aquatic nuisance species, or ANS.

RCW 77.60 defines the term aquatic nuisance species as a "nonnative aquatic plant or animal species that threatens the diversity or abundance of native species, the ecological stability of infested waters, or commercial, agricultural, or recreational activities dependent on such waters." The introduction of 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 habitat, ANS spread rapidly, damaging recreational opportunities, lowering property values, clogging waterways, impacting irrigation and power generation, destroying native plant and animal habitat, and sometimes destroying or endangering native species.

The full impact of existing ANS on salmonids is poorly understood. However we do know that heavy infestations of submersed plants, such as Eurasian watermilfoil, lead to decreased levels of dissolved oxygen in waterbodies. In one study, caged steelhead were submersed in beds of milfoil, all the fish died within 24 hours due to low dissolved oxygen levels (Frodge, 1995). Other plants pose physical barriers to salmon migration. In Kitsap County the Navy was called in to blast reed canary grass out of a stream to clear a path for salmon. ANS species like zebra mussels and Chinese Mitten crabs could cause problems for salmonids if they reach Washington.

We must be diligent on monitoring for ANS and responding quickly to invasions. We learned a powerful lesson with the smooth cordgrass *(Spartina alterniflora)*. The cordgrass did not flower for many years, so it wasn't identified when it first started spreading in Willapa Bay. By the time the threat was recognized, the cordgrass was out of hand. Today over 4,000 acres of *Spartina alterniflora* exist in Willapa Bay alone, and it continues to spread. Without a major multimillion dollar effort, there will be a continued loss of habitat for many native species of fish, clams, shorebirds, and migratory waterfowl, as well as further impacts to the shellfish aquaculture industry. We are learning from our past mistakes.

Washington responded rapidly to the introduction of the European green crab (*Carcinus maenas*) into coastal waters. The early implementation of monitoring and control efforts in infested bays has kept populations down. The discovery of European green crab on Vancouver Island, British Columbia quickly resulted in a contract with Fisheries and Oceans Canada to assist with the

development of a monitoring and control plan in shared waters of British Columbia. Over 100 sites in Puget Sound are monitored for the presence of green crab by volunteers trained by Washington Department of Fish and Wildlife staff. One of the tasks in the plan is the development of a rapid response plan should green crab be discovered in Puget Sound.

The State has also taken advantage of the opportunity to prevent or prepare for the introduction of the freshwater zebra mussel (*Dreissena polymorpha*), which is well suited for survival here. A volunteer monitoring program is in place along the Columbia and Snake Rivers and in several lakes throughout the state. The Washington State Patrol Commercial Vehicle Inspectors are checking commercially hauled boats at entry points into the state for the presence of zebra mussels. Zebra mussels have been found on one boat traveling through Washington into British Columbia. State agencies acted quickly in concert with Canadian authorities to ensure that the boat was not launched until it had been properly decontaminated.

The Washington State Legislature passed legislation in 2000 establishing ballast water management and monitoring guidelines for vessels entering Washington waters. The law makes reporting and open sea exchange mandatory, with certain safety and design limitation exemptions. After July 1, 2002 no vessel will be allowed to discharge ballast water in Washington waters unless it has been adequately exchanged or treated. Washington Department of Fish and Wildlife is mandated to work with the shipping vessel industry to develop a pilot project to identify and test viable treatment options, to identify an effective method for verifying the adequacy of exchange, and to develop protocols and standards for treated and exchanged ballast water.

Legislation was also passed forming an Aquatic Nuisance Species Committee for the purpose of fostering state, federal, tribal and private cooperation to prevent the introduction and spread of ANS. One of the major roles of this committee is to assist in revising and implementing the state plan. Members of the various subcommittees of the ANS Committee assumed an active role in the current revision of the plan, as did representatives from the many agencies involved in ANS management. Washington Department of Fish and Wildlife is the lead agency assigned to coordinate the drafting of the plan and the Washington State Aquatic Nuisance Species Coordinator serves as the committee chair. A meeting of the full ANS Committee was convened on April 13, 2001, in Olympia, Washington to review a draft of the revised plan. A list of attendees along with the organizations they represent, and their general comments on the draft are provided in Appendix B. Suggestions generated by this review have been incorporated into the plan, and the plan has been submitted to the ANS Task Force for review.

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. The 1998 plan focused on eliminating the threat of accidental ANS introductions. The intentional introduction of nonnative species for aquacultural, commercial, or recreational purposes was addressed to insure that these beneficial introductions would not result in accidental ANS introductions, and to improve information sharing among those agencies

responsible for regulating intentional introductions. The focus of this update remains largely the same, with an effort being made to address a broader range of potential pathways for introduction. Tasks outlined in the plan are implemented by and coordinated with ongoing programs managed by the state agencies that have regulatory authority over the species targeted by the task. Every effort has been made to assure that activities identified in the state plan that are carried out in the Puget Sound basin are included in the biennial Puget Sound Water Quality work plan, which is submitted biannually to the legislature and the Governor for funding considerations.

Washington's ANS Management Plan will continue be reviewed and revised biannually, 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.

Nonnative Species Authorities and Programs

This section provides a brief discussion of nonnative species authorities and programs in Washington State, as well as regional activities, federal law and international agreements. Washington State laws relating to nonnative species cannot be discussed without a basic understanding of federal and international authorities. The policies regarding nonnative 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.

State Authorities and Programs

State and local efforts play a large role in controlling the spread of nonnative 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 nonnative 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. In 2000 Washington State became the second state to pass legislation regulating ballast water discharges into State waters. The Washington law is designed to complement the federal act, however it goes a step further in that it includes vessels involved in coastal trade.

Additional information on regulated pathways of introduction for nonnative species can be found in Appendix D, along with a copy of the Washington Ballast Water Law and the first administrative rule.

State Animal Programs and Regulations

Wildlife Code of the State of Washington - The Washington Department of Fish and Wildlife is responsible for the administration and enforcement of the wildlife code, including the classification and regulation of wildlife. Regulations pertinent to ANS include:

- The director of the Washington Department of Fish and Wildlife may request the designation of a species as “deleterious exotic wildlife” under RCW 77.10.020. The Fish and Wildlife Commission regulates the taking, sale, possession and distribution of “deleterious exotic wildlife” under RCW 77.12.040. Enforcement codes are under RCW 77.15.

- In 1998 legislation was passed to include zebra mussel and green crab in the deleterious species law (RCW 77.60.110). Regulations are in place regarding their introduction and control.

- The director of the Washington Department of Fish and Wildlife may issue a permit for the propagation, possession, importation, purchase or transport of an nonnative species for the purposes of disposal, control, research, or education (RCW 77.32.010).

- Transplantation and introduction of nonnative warmwater fish are reviewed and managed by the warmwater fish program under RCW 77.44.040.

- The Washington Department of Fish and Wildlife shellfish program issues permits for the import and transfer of food fish and shellfish under RCW title 75.

- No person other than the director of Fish and Wildlife may authorize planting aquatic plants or release of any species or sub-species of animal that does not already exist in the state (WAC 232-12-271)

- The Washington Department of Fish and Wildlife is responsible for the implementation and enforcement of the Ballast Water Management Act (RCW 77.120). Ballast water is a significant pathway for the introduction of aquatic nuisance species.

- The Aquatic Nuisance Species Coordinator chairs the Aquatic Nuisance Species Committee for the purpose of fostering state, federal, tribal, and private cooperation on aquatic nuisance species issues (RCW 77.60.130).

- In the coming year the creation of a screening process and classification program that will take the invasive potential of a species into consideration prior to permitting importation or release will be considered.

Washington Department of Fish and Wildlife European Green Crab Monitoring and Control Program - A regulatory program that requires chlorine treatments of imported shellfish seed and broodstock (WAC 220-77-040) and declares the green crab a deleterious species, making it illegal to possess or transport the species within the state without a permit (WAC 232-12-01701). The department is trapping and researching green crab in Willapa Bay and Grays Harbor, and monitoring over 100 sites in the Puget Sound area and the Strait of Juan de Fuca for the presence of green crab.

Washington Department of Fish and Wildlife Zebra Mussel Monitoring - Washington State regulations addressing the introduction of nonnative species include regulations protecting against introduction of the zebra mussel, WAC 232-12-01701 and WAC 232-12-168. WDFW utilizes staff and volunteers to do zebra mussel sampling in priority lakes and along the Columbia and Snake rivers. To date, no zebra mussels have been found.

The department also entered into a partnership with the Washington State Patrol Commercial Vehicle Inspection Program to inspect commercially hauled boats entering the state. To date, two vessel carrying zebra mussels and two with a brackish water sister species have been stopped.

Washington Department of Fish and Wildlife Ballast Water Management - A regulatory program that requires vessels to file ballast water management reports and to submit to random sampling. The law makes open ocean exchange of ballast water mandatory for all commercial vessels of three hundred gross tons or more, including those involved in coastal trade, unless specifically exempted. After July 1, 2002 discharge of ballast water into state waters is prohibited unless it has been adequately exchanged or treated to meet standards to be set by the Washington Department of Fish and Wildlife.

WDFW is mandated to create a joint pilot project to establish a private sector ballast water treatment operation capable of servicing vessels at all Washington ports, to develop ballast water sampling and testing protocols for monitoring the biological components of ballast water, and to set standards for treated and exchanged ballast water.

Puget Sound Water Quality Action Team - The Puget Sound Water Quality Action Team works with tribal and local governments, community groups, citizens and businesses, and state and federal agencies to develop and carry out two-year work plans that guide protection of water quality and biological resources in the Sound. The goal of the Puget Sound Water Quality Action Team is to restore and protect the biological health and diversity of Puget Sound by protecting and enhancing Puget Sound's water and sediment quality; its fish and shellfish; and its wetlands and other habitats.

Action Team support staff also participate on various state and regional committees including the state ANS Coordinating Committee, the Pacific Coast Ballast Water Group and the Coastal Committee of the Western Regional Panel of the ANS Task Force.

State Plant Programs and Regulations

The Washington State Noxious Weed Control Board - Washington's State Noxious Weed Control Board sets state policy and determines the noxious weed list for the state (RCW 17.10.080). Further details can be found in Appendix D.

Washington State Department of Agriculture Quarantine List - The Washington State Department of Agriculture Quarantine List (RCW 17.10) identifies plants known to be invasive and a detriment to the state's natural resources. Terrestrial noxious weeds and seeds are listed under WAC 16-752-610; wetland and aquatic plants under WAC 16-752-505; and all loosestrife species under WAC 16-752-400-415.

The plant pest statute (RCW 15.13) has been expanded to include zebra mussels. Under WAC 16-402 there is zero tolerance for any pest infestations on imported plants. Further details can be found in Appendix D.

Spartina and Purple Loosestrife Eradication Program - Chapter 255, Laws of 1995 (RCW 17.26) designated the Washington State Department of Agriculture as the lead state agency for the eradication of *Spartina* and the control of purple loosestrife. Further details can be found in Appendix D.

Washington Department of Ecology Aquatic Weeds Program - The Department of Ecology Freshwater Aquatic Weeds Management Program is a non-regulatory 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 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

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. A large gap that must be addressed is developing a classification system that includes a risk assessment of the invasive potential of species proposed for importation. The Department of Fish and Wildlife is working on developing a rule to address this issue.

Regional Authorities and Programs

Columbia River Aquatic Nuisance Species Initiative (CRANSI) - CRANSI is a joint effort of the Ports of Portland and Astoria, and Senator Ron Wyden. It was formed to meet the need for a comprehensive approach to nonnative species issues in the lower Columbia River, and to examine the possible role of shipping traffic in spreading nonnative species throughout the Columbia River Basin.

Pacific Ballast Water Group - The Pacific Ballast Water Group is a coalition of representatives from the shipping industry, environmental organizations, state and federal agencies, and other

interested parties to address the need for a cooperative regional approach to ballast water management to prevent the introduction of invasive species on the West Coast.

Pacific States Marine Fisheries Commission/Bonneville Power Administration Aquatic Nuisance Species Program for the Columbia River Basin - In 1999 the Bonneville Power Administration, recognizing the serious economic and ecological threat to their operations and other water based activities posed by the potential introduction of zebra mussels and/or mitten crab, funded the development of an ANS prevention program for the Columbia River Basin. In addition to developing a regional ANS program, Pacific States Marine Fisheries has collaborated with other state and federal agencies and universities to develop and ANS outreach and inspection program in Washington, Oregon, Idaho and Wyoming.

Federally Recognized Tribes - There are 28 federally recognized Tribes with reservation lands in the State of Washington. These reservation lands include marine and freshwater shorelines, lakes, and in some cases entire watershed systems. Clearly, a coherent strategy for aquatic nuisance species depends on addressing all waters of the region. However, federal reserved lands like Indian reservations and military bases are subject to federal, not state law. Tribes are also empowered to develop Tribal laws under the Clean Water Act and other authorities and some have done so. With the myriad of authorities and regulations that apply to waters of this region it is of critical importance that there exists a well-coordinated strategy for a problem that overrides jurisdictional boundaries.

Tribes have been active participants in many of the strategies of the Aquatic Nuisance Species Management Plan. The Tribes with Puget Sound and coastal reservations are typically directly involved with shellfish production, as an industry and for ceremonial and subsistence purposes. Risks to shellfish populations from nonnative species like the European Green Crab not only threaten shellfish harvesters' livelihoods, but in the case of Tribes, it also threatens their culture. As a result, Tribes have been actively involved in assessing the invasion of green crab and deploying resources to combat this threat. Individual Tribes may also take actions on problems that are particular to their reservations.

Washington and Oregon Sea Grant Marine Invasive Species Team (MIST) - MIST is a collaborative, region-wide effort to provide natural resource managers, industry, local government, and the public with access to the broadest possible pool of university research and expertise on marine invasive species.

The Western Regional Panel - The Western Regional Panel on Aquatic Nuisance Species was formed in 1997 to help limit the introduction, spread and impacts of aquatic nuisance species into the Western Region of North America. This panel of public and private entities was formed by a provision in the National Invasive Species Act of 1996 (P.L. 101-636), the amendment to the 1990 Act. The WRP encompasses an extensive geographic range, all states and provinces west of the 100th Meridian as well as Guam, Hawaii and Alaska.

Western Governor's Association - The Western Governor's Association was established in 1984 to address key policy and governance issues common to the 18 Western states, two territories and one commonwealth represented. In June of 1998 the association passed Resolution 98-018, Undesirable Aquatic and Terrestrial Species, for the purpose of developing and coordinating strategies and management actions to control and prevent the spread and introduction of undesirable species.

U.S. Army Corps of Engineers, Columbia River Basin, Northwestern Division - The U.S. Army Corps of Engineers quarterly meetings of the Portland, Seattle and Walla Walla districts in their North Pacific Division Office serve as a coordination forum for state and federal agencies, tribes, and other interested parties in the Columbia River Basin. The Corps has provided zebra mussel signs to be erected at Columbia Basin hydroelectric projects and at public boat launches along the Columbia, Snake and Willamette rivers as well as some high use lakes.

U.S. Fish and Wildlife Service - The U.S. Fish and Wildlife Service works with the ANS Task Force in the implementation and funding of ANS management plans. One of their major efforts is the 100th Meridian Initiative. The initiative is a large-scale concerted effort between federal, state, provincial and tribal entities and other stakeholders to prevent the spread of zebra mussels.

Federal Acts, Agencies and Authorities Pertaining to Invasive Species

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 nonnative species. Some of these are:

- National Invasive Species Act (1996)
- Nonindigenous Aquatic Nuisance Prevention and Control Act (1990)
- Alien Species Prevention and Enforcement Act (1992)
- Federal Plant Pest Act (1957)
- Plant Protection Act (1998)
- Water Resources Development Act
- Federal Noxious Weed Act (1974)
- International Plant Protection Convention (1952)
- Convention on Great Lakes Fisheries Between the U.S. and Canada
- Coastal Zone Management Act (1972)
- Lacey Act (1900; amended in 1998)
- Agreement on the Application of Sanitary and Phytosanitary Measures (1995)
- Plant Quarantine Act (1912)
- Organic Act of 1944
- Animal Damage Control Ac5 (1931)
- North American Agreement on Environmental Cooperation (1994)
- Federal Insecticide, Fungicide, and Rodenticide Act

- Federal Seed Act (1939)
- National Environmental Protection Act (1970)
- Convention on International Trade in Endangered Species (1975)
- Wild Bird Conservation Act (1992)
- Endangered Species Act
- Executive Order 13112 (1999)
- Executive Order 13186 (2001)

The Federal Agencies Table in Appendix D outlines the responsibilities of a number of government agencies and summarizes their current role in the control of introduced species.

International Agreements

In addition to state and federal regulations, a number of international agreements address the issue of nonnative 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.

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 nonnative species in ocean trade and transport vessels. Additional information on international agreements addressing the issue of nonnative species may be found in Appendix D.

Nonnative Species Problems and Concerns in the State of Washington

There are many ways organisms may be transported and introduced. 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. The aquaculture industry is regulated to minimize the risk of new ANS introductions, and new laws have been put in place to minimize the risk of introductions via ballast water discharge. (Additional information regarding regulated pathways is listed in Appendix D.) Efforts are underway to educate recreational boating and fishing enthusiasts and the aquarium and aquatic plant trades as to the role they play in preventing the introduction and spread of ANS.

Potential Impact of Nonnative Species

Potential threats may be evidenced by the degree of negative impact these species have upon the environment, human health, 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 introduction of any nonnative species has an effect on native species and habitats, although it is often difficult to predict those effects. However, there is a growing number of nonnative aquatic plant and animal species whose current or potential impacts on native species, and

habitats are known to be significant. The following section is an approach to prioritize ANS species considered a threat to Washington on the basis of known or recommended management activities for each species.

Management of Nonnative Species

The following management classes list nonnative species that are known or thought to present a risk of becoming invasive and discuss levels of management for these species. The highest priority class includes nonnative species known to have significant effects on the economy, environment, industry or human health. Suggested management classes are based upon the extent of invasion within the state and the degree to which the state's current management capabilities can effectively control or eradicate these species. The lists of species under each management class are incomplete, and are intended to provide a basis for discussion and to illustrate species for each class. Further work is needed to identify the presence, distribution, status, and threat of these and other nonnative species. These management classes are suggested solely for the purpose of prioritizing species in the management plan. A possible regulatory structure for managing all nonnative species in Washington is discussed in next section. More information on these species, and others, is available in Appendix C.

Management Class 1 - Management activities focus on preventing the introduction and eradicating pioneering populations of nonnative plant and animal species that currently are not present in the state, or that have limited populations within state waters.

Freshwater Animals and Plants	**Marine Animals and Plants**
Mitten crab (*Eriocheir* spp)	**European green crab** (*Carcinus maenas*)
Zebra mussel(*Dreissena spp*)	**Asian or Asiatic clam** (*Potamocorbula amurensis*)
Spiny water flea (*Bythotrephes cederstroemi*)	**Cordgrass** *(Spartina spp)*
Round goby (*Neogobius melanostomus*)	
Ruffe (*Gymnocephalus cernuus*)	
Hydrilla (*Hydrilla verticillata*)	
Water chestnut (*Trapa natans*)	
Water Hyacinth (*Eichornia crassipes*)	

Management Class 2 - Management activities focus on mitigating the impact, controlling population size and preventing dispersal to other water bodies of nonnative plant or animal

species that are present and established in Washington. This class includes nonnative species approved for import and managed under other regulations - such as aquacultural species.

Freshwater Animals and Plants

New Zealand mudsnail (*Potamopyrgus antipodarium*)

Louisiana red swamp crayfish (*Procambarus clarkii*)

Eurasian watermilfoil (*Myriophyllum spicatum*)

Brazilian elodea (*Egeria densa*)

Parrotfeather (*Myriophyllum aquaticum*)

Purple loosestrife (*Lythrum salicaria*)

saltcedar (*Tamarix ramosissima*)

common reed (*Phragmites australis*)

Marine Animals and Plants

Japanese oyster drill (*Ceratostoma inornatum*)

Cordgrass (*Spartina* spp)
(We have both established and pioneering populations in Washington)

Management Class 3 - Includes nonnative species that are established throughout Washington and that have an impact, but for which there are no available or appropriate management techniques. These species warrant further evaluation and research to ascertain the potential for impact and control, and to prevent establishment in new waterbodies.

Freshwater Animals and Plants

Asian clam (*Corbicula fluminea*)

A number of nonnative fish, amphibians, and other vertebrates have been introduced, intentionally and unintentionally, into Washington. While these species have established populations in some areas, there are areas where they do not occur, and management should be directed at limiting their spread.

Marine Animals and Plants

Asian copepod (*Pseudodiaptomus inopinus*)

Brown Alga *(Sargassum Muticum)*

Mahogany or purple varnish clam *(Nuttalia obscurata)*

Management Class 4 - This group consists of nonnative species that are not present in Washington for which we lack adequate information to understand their potential to be invasive, or their interaction and effects on native species. These species warrant further evaluation and research to ascertain the potential for impact and control. Until information is available that would place them in management class two or three - they are treated as management class 1 species.

Freshwater Animals and Plants	Marine Animals and Plants
Giant Salvinia (*Salvinia molesta*)	**Caulerpa** *(Caulerpa taxifolia)*

Addressing the Need for a Clear Regulatory Structure for the Management of Nonnative Species

The intentional and unintentional movement of species outside of their native area has provided both benefit and destruction to economies and ecosystems worldwide. By some estimates, over 98% of the food we eat comes from nonnative species, and yet others estimate that nonnative species cost our nation over $123 billion annually in economic damage. There is a great need for a science based system to be developed that integrates the numerous state authorities that regulate nonnative species into a comprehensive program that promotes the prudent use of beneficial nonnative species while minimizing the risk of damage from destructive nonnative species. The agencies must work together to implement protocols and policies to improve existing processes for reviewing proposed intentional introductions of nonnative species.

Several states, including Oregon and Hawaii, have adopted regulations and established panels to review proposed importations of all nonnative plant and animal species, evaluate them using science based risk management analysis, and recommend a classification to the appropriate authority. The panels consist of a number of scientific experts in the fields of plant and animal biology. Criteria they consider include: the likelihood of introduction into the wild if importation is allowed; the likelihood of becoming established if introduction occurs; the magnitude of potential impacts on native species, outdoor recreation, commercial fishing and other uses of natural resources in the state; the ability to eradicate or control the spread of the species if introduced, and; any other criteria deemed appropriate.

The Washington Department of Fish and Wildlife is considering adopting a rule similar to those that have been established in Oregon and Hawaii and will be conducting a regional workshop in September 2001 to explore viable options for reducing the potential introduction of new invasive species into the United States, with emphasis on the west. The workshop will consider means of screening and assessing risk when intentional introduction, importation, or sale of nonnative species is considered and measures that could be taken to minimize risks of establishment of new invasive species.

The following table is an example of one potential classification system based upon rules and regulations already in place in Washington. Several nonnative species are approved for import and regulated under Title 77RCW as game or under Title 75 RCW as food fish or shellfish. They may not be introduced into the state without a permit. Further explanation of Regulated species and pathways may be found in appendix D.

POTENTIAL CLASSIFICATIONS			
PROHIBITED	**REGULATED**	**UNREGULATED**	**UNLISTED**
Prohibited species are those which have been reviewed by the panel and determined to present a high risk of becoming invasive if released into the wild. These species may not be possessed, imported, sold, propagated, transported or introduced except under a permit issued by the appropriate agency for scientific or educational purposes.	Regulated species are species that have some beneficial commercial or recreational use, have been reviewed by the panel and determined to present a moderate risk of becoming invasive if regulated and managed. Possession, propagation, transport, purchase or sale will be managed by the appropriate agency by rule.	Unregulated species are those that have been reviewed by the panel and have been determined to present a low risk of becoming invasive if or a species already present and beyond control. Such species may be imported, purchased, sold, propagated and transported without a permit	Unlisted species are those that have not been reviewed and classified by the panel. These species may not be possessed, imported, purchased, sold, propagated, transported or introduced into the state. A petition may be made to the panel to review the species and recommend a classification.

Genetically Modified Organisms

Genetically modified organisms are becoming an issue of concern. In many arenas genetically modified organisms are recognized as an exotic organism, even if they are derived by conventional breeding techniques and of the same species as native organisms. The product of the genetic modification needs to be assessed, rather than the process that leads to the modification, in order to assess accurately the level of risk that may be associated with genetically modified organisms.

Accomplishments

Washington's state plan is considered a model for other states to follow, and we have been contracted by the Western Governor's Association to assist other states in putting a plan in place. Many of the management action objectives outlined in the initial plan have been accomplished or are ongoing. Washington Department of Fish and Wildlife is supporting two management level FTEs to coordinate ANS activities within the state[1]. The department pays the salary of 0.5 FTE, the remaining 1.5 are funded by provisos and NISA funding, administered by the U.S. Fish and Wildlife Service. The ANS Coordinator works closely with other agencies and with organizations such as the Puget Sound/Georgia Basin International Task Force, Pacific States Marine Fisheries, Western Governor's Association, Western Regional Panel, 100th Meridian Project, and the National ANS Task Force to address ANS issues[2].

Washington Animal Aquatic Nuisance Species Programs and Regulations

The discovery of the first European green crab in Willapa Bay in June 1998 brought a quick response from the Governor and the Legislature. The Zebra Mussel and European Green Crab Task Force was established by Chapter 153 of the Washington State Laws of 1998. This task force was charged with developing recommendations for legislative consideration to prevent and control the spread of these two aquatic nuisance species (ANS) in the state of Washington[3]. Washington Department of Fish and Wildlife received emergency funds from the Governor (Fund 001-4, Appropriation Code 612-4) in order to begin monitoring programs and initiate control actions. In 1999, the Washington State Legislature under ESSB 5180 directed Washington Department of Fish and Wildlife to develop a monitoring and control plan for European green crab. The Puget Sound Water Quality Action Team made prevention and control of aquatic nuisance species a priority during 1999-2001. The 1999-2001 *Puget Sound Water Quality Work Plan* identified $248,000 in provisoed funding to monitor for European green crab presence in Puget Sound. The 2001-2003 work plan seeks $342,458 to continue green crab monitoring, to coordinate the Spartina management program and coordinate state ANS management programs in the Puget Sound basin.

[1]Strategic action 1A1

[2]Strategic Action 2A1

[3]Strategic Action 2A2, 5A2

Green Crab Monitoring and Control Program

- The coastal monitoring program for green crab began in the fall of 1998 with a rapid survey of Willapa Bay and Grays Harbor. These surveys continue to be conducted annually along with monthly monitoring of three locations in Willapa Bay and two in Grays Harbor. More than 733 crabs have been collected in Willapa Bay and 150 in Grays harbor, including female crabs with eggs. The coastal program budget for FY2000 was $112, 464, which included a full time biologist, a ½ time scientific technician, 1/4 of the ANS coordinators salary, mapping software, office equipment and supplies. Shellfish growers in the area have been active participants in the program, having captured or killed many crab and provided the department with good information as to what sort of habitat they were found in.

- The Puget Sound program monitors 100 sites for the presence of European green crab. Monitoring is done primarily by volunteers from numerous organizations such as Adopt a Beach, Puget Sound Restoration Fund, Discovery Baywatch, Island County Beach Watchers, the Point Defiance Zoo and Aquarium, Washington State Parks, the Port Townsend Marine Science Center, Poulsbo Marine Science Center, the Jamestown and Lower Elwah S'Klallam Tribes, the Association for the Protection of Hammersly, Eld and Totten Inlets, and the Dungeness Wildlife Refuge. Washington Department of Fish and Wildlife staff have developed a detailed monitoring protocol and information packet and have held volunteer monitoring workshops throughout the Puget Sound region. Staff members also investigate citizen reports of green crab sightings. The Puget Sound program budget for FY2000 was $144,146, which included a full time biologist, a ½ time scientific technician, 1/4 time support staff, 1/4 of the ANS Coordinators salary, office equipment and supplies, and an airboat and trailer.

- Washington Department of Fish and Wildlife and U.S. Fish and Wildlife Service each provided an additional $3,000 to Adopt a Beach to fund volunteer monitoring training. To date, no green crab have been trapped in Puget Sound. However, green crab have been captured at three locations on Vancouver Island, British Columbia. In response to this, Washington Department of Fish and Wildlife provided $3,000 to Canada Fisheries and Oceans to assist them in developing a monitoring and control plan for shared waters and has increased monitoring efforts in the Strait of Juan de Fuca and the San Juan Islands.

Zebra Mussel Risk Assessment and Monitoring

- Washington Department of Fish and Wildlife also worked with the University of Washington to design and conduct a zebra mussel risk assessment and implement monitoring programs[4]. Initially plankton samples were taken by the Washington

[4]Strategic action 5A1

Department of Ecology Lakes Program staff and volunteers and tested at the University. In 2000, due to program cuts at Ecology, Washington Department of Fish and Wildlife hired temporary staff and recruited volunteers from their own staff, Public Utility Districts, and Tribes to monitor the Columbia and Snake rivers and priority lakes in Eastern Washington. To date, no zebra mussel veligers have been found in samples. However, it is to be noted that juvenile Asian clams *(corbicula)* are present in large numbers in nearly all of the samples. The most prominent effect of the introduction of the Asian clam into the United States has been biofouling, especially of complex power plant and industrial water systems. It also causes problems in irrigation canals and pipes and drinking water supplies, alters benthic substrate, and competes with native species for limited resources.

- Washington Department of Fish and Wildlife has also entered into a partnership with the Washington State Patrol to develop and implement an inspection program for large commercially hauled boats at weight stations. Commercial Vehicle Inspectors, trained by Washington Department of Fish and Wildlife staff, inspect the boats and contact the Department if a vessel appears to be infested with zebra mussels. To date one boat has been found with live zebra mussels attached, and two others that were heavily encrusted with dark false mussel *(Mytilopsis leucophaeata)* a dreissenid native to the east coast known to be a biofouler in some brackish water or estuarine areas. Adult dark false mussels are known to occasionally occur in freshwater environments, and all stages of zebra mussels (*Dressinea spp)* may occur in brackish waters of low salinity. Being a coastal state, Washington is susceptible to both genera, so all of the boats were properly cleaned and flushed prior to launching.

Mitten Crab

Washington Department of Fish and Wildlife has not developed a comprehensive mitten crab monitoring program, although they have distributed identification literature and include mitten crab in all educational presentations[5]. However, with recent unconfirmed reports of mitten crab sightings in Oregon efforts are underway to develop a collaborative monitoring program along the Columbia.

[5]Strategic action 5A3

Washington Plant Aquatic Nuisance Species Programs and Regulations

Spartina Eradication

The lead agency for the eradication of *Spartina* and the control of purple loosestrife in the state is the Department of Agriculture. Over the current biennium they allocated $718,000 for eradication of *Spartina*[6]. This included working with stakeholders to develop six regional management plans, obtaining the necessary permits, hiring, equipping and coordinating work crews for some sites and working with Washington Department of Fish and Wildlife on infestations in Willapa Bay and north Puget Sound. Washington Department of Fish and Wildlife mowed nearly 168 acres of *Spartina* in Willapa Bay in preparation for herbicide application, and over 157 acres in north Puget Sound were treated with Rodeo. All told, WSDA partnered with other state and federal agencies, local governments, tribal entities and private and commercial landowners to treat approximately 1,150 solid acres of *Spartina*, 800 of which were in Willapa Bay. Treatment resulted in killing approximately 300 acres. Expansion of the infestation in untreated areas resulted in an overall increase of approximately 12%, significantly less than the previous 20% per year expansion. Washington State Department of Agriculture has requested a total of $2.48 million for *Spartina* next biennium, and estimate that if it is granted and continues at that level *Spartina* might be totally eradicated throughout the state by the end of FY2007. Without additional funding the agency predicts that *Spartina* will increase dramatically from an estimated 4,600 solid acres to more than 11,000 solid acres in Willapa Bay and that in Puget Sound and Grays Harbor there will be a minimal reduction from 850 acres to 730 acres by the end of FY2007. *Spartina* is one of the key marine species whose population trends are monitored by the Puget Sound Action Team's Ambient Monitoring Program as indicators of environmental conditions in Puget Sound.

The Washington Department of Natural Resources has continued infrared photography of *Spartina* infestations. GIS layers from 1994 and 1997 photographs have been developed and distributed to other agencies as a management tool. More photos were taken in September, 2000 to produce another GIS layer for distribution.

Purple Loosestrife Management and Control

Washington State Department of Agriculture worked with Washington Department of Fish and Wildlife and the U.S. Bureau of Land Management to control purple loosestrife on public lands in 2000[7]. They obtained a statewide water quality permit to allow herbicide treatment by 46 individuals, Washington Department of Fish and Wildlife and County Weed Boards on more

[6]Strategic Action 5A4

[7] Strategic Action 5A5 and Task 3D3e

than 2000 acres of purple loosestrife and 300 acres of other noxious weed species. The agency also purchased herbicide, boat-mounted sprayers and biological control collection and distribution equipment.

Bio-control efforts were initiated in Grant County in 1991 with the release of *Galerucella* beetles.[8] Extremely high reproduction rates of the beetles in 1998 and 1999 resulted in large areas of purple loosestrife being prevented from seeding, and in many cases actually killed. In many of these areas a re-emergence of more desirable wetland plants has occurred. However, the common reed (*Phragmites australis*) is now becoming a concern in some of areas. Phragmites is a highly invasive, dense reed grass that spreads at an incredible rate, by a variety of methods. It is difficult to eradicate as the rhizomes (tuber roots) can penetrate more than a yard down and are thick and strong.

Saltcedar management and control

Special funding sources have provided for effective attack on *Spartina* and Purple Loosestrife, and some additional control of saltcedar and other "A and B" listed weeds, by various agencies and local governments. Efforts to control approximately 600 acres of saltcedar infestations in south eastern Washington were conducted in cooperation with 12 federal, state and local entities.[9]

ANS Coordinating Committee

The Zebra Mussel and Green Crab Task Force generated several recommendations aimed at managing the major pathways for the introduction of aquatic nuisance species. The Task Force emphasized the role of education in preventing the spread of ANS. Funding was recommended for nine educational activities. The highest priority set by the task force was the establishment of an ANS Coordinating Committee to implement ANS prevention and control programs. This recommendation did not pass the 1999 Legislature. However, the 2000 Legislature did create a committee to serve in an advisory capacity to the ANS Coordinator (RCW 77.60.130). Over 200 individuals from various agencies, local governments, tribes and industries were invited to participate, and seventy people attended the first meeting. There are seven working subcommittees addressing various ANS issues. The committee members have played a major role in the updating of the ANS management plan.

[8]Task 3D3b

[9]Task 3D3c

Ballast Water Management Act

One of the pathways the task force studied and recommended be addressed was the introduction of aquatic nuisance species through ballast water. The 2000 legislature, recognizing the risks, passed the Ballast Water Management Act, which became RCW 77.120. The law, with a few exceptions, establishes ballast water management and monitoring guidelines for vessels entering state waters. The law authorizes discharge of ballast water only if the nonexempt vessel has conducted an open sea exchange of its ballast. State requirements differ from those of the U.S. Coast Guard in that the state includes coastal shipping, and allows exchange to occur 50 or more nautical miles offshore. After July 1, 2002, discharge of ballast into state waters is authorized only if there has been an adequate open sea exchange of if the vessel has treated its ballast water to meet the standards set by the Department of Fish and Wildlife.

To monitor the effectiveness of national and international efforts to prevent the introduction of nonnative species, all nonexempt vessels must submit monitoring data describing any nonnative species that might be present in the vessel's ballast. Civil penalties may be imposed for violations related to ballast water discharge, reporting and monitoring requirements.

Under the law, the department and the shipping industry must promote the creation of a pilot project. The focus of the project is to identify and test equipment designed to treat ballast water and to establish treatment methods that do not increase the cost of ballast water treatment at smaller ports. The department is given rule making authority to develop standards for treated ballast water discharges and ballast water sampling and testing protocols in consultation with advisors from the regulated industry and potentially affected parties. The department is required to submit two reports to the Legislature summarizing the results of the ballast water management program and making recommendations to improve it. The first report is due on or before December 1, 2001. This report must describe how the costs of the treatment will be 'substantially equivalent' among ports where treatment is required. The second report must be submitted on or before December 1, 2004.

Other Task Force Recommendations

Other task force recommendations, in order of priority, included:

- Educate boat owners, marinas and boat yard personnel on how to identify zebra mussel.
- Develop and disseminate ANS education materials including WDFW import guidelines.
- Educate the maritime community on ballast water issues.
- Fund an ANS education specialist within the Washington Sea Grant program and provide support for the production of educational materials.
- Fund Washington State Department of Agriculture for ANS education/aquatic inspector program.

- Contribute to funding the 100th Meridian Program.
- Educate aquatic plant and animal suppliers on an annual basis.

Most of these recommendations, along with others, were incorporated into Objective 4 of the original state plan, and have either been completed or ongoing.

- Washington Department of Fish and Wildlife has given informational presentations on ANS to the recreational boaters associations of Washington and British Columbia, and to Marine Enforcement Officers from all over the state who are responsible for boater safety education classes.
- Washington Department of Fish and Wildlife has purchased and disseminated ANS educational materials via boating and fishing associations, schools, and a variety of state and federal programs.
- Washington Department of Fish and Wildlife has been working closely with the shipping vessel industry and ports to educate them on ballast water issues, to pass and implement ballast water legislation, and to develop a ballast water research pilot project.
- Washington Sea Grant developed educational materials designed to educate the public about the concept of ANS, problems caused, and ways to help. The Puget Sound Action Team, through public involvement and education grants totaling $44,000, funded the production and distribution of educational material designed to heighten public awareness of the ANS issue in the Pacific Northwest and the Puget Sound basin. The materials produced included the *Bio-invasions: Breaching Natural Barriers* booklet, a pet store handout on ANS, fact sheets on green crabs and various pathways of introduction for nonnative species, *Handling and Disposal of Nonnative Aquatic Species and their Packaging* booklet for laboratories and research facilities and the *Guide to Least Wanted Aquatic Organisms of the Pacific Northwest*. In addition, the Action Team provided financial and logistical support to carry out two rapid assessments of Puget Sound to detect and document the presence of nonnative species within basin.
- The Action Team also adopted a new aquatic nuisance species program in December 2000, as part of the long-range *Puget Water Quality Management Plan*. This program has a similar goal to the state program but maintains a focus on aquatic nuisance species management issues in the Puget Sound and Georgia Basin shared marine waters. It also recommends several new management activities to improve the protection of the Sound. Existing programs and institutional structures for coordinating and carrying out management programs are integrated into this program.
- The Action Team, Washington Department of Fish and Wildlife, Washington Noxious Weed Control Board, Washington and Oregon Sea Grant Programs, and U.S. Fish and Wildlife Service also provided financial support to the Tacoma Zoo and Aquarium to develop a permanent ANS display, **Alien Invader**, at the aquarium facility.
- The Washington Department of Ecology is currently working with Washington Department of Fish and Wildlife and The Department of Parks and Recreation to develop signs to be placed at all boat launches in Washington warning boaters of ANS animals

and plants and encouraging them to clean their boats, trailers and fishing gear. New multi-species "infested water body" signs will be developed to replace old milfoil signs.

- The Washington Department of Ecology maintains a web site containing technical and non-technical information about ANS weeds[10], and has developed brochures and flyers on several nonnative freshwater species. Last year they evaluated 22 aquatic plants for potential quarantine by the Washington State Department of Agriculture and fact sheets were created and distributed to weed board members and field staff by the department. Of the sixteen plants considered highest priority, fifteen were listed. Planned research projects into the development of biological control insects for Brazilian elodea and parrotfeather milfoil did not materialize due to a lack of funding.[11] However a paper evaluating the effectiveness of 2,4-D on Eurasian watermilfoil has been submitted to a peer reviewed journal.[12]
- The Department of Ecology updated their Aquatic Plant Management Environmental Impact Statement which will allow the use of more tools to manage problems associated with noxious weeds. The department spent $1.2 million on aquatic freshwater nonnative weed management and monitoring over the last biennium and anticipates spending the same amount next biennium. The department also worked to raise awareness of ANS and issues surrounding their control via 4(d) rule comments to National Marine Fisheries.

[10]Task 4A1h

[11]Task 6B1b

[12]Task 6B1d

Management Actions

Goal

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.

Objective 1: Coordinate All ANS Management Programs Within Washington and Collaborate with Regional, National and International ANS Programs

1A. Problem: ANS management authority is divided among many agencies within Washington. Management efforts within the state are not always coordinated between agencies, or with regional, national or international efforts.

1A1. Strategic Action: Coordinate all ANS management programs and activities within Washington. Ensure that state activities are coordinated with regional, national and international efforts.

1A1a Task: Create and fund an ANS Coordinator and Assistant Coordinator position.
Status: Washington Department of Fish and Wildlife supports two management level positions to coordinate all ANS activities, including marine and freshwater, plants and animals. The Washington Department of Fish and Wildlife Warmwater Fish Program has dedicated .5 FTE ($30,000.00) and another .5 FTE is funded with part of the European green crab monies provided by the Legislature. An additional $30,000.00 proviso is applied toward the second management position, and funding is requested for the remaining 1/3 ($20,000.00).

1A1b Task: Establish an Aquatic Nuisance Species Coordinating Committee to foster coordination and cooperation on ANS tasks within Washington.
Status: The 2000 Washington Legislature passed a bill creating the ANS Coordinating Committee. The committee is supported by the ANS Coordinator and his assistant, and convenes twice a year.

1A1c Task: Coordinate ANS management programs and activities within the Puget Sound basin with the implementation of the *2000 Puget Sound Water Quality*

Management Plan aquatic nuisance species program. Ensure that actions to implement the state ANS Plan within the Puget Sound basin are identified in the biennial Puget Sound water quality work plans submitted to the governor and legislature for funding consideration. Submit funding recommendations to the Puget Sound Council and Action Team in December of even numbered years for inclusion into work plans.
Status: Puget Sound ANS program was adopted in December 2000. Implementation is beginning.

1A1d Task: Work with the Columbia River Aquatic Nonindigenous Species Initiative in Oregon to monitor and protect our shared waters.

1A1e Task: Participate in the Pacific Ballast Water Group.

1A1f Task: Coordinate ballast water management and treatment standards development with the U.S. Coast Guard and the International Maritime Organization.
Status: The Washington 2000 Legislature passed a Ballast Water Management Act. The law makes the U.S. Coast Guard voluntary reporting rule mandatory in Washington, and mandates that the Department of Fish and Wildlife develop protocols for testing and set standards for the discharge of exchanged and/or treated ballast water. Under this law the state is mandated to work with the maritime industry develop a ballast water treatment pilot project to identify effective, cost efficient methods of treating ballast water. The ANS Coordinator acts as the project coordinator and has developed a cooperative research program with Alaska, California, Oregon and British Columbia.

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. Although strides have been made in this direction, 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.
Status: Washington Department of Fish and Wildlife is requesting $8,000 to fund travel expenses necessary to implement the following tasks.

2A1a Task: Washington Department of Fish and Wildlife will coordinate participation in regional and national conferences 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.
Status: The Washington State ANS Coordinator is the Chair of the Western Regional Panel for 2000-2001.

2A1c Task: Washington Department of Fish and Wildlife will participate in the Pacific States Marine Fisheries Commission effort to coordinate and implement regional ANS activities.
Status: Washington Department of Fish and Wildlife is partnering with Pacific States Marine Fisheries Commission on: a survey of recreational watercraft owners at sites deemed likely to attract boaters that have the potential to introduce zebra mussels and other ANS into the Northwest, and; a regional substrate sampling project aimed at early detection of zebra mussels in Northwest water bodies. Washington Department of Fish and Wildlife is requesting $10,000 to implement this task.

2A1d Task: Washington Department of Fish and Wildlife will continue to participate in meetings of the Puget Sound/Georgia Basin International Task Force.

2A1e Task: Washington Department of Fish and Wildlife will support the 100th Meridian Project, using federal and state dollars to help stop the spread of zebra mussels past the 100th meridian and into Washington's waters.
Status: WDFW has contracted with Pacific States Marine Fisheries Commission to conduct boater surveys in Washington lakes and rivers in accord with the 100th Meridian Project.

2A1f Task: Washington Department of Fish and Wildlife will explore new opportunities to increase tribal awareness and involvement in ANS issues and to provide them with support to identify ANS management needs on their lands.

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.
Status: In 2000 Washington Department of Fish and Wildlife contributed $3,000 and technical support to Fisheries and Oceans, Canada to assist them in developing a monitoring program for European Green Crab in shared waters.

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 nonnative aquatic species into our shared waters.

2A2. Strategic Action: Foster state, federal, tribal and private cooperation on ANS issues.

Status: Washington Department of Fish and Wildlife has appointed chairs to several sub–committees of the Aquatic Nuisance Species Committee created by the 2000 Legislature, 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.

2A2a Task: The Commercial Shipping sub–committee will work with maritime cargo vessel representatives and other affected groups to implement Washington's Ballast Water Law 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: The Recreational Boating sub–committee will work 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: The Education/Research/Risk Assessment sub–committee will work with representatives of Washington boat yards and marinas, the Washington Department of Ecology, Puget Sound Water Quality Action Team, 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 these pathways.

2A2d Task: The Imports and Transfers sub–committee will work with representatives of the live seafood industry, 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 these pathways.

2A2e Task: The Monitoring/Response/and Control sub-committee will work with state agencies, tribes, and other affected groups to review existing ANS monitoring, response and control plans for adequacy and information gaps, and provide the full committee with recommendations for addressing those gaps and developing rapid response guidelines.

2A2f Task: The ANS and Salmon sub-committee will strive to educate those involved with management efforts of threatened and endangered salmon runs that effective management must include ANS education, prevention and monitoring.

2A2g Task: The Regulatory Reform sub-committee will review existing state regulations to identify gaps and help develop statutes and rules that serve to protect State waters from invasive species introductions. Rules needed to be developed in 2001include: a rule requiring water bodies containing ANS plants or animals to be designated as 'infested waters' and clearly posted, and; a rule requiring all intended importations of nonnative species to be evaluated for their potential to become invasive if introduced.

2A3. Strategic Action: Prohibit, control, or permit the importation of nonnative aquatic species based upon their invasive potential.

2A3a Task: Washington Department of Fish and Wildlife will develop a process to classify and regulate aquatic nonnative animal species. The process should ensure that all species intended for introduction or sale are screened to demonstrate a low potential for invasiveness before being allowed into the waters of the state. The process and regulations should distinguish among:
1) species that pose a significant threat to the biological health and diversity of state waters; 2) species that pose a minimal threat to the biological health and diversity of state waters; 3) species for which there is little or no information to ascertain their status as an aquatic nuisance species; and 4) species that have potential commercial or recreational value and may be safely managed under aquacultural regulations.

2A3b Task: Washington Department of Fish and Wildlife, in consultation with the departments of Agriculture and Health and other agencies, will evaluate whether there is a need to classify and regulate microorganisms that are not currently regulated as plant or animal disease organisms by Department of Agriculture; as fish and shellfish pathogens by
the departments of Fish and Wildlife or Health; or through the state's ballast water treatment standards. Microorganisms may include viruses, bacteria and fungi but excludes genetically modified organisms at this time.

2A3c Task: Washington Department of Fish and Wildlife will work with the Washington Department of Agriculture and encourage them to develop a process to classify and regulate nonnative aquatic plant species. The process should ensure that all species intended for introduction or sale are screened to demonstrate a low potential for invasiveness before being allowed into the waters of the state.

2A3d Task: Washington Department of Fish and Wildlife in cooperation with the ANS Coordinating Committee will develop and implement, through the Aquatic Nuisance Species Management Plan, a biennial process to: identify potential new threats to state waters; identify the threats associated with the spread of existing aquatic nuisance species; assess the relative environmental risks associated with these threats; and report these findings to the appropriate agencies and to the Puget Sound Council and Action Team.

2A3e Task: Washington Department of Fish and Wildlife, in cooperation with other state agencies, local enforcement agencies, and various recreational association will develop and implement a program to inspect and certify that all vessels transported into Washington on trailers are free of unauthorized nonnative species. This program should build on the state's commercial vehicle inspection program. The program should also implement a recreational boater education and inspection program to minimize the spread of aquatic nuisance species between water bodies within the state. Inspections should target recreational vessels that originate from water bodies infested with aquatic nuisance species classified as a significant threat to the biological health and diversity of Washington waters.

2A3f Task: 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, European green crab, or other ANS animal species. Washington Department of Fish and Wildlife is requesting $3,000 for printing and miscellaneous expenses needed to implement this task.

2A3g Task: Washington Department of Fish and Wildlife, coordinating with other agencies and the ANS Coordinating Committee will develop and implement a process to provide economic incentives for voluntary prevention, control and eradication of aquatic nuisance plants and animals.

2A4 Strategic Action: Increase enforcement and awareness of existing laws controlling the transport, propagation, sale, collection, possession, importation, purchase, cultivation, distribution, and introduction of ANS.

2A4a Task: The ANS Coordinating Committee will work with Washington Department of Fish and Wildlife and the Department of Agriculture to increase the priority of enforcing existing ANS laws and rules.

2A4b Task: Washington Department of Fish and Wildlife will continue training state police, sheriff's marine patrols, and wildlife enforcement officers on ANS identification and regulations.

2A4c Task: Washington Department of Fish and Wildlife will work with Puget Sound Water Quality Action Team, Washington Sea Grant, and other state agencies to conduct workshops and distribute information on ANS law to businesses that import aquatic organisms.

2A4d Task: Washington Department of Fish and Wildlife will work with Puget Sound Water Quality Action Team, Washington Sea Grant, and other state agencies to publicize existing penalties for the intentional introduction of any nonnative species into Washington waters.

Objective 3: Detect, Monitor, Control or Eradicate Nonnative Invasive Species

3A. Problem: Several very damaging ANS are spreading closer to Washington waters. Current efforts to monitor for these species and for some ANS species already present in Washington are inadequate. Economic and environmental damage will be greater without an effective monitoring program to quickly detect new ANS introductions or the spread of those already present. We must be able to rapidly detect new ANS introductions and the spread of established ANS so that emergency response plans can be immediately implemented while the problem species can be eradicated. We also need accurate information about which ANS are present, where they are present, and an estimate of their population numbers and/or densities. This information needs to be made available to appropriate authorities.

3A1. Strategic Action: Monitor waters that are vulnerable to new ANS introductions and track the distribution of existing ANS populations. Survey Washington lakes, rivers, estuaries, wetlands, and coastlines on a periodic basis to establish an accurate assessment of the presence of nonnative species that have become, or have the potential to become nuisance species, and make this data available statewide.

3A2. Strategic Action: Identify existing Geographic Information Systems (GIS) maps available and determine what maps need to be created to build a statewide on-line monitoring and education project for ANS.

3A2a Task: Create a list of GIS maps available from local, state, and federal agencies and from research institutions. Available data not currently in GIS format need to be identified, as well as missing data/data sets.

3A2b Task: GIS maps will be developed by the *NatureMapping* program and cooperating agencies to show "hotspots" and potential "hotspots" for ANS species. These maps will be posted on the *NatureMapping* program's web site and updated regularly.

3A2c Task: The *NatureMapping* program's on-line data entry screens for wildlife and water quality monitoring will be expanded to allow for feedback and ANS sighting reports from the public. The data entry screen will have GIS maps showing actual and potential "hotspot' areas for data providers to compare their new sightings with existing ones.

3A3. Strategic Action: Continue monitoring and control efforts for European green crab. Washington Department of Fish and Wildlife is requesting $464,000 for the 2001-2003 biennium to continue monitoring and control activities.

Status: The establishment of the European green crab in California prompted Washington Department of Fish and Wildlife to institute measures to minimize the risk of introduction to State waters via aquaculture transfers. The department began requiring chlorine treatments of imported shellfish seed and broodstock (WAC 220-77-040) and declared the crab a deleterious species, making it illegal to possess or transport the species within the state without a permit (WAC 232-12-01701). The discovery of European green crabs in Willapa Bay in 1998 prompted the Governor and the Legislature to provide Washington Department of Fish and Wildlife with emergency funds to develop monitoring and control programs. The coastal plan focuses on monitoring abundance and distribution of the crabs in Willapa Bay and Grays Harbor. As of August, 2000 over 833 European green crab have been captured. Volunteers have captured 30% of all crabs in Willapa Bay, and 80% in Grays Harbor. The Puget Sound plan works with several volunteer organizations to monitor over 100 locations for the presence of European Green crab. Washington Department of Fish and Wildlife staff developed a detailed monitoring protocol and information packet for volunteers, have held seven training workshops around the Puget Sound area, and provide traps and bait. To date no crab have been captured in Puget Sound. However, they have been captured at three locations on Vancouver Island, British Columbia. As a result of these captures, Washington Department of Fish and Wildlife entered into a contract with Fisheries and Oceans Canada for monitoring in shared waters, and has increased monitoring efforts in the Strait of Juan de Fuca and the San Juan Islands. Staff is currently developing a list of priority monitoring sites based on new information on the life history and distribution of the European green crab in the Pacific Northwest.

3A3a Task: Washington Department of Fish and Wildlife will continue monitoring the abundance and testing control techniques for European green crab along the outer coast. Information on green crab behavior during the past year can be used to modify existing trapping and monitoring activities, which include:

- monthly monitoring at three locations in Willapa Bay and two in Grays Harbor;

- annual baywide surveys at more than 20 sites in Willapa Bay and Grays harbor in August and September;
- 23 volunteers constantly monitoring traps in Willapa Bay.

3A3b Task: Washington Department of Fish and Wildlife will continue to train and coordinate volunteer groups to continue monitoring at over 100 sites in the Puget Sound region for the presence of European green crabs in Puget Sound. Since the capture of European green crabs at three locations on Vancouver Island, British Columbia, staff have increased monitoring efforts in the Strait of Juan de Fuca and the San Juan Islands. A new list of priority sites is being developed based on new information on the life history and distribution of the crab in the Pacific Northwest.

3A3c Task: Washington Department of Fish and Wildlife will coordinate with the Aquatic Nuisance Species Task Force and the Western Regional Panel in the development of a regional management plan for green crab.

3A4. Strategic Action: Continue monitoring for the presence of zebra mussels and mitten crab species.

Status: Washington State regulations addressing the introduction of nonnative species include regulations protecting against introduction of the zebra mussel, WAC 232-12-01701 and WAC 232-12-168. Washington Department of Fish and Wildlife worked with the University of Washington to conduct a zebra mussel risk assessment and to develop and coordinate a zebra mussel veliger monitoring program for high risk lakes. Department of Ecology staff and volunteers took samples for the first two years of the program. Samples were analyzed at the University of Washington. In 2000, due to cuts in the Department of Ecologies programs, Washington Department of Fish and Wildlife utilized staff and solicited volunteers from PUD's and tribes to do sampling in priority lakes and along the Columbia and Snake rivers. To date, no zebra mussel veligers have been found.

The department also entered into a partnership with the Washington State Patrol Commercial Vehicle Inspection Program to inspect commercially hauled boats entering the state. Washington Department of Fish and Wildlife staff provides on-site training and support. To date, two vessels heavily infested with dark false mussel (*Mytilopsis leucopheata)*, a brackish water sister species to the zebra mussel native to the southeast U.S., have been required to be cleaned prior to launch. One vessel with live zebra mussels on the trim tabs and other protected areas passed through the state into British Columbia. Canada Fisheries and Oceans was contacted and they had the vessel cleaned prior to launch. Inspection officers had not initially been given authority to detain boats. This close call prompted WSP to change their policy and

allow their inspectors to detain a boat that may be infested until Washington Department of Fish and Wildlife responds.

3A4a Task: Washington Department of Fish and Wildlife will continue to coordinate with the Tribes, Army Corps of Engineers, mid-Columbia Public Utility Districts, Bonneville Power Administration and other affected parties on the implementation of a zebra mussel veliger monitoring program for major rivers and high-risk lakes.

3A4b Task: Washington Department of Fish and Wildlife, working with local volunteer groups and, will monitor low priority lakes and possibly rivers with a technology that is simpler and less expensive than veliger sampling.

3A4c Task: Washington State Patrol Commercial Vehicle Inspectors will continue inspecting commercially hauled vessels entering the state for the presence of zebra mussels and Washington Department of Fish and Wildlife will ensure that contaminated vessels will be appropriately cleaned prior to launch.

3A4d Task: Washington Department of Fish and Wildlife, in cooperation with Washington Parks and Recreation Commission, Marine Enforcement units of County Sheriffs offices, and the Recreational Boaters Association will continue to incorporate Aquatic Nuisance Species information into boater safety classes.

3A4e Task: Washington Department of Fish and Wildlife will participate in the Chinese Mitten Crab Control Committee of the Aquatic Nuisance Species Task Force and contribute to the development of a comprehensive management plan to reduce further spread, prevent new introductions and reduce the impacts of existing populations.

3A4f Task: Washington Department of Fish and Wildlife, in cooperation with U.S. Fish and Wildlife Service, Pacific States Marine Fisheries Commission, and volunteer groups will post warning signs and coordinate a monitoring program in the Columbia and Snake Rivers for the presence of mitten crab *(Eriocheir spp).*

3A5. Strategic Action: Continue monitoring for the spread of *Spartina*.

3A5a Task: Washington State Department of Agriculture will continue to act as the lead agency for statewide *Spartina* coordination, including monitoring and control efforts. As such they coordinate the development of strategies and management plans and streamline regulatory process requirements by obtaining 'umbrella" water quality permits for eradication efforts.
Status: The Washington State Department of Agriculture dedicates approximately $50,000 per year to this task, which includes 1 FTE. Washington State Department of

Agriculture allocated $718,000 of its appropriation from the Aquatic Lands Enhancement Account for labor and equipment for *Spartina* work crews this biennium. County Weed boards also do a tremendous amount of monitoring and local control efforts on all shorelines, including lakes.

3A5b Task: County noxious weed boards (Grays Harbor, Pacific, Skagit, Snohomish, Island, and San Juan) will continue to monitor their coastlines for new *Spartina* infestations and serve as a local source for information to the general public. In addition, with the financial assistance of the Washington Department of Agriculture, several counties will hire a *Spartina* coordinator to manage Spartina related activities.
Status: County noxious weed boards (Grays Harbor, Pacific, Skagit, Snohomish, Island, and San Juan) have dedicated 0.5 FTE ($15,000) to this task.

3A5c Task: Washington Department of Fish and Wildlife will continue to monitor regions, such as Grays Harbor and North Puget Sound, for new infestations and perform *Spartina* control when pioneering *Spartina* seedlings and clones are found.
Status: The Washington Department of Ecology Natural Resource Damage Assessment Fund has dedicated approximately $7,500 annually and Washington Department of Fish and Wildlife has dedicated approximately $7,500 annually to this task. This task has 0.5 FTE dedicated by these funds.

3A5d Task: Washington Department of Agriculture, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, and U. S. Fish and Wildlife Service will continue to treat known infestations and monitor areas relatively free of *Spartina* in Willapa Bay to maintain their weed–free integrity.
Status: Ongoing. Washington State Department of Agriculture has dedicated approximately $200,000 annually for Willapa Bay and North Puget Sound control work. Washington Department of Natural Resources has dedicated approximately $136,000 annually and U. S. Fish and Wildlife Service has dedicated approximately $137,000 annually for work in Willapa Bay. Washington Department of Fish and Wildlife has dedicated approximately $140,000 annually for control in Willapa Bay and $170,000 for North Puget Sound through the Natural Resource Damage Assessment Fund. This task has 9 FTEs dedicated by these funds.

Full information on control efforts, including biological control research is available on the internet at **http://www.willapabay.org/~coastal/nospartina/biocontrol/** Prokelisis/release/release_ program.htm)

3A5e Task: Washington Department of Natural Resources will continue to aerially photograph *Spartina* in Willapa Bay in color infrared. This information is entered into a Geographical Information System to create maps yielding accurate acreage

figures and trends regarding the spread of *Spartina* within that estuary. The maps are distributed to other agencies for use as a management tool.
Status: Ongoing. Washington Department of Natural Resources has dedicated 0.5 FTE ($30,000) for this task.

3A5f. Task: Washington Department of Fish and Wildlife will continue to aerially photograph portions of North Puget Sound to monitor the efficacy of *Spartina* treatment and to locate new infestations. This information will be entered into a Geographical Information System in the near future.
Status: Washington Department of Fish and Wildlife has dedicated $16,000 for this task.

3A6. Strategic Action: Continue the monitoring of purple loosestrife in Washington's wetlands and shorelines.

3A6a Task: Washington Department of Agriculture, Washington Noxious Weed Control Board, and Washington Department of Ecology will continue efforts toward purple loosestrife population monitoring and control. Control methods include hand pulling, herbicide application and biological control agents.
Status: Biological control has been very encouraging. *Galerucella* beetles were first released on the Desert Wildlife Area in Grant County in 1991. Reproduction remained low until 1998, when reproduction dramatically increased, and has continued to do so. The insects migrated over wide areas, killing or damaging plants and eliminating seed production. In areas with devastating insect damage there has been re-emergence of more desirable wetland plants. Beetle reproduction has been so high that 21 counties and 20 agencies from Washington, Oregon, and Idaho came and collected beetles for release on their purple loosestrife infestations. Beetles were also collected and shipped to New Hampshire and Pennsylvania.

3A7. Strategic Action: Continue monitoring for freshwater nonnative plants in Washington's lakes and rivers.

3A7a Task: The Washington Department of Ecology will continue to survey a subset of Washington lakes and rivers each year to establish baseline data on Washington native aquatic plant species and to detect and map nonnative freshwater plants. Nonnative plant species targeted include: hydrilla, Eurasian watermilfoil, parrotfeather milfoil, Brazilian elodea, fanwort, and other plants listed in Appendix C.

Status: Washington Department of Ecology has dedicated 0.5 FTE ($35,000) to this task.

3B. Problem: Washington currently has few emergency response plans in place to quickly address new introductions of ANS, especially emergency response plans for marine and freshwater animals. Small populations of newly introduced ANS are most vulnerable to eradication. Without previously developed plans, new ANS populations can become established while agencies are developing and agreeing upon appropriate eradication measures.

3B1. Strategic Action: Develop emergency response plans for specific ANS known to be an eminent threat to Washington waters. Actions outlined in these emergency response plans, when implemented, will prevent the establishment and spread of these species, or minimize their impacts. The emergency response plans will include elements for permitting, funding, equipment and resources, staffing, and stakeholder input.

3B1a Task: The Washington Department of Fish and Wildlife will establish and administer an ANS Emergency Response Fund. These readily available funds would be used to finance a quick initial response to the introduction of zebra mussels, green crab, mitten crab or other invasive species into Washington. Without readily available funds to quickly implement a response plan, an opportunity could be lost to eradicate or control the further spread of zebra mussels. This fund will require a $50,000-$100,00 commitment from federal sources and a combined $50,000 -$100,000 commitment from state, public and private organizations within Washington.

3B1b Task: The Washington Department of Fish and Wildlife will continue to work in cooperation with the United States Army Corps of Engineers Zebra Mussel Research Center on early response eradication strategies.
Status: Members of the Aquatic Nuisance Species Coordinating Committee are working on developing a comprehensive response plan. Priority water bodies in the state have been identified and are monitored for the presence of zebra mussels. Some of these water bodies have been posted with informational signs. The Washington Department of Fish and Wildlife is currently working with The Washington Department of Ecology and the Washington Department of Parks and Recreation, and U.S. Fish and Wildlife Service to develop and post signs regarding ANS plants and animals at all boat access areas in the state. An inspection program for commercially hauled boats has been established, and the Washington Department of Fish and Wildlife are working with Pacific States Marine Fisheries to implement boat inspections and boater information outreach activities.

Washington Department of Fish and Wildlife is requesting $1,000 for miscellaneous expenses to implement this task, along with the establishment of an Emergency Response Fund (Task 3B1a), and adequate staffing from Objective 1.

3B1c Task: The Washington Department of Fish and Wildlife will coordinate the Green Crab Response Plan. When green crab are discovered in new waters, managers have a prearranged plan to facilitate their response.
Status: The Washington Department of Fish and Wildlife has two European green crab monitoring programs in place, funded by Legislative provisos. Vulnerable waters, including shared waters with British Columbia, are monitored for new invasions. A control program is in place in infested waters that has controlled populations, and may eventually succeed in eradicating them. The State of Washington currently spends over $200,000 annually on European green crab monitoring and control programs. However, this does not allow for a reserved fund to finance large scale response to new invasions. Washington Department of Fish and Wildlife is requesting $1,000 for miscellaneous expenses to implement this task, along with the establishment of an Emergency Response Fund (Task 3B1a), and adequate staffing from Objective 1.

3B1d Task: The Washington Department of Fish and Wildlife will continue to work with the State of Oregon to coordinate the development of a Mitten Crab Emergency Response Plan. Without readily available funds to quickly implement a response plan, an opportunity could be lost to eradicate or control the further spread of mitten crab.
Status: Washington Department of Fish and Wildlife is requesting $1,000 for miscellaneous expenses to implement this task, along with the establishment of an Emergency Response Account (Task 3B1a) and adequate staffing from Objective 1.

3B1e Task: In partnership with King County and the Cities of Covington and Maple Valley, the Washington Department of Ecology has developed and is implementing an emergency response plan for hydrilla eradication in Washington State.
Status: Hydrilla was discovered in two King County lakes in 1995. Eradication efforts have been going on since that discovery. To date total eradication has not been accomplished due to the inability to completely remove all tubers from the substrate. However the weed is under control and has not spread to any other water bodies in Washington State. The Washington Department of Ecology Aquatic Weeds Grant Program funds this task with $50,000 per year of dedicated funding to King County.

3B1f Task: The Department of Ecology, in conjunction with local governments, will continue targeting early infestations of Eurasian watermilfoil and Brazilian elodea for eradication.
Status: The Department of Ecology provides financial assistance and technical advice to local government management efforts. Eurasian watermilfoil is now at extremely low levels in 20 lakes, and several other eradication efforts for Eurasian watermilfoil and Brazilian elodea are ongoing in several Washington lakes and rivers. The

department is requesting federal funding back for these programs so they can totally eradicate these plants from state waters.

3B1g Task: In partnership with affected county weed control boards, volunteer groups, and others, the Washington State Department of Agriculture has developed and is implementing a cordgrass (*Spartina*) plan for the eradication of *Spartina spp*. in isolated areas and the containment/control of *Spartina alterniflora* and *Spartina anglica* in heavily infested areas.
Status: Washington State Department of Agriculture spent $718,000 of its appropriation from the Aquatic Lands Enhancement Account for *Spartina spp* efforts this biennium. These efforts slowed the spread in heavily infested areas, but did not reverse it. Because of new tools and the knowledge gained in past years, the department feels eradication of *Spartina spp* in Washington State by 2006 is possible provided adequate resources. Washington State Department of Agriculture is requesting an additional $1,480,000 during the 2001-2003 biennium.

3B1h Task: The Department of Fish and Wildlife will work with the departments of Agriculture and Natural Resources to review legal issues and develop solutions to facilitate control of aquatic nuisance species on property where ownership is in question or where access is denied.

3C. Problem: State resources (funding and staff) for ANS management are limited. Existing resources are insufficient to deal with all ANS management problems in Washington. Without resources, action plans cannot be implemented in a timely manner. Early action is imperative to contain and/or eradicate pioneer infestations of ANS.

3C1. Strategic Action: Increase existing funding and resources for ANS management and establish new funding and resources.

3C1a Task: Increase federal awareness on ANS issues.
Status: During an annual lobbying trip, the Washington State Noxious Weed Control Board worked through the Intermountain Noxious Weed Advisory Council to increase the awareness of noxious weeds on Federal Lands and encourage additional federal funding for noxious weed control.

3C1b Task: Washington Department of Fish and Wildlife will explore new ideas for ANS funding with the members of the Aquatic Nuisance Species Coordinating Committee.

3C1c Task: Washington Department of Fish and Wildlife will ensure that actions to implement the state ANS Plan within the Puget Sound Basin are submitted to the Puget Sound Council and Action Team in December of even numbered years for

inclusion in their work plans that are submitted to the governor and the legislature for funding consideration.

3C2. Strategic Action: Set priorities for the management of existing ANS so that existing local, state, and federal resources can be directed in a cost–effective manner to manage Washington's highest priority ANS.

3C2a Task: The Washington State Noxious Weed Control Board will set state priorities for the management of noxious ANS weeds during the annual development of the Washington State Noxious Weed list.
Status: At the 2000 meeting, one new aquatic plant was added to the state noxious weed list. Factors such as statewide distribution of each species are considered when setting management priorities. For instance, Class A weeds, such as hydrilla, are mandated to be eradicated under state law (see Appendix D). Each local weed control board or weed district (most Washington counties have local boards) uses the state list to set their weed management priorities.

3C2b Task: The Washington Department of Ecology will set management and funding priorities for ANS weeds during an annual grant funding cycle when grants are awarded for the management of ANS weeds. High priority weeds in targeted areas receive funding preference.

3C2c Task: The Washington Department of Fish and Wildlife will set priorities for control of green crab, mitten crab, zebra mussels, and other animal ANS during the development of response plans.

3D. Problem: Established populations of ANS in Washington waters can spread to uninfested waters thereby increasing their potential for economic and ecological damage.

3D1. Strategic Action: Implement strategies (response or management plans) for controlling and/or eradicating pioneer infestations of ANS.

3D1a Task: The herbicide 2-4D has been approved for the eradication of pioneer infestations of aquatic weeds, allowing for immediate action to eradicate or contain the infestation immediately.

3D1b Task: The Washington Department of Ecology has established an emergency fund that is reserved for the containment/eradication of pioneering infestations of freshwater ANS weeds. This emergency funding is made available to local governments so that immediate control actions can be taken against new infestations of ANS weeds.

Status: The Washington Department of Ecology spends $1.2 million annually on aquatic weed control, and provides dedicated funding of $100,000 per year to fund this task.

3D2. Strategic Action: Minimize the dispersal of established ANS species in Washington.

3D2a Task: The Washington State Department of Agriculture maintains a list of ANS plants prohibited for sale and transport in Washington.
Status: The department maintains a list of plants prohibited for sale or transport. Effective January 2001 an additional 15 aquatic plants were added to the quarantine list. Some of the prohibited plants already have limited populations in Washington. Others have not been introduced but have the potential to become established if they are introduced.

3D2b Task: The Washington Department of Fish and Wildlife will coordinate with other agencies to develop guidelines and regulations to ensure the cleaning of water–based equipment such as, plant harvesters, dredges, etc., that may accidentally spread ANS when moved from infested to uninfested waters.

3D2c Task: The Washington Department of Fish and Wildlife will consider developing regulations to quarantine waterbodies (or use barriers) to prevent the spread of zebra mussels or other ANS organisms into uninfested waters (see Objective 6 on ANS law).

3D2d Task: State agencies and others will develop and implement educational strategies designed to prevent the spread of ANS by educating the public and specific groups about ANS transportation pathways (see Objective 4).
Status: The Puget Sound Water Quality action Team has adopted an updated action plan that includes management of ANS in the Puget Sound basin. The plan directs team staff to work with the state ANS Coordinator to prepare an education and technical assistance strategy for invasive species within the next two years.

3D3. Strategic Action: Manage large populations of established ANS to reduce their size or minimize their expansion.

3D3a Task: The Washington Department of Ecology will continue to provide funding to state and local governments for the management/eradication of established populations of ANS weeds using an integrated approach. Private lake groups are encouraged to form funding districts to fund their own eradication/control efforts.
Status: The Washington Department of Ecology dedicates approximately $300,000 per year to fund this task.

3D3b Task: The Washington Department of Fish and Wildlife and others will continue to release approved biocontrol agents (insects) for the management of purple loosestrife.
Status: *Galerucella* reproduction has been extremely high, resulting in migration over a wide area, killing or damaging plants and eliminating seed production. The Washington State Noxious Weed Control Board has organized collection events, allowing people to collect beetles free of charge for introduction on their problem purple loosestrife stands. Twenty-one counties and 20 agencies from Washington, Oregon and Idaho came to collect beetles. The Washington Department of Fish and Wildlife, in cooperation with other agencies, is rearing *Galerucella* en masse for distribution to specific sites.

3D3c Task: Management and control of Saltcedar.
Status: The Washington Department of Fish and Wildlife, and others, implemented a Saltcedar control/eradication plan in 1998 with $200,000 of dedicated funding from the Washington Department of Ecology Aquatic Weeds Program. Approximately 500 acres were treated with herbicide in 1998 and 1999, with good results. The State Weed Board provided $8,000 in 2000 and $5,000 in 2001 for saltcedar control on Washington Department of Fish and Wildlife lands. Management responsibility for the Wahluke Wildlife Area, located on U.S. Department of Energy lands, has now been transferred from Washington Department of Fish and Wildlife to the Hanford Reach National Monument/Saddle Mountain National Wildlife Refuge management division of the U.S. Fish and Wildlife Service.

3D3d Task: Monitoring and control of *Spartina* and purple loosestrife.
Status: Land–owning state agencies have prepared and are implementing integrated plans for the control of purple loosestrife and *Spartina*. Monitoring is a key element to determine plan effectiveness and provide data for the development of the next years operation. The goal is to restore desirable habitat and recreational opportunities.

The Washington Department of Fish and Wildlife plans and implements a purple loosestrife control program each year, throughout Washington, on owned and controlled lands in cooperation with other land management agencies, county weed control authorities and other entities. This is based on integrated pest management principles and uses all control methods applied so they are complementary and most effective.

The Washington Department of Fish and Wildlife has dedicated 2.5 FTEs ($97,000) and $53,000 annually for operations and equipment to implement this task.

The Washington State Department of Agriculture allocates $100,000 of its appropriation from the Aquatic Lands Enhancement Account for purple loosestrife control activities each biennium.

Objective 4: Educate Appropriate Resource User Groups about the Importance of Preventing the Introduction and Spread of ANS, and How Their Harmful Impacts Can Be Reduced

4A. Problem: Accidental introductions occur through actions of the general public, such as naively releasing nonnative aquarium plants and animals into natural waters. The current state of public awareness of ANS issues is inadequate to address the problem.

4A1. Strategic Action: Compile, develop, and coordinate the dissemination of educational materials on ANS that will increase general public awareness of the ANS problem.

4A1a Task: Washington Sea Grant, Washington Department of Fish and Wildlife, Washington Department of Ecology, the Washington Noxious Weed Control Board, County Noxious Weed Control Boards, Puget Sound Water Quality Action Team, The Governor's Council on Environmental Education, U.S. Fish and Wildlife Service, and other state and federal agencies will distribute materials that can be used in the identification of ANS to the general public.
Status: Several educational publications have been created for distribution to the general public by Washington Sea Grant, Washington Department of Ecology, Washington Noxious Weed Control Board, County Noxious Weed Control Boards, Washington Department of Agriculture, Washington Department of Fish and Wildlife, Puget Sound Water Quality Action Team, U.S. Fish and Wildlife Service and the U.S. Corp of Engineers. These publications contain broad information on invasive species and the pathways by which they arrive. Examples include: "Bioinvasions: Breaching Natural Barriers", "Bioinvasions" flyer and poster, ANS Fact Sheets, European green crab identification cards, a pet store card and poster, a booklet for handling and disposal of NIS at research labs, a guide to the least wanted aquatic organisms of the Pacific Northwest, and brochures for species including *Spartina*,, Hydrilla, Brazilian elodea, fanwort, purple loosestrife, saltcedar, zebra mussel, green crab, and Chinese mitten crab. With the constant introduction of new species, new publications, as well as updates to existing publications are needed so the general public will stay informed on the current ANS issues.

4A1b Task: Washington Sea Grant, Puget Sound Water Quality Action Team, the Governor's Council on Environmental Education and other state and federal agencies will increase distribution of ANS identification cards, pet store cards, and other

literature to individual pet stores and large chains (e.g. PetSmart, Petco) to increase awareness of pet buyers to the dangers of ANS introductions.

4A1c Task: The Washington Department of Fish and Wildlife in cooperation with the University of Washington, Washington Sea Grant, the Governor's Council on Environmental Education and other state and federal agencies will develop a statewide ANS web site for the distribution of ANS information to the general public. The site will also provide updated information on newly introduced species, proposed solutions for their control and through likes to related sites. Key sites include the national Sea Grant nonnative species site (http://www.sgnis.org); Marine Invasive Species Team (http://seagrant.orst.edu/mist), Washington Department of Ecology's site on aquatic weeds (http://www.ecy.wa.gov/programs/wq/links/plants.html), and the Washington Department of Fish and Wildlife's ANS page (**http://www.wa.gov** /Washington Department of Fish and Wildlife/fish/nuisance/ans1.htm).

4A1d Task: Puget Sound Restoration Fund, Puget Soundkeeper Alliance, Washington Water Trails Association and other volunteer groups will coordinate with Washington Department of Fish and Wildlife to conduct community training workshops to distribute and disseminate ANS materials in the Puget Sound area, and provide hands-on training for volunteers throughout the state to participate in monitoring programs.

4A1e Task: The Washington Department of Ecology will publish an aquatic plant identification manual for Washington State. This will enable lake residents and managers to identify nonnative aquatic plants as well as common native species.

4A1f Task: The U.S. Fish and Wildlife Service, with support from Washington Department of Fish and Wildlife, University of Washington, Washington Sea Grant, the Governor's Council on Environmental Education and other state and federal agencies will coordinate the development of several ANS educational 'traveling trunks' filled with literature, samples of nonnative species, and hands on learning tools for distribution.
Status: This task is being coordinated by the MIST program (Washington and Oregon Sea Grant, and has received a USFWS/NOAA grant.

4A2. Strategic Action: Develop partnerships with media outlets and established publications to reach a broad range of the public with ANS messages through channels to which the public are already attuned. The constantly changing nature of new introductions and the spread of ANS make the media an excellent outlet to disseminate ANS information.

4A2a Task: Washington Department of Fish and Wildlife, Washington Sea Grant, Washington State Noxious Weed Control Board, Washington Department of Ecology, Washington Department of Natural Resources, Puget Sound Water Quality Action Team, and the Governor's Council on Environmental Education will periodically write press releases aimed at print, radio, television and electronic media focusing on problems associated with the threat of ANS and methods by which the public can prevent introductions. Press releases will be tied to specific events and will be distributed to media outlets throughout the state.

4A2b Task: Washington Sea Grant will develop public service announcements to introduce the public to the threats associated with ANS and how to prevent their introduction.

4A2c Task: Members of the ANS Coordinating Committee will contribute articles that explain ANS issues and detail existing state quarantines that prohibit the sale of ANS to magazines, newsletters, and newspapers. Target publications will include those devoted to gardening, hunting and fishing, boating, and outdoor recreation.

4A2d Task: Washington Department of Fish and Wildlife, Pacific States Marine Fisheries Commission, U.S. Fish and Wildlife Service, Washington State Noxious Weed Control Board, The Department of Agriculture, and the Recreational Boaters Association will distribute Aquatic Nuisance Species information at boat shows, sportsman shows, garden shows, state fairs and other events.

4A3. Strategic Action: Increase the awareness of ANS issues and solutions for their control in the K-12 public schools system via school curricula and teacher training.

4A3a Task: Washington Sea Grant and the Washington Department of Natural Resources in conjunction with Washington Department of Ecology, Washington Department of Fish and Wildlife, the Washington State Noxious Weed Control Board, the Governor's Council on Environmental Education, and other state and federal agencies will work with the Office of the Superintendent of Public Instruction and the Educational Service Districts, to develop curricula that meet Washington State Essential Academic Learning Requirements for specific grade levels in science and social studies. These curricula will emphasize the concept of nonnative species invasions and the damage they may cause, and will encourage student involvement in ANS identification and stewardship projects.
Status: The Washington State Noxious Weed Control Board has already developed a noxious weed curriculum that meets the State Essential Learning Requirements.

4A3b Task: Washington Department of Natural Resources, Washington Sea Grant, Washington Department of Ecology, Washington Department of Fish and Wildlife

and Washington State Noxious Weed Control Board will develop teacher training workshops to facilitate teachers learning of the new curricula. Examples of these workshops include the Washington Sea Grant Program-sponsored Exotic Aquatics on the Move, Washington Department of Natural Resources teacher training workshops, and training for the use of a traveling ANS educational trunk being coordinated by U.S. Fish and Wildlife Service.

4B. Problem: Several industry, research, and agency practices may be responsible for the introduction of ANS. In addition resource managers and others may work on the "frontline" and be in a position to notice the establishment or introduction of a new species, or may be particularly affected by ANS introductions. Current educational efforts are inadequate to help these groups understand and address these problems.

4B1. Strategic Action: Develop and distribute educational information targeted at specific groups who may be potential sources for ANS introductions.

4B1a Task: Washington Department of Fish and Wildlife, Washington Department of Agriculture, Washington Department of Ecology, Washington Sea Grant, and Puget Sound Water Quality Action Team will continue ongoing outreach to the aquaculture industry to alert them to the potential ANS impacts from their operations, working primarily through Pacific Coast Shellfish Growers' Association and the Washington Finfish Association. Presentations on ANS risks at industry conferences, including the annual Shellfish Grower's Conference (sponsored by Washington Sea Grant Program) will be encouraged, as will preparation of articles for industry publications. Aquaculture industry staff can be strong partners for peer to peer education. The shellfish and finfish aquaculture industries are well regulated and introduction of target culture species into the environment are not common. However, organisms that arrive in association with imports from other regions are a potential source of ANS introductions.

4B1b Task: Washington Sea Grant will develop display material directed at restaurants and fish markets, detailing how to handle, ship, display, and/or store nonnative species to prevent unintentional introductions. A booklet directed at research labs and biological supply houses provides a potential model. Materials will be mailed directly to restaurants and fish markets, using a mailing list to be developed in cooperation with the Office of Trade and Economic Development and the Small Business Administration. Opportunities will be sought to talk to the industry at their conferences and functions. The live seafood trade to restaurants and fish markets is less well regulated and the issue of ANS is not well recognized.

4B1c Task: ANS Coordinating Committee members will identify several interested bait shop operators to work with the Education Subcommittee of the ANS

Coordinating Committee and state agencies to develop education materials for display at bait shops and as handouts to fishers to educate them on the disposal of unused bait. Many species sold as fishing bait are nonnative; in addition bait species and the materials in which they are transported, may harbor many nonnative species of plants, animals and micro-organisms.

4B1d Task: Washington Sea Grant and Puget Sound Water Quality Action Team will increase distribution of pet store cards to individual stores and large chains (e.g. PetSmart, Petco). Companion materials, including posters, will be developed and distributed, and stores will be encouraged to print ANS messages on their shopping bags.

4B1e Task: Washington Sea Grant and Puget Sound Water Quality Action Team will develop a "good housekeeping" program for pet stores, to be awarded to those with good outreach programs and responsible policies against ANS introductions.
Status: Many plants, fish and other animals imported by pet stores and nurseries are nonnative; they have the potential to become established ANS through deliberate and accidental release. Many consumers believe they are being kind in releasing unwanted pets or dumping plants into the environment. Some pet stores and nurseries may also release excess supplies. There is also the potential for ANS introductions of microorganisms associated with aquatic pets or plants, or contained in packing material or water. The pet store industry does not appear to have a well-organized program of outreach that will easily be tapped for coordination.

4B1f Task: Washington Department of Fish and Wildlife will coordinate and provide outreach material and training programs for ship captains and crew in conjunction with the shipping industry, and port management staff in cooperation with the American Ports and Harbor Association to ensure that accurate information on ballast water management is made available.

Ballast water discharge is probably the largest pathway by which ANS can become established in Washington estuaries and marine waters. The U.S. Coast Guard voluntary exchange program and new state regulations address this problem. Programs developed to minimize ballast water introductions of ANS are not well known or understood at this time. The Pacific Ballast Water Treatment Pilot Project, mandated in the state ballast water act, is addressing this issue.

4B1g Task: Washington Department of Fish and Wildlife, as a part of the Pacific Ballast Water Treatment Pilot Project, will work with the shipping vessel industry, ballast water treatment vendors, and the United States Coast Guard to identify efficient, cost effective methods of treatment, develop sampling and monitoring protocols and set standards for treated and/or exchanged ballast water.

4B1h Task: Washington Sea Grant, Washington Department of Fish and Wildlife, Puget Sound Water Quality Action Team, in cooperation with other state and federal agencies will work with large aquariums (Seattle Aquarium, Point Defiance Zoo and Aquarium) and with regional interpretive centers (The Maritime Discovery Center, Pacific Science Center and others) to develop displays and programs that will help introduce aquarium staff and docents to the importance of avoiding ANS introductions, as well as the providing the educational benefits to the public.
Status: The Point Defiance Zoo and Aquarium , with support and funding from National and Washington Sea Grant programs, The University of Washington, U.S. Fish and Wildlife Service, Washington Department of Fish and Wildlife, the Washington State Noxious Weed Control Board, and Puget Sound Action Team is developing an interpretive ANS exhibit for the Point Defiance Aquarium that will contain entertaining, interactive displays, many with live organisms. Designs have been completed, and work is beginning on developing the exhibit. Efforts are underway in Oregon to utilize the initial design work to create a similar exhibit at the Hatfield Marine Science Center in Newport, Oregon and a traveling version that could be put on exhibit in aquaria, zoos and science museums around the U.S. and Canada. Exhibits will be continually updated to contain the latest scientific information on new invasions, control efforts, and implications for public policy.

4B1i Task: Washington Department of Fish and Wildlife, and Washington Sea Grant will continue to provide ANS prevention materials and training to boaters by working with the Recreational Boaters Association, Coast Guard Auxiliary and local yacht clubs, and assist them to incorporate this information into their own programs.

4B1j Task: Washington Department of Fish and Wildlife, Washington State Parks and Recreation, and Washington Sea Grant will develop tailored text and graphics to be incorporated into key state publication, including: Boaters' Guide, fisheries regulations, fishing license renewals, and boat tax statements.

4B1k Task: Members of the ANS Coordinating Committee will prepare articles on ANS and ANS prevention for regional boating and fishing publications (e.g. 48 degrees North- The Sailing Magazine, Saltwater Sportsman Magazine, Cruising World, Washington State Fishing Pamphlet, Puget Sounder).

4B1l Task: Washington Department of Fish and Wildlife, Washington Department of Ecology, and Washington State Parks and Recreation will cooperatively develop signs for boat launches and roadways, warning boaters and fishers of the dangers of transporting ANS, and asking them to check and wash their boats.

4B1m Task: Washington Sea Grant will survey research laboratories and biological supply houses who received a copy of Handling and Disposal of Nonnative Aquatic

Specimens and their Packaging prepared by WSGP to determine whether the information is useful and being used. They will also work with representatives from biological supply houses to determine venues and publications for further educating the industry and to develop a more expansive mailing list for future contacts. Without proper handling and disposal of the organisms and packing materials, nonnative species can be introduced into local waterways.

4B2 Strategic Action. Compile, develop and coordinate the dissemination of materials on ANS to immigration offices and local community ethnic centers addressing the potential for intentional introductions of ANS through cultural ceremonies (e.g., traditions) of immigrants.

4B2a Task: Identify the number of ethnic communities in Washington. Washington Department of Fish and Wildlife has identified Asian communities in the Puget Sound region, and has an active education and outreach program.

4B2b Task: Washington Department of Fish and Wildlife, Washington Sea Grant, and Puget Sound Water Quality Action Team will create a list of cultural traditions which could affect introductions of ANS into Washington.

4B2c Task: Washington Department of Fish and Wildlife, Washington Sea Grant, and Puget Sound Water Quality Action Team will host workshops to teach about ANS and have cultural leaders assist with the development of educational material design and translation into their native tongues.

4B2d Task: Washington Department of Fish and Wildlife, Washington Sea Grant, and Puget Sound Water Quality Action Team will compile, develop and coordinate the dissemination of materials on ANS to immigration offices and local community ethnic centers.

4B2e Task: Washington Department of Fish and Wildlife, Washington Sea Grant, and Puget Sound Water Quality Action Team will create articles for newspapers and literature regularly read by this audience.

4B3. Strategic Action: Develop and distribute educational information targeted at specific groups who are especially affected by introductions of ANS and/or who may be in a position to first observe ANS introductions.

4B3a Task: Washington Department of Fish and Wildlife and Washington Sea Grant will provide training and identification materials to aquaculture staff and encourage them to report sightings of suspected ANS. Washington Department of Fish and Wildlife will develop a reporting system to receive information on suspected ANS

and the capacity to follow up sightings, including expertise to identify aquatic species. Because staff in aquaculture operations are constantly scanning their rearing locations they may also be the first to observe new nonnative organisms in an area.
Status: The shellfish and finfish growers can be especially hard hit by ANS as they rear organisms under culture conditions. Examples of existing and threatened ANS impacts include green crab predation on shellfish and harmful algal bloom impacts on net pen reared fish.

4B3b Task: Washington Sea Grant will develop plastic cards with easily identifiable ANS to be given to divers through local dive shops, and prepare articles for local and regional dive publications such as Northwest Dive News, Pacific Northwest: Diving and Snorkeling Guide, Rodales Scuba Diving and Skin Diver, to familiarize them with species of concern and the dangers of ANS introductions.

4B3c Task: Washington Department of Fish and Wildlife will develop a system to accept reports of ANS sightings by divers, including the capacity to follow up sightings. The department will publicize the system and ask divers for help in early warning monitoring of Washington waters.

4B3d Task: Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington Sea Grant, and Puget Sound Water Quality Action team will work with key individuals from large industries and municipal treatment facilities in the region to develop a mailing list of plants and facilities at possible risk form ANS. Materials will be developed and distributed to introduce facilities staff and the executives to whom they report to the potential impacts of ANS introductions.

4B3e Task: Washington Sea Grant, in cooperation with Washington Department of Fish and Wildlife and Puget Sound Water Quality Action Team will hold a one-day conference for municipal and industrial water users modeled after successful efforts by mid-west Sea Grant programs the past nine years. The conference will focus on the risks to municipal and industrial facilities from ANS, solutions to those risks, and will feature peer to peer education as much as possible.
Status: Municipal and industrial water users in Washington have not yet suffered the direct economic impacts of ANS experienced in other parts of the country, and may not recognize the risk they face from potential invasive species. These facilities are without precautionary, identification, or monitoring measures. They are also outside existing communication networks for ANS related issues. Recent sightings of zebra mussels in the Missouri drainage and on a recreational boat in the Fraser River drainage raises the likelihood of zebra mussels invading the Columbia River basin. Mitten crab may similarly pose an enormous threat to industries and municipalities who use freshwater for irrigation, industrial processes, cooling, or drinking water treatment. With recent ESA listings of numerous salmonid species, mitten crab and

zebra mussel damage to the numerous fish passage operations at Pacific Northwest facilities could be potentially disastrous as well. Staff in municipal and industrial facilities may be among the first to sight new ANS and can provide early warning on a number of potential invaders.

4B3f Task: Washington Sea Grant, in cooperation with Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington Department of Agriculture, the Washington State Noxious Weed Control Board and Puget Sound Water Quality Action Team will hold local workshops to introduce the concept of ANS to shoreline property owners. Shoreline property owners, particularly those on lakes and streams, may see the value and use of their property diminish with the invasion of ANS. Included in the workshop will be practical hands-on training on identification, removal, and disposal of noxious weeds. These property owners will also be enlisted to monitor and report sightings on ANS on their shorelines and beaches.

4B3g Task: Washington Department of Fish and Wildlife will provide information to fishing groups and fishers (as in Task 4B1f) to monitor and report sightings of ANS and changes in native animal populations. In addition, Washington Department of Ecology will provide information so that fishers can recognize and remove ANS weeds that can choke waterways and impact fishing opportunities.

4C. Problem: Decision-makers need to be aware of the threat of ANS to the marine resources of Washington State so they can develop effective policies, direct agencies to develop ANS management programs, and appropriate funds to carry out education, research, control and management activities. Natural resource managers must become knowledgeable about ANS in order to develop and implement effective ANS management programs that identify potential issues and propose solutions.

4C1. Strategic Action: Washington Department of Fish and Wildlife and the ANS Coordinating Committee will provide educational briefings on the threats and solutions to ANS invasions for decision-makers to help them weigh these threats against other legislative imperatives.

4C1a Task: Washington Department of Fish and Wildlife and Washington Sea Grant, with guidance from the ANS Coordinating Committee, will provide educational briefings to state legislators and legislative staff, and to local elected officials and their staffs on the threat of ANS and proposed solutions. Material for these briefings will be drawn locally, as well as from other parts of the country and abroad.

4C1b Task: Washington Department of Fish and Wildlife and Washington Sea Grant will organize a biennial field day for legislators and staff. The day will involve a trip to one or more infested sites and highlight the problems caused by the species along with the actions required to eliminate or minimize the problem. Potential legislative solutions will be highlighted.

4C1c Task: Washington Department of Fish and Wildlife and Washington Sea Grant, in conjunction with local volunteer organizations, will invite state and local decision–makers to attend volunteer training workshops on ANS identification and control throughout Puget Sound.

4C1d Task: Washington Department of Fish and Wildlife, in conjunction with Washington Department of Ecology, Washington Department of Natural Resources, Washington State Department of Agriculture and Washington State Noxious Weed Control Board, will prepare a biennial summary of ANS projects for members and staff of key legislative committees. The report will detail the current status of ANS in Washington and will highlight successful prevention/control projects.

4C1e Task: Washington Department of Fish and Wildlife will conduct a regional workshop to promote consensus on ways to prevent new invasive species introductions in the West. A full diversity of stakeholders including affected industries, state and local governments, federal agencies, non-governmental organizations and the public will be invited. Experts from throughout the country will be invited to speak and participate in panel discussions. The workshop will consider means of screening and assessing risks when intentional introduction, importation, or sale of nonnative species is considered and measures that could be taken to minimize risks of establishment of new invasive species.
Status: This workshop is tentatively scheduled for September 25-27th in Las Vegas, Nevada. Further information on possible screening and classification is in appendix E).

4C2. Strategic Action: Provide training on ANS for natural resource agency staff that support the identification and management of ANS.

4C2a Task: Washington Sea Grant, Washington Department of Fish and Wildlife, Washington Department of Natural Resources, Washington State Noxious Weed Control Board, Washington Department of Ecology, and Puget Sound Water Quality Action Team with assistance from other agencies, universities and the private sector will distribute or make available to agency staff and citizens working on monitoring and assessment programs materials that can be used in the identification of ANS. Examples include:

- ANS species bulletins and wallet ID cards will be distributed to agency field staff;
- The booklet *Field Identification Guide to Washington's Aquatic Plants*;
- An ANS slide library will be developed for use by agency staff, citizens groups and other interested parties.

4C2b Task: Washington Sea Grant will hold a biennial regional ANS workshop to train resource managers on the identification of new ANS and to share information on ANS prevention and control. Target groups should include fisheries biologists and managers of salmon enhancement projects. In particular, information will be developed for use in volunteer monitoring training workshops. Partners in this endeavor include Conservation Districts, Cooperative Extension and Sea Grant field agents and Washington Department of Fish and Wildlife.
Status: Washington Sea Grant Program requests $30,000 to implement this task.

4C2c Task: Washington Department of Fish and Wildlife and Washington Sea Grant, with the assistance of other agencies and universities will develop and publicize a list of experts to whom samples can be sent for identification to complement the existing Washington Department of Ecology Aquatic Plant Identification Service.

4C2d Task: Washington Department of Fish and Wildlife will participate in a West Coast conference being held to assess the potential for spread, local adaptation, and projected environmental and economic impacts of Chinese mitten crab, and serve on the Chinese Mitten Crab Control Committee of the ANS Task Force. The purpose of the committee is to develop a comprehensive management plan that will include a variety of control strategies to reduce further spread, prevent additional introductions and reduce the impacts of existing populations.

4 D. Problem: It is very difficult to determine whether environmental education programs are successful. Commonly, few attempts are made to assess their worth.

4D1 Strategic Action: Evaluate and assess the effectiveness of educational and outreach efforts in reaching target audiences, improving pubic understanding and changing behaviors that increase the risk of ANS introductions.

4D1a Task: Washington Sea Grant will survey individual members of the public and members of target groups to ascertain their level of knowledge and personal behaviors that relate to the release and spread of nonnative species. After one year of educational programming directed at the particular group, the individuals will be surveyed again to determine changes in behavior.

Objective 5: Conduct Research on ANS Priority Species in Washington to Better Understand the Risks and Threats Associated with Invasions

5A. Problem: Many aspects of ANS introduction, spread, and impact remain poorly understood. Such information is necessary to develop effective management and control programs, to create accurate education programs, as well as to weigh the relative risks of ANS invasions and to appropriately allocate resources to minimize those risks. Nonnative species have been and continue to be introduced to Washington for agriculture, aquaculture, live seafood trade, ornamentals and pet trade, recreational fisheries, and other purposes. There is little common understanding of which species are introduced, nor whether there are related species that might be used in place of nonnative species.

5A1. Strategic Action: Assess the risks of nonnative species introductions to human health, the economy, endangered species, and ecosystem functions that support living resources. Risks of established, newly arrived and potential arrivals of nonnative species need to be considered.

5A1a. Task: Washington Department of Fish and Wildlife will work with the University of Washington, Washington State University, and members of the Aquatic Nuisance Species Coordinating Committee to define aquatic nuisance species risks that affect natural resources, economic concerns and human health through workshops and analyses, and develop criteria for evaluating and classifying the extent of those risks. From these criteria, a full risk assessment of potential aquatic nuisance species will be conducted; a key candidate for such a risk assessment is the Chinese mitten crab

5A1b Task: Washington Department of Fish and Wildlife will work with the University of Washington, Washington Sea Grant Program, Washington State University, and members of the Aquatic Nuisance Species Coordinating Committee to compile a list of aquatic species that are intentionally introduced to the region; prepare analyses of their uses in the region, the risks they pose and efforts to manage those risks. A list of native species that might be used for commercial purposes in place of the nonnative will be compiled.

5A1c Task: Washington Department of Fish and Wildlife will work with the University of Washington, Washington Sea Grant Program, Washington State University, and members of the Aquatic Nuisance Species Coordinating Committee to characterize potential ANS by identifying and describing traits associated with successful high-impact invaders, particularly those present in estuaries, coastal regions, lakes and streams on the West Coast, and in similar habitats elsewhere.

5A1d Task: Washington Department of Fish and Wildlife will work with the University of Washington, Washington Sea Grant Program, and members of the Aquatic Nuisance Species Coordinating Committee to characterize resources and habitats at greatest risk from ANS invasions by identifying and describing traits associated with highly invaded or 'invade-able' ecological communities in Washington and beyond. Certain disturbed habitats can be at greater risk for invasions; evidence from the region and elsewhere in the world can help to determine those resources and habitats most at risk.

5A2. Strategic Action: Study the population dynamics, ecology, and impacts of current and potential invaders to gain an understanding of the chances of invasion and potential for damage from specific species.

5A2a Task: University of Washington, Washington Sea Grant Program, Washington State University, Washington State Noxious Weed Control Board, U.S. Fish and Wildlife Service, and the Department of Fish and Wildlife will identify appropriate species for further ANS investigations; work with the research community to interest them in pursuing these investigations; and work with funding sources to identify sources of funds.
Status: Studies are ongoing in the state for some established ANS as well those that are considered likely invaders. Continued investigations of these species and others are needed to understand the potential threat of invasion and damage by each.

5A2b.Task: Washington Sea Grant Program and the University of Washington will encourage studies that look at interactions between established ANS, potential new arrivals and native species, through working with the research and funding communities. An ongoing example is a University of Washington study of green crab interactions with native crabs.

5A2c Task: Washington Sea Grant Program and the University of Washington will encourage studies that assess the ecological impacts of economically important species. While most such species have not been shown to be damaging to native species and habitats, systematic studies to examine their impact have never been undertaken.

5A2d Task: Washington Sea Grant Program and the University of Washington will develop a list of experts with a broad knowledge of aquatic taxonomic groups, and assess their availability to respond to requests for identification of ANS.

5B. Problem: The extent of existing ANS invasions, and the pathways by which they arrived, is not well documented. Where data exist they are poorly summarized or difficult to access. Geographically referenced data on the extent and spread of ANS invasions, and their pathways of

introduction, are needed to understand where the existing ANS might spread, to further understand what allows certain nonnative species to become established as ANS, and to develop strategies for closing pathways by which ANS enter the state.

5B1 Strategic Action: Baseline assessments.

5B1a Task: In coordination with federal ANS activities, Washington agencies and scientists will design and implement a rapid assessment of all waterbodies in the state to document the presence of nonnative species. Provide the information to agencies and organizations with responsibility for waterbody monitoring.

5B2. Strategic Action: Encourage and support ongoing efforts to map ANS distributions and locations within the state that are at risk for future invasions, and relate their distribution to environmental factors.

5B2a Task: The University of Washington with the assistance of Washington agencies and scientists will gather geo-spatial data of ANS distributions and develop maps of their spread from monitoring programs within the state; relate the distributions to the distributions of native species, habitats and environmental factors.

5B2b Task: The Washington Department of Fish and Wildlife, in cooperation with the National Oceanic and Atmospheric Administration Hazardous Materials Division, is using a statistical computer model to determine the potential spread of floating ANS, such as *Spartina* seeds.

5B3 Strategic Action: Continue to develop and maintain lists of nonnative species known to occur in Washington.

5B3a Task: The Washington Department of Ecology will continue to provide information about nonnative freshwater plants and an aquatic plant identification service to the public and others. This service is publicized via their web site at http://www.wa.gov/ecology/wq/plants/plantid.html. Washington Department of Ecology has dedicated .01 FTE to maintain this task.

5B3b Task: Washington Department of Fish and Wildlife, with the assistance of Washington Sea Grant Program, U.S. Fish and Wildlife Service and others will further develop and maintain a list of nonnative aquatic animal species in Washington.

5B3c Task: The Education and Information subcommittee of the ANS Coordinating committee will identify the agencies who have created special sites on their websites

and create a list of them. Review each site to prevent duplication of effort for new material. Encourage cooperative groups to create hot-links to one another's sites.

5B4. Strategic Action: Compare locations of major human activities that commonly affect aquatic resources with invasions of ANS. Overlaps between nonnative invasions and human activities will help to elucidate the interaction between human activities, the pathways by which nonnative species arrive, and the establishment of ANS. Consider the pathways by which nonnative species are known to enter the state and they are likely to be concentrated.

5B4a Task: Washington Sea Grant Program and the University of Washington *NatureMaping* program will compile maps of major human activities that affect aquatic resources and compare those locations with distributions of ANS. Human activities to be examined include areas of shoreline development; ports and marinas; discharges; aquaculture operations; intentional and accidental release of nonnative species; and marine protected areas.

5C.Problem: There are few tools or strategies available for the management and control of ANS in Washington state. Relatively little is known about some of the major and minor pathways by which nonnative species arrive and become established in the state.

5C1. Strategic Action: Compare and contrast ANS management and control strategies throughout the world for species of local interest, and develop Best Management Practices for established populations or potential invasions of ANS in Washington State.

5C1a Task: Washington Department of Fish and Wildlife, Washington Department of Ecology, Washington Department of Agriculture, Washington Noxious Weed Control Board, with assistance ffom Washington Sea Grant Program, University of Washington, and Washington State University will: 1) compile information on management and control strategies for established populations of ANS including watermilfoil, green crab, purple loosestrife and *Spartina* that have been tried within the region and around the world; 2) gather information on other ANS which may invade the region in the future, including mitten crab and zebra mussel; 3) compare and contrast the success of management and control strategies for single species and for assemblages of species, and; 4) present the results in a report to the ANS Coordinating Committee.
Status: The Washington State Noxious Weed Control Board already does this for most of the plants on the noxious weed list.

5C1b Task: Washington Sea Grant Program and Washington Department of Fish and Wildlife will convene a national/international workshop of experts in ANS

research, management and assessment to develop a series of Best Management Practices for ANS management and control.

5C2 Strategic Action: Trace the pathways by which nonnative species arrive in Washington state to determine the relative risk from each pathway, and to appropriately direct management and education attention towards that pathway.

5C2a Task: Washington Sea Grant program and Puget Sound Water Quality Action Team in cooperation with agencies involved in response planning will identify the major and minor pathways for nonnative introductions, characterize and evaluate the potential threat of ANS invasion from each pathway, and develop an assessment of the risks from each pathway. At a minimum the study will address the relative risks of ballast water dumping; introduction of live seafood and aquaculture products; imports of ornamentals and pets; activities of recreational boaters and fishers; and actions by the public.

5D.Problem: Results from research on ANS are not always communicated widely within the research community or made available to those tasked with management and control of ANS. In addition reports of developing invasions and potential new arrivals are not always reported in a timely fashion.

5D1. Strategic Action: Develop a process to inform researchers and resource managers of recent and emerging information on ANS invasions.

5D1a Task: Agencies involved in monitoring and response planning will develop a clearinghouse and email listserve to connect invasion biology researchers and resource managers tasked with ANS management and control.

5D1b Task: Washington Sea Grant Program and agencies involved in monitoring and response planning will encourage presentations and sessions on ANS research at regional conferences and symposia, including the Puget Sound Research Conference and Pacific Estuarine Research Society (PERS) annual meetings.

5D1c Task: Washington Department of Fish and Wildlife will encourage the Western Regional Panel to compile and evaluate information on the life history characteristics and habitat requirements of the mitten crab, and compare it with west coast conditions to determine areas at risk of establishing populations.

5D1d Task: The Salmon and ANS subcommittee of the ANS Coordinating Committee, in cooperation with state agencies, will identify research designed to determine the impacts of ANS on salmonids in Washington. The Governor's Salmon Team has added ANS to the Salmon Recovery Strategy. The threat of ANS should be

incorporated in all Water Resource Inventory Area (WRIA) management plans being developed for salmon recovery.

5D1e Task: The Washington Department of Fish and Wildlife will identify research needed on the effects of green crab on established native and nonnative, cultured and non–cultured shellfish species, including state shellfish populations. The goal is to develop effective predator control techniques to minimize economic impacts to the shellfish industry and environmental impacts to native species.

Objective 6: Legislation for Washington State ANS Rules and Regulations to Ensure that our Legislation Efficiently Promotes the Prevention and Control of ANS in Coordination with Federal Regulations

6A. Problem: ANS law is a new and rapidly evolving field. Washington State laws must adapt as we improve our knowledge of ANS issues. The regulatory authority and financial support afforded by integrated state and federal legislation can enable our society to avoid or minimize environmental and economic damage from ANS. State ANS regulations have been enacted to address specific problems, and to manage ballast water discharges. However, further regulatory action is needed that increases the state's authority to control the introduction of new species.

6A1. Strategic Action: Review the laws governing ANS in Washington for gaps and overlaps, compare them to other state and federal ANS laws, and recommend changes to improve our ability to protect Washington waters from the introduction and spread of ANS.

6A1a Task: The Regulatory Review subcommittee of the ANS Coordinating Committee will review current laws governing ANS in Washington for gaps and overlaps, compare them to other state and federal ANS laws, and recommend changes to agencies responsible for regulating ANS. When making recommendations, the committee shall emphasize working in a coordinated fashion with existing state, federal, and international programs. The committee shall invite participation from all groups affected by the proposed pathway control measures, including representatives of aquaculture, recreational boating, seaplane operations, maritime cargo vessels, retail and wholesale aquariums, shellfish growers, marinas, and small boat harbors.

6A2. Strategic Action: Promote legislation and administrative rules that establishes or increases the state's authority to control the introduction of new species.

6A2a Task: The Washington Department of Fish and Wildlife will enact and enforce rules governing the discharge of treated and / or exchanged ballast water.

Status: The 2000 Washington State Legislature passed the Ballast Water Management Act (RCW 77.120). The law makes open ocean exchange of ballast water mandatory for all commercial vessels of three hundred gross tons or more, including those involved in coastal trade, unless specifically exempted. Vessels are required to file ballast water management reports and to submit to random sampling. After July 1, 2002 discharge of ballast water into state waters is prohibited unless it has been adequately exchanged or treated to meet standards to be set by the Washington Department of Fish and Wildlife.

Washington Department of Fish and Wildlife is mandated to develop ballast water sampling and testing protocols for monitoring the biological components of ballast water, and to set standards for treated and exchanged ballast water. The shipping vessel industry, public ports, Washington Department of Fish and Wildlife, and other federal and state agencies are to promote the creation of a pilot project to establish a private sector ballast water treatment operation capable of servicing vessels at all Washington ports. A research team comprised of ballast water experts from across the U.S. and British Columbia has been assembled to participate in the Pacific Coast Ballast Water Treatment Pilot Project. The project will coordinate with other research projects throughout the U.S. and Canada. Congressman Norm Dicks obtained a $500,000 annual appropriation to USGS for ballast water research. Funding is being sought to create a model ballast water treatment testing and research facility at the USGS facility on Marrowstone Island. University of Washington received a $150,000 grant from USFWS to identify indicator species and assist in developing monitoring and testing protocols.

6A2b Task: Washington Department of Fish and Wildlife shall seek the participation of the Washington Department of Ecology, Washington Department of Agriculture, Washington Department of Transportation, Washington Department of Natural Resources, Washington State Patrol, and other stakeholders in promoting legislation that establishes the authority to inspect, detain and require cleaning of any vehicle, vessel or water based equipment containing or infested with ANS that is traveling in Washington.

6A2c Task: Washington Department of Fish and Wildlife shall seek the participation of the Washington Department of Ecology, and the Washington State Department of Agriculturein establishing the authority to designate water bodies as infested and to quarantine them to prevent ANS from spreading and to contain them for possible eradication.

6A2d Task: Washington Department of Fish and Wildlife shall also seek the participation of the Department of Agriculture and appropriate federal interests in the development of rules to improve the regulation of nonnative species and to protect

native wildlife while allowing flexibility for private ownership of nonnative species having no potential to be harmful.

In these rules a process would be established by which nonnative species would be reviewed and classified according to their potential to harm native wildlife and habitat. The rules would appoint a review panel to assist the Department in a process of review and classification.

Table 1. Planned Efforts Implementation Table

Table 1. Washington ANS Management Plan - Planned Efforts Implementation Table.

Tasks/Actions		Fund Source	Imple. Entity	Coop. Organ.	Recent Efforts ($000/FTEs)				Planned Efforts			
					FY 00		FY 01		FY 02-03			
									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
SA 1A1	Coordinate all ANS management programs and activities within Washington.											
1A1a	Create and fund an ANS Coordinator and Assistant Coordinator position.	WDFW	WDFW		30	0.5	30	.5	30	.5		
		USFWS	WDFW		90	1.5	90	1.5			130	2.5
1A1b	Establish an ANS Coordinating Committee.	USFWS	WDFW		0	-	0	-				
1A1c	Coordinate the ANS management plan with the *Puget Sound Water Quality management Plan*.	USFWS	WDFW		0	-	0	-				
1A1d	Work with the Columbia River ANS Initiative.		WDFW		0	-	0	-				
1A1e	Participate in the Pacific Ballast Water Group.		WDFW		0	-	0	-				
1A1f	Coordinate with the U.S. Coast Guard on ballast water management.	USFWS	WDFW		0	-	0	-				
SA 2A1	Coordinate with other states and nations	USFWS	WDFW		0	0	0	0			5	
2A1a	Coordinate participation in regional and national conferences		WDFW		0	0	0	0				
2A1b	Participate in the Western Regional Panel		WDFW		0	0	0	0				
2A1c	Participate in the PSMFC regional activities	WDFW	PSMFC		0	0	0	0	2.5			
		WDOE	PSMFC		0	0	0	0	2.5			
2A1d	Participate in meetings of the Puget Sound/Georgia Basin International Task Force.		WDFW		0	0	0	0				
2A1e	Support the 100th Meridian Project.	WDFW	USFWS	PSMFC	0	0	8	0			10	

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Tasks/Actions		Fund Source	Imple. Entity	Coop. Organ.	Recent Efforts ($000/FTEs)				Planned Efforts			
					FY 00		FY 01		FY 02-03			
									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
2A1f	Increase Tribal involvement	USFWS	WDFW		0	0	0	0				
2A1g	Enhance use of the PSMFC Shellfish Transport Subcommittee.	USFWS	WDFW		0	0	0	0				
2A1h	Consult with the British Columbia Transplant Committee on the intentional introduction of nonindigenous aquatic species.		WDFW		3	0	0	0				
SA 2A2	Foster state, federal, tribal and private cooperation on ANS issues.	USFWS	WDFW		0	.10	0	.10			25	
2A2a	Establish a sub-committee on commercial shipping practices.		WDFW		0	0	0	0				
2A2b	Establish a sub-committee on recreational boats and seaplanes.		WDFW		0	0	0	0				
2A2c	Establish a sub-committee on education and risk-assessment to address pathways: boatyards and marinas, the aquarium trade, biological supply catalogs, aquatic garden suppliers, aquatic mail order catalogs, and plant importers.		WDFW	WDOE PSWQAT WSG	0	0	0	0				
2A2d	Establish a sub-committee on imports and transfers of live seafood.		WDFW		0	0	0	0				
2A2e	Establish a sub-committee on monitoring, response, and control of ANS.		WDFW		0	0	0	0				
2A2f	Establish a sub-committee on ANS and Salmon		WDFW		0	0	0	0				
2A2g	Establish a sub-committee on regulatory reform.				0	0	0	0				
SA 2A3	Prohibit, control or permit the importation of nonnative aquatic species based upon their invasive potential.	USFWS	WDFW		0	0	0	0	0	0	0	

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Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
2A3a	Develop a screening and classification system for aquatic nonnative animal species.		WDFW		0	0	0	0				
2A3b	Evaluate the need to classify micro-organisms not currently regulated.		WDFW	WDOA WDOE WDOH	0	0	0	0				
2A3c	Encourage development of a screening and classification system for plants		WDFW	WDOA	0	0	0	0				
2A3d	Develop and implement a biennial process to identify threats to state waters.		WDFW		0	0	0	0				
2A3e	Develop and implement a program to inspect and certify that all vessels transported into the state on trailers are free of unauthorized nonnative species.	USFWS WSP	WDFW	WSP	0	0	0	0				
2A3f	Prepare, maintain and publish a list of water bodies infested with zebra mussels or green crab.	USFWS	WDFW		0	0	0	0			3	
2A3g	Develop and implement an economic incentive program for voluntary prevention, control and eradication of ANS plants and animals.	Various	Various	Various	0	0	0	0				
SA2A4	Increase enforcement and awareness of existing laws controlling transport, propagation, sale, collection, possession, importation, purchase, cultivation, distribution and introduction of ANS											
2A4a	Increase the priority of enforcing existing ANS rules and laws.		WDFW WDOE	ANSCC	0	0	0	0			-	-

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Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
2A4b	Continue training state police, sheriff's marine patrols, and wildlife enforcement officers on ANS identification and regulations.	USFWS	WDFW		-	-	-	-			2	.05
2A4c	Conduct workshops and distribute information on ANS law to businesses that import aquatic organisms.	WSFWS	WDFW PSWQAT	various	0	0	0	0			2	.05
2A4d	Publicize existing penalties for the intentional introduction of any nonnative species into Washington waters.	WSFWS	WDFW PSWQAT WSG	Other state and federal agencies	0	0	0	0			2	.05
SA 3A1	Survey Washington lakes, rivers, estuaries, wetlands, and coastlines for ANS.				0	0	0	0				
SA3A2	Identify existing and needed GIS maps and data				0	0	0	0				
3A2a	Create a list of GIS maps available and identify missing data.	UW	UW		0	0	0	0				
3A2b	Develop and post GIS maps of ANS sites and the *NatureMapping* web site.	UW	UW		0	0	0	0				
3A2c	Expand *NatureMapping's* on-line monitoring site to allow for reports from the public.	UW	UW		0	0	0	0				
SA 3A3	Continue monitoring and control efforts for European Green Crab.	WDFW	WDFW		0	0	0	0				
3A3a	Continue green crab monitoring and control along the outer coast.	WDFW	WDFW		116		116				232	2.5
3A3b	Continue green crab monitoring in the Puget Sound Region	WDFW	WDFW		116		116				232	1.5

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Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
3A3c	Coordinate with the Federal ANS Task Force and the Western Regional panel in the development of a regional green crab management plan.	USFWS	WDFW		0	0	0	0				
SA3A4	Continue monitoring for the presence of zebra mussels and mitten crab.	USFWS	WDFW								60	1.0
3A4a	Coordinate with other agencies and public entities to implement monitoring for zebra mussel veligers at high risk sites.	USFWS, State and private orgs.	WDFW	BPA, Tribes, PUDs USACE,	20	.5	20	.5			60	.75
3A4b	Coordinate volunteer monitoring at low priority lakes using substrate.	USFWS	WDFW	State and private	0	0	0	0			20	.25
3A4c	Continue and expand WSP inspection program at Ports of Entry.	WSP	WSP		10	.10	10	.10			700	3
		USFWS	WDFW			.05		.05		0.5		
3A4d	Incorporate ANS information into boater safety classes.		WDFW	State, county and private org.	0	0	0	0				
3A4e	Participate in development of a comprehensive regional mitten crab management plan.	USFWS	WDFW		0	0	0	0				
3A4f	Post warning signs and coordinate mitten crab monitoring in the Columbia and Snake rivers.	USFWS	WDFW	USFWS, PSMFC, volunteers	0	0	0	0				
SA3A5	Continue monitoring for the spread of *Spartina*											

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									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
3A5a	Coordinate the development of strategies and management plans for *Spartina*	WDOA	WDOA		385	1.0	385	1.0	50	1		
3A5b	Coastal and Puget Sound area County Weed Boards will continue to monitor for new infestations of *Spartina* and serve as a local source for public information.	WDOA Local government	WDOA and Local government	Grays Harbor, Pacific, Skagit, Snohomish, Island and San Juan Counties	15	.5	15	.5	15	.5		
3A5c	Continue to monitor Grays Harbor and N. Puget Sound for new infestations of *Spartina.*	WDOE	WDOE		7.5		7.5		7.5			
		WDFW	WDFW		7.5	.5	7.5	.5	7.5	.5		
3A5d	Continue to treat known infestations of *Spartina.*	WDOA	WDOA		200		200		400			
		WDFW	WDFW		310		310		620			
		WDNR	WDNR		136	9	136	9	272	9		
		USFWS	USFWS		137		137		274			
3A5e	Continue aerial infrared photography of *Spartina* for use as a management tool.	WDNR	WDNR		30	.5	30	.5	60	.5	0	
3A5f	Continue aerial photography of N. Puget Sound *Spartina.*	WDFW	WDFW		16		16		32			
SA3A6	Continue monitoring purple loosestrife.											
3A6a	Continue hand pulling, herbicide and biological control activities on purple loosestrife.	WDOA, WNWCB, WDOE	WDOA, WNWCB, WDOE		190	-	200	-	400			

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Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
SA3A7	Continue monitoring for freshwater nonnative plants in state lakes and rivers.				0	0	0	0				
3A7a	Continue surveying a subset of lakes and rivers each year to establish baseline populations and detect and map new infestations.	WDOE	WDOE		35	.5	35	.5	70	.5		
SA3B1	Develop emergency response plans for specific ANS.											
3B1a	Establish and administer an ANS emergency response fund to finance initial response to new introductions of ANS.	State, public and private	WDFW		0	0	0	0			50-100	
		Federal sources	WDFW		0	0	0	0			50-100	
3B1b	Develop a Zebra Mussel Emergency Response Plan	USFWS	WDFW		0	0	0	0			1	
3B1c	Develop a Green Crab Emergency Response Plan.	USFWS	WDFW		0	0	0	0			1	
3B1d	Development a Mitten Crab Emergency Response Plan.	USFWS	WDFW		0	0	0	0			1	
3B1e	Developed and implementing an emergency response plan for hydrilla eradication.	WDOE	King County	The Cities of Covington and Maple Valley	50	.05	50	.05	50	.05		
3B1f	Continue eradicating early infestations of Eurasian watermilfoil and Brazilian elodea.	WDOE	WDOE	Local Government	-	-	-	-				
3B1g	Developed and implementing a cordgrass eradication plan.	WDOA	WDOA	county weed boards	359	-	359	-			1,480	

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3B1h	Review legal issues and facilitate control of ANS on property where ownership is in question or access is denied.	WDFW WDOA WDNR	WDFW WDOA WDNR		-	-	-	-				
SA 3C1	Increase existing funding for ANS management				0	0	0	0				
3C1a	Increase federal awareness on ANS issues.	USFWS	WSNWCB		0	0	0	0			2	
3C1b	Explore new ways to fund ANS programs	USFWS	WDFW	ANSCC	0	0	0	0				
3C1c	Ensure ANS activities planned withing the Puget Sound basin are submitted to the Puget Sound Council for funding .	USFWS	WDFW		0	0	0	0				
SA 3C2	Set priorities for the management of existing ANS.				0	0	0	0				
3C2a	Sets state priorities for the management of noxious ANS weeds.	WSNWCB	WSNWCB		0	0	0	0				
3C2b	Sets management and funding priorities for ANS weed grants.	WDOE	WDOE		0	0	0	0				
3C2c	Set priorities for control of the green crab, the mitten crab, the zebra mussels, and other animal ANS.	WDFW	WDFW		0	0	0	0				
SA 3D1	Implement strategies for controlling and/or eradicating pioneer infestations of ANS.				0	0	0	0				
3D1a	Immediate response to new infestations.	WDOE	WDFW WDOE		0	0	0	0				
3D1b	Established an emergency fund reserved for the containment/eradication of pioneering infestations of freshwater ANS weeds.	WDOE	Various		100	-	100	-	100			

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SA 3D2	Minimize the dispersal of established ANS.											
3D2a	Established a list of prohibited ANS plants	WDOA	WDOA		0	0	0	0				
3D2b	Develop guidelines and regulations to ensure the cleaning of water-based equipment that may unintentionally spread ANS.	WDFW	WDFW	WDOE WDOA	0	0	0	0				
3D2c	Consider developing regulations to quarantine waterbodies to prevent the spread of ANS.	WDFW	WDFW		0	0	0	0				
3D2d	Develop strategies to educate the public and specific groups to prevent the spread of ANS.	State agencies	State agencies		0	0	0	0				
SA3D3	Manage large populations of established ANS.											
3D3a	Funding state and local governments to manage established ANS weeds.	WDOE	State & local		300	0.3	300	0.3	300	0.3		
3D3b	Released (and will continue to release) approved biocontrol agents (insects) for the management of purple loosestrife.	WDFW	WDFW	others	-	-	-	-				
3D3c	Developed an integrated saltcedar control/eradication plan.	WSNWCB	WDFW		8	0	5	0				
		USFWS	USFWS		0	0	0	0	-	-	-	-
3D3d	Prepared and implementing plans to control purple loosestrife and cordgrass.	WDFW	WDFW		200	2.5	200	2.5	100	2.5		
		WDOA	WDOA		50		50		100			
SA 4A1	Produce educational materials to increase public awareness of the ANS problem.											
4A1a	Distribute materials identifying ANS to the general public	State and federal agencies	State and federal agencies		12	-	12	-				

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4A1b	Increase educational efforts directed at pet stores.	WSG PSWQAT state and federal agencies	WSG PSWQAT state and federal agencies		-	-	-	-			-	-
4A1c	Develop a statewide ANS website.	WDFW, WSG, state and federal agencies.	WDFW, WSG, state and federal agencies.		0	0	0	0			10	
4A1d	Conduct training workshops.	PSRF, WWTA, PSA	PSRF, WWTA, PSA		0	0	0	0				
4A1e	Published an aquatic plant ID manual for Washington State.	WDOE	WDOE		250	.3						
4A1f	Coordinate development of several ANS educational 'traveling trunks'.	NOAA SeaGrant	WSG,	Other state and federal agencies	-	-	-	-			-	
SA 4A2	Develop partnerships with media outlets to disseminate ANS information.				0	0	0	0				
4A2a	Develop press releases for distribution throughout the state.		WDFW WSG, WDOE, WDNR, PSWQAT		0	0	0	0				
4A2b	Develop public service announcements.	WSG	WSG		0	0	0	0			3	

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					FY 00		FY 01		FY 02-03			
									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
4A2c	Contribute articles to magazines targeting select audiences.	Various	various		0	0	0	0				
4A2d	Distribute ANS information at boat shows, fairs, sportsmen shows, and other events.	WDOE	WDOE		0	0	0	0	5			
		USFWS	WDFW	PSMFC	0	0	0	0			12	
S4A3	Increase awareness of ANS issues in Public Schools.				0	0	0	0				
4A3a	Develop curricula that meets Washington State Essential Academic Learning Requirements for specific grade levels in science and social studies.	WSG, WDNR, WDEA, WDFW, WSNWCB	WSG, WDNR, WDEA, WDFW, WSNWCB		-	-	-	-				
4A3b	Develop teacher training workshops.	WSG, WDNR, WDEA, WDFW, WSNWCB	WSG, WDNR, WDEA, WDFW, WSNWCB		0	0	0	0			4	
SA 4B1	Develop and distribute educational information targeted at specific groups identified as potential sources for ANS introductions.				0	0	0	0				
4B1a	Ongoing outreach to aquaculture industry.	Various	Various		0	0	0	0				
4B1b	Develop display material for restaurants and fish markets.	WSG	WSG		0	0	0	0			4	
4B1c	Develop educational materials for bait shops.		ANSCC	Various	0	0	0	0				

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									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
4B1d	Increase distribution of ID cards, posters, shopping bags at pet stores.	WSG PSWQAT	WSG PSWQAT		0	0	0	0			-	
4B1e	Develop a 'good housekeeping' program for pet stores .	WSG PSWQAT	WSG PSWQAT		0	0	0	0			-	
4B1f	Provide outreach material and training programs for ship captains and crews, and port staff.	WDFW	WDFW		0	0	0	0			-	
4B1g	Identify efficient, cost effective methods of ballast water treatment, set standards, establish monitoring protocols.	USFWS	WDFW		-	.25	-	.25			-	
		USFWS	UW				150	3.0				
4B1h	Develop interpretive centers at zoos and aquariums.	USFWS	WDFW	Public zoos and aquariums	5		5		5			
			Various		-	-	-	-				
4B1i	Provide educational information to boaters.	USFWS	WDFW WSG		-	-	-	-			3	
4B1j	Develop tailored text and graphics to be incorporated into key state publications.	USFWS	WDFW WSPR WSG		0	0	0	0			3	
4B1k	Prepare articles on ANS prevention for regional boating magazines.		ANSCC	various								
4B1l	Develop and post signs for boat launches and road ways.	USFWS	WDFW	various	0	.10	5	.10			5	
		WDOE	WDOE		-	-	-	-				
4B1m	Survey research laboratories and biological supply houses to determine effectiveness of the handling and disposal brochure.	WSG	WSG		0	0	0	0				

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					FY 00		FY 01		FY 02-03			
									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
SA 4B2	Disseminate materials on ANS to various cultural and ethnic groups.				0	0	0	0				
4B2a	Identify ethnic communities in Washington	WDFW WSG	WDFW WSG		0	0	0	0			2	
4B2b	Identify cultural traditions that could affect introductions of ANS.	WDFW WSG PSWQAT	WDFW WSG PSWQAT		0	0	0	0			2	
4B2c	Host workshops for cultural leaders, assist in creating brochures in native tongues.	WDFW WSG PSWQAT	WDFW WSG PSWQAT		0	0	0	0			2	
4B2d	Disseminate ANS materials to local community ethnic centers.	WDFW WSG PSWQAT	WDFW WSG PSWQAT		0	0	0	0			2	
4B2e	Create articles for newspapers and literature regularly read by various ethnic groups.	WDFW WSG PSWQAT	WDFW WSG PSWQAT		0	0	0	0			2	
SA 4B3	Develop and distribute educational information to those most affected by or in a position to first observe ANS introductions.				0	0	0	0				
4B3a	Provide training and identification materials to aquaculture staff and develop a reporting system.	USFWS	WDFW	WSG	0	0	0	0			2	.10
4B3b	Develop and disperse plastic ID cards to local divers.	WSG	WSG		0	0	0	0			30	
4B3c	Develop system to accept reports of sightings by divers	USFWS	WDFW	Various	0	0	0	0			2	.10

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					FY 00		FY 01		FY 02-03			
									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
4B3d	Develop a list of industrial and municipal facilities at possible risk from ANS.	WDFW WDOE WSG PSWQAT	WDFW WDOE WSG PSWQAT		0	0	0	0				
4B3e	Hold a one-day conference for municipal and industrial water users on the risks of ANS.	WSG USFWS	WSG WDFW		0	0	0	0			-	
4B3f	Hold workshops for shoreline property owners	WSG USFWS WDOE	WSG WDFW WDOE		0	0	0	0			-	
4B3g	Provide ID information to fishers to monitor and report sightings of ANS plants and animals.	USFWS WDOE	WDFW WDOE		0	0	0	0				
SA4C1	Provide briefings to decision makers											
4C1a	Provide briefings to legislators and local officials and their staffs on ANS problems ans solutions.	USFWS	WDFW WSG		0	0	0	0				
4C1b	Organize a biennial field day for legislators.	USFWS	WDFW WSG								10	
4C1c	Invite local decision makers to attend volunteer training workshops.	USFWS	WDFW PSRF, WSG	Various	0	0	0	0				
4C1d	Prepare biennial summary of ANS projects for key legislative committees.		WDFW, WDOE, WDNR, WDOA, WSNWCB		0	0	0	0				

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					FY 00		FY 01		FY 02-03			
									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
4C1e	Conduct a regional workshop to promote consensus on ways to prevent new introductions.	WGA	WDFW WRP		0	0	8	.10				
SA 4C2	Provide training on ANS for agency staff that support the identification and management of ANS.				0	0	0	0				
4C2a	Distribute field guides and ID cards.	State and federal agencies.	State and federal agencies.		0	0	0	0				
4C2b	Hold a biennial regional workshop to train resource managers.	WSG	WSG	WDFW Conservation districts	0	0	0	0			10	
4C2c	Develop and publish a list of taxonomic experts.	USFWS	WDFW	Various	0	0	0	0				
4C2d	Participate in west coast conferences on mitten crab control.	USFWS	WDFW		0	0	0	0				
SA4D1	Evaluate and assess the effectiveness of education and outreach efforts.											
4D1a	Survey members of the public and target groups	WSG	WSG		0	0	0	0	-	-	-	-
SA 5A1	Risk assessments.											
5A1a	Define ANS risks that affect natural resources, economic issues, and human health	USFWS	WDFW	UW, WSG,WSU	-	-	-	-			-	
5A1b	Compile list of intentional introductions, analyze risks vs. benefits, present native alternatives that may be used in their place.	USFWS	WDFW	UW, WSG,WSU	-	-	-	-			-	

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					FY 00		FY 01		FY 02-03			
									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
5A1c	Identify traits associated with successful high-impact invaders in similar habitats.	USFWS	WDFW	UW, WSG,WSU	-	-	-	-			-	
5A1d	Characterize resources and habitats at greatest risk from invasive species.	USFWS	WDFW	UW, WSG,WSU	-	-	-	-			-	
SA5A2	Study current and potential invaders to understand potential for damages.											
5A2a	Identify appropriate species for further investigation. Identify funding for research.	State and federal agencies	State and federal agencies	Universities	-	-	-	-			-	
5A2b	Encourage studies on interactions between ANS and native species.	UW, WSG	UW, WSG		-	-	-	-			-	
5A2c	Encourage studies to assess the ecological impacts of economically important species.	UW, WSG	UW, WSG		-	-	-	-			-	
5A2d	Develop list of experts and their availability to respond to requests for ANS identification.	UW, WSG	UW, WSG		-	-	-	-			-	
SA 5B1	Baseline assessments.											
5B1a	Design and implement a rapid assessment of all waterbodies in the state.	Federal and state agencies	Federal and state agencies	Universities researchers	0	0	0	0	-		-	
SA 5B2	Encourage and support ongoing efforts to map ANS distribution and location databases.											
5B2a	Gather geo-spatial data of ANS distributions.	UW	UW, state agencies, scientists		-	-	-	-				
5B2b	Determine the spread of floating ANS	WDFW	WDFW	NOAA	-	-	-	-				

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					FY 00		FY 01		FY 02-03			
									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
SA 5B3	Develop and maintain lists of nonnative species known to occur in Washington.											
5B3a	Provide information on freshwater plants.	WDOE	WDOE			.01		.01		.01		
5B3b	Develop and maintain a list of nonnative animal species in Washington.	USFWS	WDFW	UW and others		.01		.01		.01		
5B3c	Review and list websites on ANS, encourage groups to hot-link to one another's sites.	ANSCC	ANSCC		0	0	0	0				
SA 5B4	Study the relationship between human activities and invasions of ANS.											
5B4a	Compile maps of human activities that affect aquatic resources and compare them with maps of invasions.	UW, WSG	UW, WSG	*Nature-Mapping*	0	0	0	0				
SA 5C1	Develop Best Management Practices for established and potential ANS.											
5C1a	Compile information on management and control strategies for established ANS and potential invaders. Identify successful strategies.	State agencies and universities	State agencies and universities		0	0	0	0				
5C1b	Convene a national/international workshops of experts to develop a series of best management practices for ANS.	WSG USFWS	WSG WDFW		0	0	0	0			10	
SA 5C2	Identify pathways and assess the risk of invasion											

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					FY 00		FY 01		FY 02-03			
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	DEDICATED $ (000)	DEDICATED FTE	REQUESTED $ (000)	REQUESTED FTE
5C2a	Identify major and minor pathways for nonnative introductions, evaluate potential threat, prepare risk assessment.	WSG PSWQAT	WSG PSWQAT	State agencies	0	0	0	0				
SA5D1	Inform researchers and resource managers of emerging information.											
5D1a	Develop an information clearinghouse and listserve.	Various	Various		0	0	0	0				
5D1b	Encourage ANS presentations at regional conferences and symposia.	WSG, various	WSG, various		0	0	0	0				
5D1c	Encourage the WRP to compile and evaluate information on the mitten crab.	USFWS	WDFW		0	0	0	0				
5D1d	Identify research to determine the impacts of ANS on salmonids.		ANSCC		0	0	0	0				
5D1e	Identify research needed on the effects of green crab on native and nonnative species.	WDFW	WDFW		0	0	0	0				
SA 6A1	Review laws governing ANS in Washington.											
6A1a	Review state laws for gaps and overlaps, compare with other state and federal laws, and recommend changes to agencies responsible for regulating ANS.		ANSCC WDFW		0	0	0	0				
SA 6A2	Increase the state's authority to control the introduction of new species.											
6A2a	Enact and enforce rules governing ballast water.	USFWS	WDFW		0	0	45	.5			27	.5

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					FY 00		FY 01		FY 02-03			
									DEDICATED		REQUESTED	
Num.	Descriptive Title/Brief Summary				$	FTE	$	FTE	$ (000)	FTE	$ (000)	FTE
6A2b	Promote legislation that establishes the authority to inspect, detain and require cleaning of any vehicle, vessel or water based equipment containing ANS traveling in Washington.	WDFW WSP	WDFW WSP	State agencies	0	0	0	0				
6A2c	Establish authority to designate waterbodies as infested and to quarantine them to prevent ANS from spreading and to contain them for possible eradication.	WDFW WDOE WDOA	WDFW WDOE WDOA		0	0	0	0				
6A2d	Develop rules to improve the regulation of nonnative species introductions.	WDFW	WDFW		0	0	0	0				

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Table 2. Future Efforts Implementation Table

Table 2. Washington ANS Management Plan - Future Efforts Implementation Table.

Tasks/Actions		Fund Source	Imple. Entity	Coop. Organ.	Funding		Future Needs ($000)							
							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
SA 1A1	Coordinate all ANS management programs and activities within Washington.													
1A1a	Create and fund an ANS Coordinator and Assistant Coordinator position.	WDFW	WDFW		*		30	.5	30	.5	30	.5	30	.5
		USFWS	WDFW			*	130	2.5	130	2.5	130	2.5	130	2.5
1A1b	Establish an ANS Coordinating Committee.	USFWS	WDFW											
1A1c	Coordinate the ANS management plan with the *Puget Sound Water Quality management Plan.*	USFWS	WDFW											
1A1d	Work with the Columbia River ANS Initiative.		WDFW											
1A1e	Participate in the Pacific Ballast Water Group.		WDFW											
1A1g	Coordinate with the U.S. Coast Guard on ballast water management.	USFWS	WDFW											
SA 2A1	Coordinate with other states and nations	USFWS	WDFW			*	5		5		5		5	
2A1a	Coordinate participation in regional and national conferences		WDFW											
2A1b	Participate in the Western Regional Panel		WDFW											
2A1c	Participate in the PSMFC regional activities	WDFW	PSMFC		*		2.5		2.5		2.5		2.5	
		WDOE	PSMFC		*		2.5		2.5		2.5		2.5	
2A1d	Participate in meetings of the Puget Sound/Georgia Basin International Task Force.		WDFW											
2A1e	Support the 100th Meridian Project.	WDFW	USFWS	PSMFC		*	10		10		10		10	
2A1f	Increase Tribal involvement	USFWS	WDFW											
2A1g	Enhance use of the PSMFC Shellfish Transport Subcommittee.	USFWS	WDFW											

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Tasks/Actions		Fund Source	Imple. Entity	Coop. Organ.	Funding		Future Needs ($000)							
							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
2A1h	Consult with the British Columbia Transplant Committee on the intentional introduction of nonindigenous aquatic species.		WDFW											
SA 2A2	Foster state, federal, tribal and private cooperation on ANS issues.	USFWS	WDFW			*	25	.10	25	.10	25	.10	25	.10
2A2a	Establish a sub-committee on commercial shipping practices.		WDFW											
2A2b	Establish a sub-committee on recreational boats and seaplanes.		WDFW											
2A2c	Establish a sub-committee on education and risk-assessment to address pathways: boatyards and marinas, the aquarium trade, biological supply catalogs, aquatic garden suppliers, aquatic mail order catalogs, and plant importers.		WDFW	WDOE PSWQAT WSG										
2A2d	Establish a sub-committee on imports and transfers of live seafood.		WDFW											
2A2e	Establish a sub-committee on monitoring, response, and control of ANS.		WDFW											
2A2f	Establish a sub-committee on ANS and Salmon		WDFW											
2A2g	Establish a sub-committee on regulatory reform.													
SA 2A3	Prohibit, control or permit the importation of nonnative aquatic species based upon their invasive potential.	USFWS	WDFW											

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Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
2A3a	Develop a screening and classification system for aquatic nonnative animal species.		WDFW											
2A3b	Evaluate the need to classify micro-organisms not currently regulated.		WDFW	WDOA WDOE WDOH										
2A3c	Encourage development of a screening and classification system for plants		WDFW	WDOA										
2A3d	Develop and implement a biennial process to identify threats to state waters.		WDFW											
2A3e	Develop and implement a program to inspect and certify that all vessels transported into the state on trailers are free of unauthorized nonnative species.	USFWS WSP	WDFW	WSP										
2A3f	Prepare, maintain and publish a list of water bodies infested with zebra mussels or green crab.	USFWS	WDFW			*	3		3		3		3	
2A3g	Develop and implement an economic incentive program for voluntary prevention, control and eradication of ANS plants and animals.	Various	Various	Various										
SA2A4	Increase enforcement and awareness of existing laws controlling transport, propagation, sale, collection, possession, importation, purchase, cultivation, distribution and introduction of ANS													
2A4a	Increase the priority of enforcing existing ANS rules and laws.		WDFW WDOE	ANSCC	0	0	0	0			-	-		

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Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
2A4b	Continue training state police, sheriff's marine patrols, and wildlife enforcement officers on ANS identification and regulations.	USFWS	WDFW		-	-	-	-			2	.05		
2A4c	Conduct workshops and distribute information on ANS law to businesses that import aquatic organisms.	WSFWS	WDFW PSWQAT	various	0	0	0	0			2	.05		
2A4d	Publicize existing penalties for the intentional introduction of any nonnative species into Washington waters.	WSFWS	WDFW PSWQAT WSG	Other state and federal agencies	0	0	0	0			2	.05		
SA 3A1	Survey Washington lakes, rivers, estuaries, wetlands, and coastlines for ANS.													
SA3A2	Identify existing and needed GIS maps and data													
3A2a	Create a list of GIS maps available and identify missing data.	UW	UW											
3A2b	Develop and post GIS maps of ANS sites and the *NatureMapping* web site.	UW	UW											
3A2c	Expand *NatureMapping's* on-line monitoring site to allow for reports from the public.	UW	UW											
SA 3A3	Continue monitoring and control efforts for European Green Crab.	WDFW	WDFW											
3A3a	Continue green crab monitoring and control along the outer coast.	WDFW	WDFW			*	116	2.5	116	2.5	116	2.5	116	2.5
3A3b	Continue green crab monitoring in the Puget Sound Region	WDFW	WDFW			*	116	1.5	116	1.5	116	1.5	116	1.5

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							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
3A3c	Coordinate with the Federal ANS Task Force and the Western Regional panel in the development of a regional green crab management plan.	USFWS	WDFW											
SA3A4	Continue monitoring for the presence of zebra mussels and mitten crab.	USFWS	WDFW											
3A4a	Coordinate with other agencies and public entities to implement monitoring for zebra mussel veligers at high risk sites.	USFWS, State and private orgs.	WDFW	BPA, Tribes, PUDs USACE,		*	60	.70	60	.70	60	.70	60	.70
3A4b	Coordinate volunteer monitoring at low priority lakes using substrate.	USFWS	WDFW	State and private		*	20	.20	20	.20	20	.20	20	.20
3A4c	Continue and expand WSP inspection program at Ports of Entry.	WSP	WSP			*	350	3	350	3	350	3	350	3
		USFWS	WDFW			*		.10		.10		.10		.10
3A4d	Incorporate ANS information into boater safety classes.		WDFW	State, county and private org.	0	0	0	0						
3A4e	Participate in development of a comprehensive regional mitten crab management plan.	USFWS	WDFW											
3A4f	Post warning signs and coordinate mitten crabmonitoring in the Columbia and Snake rivers.	USFWS	WDFW	USFWS, PSMFC, volunteers										

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							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
SA3A5	Continue monitoring for the spread of *Spartina*													
3A5a	Coordinate the development of strategies and management plans for *Spartina*	WDOA	WDOA		*		50	1	50	1	50	1	50	1
3A5b	Coastal and Puget Sound area County Weed Boards will continue to monitor for new infestations of *Spartina* and serve as a local source for public information.	WDOA Local governmen t	WDOA and Local governmen t	Grays Harbor, Pacific, Skagit, Snohomish, Island and San Juan Counties	*		15	.5	15	.5	15	.5	15	.5
3A5c	Continue to monitor Grays Harbor and N. Puget Sound for new infestations of *Spartina.*	WDOE	WDOE				7.5	.5	7.5	.5	7.5	.5	7.5	.5
		WDFW	WDFW		*		7.5		7.5		7.5		7.5	
3A5d	Continue to treat known infestations of *Spartina.*	WDOA	WDOA				200		200		200		200	
		WDFW	WDFW				310		310		310		310	
		WDNR	WDNR		*		136	9	136	9	136	9	136	9
		USFWS	USFWS				137		137		137		137	
3A5e	Continue aerial infrared photography of *Spartina* for use as a management tool.	WDNR	WDNR		*		30	.5	30	.5	30	.5	30	.5
3A5f	Continue aerial photography of N. Puget Sound *Spartina.*	WDFW	WDFW		*		16		16		16		16	
SA3A6	Continue monitoring purple loosestrife.													
3A6a	Continue hand pulling, herbicide and biological control activities on purple loosestrife.	WDOA, WNWCB, WDOE	WDOA, WNWCB, WDOE		*		200		200		200		200	

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Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
SA3A7	Continue monitoring for freshwater nonnative plants in state lakes and rivers.													
3A7a	Continue surveying a subset of lakes and rivers each year to establish baseline populations and detect and map new infestations.	WDOE	WDOE				35	.5	35	.5	35	.5	35	.5
SA3B1	Develop emergency response plans for specific ANS.													
3B1a	Establish and administer an ANS emergency response fund to finance initial response to new introductions of ANS.	State, public and private	WDFW			*	50		50		50		50	
		Federal sources	WDFW			*	50		50		50		50	
3B1b	Develop a Zebra Mussel Emergency Response Plan	USFWS	WDFW											
3B1c	Develop a Green Crab Emergency Response Plan.	USFWS	WDFW											
3B1d	Development a Mitten Crab Emergency Response Plan.	USFWS	WDFW											
3B1e	Developed and implementing an emergency response plan for hydrilla eradication.	WDOE	King County	The Cities of Covington and Maple Valley	*		50	.05	50	.05	50	.05	50	.05
3B1f	Continue eradicating early infestations of Eurasian watermilfoil and Brazilian elodea.	WDOE	WDOE	Local Government										
3B1g	Developed and implementing a cordgrass eradication plan.	WDOA	WDOA	county weed boards	*		359	-	359	-	359	-	359	-
3B1h	Review legal issues and facilitate control of ANS on property where ownership is in question or access is denied.	WDFW WDOA WDNR	WDFW WDOA WDNR											

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Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
SA 3C1	Increase existing funding for ANS management													
3C1a	Increase federal awareness on ANS issues.	USFWS	WSNWCB											
3C1b	Explore new ways to fund ANS programs	USFWS	WDFW	ANSCC										
3C1c	Ensure ANS activities planned withing the Puget Sound basin are submitted to the Puget Sound Council for funding .	USFWS	WDFW											
SA 3C2	Set priorities for the management of existing ANS.													
3C2a	Sets state priorities for the management of noxious ANS weeds.	WSNWCB	WSNWCB											
3C2b	Sets management and funding priorities for ANS weed grants.	WDOE	WDOE											
3C2c	Set priorities for control of the green crab, the mitten crab, the zebra mussels, and other animal ANS.	WDFW	WDFW											
SA 3D1	Implement strategies for controlling and/or eradicating pioneer infestations of ANS.													
3D1a	Immediate response to new infestations.	WDOE	WDFW WDOE											
3D1b	Established an emergency fund reserved for the containment/eradication of pioneering infestations of freshwater ANS weeds.	WDOE	Various		*		100	-	100	-	100	-	100	-
SA 3D2	Minimize the dispersal of established ANS.													
3D2a	Established a list of prohibited ANS plants	WDOA	WDOA											
3D2b	Develop guidelines and regulations to ensure the cleaning of water-based equipment that may unintentionally spread ANS.	WDFW	WDFW	WDOE WDOA										

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3D2c	Consider developing regulations to quarantine waterbodies to prevent the spread of ANS.	WDFW	WDFW											
3D2d	Develop strategies to educate the public and specific groups to prevent the spread of ANS.	State agencies	State agencies											
SA3D3	Manage large populations of established ANS.													
3D3a	Funding state and local governments to manage established ANS weeds.	WDOE	State & local		*		300	0.3	300	0.3	300	0.3	300	0.3
3D3b	Released (and will continue to release) approved biocontrol agents (insects) for the management of purple loosestrife.	WDFW	WDFW	others										
3D3c	Developed an integrated saltcedar control/eradication plan.	WSNWCB	WDFW											
		USFWS	USFWS				-	-	-	-	-	-	-	-
3D3d	Prepared and implementing plans to control purple loosestrife and cordgrass.	WDFW	WDFW				200	2.5	200	2.5	200	2.5	200	2.5
		WDOA	WDOA				50		50		50		50	
SA 4A1	Produce educational materials to increase public awareness of the ANS problem.													
4A1a	Distribute materials identifying ANS to the general public	State and federal agencies	State and federal agencies		*		12		12		12		12	
4A1b	Increase educational efforts directed at pet stores.	WSG PSWQAT state and federal agencies	WSG PSWQAT state and federal agencies				-	-	-	-	-	-	-	-

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4A1c	Develop a statewide ANS website.	WDFW, WSG, state and federal agencies.	WDFW, WSG, state and federal agencies.			*	10		10		10		10	
4A1d	Conduct training workshops.	PSRF, WWTA, PSA	PSRF, WWTA, PSA											
4A1e	Published an aquatic plant ID manual for Washington State.	WDOE	WDOE											
4A1f	Coordinate development of several ANS educational 'traveling trunks'.	NOAA SeaGrant	WSG,	Other state and federal agencies		*	-	-	-	-	-	-	-	-
SA 4A2	Develop partnerships with media outlets to disseminate ANS information.													
4A2a	Develop press releases for distribution throughout the state.		WDFW WSG, WDOE, WDNR, PSWQAT											
4A2b	Develop public service announcements.	WSG	WSG			*	8		8		8		8	
4A2c	Contribute articles to magazines targeting select audiences.	Various	various											
4A2d	Distribute ANS information at boat shows, fairs, sportsmen shows, and other events.	WDOE	WDOE		*		5		5		5		5	
		USFWS	WDFW	PSMFC		*	6		6		6		6	
S4A3	Increase awareness of ANS issues in Public Schools.													

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Tasks/Actions		Fund Source	Imple. Entity	Coop. Organ.	Funding		Future Needs ($000)							
							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
4A3a	Develop curricula that meets Washington State Essential Academic Learning Requirements for specific grade levels in science and social studies.	WSG, WDNR, WDEA, WDFW, WSNWCB	WSG, WDNR, WDEA, WDFW, WSNWCB			*	12		12		12		12	
4A3b	Develop teacher training workshops.	WSG, WDNR, WDEA, WDFW, WSNWCB	WSG, WDNR, WDEA, WDFW, WSNWCB			*	4		4		4		4	
SA 4B1	Develop and distribute educational information targeted at specific groups identified as potential sources for ANS introductions.													
4B1a	Ongoing outreach to aquaculture industry.	Various	Various			*	3		3		3		3	
4B1b	Develop display material for restaurants and fish markets.	WSG	WSG			*	3		3		3		3	
4B1c	Develop educational materials for bait shops.		ANSCC	Various		*	3		3		3		3	
4B1d	Increase distribution of ID cards, posters, shopping bags at pet stores.	WSG PSWQAT	WSG PSWQAT				5		5		5		5	
4B1e	Develop a 'good housekeeping' program for pet stores .	WSG PSWQAT	WSG PSWQAT				10		10		10		10	
4B1f	Provide outreach material and training programs for ship captains and crews, and port staff.	WDFW	WDFW				3		3		3		3	
4B1g	Identify efficient, cost effective methods of ballast water treatment, set standards, establish monitoring protocols.	USFWS	WDFW			*		.25		.25		.25		.25
		USFWS	UW			*	150	3.0	-		-		-	

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							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
4B1h	Develop interpretive centers at zoos and aquariums.	USFWS	WDFW	Public zoos and aquariums		*	5		5		5		5	
			State and federal agencies			*	-	-						
4B1i	Provide educational information to boaters.	USFWS	WDFW WSG			*	3		3		3		3	
4B1j	Develop tailored text and graphics to be incorporated into key state publications.	USFWS	WDFW WSPR WSG			*	2.5		2.5		2.5		2.5	
4B1k	Prepare articles on ANS prevention for regional boating magazines.		ANSCC	various										
4B1l	Develop and post signs for boat launches and road ways.	USFWS	WDFW	various		*	5	.10	5	.10	5	.10	5	.10
		WDOE	WDOE			*	-	-	-	-	-	-	-	-
4B1m	Survey research laboratories and biological supply houses to determine effectiveness of the handling and disposal brochure.	WSG	WSG											
SA 4B2	Disseminate materials on ANS to various cultural and ethnic groups.					*	10		10		10		10	
4B2a	Identify ethnic communities in Washington	WDFW WSG	WDFW WSG											
4B2b	Identify cultural traditions that could affect introductions of ANS.	WDFW WSG PSWQAT	WDFW WSG PSWQAT											
4B2c	Host workshops for cultural leaders, assist in creating brochures in native tongues.	WDFW WSG PSWQAT	WDFW WSG PSWQAT											

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							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
4B2d	Disseminate ANS materials to local community ethnic centers.	WDFW WSG PSWQAT	WDFW WSG PSWQAT											
4B2e	Create articles for newspapers and literature regularly read by various ethnic groups.	WDFW WSG PSWQAT	WDFW WSG PSWQAT											
SA 4B3	Develop and distribute educational information to those most affected by or in a position to first observe ANS introductions.													
4B3a	Provide training and identification materials to aquaculture staff and develop a reporting system.	USFWS	WDFW	WSG		*	4	.10	4	.10	4	.10	4	.10
4B3b	Develop and disperse plastic ID cards to local divers.	WSG	WSG			*	2		2		2		2	
4B3c	Develop system to accept reports of sightings by divers	USFWS	WDFW	Various										
4B3d	Develop a list of industrial and municipal facilities at possible risk from ANS.	WDFW WDOE WSG PSWQAT	WDFW WDOE WSG PSWQAT											
4B3e	Hold a one-day conference for municipal and industrial water users on the risks of ANS.	WSG USFWS	WSG WDFW											
4B3f	Hold workshops for shoreline property owners	WSG USFWS WDOE	WSG WDFW WDOE											
4B3g	Provide ID information to fishers to monitor and report sightings of ANS plants and animals.	USFWS WDOE	WDFW WDOE			*	2		2		2		2	
SA4C1	Provide briefings to decision makers													

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							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
4C1a	Provide briefings to legislators and local officials and their staffs on ANS problems ans solutions.	USFWS	WDFW WSG											
4C1b	Organize a biennial field day for legislators.	USFWS	WDFW WSG			*	10				10			
4C1c	Invite local decision makers to attend volunteer training workshops.	USFWS	WDFW PSRF, WSG	Various										
4C1d	Prepare biennial summary of ANS projects for key legislative committees.		WDFW, WDOE, WDNR, WDOA, WSNWCB											
4C1e	Conduct a regional workshop to promote consensus on ways to prevent new introductions.	WGA	WDFW WRP			*	8	.10			8	.10		
SA 4C2	Provide training on ANS for agency staff that support the identification and management of ANS.													
4C2a	Distribute field guides and ID cards.	State and federal agencies.	State and federal agencies.											
4C2b	Hold a biennial regional workshop to train resource managers.	WSG	WSG	WDFW Conservation districts		*	10				10			

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							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
4C2c	Develop and publish a list of taxonomic experts.	USFWS	WDFW	Various		*	5		5		5		5	
4C2d	Participate in west coast conferences on mitten crab control.	USFWS	WDFW			*	1		1		1		1	
SA4D1	Evaluate and assess the effectiveness of education and outreach efforts.													
4D1a	Survey members of the public and target groups	WSG	WSG											
SA 5A1	Risk assessments.													
5A1a	Define ANS risks that affect natural resources, economic issues, and human health	USFWS	WDFW	UW, WSG,WSU										
5A1b	Compile list of intentional introductions, analyze risks vs. benefits, present native alternatives that may be used in their place.	USFWS	WDFW	UW, WSG,WSU										
5A1c	Identify traits associated with successful high-impact invaders in similar habitats.	USFWS	WDFW	UW, WSG,WSU										
5A1d	Characterize resources and habitats at greatest risk from invasive species.	USFWS	WDFW	UW, WSG,WSU										
SA5A2	Study current and potential invaders to understand potential for damages.													
5A2a	Identify appropriate species for further investigation. Identify funding for research.	State and federal agencies	State and federal agencies	Universities										
5A2b	Encourage studies on interactions between ANS and native species.	UW, WSG	UW, WSG											
5A2c	Encourage studies to assess the ecological impacts of economically important species.	UW, WSG	UW, WSG											
5A2d	Develop list of experts and their availability to respond to requests for ANS identification.	UW, WSG	UW, WSG											
SA 5B1	Baseline assessments.													

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							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
5B1a	Design and implement a rapid assessment of all waterbodies in the state.	Federal and state agencies	Federal and state agencies	Universities researchers										
SA 5B2	Encourage and support ongoing efforts to map ANS distribution and location databases.													
5B2a	Gather geo-spatial data of ANS distributions.	UW	UW, state agencies, scientists											
5B2b	Determine the spread of floating ANS	WDFW	WDFW	NOAA										
SA 5B3	Develop and maintain lists of nonnative species known to occur in Washington.													
5B3a	Provide information on freshwater plants.	WDOE	WDOE		*			.01		.01		.01		.01
5B3b	Develop and maintain a list of nonnative animal species in Washington.	USFWS	WDFW	UW and others		*		.01		.01		.01		.01
5B3c	Review and list websites on ANS, encourage groups to hot-link to one another's sites.	ANSCC	ANSCC											
SA 5B4	Study the relationship between human activities and invasions of ANS.													
5B4a	Compile maps of human activities that affect aquatic resources and compare them with maps of invasions.	UW, WSG	UW, WSG	*Nature-Mapping*										
SA 5C1	Develop Best Management Practices for established and potential ANS.													

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							FY 04		FY 05		FY 06		FY 07	
Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
5C1a	Compile information on management and control strategies for established ANS and potential invaders. Identify successful strategies.	State agencies and universities	State agencies and universities											
5C1b	Convene a national/international workshops of experts to develop a series of best management practices for ANS.	WSG USFWS	WSG WDFW											
SA 5C2	Identify pathways and assess the risk of invasion													
5C2a	Identify major and minor pathways for nonnative introductions, evaluate potential threat, prepare risk assessment.	WSG PSWQAT	WSG PSWQAT	State agencies										
SA5D1	Inform researchers and resource managers of emerging information.													
5D1a	Develop an information clearinghouse and listserve.	Various	Various											
5D1b	Encourage ANS presentations at regional conferences and symposia.	WSG, various	WSG, various											
5D1c	Encourage the WRP to compile and evaluate information on the mitten crab.	USFWS	WDFW											
5D1d	Identify research to determine the impacts of ANS on salmonids.		ANSCC											
5D1e	Identify research needed on the effects of green crab on native and nonnative species.	WDFW	WDFW											
SA 6A1	Review laws governing ANS in Washington.													
6A1a	Review state laws for gaps and overlaps, compare with other state and federal laws, and recommend changes to agencies responsible for regulating ANS.		ANSCC WDFW											

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Num.	Descriptive Title/Brief Summary				Ded.	Req.	$	FTE	$	FTE	$	FTE	$	FTE
SA 6A2	Increase the state's authority to control the introduction of new species.													
6A2a	Enact and enforce rules governing ballast water.	USFWS	WDFW			*	25	.25	25	.25	25	.25	25	.25
6A2b	Promote legislation that establishes the authority to inspect, detain and require cleaning of any vehicle, vessel or water based equipment containing ANS traveling in Washington.	WDFW WSP	WDFW WSP	State agencies										
6A2c	Establish authority to designate waterbodies as infested and to quarantine them to prevent ANS from spreading and to contain them for possible eradication.	WDFW WDOE WDOA	WDFW WDOE WDOA											
6A2d	Develop rules to improve the regulation of nonnative species introductions.	WDFW	WDFW			*	10	.10	10	.10	10	.10	10	.10

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Table 3. Washington ANS Strategic Plan Table

Table 3. Washington ANS Strategic Plan - through December 2002

Program Name: Washington State Aquatic Nuisance Species (ANS) Management Plan				
Mission Statement: To serve as responsible stewards of Washington by protecting and preserving the land and resources from the degrading impacts of aquatic nuisance species.				
Objective #1: Coordinate all ANS Management Programs within Washington and Collaborate with Regional, National, and International ANS Programs.				
Outcome Measure(s) for Objective #1: Coordinated local, regional, and national management strategy.				
	What Will Be Done	**By Whom**	**By When**	**Progress/Status Report**
Strategic Action 1A1	Coordinate all ANS management programs and activities within Washington.	WDFW	Ongoing	Annual report
Task 1A1a	Create and fund an ANS Coordinator and Assistant Coordinator position.	WDFW	Ongoing	Annual report
Task 1A1b	Establish an ANS Coordinating Committee.	WDFW	Established	Established in 2000, meets twice a years.
Task 1A1c	Coordinate the ANS management plan with the *Puget Sound Water Quality management Plan*.	WDFW	Ongoing	Submit list December of even number years
Task 1A1d	Work with the Columbia River ANS Initiative.	WDFW	Ongoing	Participate in CRANSI meetings.
Task 1A1e	Participate in the Pacific Ballast Water Group.	WDFW	Ongoing	Participate in PBWG meetings.
Task 1A1g	Coordinate with the U.S. Coast Guard on ballast water management.	WDFW	Ongoing	Attend USCG meetings and include them in our ballast water meetings.
Objective #2: Prevent the introduction of New ANS into Washington Waters.				
Outcome Measure(s) for Objective #2: No new introductions of problem ANS species/populations.				
Strategic Action 2A1	Coordinate with other states and nations	WDFW	Ongoing	Annual report
Task 2A1a	Coordinate participation in regional and national conferences	WDFW	Ongoing	Attend conferences and summarize meetings to the ANSCC
Task 2A1b	Participate in the Western Regional Panel	WDFW	Ongoing	Currently ANS Coordinator is chair of the WRP. Summarize meetings to the ANSCC
Task 2A1c	Participate in the PSMFC regional activities	WDFW	Ongoing	Attend meetings, cooperate in regional ANS education and management efforts.
Task 2A1d	Participate in meetings of the Puget Sound/Georgia Basin International Task Force.	WDFW	Ongoing	Attend meetings and summarize to the ANSCC.

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Washington ANS Strategic Plan - through December 2002

Program Name: Washington State Aquatic Nuisance Species (ANS) Management Plan				
Mission Statement: To serve as responsible stewards of Washington by protecting and preserving the land and resources from the degrading impacts of aquatic nuisance species.				
Task 2A1e	Support the 100th Meridian Project.	WDFW	Ongoing	Contract with PSMFC to fund boat surveys.
Task 2A1f	Increase Tribal involvement	WDFW	Ongoing	Encourage tribal participation in the ANSCC.
Task 2A1g	Enhance use of the PSMFC Shellfish Transport Subcommittee.	WDFW	Ongoing	Annual meetings/reports
Task 2A1h	Consult with the British Columbia Transplant Committee on the intentional introduction of nonindigenous aquatic species.	WDFW	Ongoing	Attend annual meetings.
Strategic Action 2A2	Foster state, federal, tribal and private cooperation on ANS issues. ANSCC subcommittees work with representatives of organizations that have been identified as potential pathways for ANS and other groups to identify voluntary or regulatory measures to prevent new ANS introductions.	WDFW	Ongoing	Annual report.
Task 2A2a	Establish a sub-committee on commercial shipping practices. The sub-committee works with maritime representatives and other affected groups to encourage voluntary compliance with Washington ballast water law	WDFW	Ongoing	Annual report.
Task 2A2b	Establish a sub-committee on recreational boats and seaplanes. The sub-committee works with recreational boating and seaplane groups to prevent further introductions via these pathways.	WDFW	Ongoing	Annual report.
Task 2A2c	Establish a sub-committee on education and risk-assessment to address pathways. The sub-committee works with boat yards, marinas, the aquarium and pet trade, biological supply houses, aquatic mail order catalogs, plant importers and other groups to prevent further introductions of ANS via these pathways.	WDFW	Ongoing	Annual report.
Task 2A2d	Establish a sub-committee on imports and transfers of live seafood. The sub-committee works with the live seafood and aquaculture industry, WDFW biologists and other affected groups to prevent further introductions of ANS via these pathways.	WDFW	Ongoing	Annual report.

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Task 2A2e	Establish a sub-committee on monitoring, response, and control of ANS. The sub-committee works with state agencies, tribes and other affected groups to review existing monitoring and response plans and make recommendations to the ANSCC to fill the gaps.	WDFW	Ongoing	Annual report.
Task 2A2f	Establish a sub-committee on ANS and Salmon. The sub-committee strives to educate those involved with management efforts of threatened and endangered salmon runs that effective management must include ANS education , prevention, and monitoring.	WDFW	Ongoing	Annual report.
Task 2A2g	Establish a sub-committee on regulatory reform. The sub-committee reviews existing regulations to identify gaps and make suggestions to those with regulatory authority	WDFW	Ongoing	. Annual report.
Strategic Action 2A3	Prohibit, control or permit the importation of nonnative aquatic species based upon their invasive potential.			
Task 2A3a	Develop a screening and classification system for aquatic nonnative animal species. WDFW is moving toward rule making to screen and classify animal species. and is holding a regional workshop in September, 2001.	WDFW	Dec 2002.	Regional workshop to be held in September of 2001 followed by Legislative action and /or rule making.
Task 2A3b	Evaluate the need to classify micro-organisms not currently regulated. WDFW, WDOA and WDOH will evaluate whether there is a need to classify these micro-organisms.	WDFW	Dec. 2002	Annual report - possible legislative action and/or rule making.
Task 2A3c	Encourage development of a screening and classification system for plants. WDFW will encourage WDOA to consider adopting a screening process. Representatives of WDOA will attend the regional workshop in September, 2001.	WDFW	Dec 2002	Regional workshop to be held in September of 2001 followed by Legislative action and /or rule making.
Task 2A3d	Develop and implement a biennial process to identify threats to state waters. WDFW will work with the ANS Coordinating Committee to develop and implement a risk assessment process, and assess the environmental risk of the spread of existing or new ANS.	WDFW	Dec. 2002	Annual report . Findings that impact the Puget Sound Basin will also be reported to the Puget Sound Council and the Action Team

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Task 2A3e	Develop and implement a program to inspect and certify that all vessels transported into the state on trailers are free of unauthorized nonnative species. WDFW is requesting the legislature broaden their authority to stop and inspect boats. WSP is considering expanding their inspection at ports of entry to privately hauled vessels.	WDFW	Dec. 2002	Legislative action and/or rule making.
Task 2A3f	Prepare, maintain and publish a list of water bodies infested with zebra mussels or green crab. WDFW does so annually for green crab. No zebra mussels to date.	WDFW	ongoing	Annual report to the legislature.
Task 2A3g	Develop and implement an economic incentive program for voluntary prevention, control and eradication of ANS plants and animals.	Various	Dec 2002	Annual work plan.
SA2A4	Increase enforcement and awareness of existing laws controlling transport, propagation, sale, collection, possession, importation, purchase, cultivation, distribution and introduction of ANS			
2A4a	Increase the priority of enforcing existing ANS rules and laws.		WDFW WDOE	ANSCC
2A4b	Continue training state police, sheriff's marine patrols, and wildlife enforcement officers on ANS identification and regulations.	USFWS	WDFW	
2A4c	Conduct workshops and distribute information on ANS law to businesses that import aquatic organisms.	WSFWS	WDFW PSWQAT	various
2A4d	Publicize existing penalties for the intentional introduction of any nonnative species into Washington waters.	WSFWS	WDFW PSWQAT WSG	Other state and federal agencies
Objective 3: Detect, monitor, control or eradicate nonnative invasive species.				
Strategic Action 3A1	Survey Washington lakes, rivers, estuaries, wetlands, and coastlines for ANS.	Various	Dec 2002	Annual work plan.
Strategic Action 3A2	Identify existing and needed GIS maps and data			
Task 3A2a	Create a list of GIS maps available and identify missing data.	UW	Ongoing	Annual report to ANSCC

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Task 3A2b	Develop and post GIS maps of ANS sites and the *NatureMapping* web site.	UW	Ongoing	Annual report to ANSCC
Task 3A2c	Expand *NatureMapping's* on-line monitoring site to allow for reports from the public.	UW	Ongoing	Annual report to ANSCC
Strategic Action 3A3	Continue monitoring and control efforts for European Green Crab.	WDFW		
Task 3A3a	Continue green crab monitoring and control activities along the outer coast.	WDFW	Ongoing	Annual report to legislature
Task 3A3b	Continue green crab monitoring in the Puget Sound Region	WDFW	Ongoing	Annual report to legislature
Task 3A3c	Coordinate with the Federal ANS Task Force and the Western Regional panel in the development of a regional green crab management plan.	WDFW	ongoing	Management plan / annual report
Strategic Action 3A4	Continue monitoring for the presence of zebra mussels and mitten crab.	WDFW		
Task 3A4a	Coordinate with other agencies and public entities to implement monitoring for zebra mussel veligers at high risk sites.	WDFW	Ongoing	Annual report
Task 3A4b	Coordinate volunteer monitoring at low priority lakes using substrate. Coordinate with Oregon program.	WDFW	Ongoing	Annual report
Task 3A4c	Continue and expand WSP inspection program at Ports of Entry.	WSP	Ongoing	
		WDFW	Ongoing	Annual report - possible legislative action and/or rulemaking.
Task 3A4d	Incorporate ANS information into boater safety classes.	WDFW	Ongoing	Presentations to various groups - annual report.
Task 3A4e	Participate in development of a comprehensive regional mitten crab management plan.	WDFW	Ongoing	Regional management plan - annual report.
Task 3A4f	Post warning signs and coordinate mitten crab monitoring in the Columbia and Snake rivers.	WDFW	Ongoing.	Annual report.

- -=Unknown

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Strategic Action 3A5	Continue monitoring for the spread of *Spartina*			
Task 3A5a	Act as lead agency for statewide *Spartina* monitoring and control efforts . Coordinate development of strategies and management plans, assist in streamlining the process for obtaining the necessary permits.	WDOA	Ongoing	Annual report to the legislature.
Task 3A5b	Coastal and Puget Sound area County Weed Boards will continue to monitor for new infestations of *Spartina* and serve as a local source for public information. Hire coordinators for *Spartina* related activities where feasible.	WSNWCB and Local government	Ongoing	Hire management activity coordinators as funding becomes available.
Task 3A5c	Continue to monitor Grays Harbor and N. Puget Sound for new infestations of *Spartina* and implement control activities when new clones or seedlings are found.	WDOE	Ongoing	WDOE Natural Resource Damage Assessment Fund has dedicated approximately $7,500 annually towards an FTE to manage monitoring.
		WDFW	Ongoing.	WDFW has dedicated approximately $7,500 annually towards an FTE to manage monitoring. Annual report.
3A5d	Continue to treat known infestations of *Spartina* and monitor areas relatively free of *Spartina* to maintain their weed-free integrity.	WDOA	Ongoing	WDOA has dedicated approximately $200,000 annually for control of *Spartina* in Willapa and N. Puget Sound. As lead, WDOA produces an annual report to the legislature.
		WDFW	Ongoing	WDFW has dedicated approximately $140,000 to control in Willapa and $170,00 for monitoring and eradication in N. Puget Sound through the Natural Resource Damage Assessment fund.
		WDNR	Ongoing	WDNR has dedicated approximately $136,000 annually for *Spartina* control in Willapa.
		USFWS	Ongoing	USFWS has dedicated approximately $137,000 annually for work in Willapa.
3A5e	Continue aerial infrared photography of *Spartina* in Willapa and enter them into a GIS database to create maps yielding accurate acerage figures and trends regarding the spread in for use as a management tool in the estuary.	WDNR	Ongoing	WDNR dedicates .05 FTE and $30,000 to this task. New maps are produced each year.
3A5f	Continue aerial photography of N. Puget Sound *Spartina*.to monitor the efficacy of treatment efforts and locate new infestations. Data is to be entered into GIS system at a later date.	WDFW	Ongoing	Produce new photos annually. WDFW dedicates $16,000 to this project annually.

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SA3A6	Continue monitoring purple loosestrife.			
3A6a	Continue hand pulling, herbicide and biological control activities on purple loosestrife. *Galerucella* beetles first introduced in 1991 have had high reproduction and have been very effective over wide areas, killing or damaging plants and limiting seed production.	WDOA, WNWCB, WDOE	Ongoing	Monitor progress and produce annual report.
SA3A7	Continue monitoring for freshwater nonnative plants in state lakes and rivers.			
3A7a	Continue surveying a subset of lakes and rivers each year to establish baseline populations and detect and map new infestations.	WDOE	Ongoing	Baseline data entered onto the WDOE website. WDOE dedicates .05 FTE and $35,000 to this task.
SA3B1	Develop emergency response plans for specific ANS.			
3B1a	Establish and administer an ANS emergency response fund to finance initial response to new introductions of ANS when funding becomes available.	WDFW		To attain this objective requires a $50,000 - $100,000 federal contribution.
		WDFW		To attain this objective requires a $50,000 - $100,000 commitment from state, public and private organizations in Washington.
3B1b	Continue to work in cooperation with the United States Army Corps of Engineers Zebra Mussel Research Center on early response eradication strategies. Members of the ANS Coordinating Committee are working on developing a comprehensive plan. Priority water bodies have been identified and are monitored for the presence of zebra mussels. Some have been posted with informational signs.	WDFW	Ongoing	In development / annual report.
3B1c	Develop a Green Crab Emergency Response Plan.	WDFW	Ongoing	There are active monitoring and control programs in the state. There is no reserve to fund a large scale response to new invasions.
3B1d	Develop a Mitten Crab Emergency Response Plan.	WDFW	Ongoing	WDFW is continuing to work with the State of Oregon to coordinate the development of a Mitten Crab Emergency Response Plan. There is a need for a reserve of readily available funds to implement immediate control and eradication efforts.

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3B1e	Developed and implementing an emergency response plan for hydrilla eradication.	King County	Ongoing	Eradication efforts are ongoing since 1995. Although not totally eradicated, the infestation is contained. WDOE dedicates $50,000 per year to this task.
3B1f	Continue eradicating early infestations of Eurasian watermilfoil and Brazilian elodea.	WDOE	Ongoing	WDOE provides technical advise and financial assistance to local government management efforts. They are requesting additional funding for these programs so they can totally eradicate these plants from state waters.
3B1g	Developed and implementing a cordgrass eradication plan.	WDOA		
3B1h	Review legal issues and facilitate control of ANS on property where ownership is in question or access is denied.	WDFW WDOA WDNR		
SA 3C1	Increase existing funding for ANS management			
3C1a	Increase the awareness in Washington, D. C.of ANS issues. Representatives from various state and federal agencies lobby for attention to ANS issues whenever possible.	Various	Ongoing	The State Noxious Weed Control Board informed Congress of the weed issues on a lobbying trip. The ANS Coordinator has worked with Congressmen Dicks and Baird on local ANS and Ballast Water issues.
3C1b	Explore new ways to fund ANS programs. WDFW has worked with the Recreational Boaters Association to obtain funding via a fuel tax rebate to boaters as well as other avenues.	WDFW	Ongoing	Legislative action.
3C1c	Ensure ANS activities planned withing the Puget Sound basin are submitted to the Puget Sound Council for funding .	WDFW	Ongoing	Annual reports, with bi-annual budget requests.
SA 3C2	Set priorities for the management of existing ANS.	All agencies	Ongoing	Annual Report
3C2a	Set state priorities for the management of noxious ANS weeds during annual development of the state Noxious Weed list.	WSNWCB		
3C2b	Sets management and funding priorities for ANS weeds during the annual grant funding cycle.	WDOE	Ongoing	Annual work plans / reports
3C2c	Set priorities for control of the green crab, the mitten crab, the zebra mussels, and other animal ANS.	WDFW	Ongoing	Annual work plans / reports

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SA 3D1	Implement strategies for controlling and/or eradicating pioneer infestations of ANS.			
3D1a	The herbicide 2-4D has been approved for the eradication of pioneer infestations of aqatic weeds, allowing for immediate action to eradicate or contain the infestation.	WDFW WDOE	Done / ongoing	Annual report
3D1b	Established an emergency fund reserved for the containment/eradication of pioneering infestations of freshwater ANS weeds. $100,000 per year is available to local governments to take immediate action.	Various	Ongoing	Annual report
SA 3D2	Minimize the dispersal of established ANS.			
3D2a	Established a list of prohibited ANS plants	WDOA	Ongoing	List updated monthly.
3D2b	Develop guidelines and regulations to ensure the cleaning of water-based equipment that may unintentionally spread ANS.	WDFW	efforts ongoing	Legislative action - probably in the 2003 session.
3D2c	Consider developing regulations to quarantine waterbodies to prevent the spread of ANS.	WDFW	efforts ongoing	Legislative action to designate infested waterbodies - probably in the 2003 session.
3D2d	Develop strategies to educate the public and specific groups to prevent the spread of ANS.	State agencies	Ongoing	Annual report at ANS Coordinating Committee meeting.
SA3D3	Manage large populations of established ANS.			
3D3a	Funding state and local governments to manage established ANS weeds & encourage them to form funding districts.	WDOE	Ongoing	WDOE dedicates approximately $300,000 per year to this fund. Annual work plan.
3D3b	Released (and will continue to release) approved biocontrol agents (insects) for the management of purple loosestrife.WDFW in cooperation with others is raising *Galerucella* en masse for distribution to infested sites.	WDFW and others	Ongoing	Annual work plans. - annual releases.
3D3c	Developed an integrated saltcedar control/eradication plan. WDFW and others implemented a control/eradication plan with dedicated funding from WDOE and the WSNWCB. Management responsibility for part of the area has now been transferred to USFWS.	WDFW, WDOA and others	Ongoing control activities	Annual work plan
		USFWS	Ongoing	Annual work plan

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3D3d	Land owing agencies have prepared and are implementing plans to control purple loosestrife and cordgrass in cooperation with county weed control authorities and other entities, using integrated pest management.	WDFW WDOA	Ongoing Ongoing	Restoration of desirable habitat and recreational opportunities. Annual reports.
Objective 4: Educate Appropriate Resource User Groups about the Importance of Preventing the Introduction and Sperad of ANS, and How Their Harmful Impacts Can Be Reduced.				
SA 4A1	Produce educational materials to increase public awareness of the ANS problem.			
4A1a	Several publications have been created and distributed by various state and federal agencies containing broad information on invasive species and the pathways by which they arrive.	State and federal agencies	Ongoing	Update current publications, create new publications as new species of concern are introduced in the U.S.
4A1b	Increase educational efforts directed at pet stores by distributing ANS ID cards, pet store cards, and other literature	WSG PSWQAT state and federal agencies	Ongoing	Publications, increase contact with pet stores.
4A1c	Develop a statewide ANS website.	WDFW, WSG, state and federal agencies.	Ongoing	**Http://www/ecy/wa/gpv/programs/wq/links/plants.html** **Http://www.wa.gov/WDFW/fish/nuisance/ans1.htm** Keep sites current, develop more links.
4A1d	Conduct community training workshops to distribute and disseminate ANS materials in the Puget Sound area, and provide hands-on training for volunteers.	PSRF, WWTA, PSA	Ongoing	Annual training workshops for volunteer monitors and others.
4A1e	Published an aquatic plant ID manual for Washington State.	WDOE	Done	Publication being distributed
4A1f	Coordinate development of several ANS educational 'traveling trunks'. Washington and Oregon Sea Grant have received funding for developing traveling trunks. Several agencies will contribute time and materials.	WSG,	Ongoing	Create and distribute trunks.
SA 4A2	Develop partnerships with media outlets to disseminate ANS information.			

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4A2a	Develop press releases for distribution throughout the state.	WDFW WSG, WDOE, WDNR, PSWQAT	Ongoing	Press releases
4A2b	Develop public service announcements.	WSG	Ongoing	Public Service Announcements
4A2c	Members of the ANS Coordinating Committee will contribute articles to magazines targeting select audiences.	various	Ongoing	Publications and press releases.
4A2d	Distribute ANS information at boat shows, fairs, sportsmen shows, and other events.	WDOE WDFW	Ongoing Ongoing	Presentations - exhibits.
S4A3	Increase awareness of ANS issues in Public Schools.			
4A3a	Develop curricula that meets Washington State Essential Academic Learning Requirements for specific grade levels in science and social studies.	WSG, WDNR, WDEA, WDFW, WSNWCB	Ongoing	School curriculum
4A3b	Develop teacher training workshops.	WSG, WDNR, WDEA, WDFW, WSNWCB	Ongoing	Training plan and courses.
SA 4B1	Develop and distribute educational information targeted at specific groups identified as potential sources for ANS introductions.			
4B1a	Ongoing outreach to aquaculture industry to alert them to the potential ANS impacts from their operations.	Various	Ongoing	Literature, presentations at trade shows and conferences.
4B1b	Develop display material for restaurants and fish markets.	WSG	12/02	Literature mailed to restaurants and fish markets - presentations at industry conferences.
4B1c	ANSCC members will work with bait shop owners to develop and distribute educational materials for bait shops.	ANSCC	12/02	Literature distributed to bait shops.
4B1d	Increase distribution of ID cards, posters at pet stores, encourage store owners to print ANS messages on shopping bags.	WSG PSWQAT	Ongoing	Increased distribution of materials. Possibly pilot project of printed shopping bags.

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Program Name: Washington State Aquatic Nuisance Species (ANS) Management Plan				
4B1e	Develop a 'good housekeeping' program for pet stores .	WSG PSWQAT	12/02	Program developed, awards given.
4B1f	Provide outreach material and training programs for ship captains and crews, and port staff.	WDFW	12/02	Material developed and distributed.
4B1g	Identify efficient, cost effective methods of ballast water treatment, set standards, establish monitoring protocols.	WDFW	Ongoing	Effective treatment available and standards set.
		UW	Ongoing	Completion of research - identification of a better means of determining the efficacy of exchange.
4B1h	Develop interpretive centers at zoos and aquariums.	WDFW	Ongoing	Displays at zoos and aquariums.
		State and federal agencies		
4B1i	Provide educational information to boaters.	WDFW WSG	Ongoing	Presentations, distribution of literature, posters at marinas.
4B1j	Develop tailored text and graphics to be incorporated into key state publications.	WDFW WSPR WSG	12/02	ANS messages in boaters guides, fishing regulations, boat tax statements, etc.
4B1k	Prepare articles on ANS prevention for regional boating magazines.	ANSCC	12/02	Articles published
4B1l	Develop and post signs for boat launches and road ways.	WDFW	Ongoing	Educational signs at most launches - warning signs at infested waters.
		WDOE		
4B1m	Survey research laboratories and biological supply houses to determine effectiveness of the handling and disposal brochure.	WSG	12/02	Survey.
SA 4B2	Disseminate materials on ANS to various cultural and ethnic groups.			
4B2a	Identify ethnic communities in Washington	WDFW WSG	Ongoing	Target groups identified.
4B2b	Identify cultural traditions that could affect introductions of ANS.	WDFW WSG PSWQAT	Ongoing	Cultural practices that could affect introductions identified

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Program Name: Washington State Aquatic Nuisance Species (ANS) Management Plan				
4B2c	Host workshops for cultural leaders, assist in creating brochures in native tongues.	WDFW WSG PSWQAT	12/02	Brochures created.
4B2d	Disseminate ANS materials to local community ethnic centers.	WDFW WSG PSWQAT	12/02	Brochures disseminated.
4B2e	Create articles for newspapers and literature regularly read by various ethnic groups.	WDFW WSG PSWQAT	12/02	Articles published.
SA 4B3	Develop and distribute educational information to those most affected by or in a position to first observe ANS introductions.			
4B3a	Provide training and identification materials to aquaculture staff and develop a reporting system.	WDFW	12/02	Biannual distribution
4B3b	Develop and disperse plastic ID cards to local divers.	WSG	12/02	ID cards distributed to dive shops
4B3c	Develop system to accept reports of sightings by divers	WDFW	Ongoing	System in place.
4B3d	Develop a list of industrial and municipal facilities at possible risk from ANS.	WDFW WDOE WSG PSWQAT	12/02	List
4B3e	Hold a one-day conference for municipal and industrial water users on the risks of ANS.	WSG WDFW	12/02	Conference
4B3f	Hold workshops for shoreline property owners	WSG WDFW WDOE	12/02	Workshops
4B3g	Provide ID information to fishers to monitor and report sightings of ANS plants and animals. WDFW will provide information to fishers (Task 4B1f) and WDOE will provide information on aquatic weeds.	WDFW WDOE	Ongoing	Distribution of information.
SA4C1	Provide briefings to decision makers			

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Program Name: Washington State Aquatic Nuisance Species (ANS) Management Plan				
4C1a	Provide briefings to legislators and local officials and their staffs on ANS problems ans solutions.	WDFW WSG	Ongoing	Annual briefings
4C1b	Organize a biennial field day for legislators.	WDFW WSG	12/02	Biennial field days
4C1c	Invite local decision makers to attend volunteer training workshops.	WDFW PSRF, WSG	Ongoing	Annual workshops
4C1d	Prepare biennial summary of ANS projects for key legislative committees.	WDFW, WDOE, WDNR, WDOA, WSNWCB	Ongoing	Biennial reports
4C1e	Conduct a regional workshop to promote consensus on ways to prevent new introductions.	WDFW WRP	12/02	Workshop
SA 4C2	Provide training on ANS for agency staff that support the identification and management of ANS.			
4C2a	Distribute field guides and ID cards.	State and federal agencies.	12/02	Full coverage
4C2b	Hold a biennial regional workshop to train resource managers.	WSG	12/02	Workshop
4C2c	Develop and publish a list of taxonomic experts.	WDFW	Ongoing	Update list regularly
4C2d	Participate in west coast conferences on mitten crab control.	WDFW	Ongoing	Participation at conferences
SA4D1	Evaluate and assess the effectiveness of education and outreach efforts.			
4D1a	Survey members of the public and target groups to determine knowledge level and behaviors to target with education. Survey again after one year of educational programing to determine changes in behavior.	WSG	12/02	Surveys

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Washington ANS Strategic Plan - through December 2002

Program Name: Washington State Aquatic Nuisance Species (ANS) Management Plan

Objective 5: Conduct research on ANS priority species in Washington to better understand the risks and threats associated with invasions.				
SA 5A1	Risk assessments.			
5A1a	Define ANS risks that affect natural resources, economic issues, and human health and classify the extent of the risks posed by certain species	WDFW	12/02	Risk assessment/evaluation
5A1b	Compile list of intentional introductions, analyze risks vs. benefits, present native alternatives that may be used in their place.	WDFW	12/02	Risk assessment/evaluation
5A1c	Identify traits associated with successful high-impact invaders in similar habitats.	WDFW	12/02	Risk assessment/evaluation
5A1d	Characterize resources and habitats at greatest risk from invasive species.	WDFW	12/02	Risk assessment/evaluation
SA5A2	Study current and potential invaders to understand potential for damages.			
5A2a	Identify appropriate species for further investigation. Identify funding for research.	State and federal agencies	12/02	Program to evaluate and classify nonnative species based on risk assessment using a panel of experts.
5A2b	Encourage studies on interactions between ANS and native species.	UW, WSG	12/02	Program to evaluate and classify nonnative species based on risk assessment using a panel of experts.
5A2c	Encourage studies to assess the ecological impacts of economically important species.	UW, WSG	12/02	Program to evaluate and classify nonnative species based on risk assessment using a panel of experts.
5A2d	Develop list of experts and their availability to respond to requests for ANS identification.	UW, WSG	12/02	Program to evaluate and classify nonnative species based on risk assessment using a panel of experts.
SA 5B1	Baseline assessments.			
5B1a	Design and implement a rapid assessment of all waterbodies in the state. WDFW , PSWQAT and others will continue doing surveys of state waters.	Federal and state agencies	ongoing	Assessment of all waterbodies.
SA 5B2	Encourage and support ongoing efforts to map ANS distribution and location databases.			

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Program Name: Washington State Aquatic Nuisance Species (ANS) Management Plan				
5B2a	UW will gather gather geo-spatial data of ANS distributions and develop maps of their spread based on monitoring programs within the state, and relate the distributions to to distributions of native species, habitats and environmental factors.	UW, state agencies, scientists	ongoing	maps
5B2b	WDFW in cooperation with NOAA is using statistical monitoring to determine the spread of floating ANS	WDFW	ongoing	computer models
SA 5B3	Develop and maintain lists of nonnative species known to occur in Washington.			
5B3a	Provide information on freshwater plants to the public, and provide plant identification services.	WDOE	ongoing	Ongoing services
5B3b	Develop and maintain a list of non-native animal species in Washington.	WDFW	Ongoing	Update database annually
5B3c	Review and list websites on ANS, encourage groups to hot-link to one another's sites.	ANSCC	Ongoing	Review and update websites
SA 5B4	Study the relationship between human activities and invasions of ANS.			
5B4a	Compile maps of human activities that affect aquatic resources and compare them with maps of invasions.	UW, WSG	Ongoing	maps
SA 5C1	Develop Best Management Practices for established and potential ANS.			
5C1a	Compile information on management and control strategies for established ANS and potential invaders. Identify successful strategies.	State agencies and universities	12/02	Database on plants updated, database on animals created.
5C1b	Convene a national/international workshops of experts to develop a series of best management practices for ANS.	WSG WDFW	Ongoing	Workshops
SA 5C2	Identify pathways and assess the risk of invasion			

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Program Name: Washington State Aquatic Nuisance Species (ANS) Management Plan				
5C2a	Identify major and minor pathways for non-native introductions, evaluate potential threat, prepare risk assessment.	WSG PSWQAT	12/02	Study of major pathways and the risks posed by each.
SA5D1	Inform researchers and resource managers of emerging information.			
5D1a	Develop an information clearinghouse and listserve.	Various	12/02	Clearinghouse
5D1b	Encourage ANS presentations at regional conferences and symposia.	WSG, various	Ongoing	Presentations aimed at broad range of audiences.
5D1c	Encourage the WRP to compile and evaluate information on the mitten crab.	WDFW	Ongoing	Report
5D1d	Identify research to determine the impacts of ANS on salmonids.	ANSCC	Ongoing	Report
5D1e	Identify research needed on the effects of green crab on native and nonnative species.	WDFW	Ongoing	Report
Objective 6: Legislation for Washington State ANS rules and regulations to ensure that our legislation efficiently promotes the prevention and control of ANS in coordination with federal regulations.				
SA 6A1	Review laws governing ANS in Washington.			
6A1a	The ANSCC Regulatory Review subcommittee, with guidance from affected stakeholders, will review state laws for gaps and overlaps, compare with other state and federal laws, and recommend changes to agencies responsible for regulating ANS.	ANSCC WDFW	Ongoing	Recommendations to various agencies in a timely manner for them to develop legislation and/or rules.
SA 6A2	Increase the state's authority to control the introduction of new species.			
6A2a	Enact and enforce rules governing ballast water. The law has been in effect since 2000 - rules for reporting and an interim standard for treated ballast water are in place. R&D is ongoing to identify a reliable means of verifying the adequacy of exchange so a standard may be developed.	WDFW	Ongoing	Effective rules and standards for ballast water treatment and exchange. Report to Legislature.
6A2b	Promote legislation that establishes the authority to inspect, detain and require cleaning of any vehicle, vessel or water based equipment containing ANS traveling in Washington.	WDFW WSP	Ongoing	Legislation introduced -rules developed and implemented.

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Program Name: Washington State Aquatic Nuisance Species (ANS) Management Plan				
6A2c	Establish authority to designate waterbodies as infested and to quarantine them to prevent ANS from spreading and to contain them for possible eradication.	WDFW WDOE WDOA	Ongoing	Legislation passed - rules developed and implemented.
6A2d	Develop rules to improve the regulation of nonnative species introductions.	WDFW	Ongoing	Rules

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Glossary

Accidental introduction: an introduction of nonnative 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 nonnative species in ballast water or in water used to transport fish, mollusks, or crustaceans for aquaculture or other purposes.

Acclimatization: a process of adaptation of an introduced species and their offspring in the new environment (Holcik 1991).

Alien Species: with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem (Executive Order 13112 of February 3, 1999 -*Invasive Species*).

Aquatic nuisance species: a nonnative species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters (National Invasive Species Act of 1996 P. L. 104-332; Fuller et al. 1999).

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.

Biocontrol: the use of living organisms, such as predators, parasites, and pathogens, to control pest insects, weeds, or diseases.

Control: efforts to eradicate, suppress, reduce or manage invasive species populations, measures to reduce the effects of invasive species, preventing the spread of invasive species from areas where they are present, and taking steps to prevent further invasions.

Cryptogenic species: a species that is not demonstrably native or introduced (Carlton 1996).

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.

Established: an introduced organism with a permanent population(s), i.e., one unlikely to be eliminated by man or natural causes (Shafland and Lewis 1984).

Exotic: (same as nonnative) an organism introduced from a foreign country (i.e., one whose entire native range is outside the country where found) (Shafland and Lewis 1984). A subcategory of **introduced.**

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.

Indigenous: occurring or found naturally in a particular area or ecosystem; historically occurring in geographic range previous to the arrival of the first European settlers; a species that is a member of the native natural community (Fuller et al. 1999).

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

Introduced: a plant or animal moved from one place to another by man (i.e., an individual, group, or population of organisms that occur in a particular locale due to mans actions) (Shafland and Lewis 1984).

Invasive Species: an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112 of February 3, 1999-Invasive Species).

Localized: a confined, reproducing population of an introduced organism that can be eliminated using standard methods (Shafland and Lewis 1984).

Locally Established: an introduced organism with one or more naturally reproducing populations but with a very restricted distribution and no evidence of natural range expansion (in general, limited to a relatively confined area, such as a small lake) (Fuller et al. 1999).

Naturalization: the final phase of acclimatization, when the introduced species finds a "vacant niche" in a community (Holcik 1991).

Native Species: with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem (Executive Order 13112 of February 3, 1999- *Invasive Species).*

Nonindigenous Species: any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country into another (National Invasive Species Act of 1996 P. L. 104-332).

Nonnative: any species introduced by man into an ecosystem outside its native range (includes exotic plus transplanted) (McCann 1984).

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

Possibly Established: an introduced organism without the status of a permanent population, but reproducing in an area where its elimination by man would be impractical (Shafland and Lewis 1984).

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.

Reported: an introduced organism collected without evidence of reproduction (Shafland and Lewis 1984).

Transfers: introductions within the native range of a species (Allendorf 1991).

Transplanted: an organism moved outside its native range but within a country where it occurs naturally (i.e., one whose native range includes at least a portion of the country where found) (Shafland and Lewis 1984). A subcategory of introduced.

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

Terminology by Source

Allendorf (1991)

- *Transfers:* introductions within the native range of a species.

Carlton (1996)

- *Cryptogenic Species:* a species that is not demonstrably native or introduced.

Executive Order 13112 of February 3, 1999- *Invasive Species*

- *Alien Species:* with respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.

- *Invasive Species:* an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

- *Native Species:* with respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.

Fuller et al. (1999)

- *Aquatic Nuisance Species:* a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters.

- *Indigenous:* occurring or found naturally in a particular area or ecosystem; historically occurring in geographic range previous to the arrival of the first European settlers; a species that is a member of the native natural community.

- *Locally Established:* an introduced organism with one or more naturally reproducing populations but with a very restricted distribution and no evidence of natural range expansion (in general, limited to a relatively confined area, such as a small lake).

Holcik (1991)

- *Acclimatization:* a process of adaptation of an introduced species and their offspring in the new environment.

- *Naturalization:* the final phase of acclimatization, when the introduced species finds a "vacant niche" in a community.

McCann (1984)

- *Nonnative:* any species introduced by man into an ecosystem outside its native range (includes exotic plus transplanted).

National Invasive Species Act of 1996 P. L. 104-332

- *Aquatic Nuisance Species:* a nonindigenous species that threatens the diversity or abundance of native species or the ecological stability of infested waters, or commercial, agricultural, aquacultural or recreational activities dependent on such waters

- *Nonindigenous Species*: any species or other viable biological material that enters an ecosystem beyond its historic range, including any such organism transferred from one country into another.

Shafland and Lewis (1984)

- *Established:* an introduced organism with a permanent population(s) i.e., one unlikely to be eliminated by man or natural causes.

- *Introduced:* a plant or animal moved from one place to another by man (i.e., an individual, group, or population of organisms that occur in a particular locale due to mans actions). Note: Introduced is broken into two subcategories (exotic and transplanted).

- Exotic: an organism introduced from a foreign country (i.e., one whose entire native range is outside the country where found).

- *Transplanted:* an organism moved outside its native range but within a country where it occurs naturally (i.e., one whose native range includes at least a portion of the country where found).

- *Localized:* a confined, reproducing population of an introduced organism that can be eliminated using standard methods.

- *Possibly Established:* an introduced organism without the status of a permanent population, but reproducing in an area where its elimination by man would be impractical.

- *Reported:* an introduced organism collected without evidence of reproduction.

Appendix A
Section 1204 of the National Invasive Species Act of 1996

SEC. 1204. STATE AQUATIC NUISANCE SPECIES MANAGEMENT PLANS.

(a) STATE OR INTERSTATE INVASIVE SPECIES MANAGEMENT PLANS.--

(1) IN GENERAL.-- After providing notice and opportunity for public comment, the Governor of each State may prepare and submit, or the Governors of the States and the governments of Indian Tribes involved in an interstate organization, may jointly prepare and submit--

(A) a comprehensive management plan to the Task Force for approval which identifies those areas or activities within the State or within the interstate region involved, other than those related to public facilities, for which technical, enforcement, or financial assistance (or any combination thereof) is needed to eliminate or reduce the environmental, public health, and safety risk associated with aquatic nuisance species, particularly the zebra mussel; and

(B) a public facility management plan to the Assistant Secretary for approval which is limited solely to identifying those public facilities within the State or within the interstate region involved for which technical and financial assistance is needed to reduce infestations of zebra mussels.

(2) CONTENT.-- Each plan shall, to the extent possible, identify the management practices and measures that will be undertaken to reduce infestations of aquatic nuisance species. Each plan shall--

(A) identify and describe State and local programs for environmentally sound prevention and control of the target aquatic nuisance species;

(B) identify Federal activities that may be needed for environmentally sound prevention and control of aquatic nuisance species and a description of the manner in which those activities should be coordinated with State and local government activities;

(C) identify any authority that the State (or any State or Indian Tribe involved in the interstate organization) does not have at the time of the development of the plan that may be necessary for the State (or any State or Indian Tribe involved in the

interstate organization) to protect public health, property, and the environment from harm by aquatic nuisance species; and

(D) a schedule of implementing the plan, including a schedule of annual objectives, and enabling legislation.

(3) CONSULTATION.--

(A) In developing and implementing a management plan, the State or interstate organization should, to the maximum extent practicable, involve local governments and regional entities, Indian Tribes, and public and private organizations that have expertise in the control of aquatic nuisance species.

(B) Upon the request of a State or the appropriate official of an interstate organization, the Task Force or the Assistant Secretary, as appropriate under paragraph (1), may provide technical assistance in developing and implementing a management plan.

(4) PLAN APPROVAL.-- Within 90 days after the submission of a management plan, the Task Force or the Assistant Secretary in consultation with the Task Force, as appropriate under paragraph (1), shall review the proposed plan and approve it if it meets the requirements of this subsection or return the plan to the Governor or the interstate organization with recommended modifications.

(b) GRANT PROGRAM.--

(1) STATE GRANTS.-- The Director may, at the recommendation of the Task Force, make grants to States with management plans approved under subsection (a) for the implementation of those plans.

(2) APPLICATION.-- An application for a grant under this subsection shall include an identification and description of the best management practices and measures which the State proposes to utilize in implementing an approved management plan with any Federal assistance to be provided under the grant.

(3) FEDERAL SHARE.--

(A) The Federal share of the cost of each comprehensive management plan implemented with Federal assistance under this section in any fiscal year shall not exceed 75 percent of the cost incurred by the State in implementing such management program and the non–Federal share of such costs shall be provided from non–Federal sources.

(B) The Federal share of the cost of each public facility management plan implemented with Federal assistance under this section in any fiscal year shall not exceed 50 percent of the cost incurred by the State in implementing such management program and the non–Federal share of such costs shall be provided from non–Federal sources.

(4) ADMINISTRATIVE COSTS.-- For the purposes of this section, administrative costs for activities and programs carried out with a grant in any fiscal year shall not exceed 5 percent of the amount of the grant in that year.

(5) IN–KIND CONTRIBUTIONS.-- In addition to cash outlays and payments, in–kind contributions of property or personnel services by non–Federal interests for activities under this section may be used for the non–Federal share of the cost of those activities.

(C) ENFORCEMENT ASSISTANCE.-- Upon request of a State or Indian Tribe, the Director or Under Secretary, to the extent allowable by law and in a manner consistent with section 141 of title 14, United States Code, may provide assistance to a State or Indian Tribe in enforcing an approved State or interstate invasive species management plan.

Appendix B
Washington Aquatic Nuisance Species Plan
Public Review Information

The Washington State Aquatic Nuisance Species Coordinating Committee membership participates in the development of and reviews the Washington State Aquatic Nuisance Species Management Plan. After their suggestions are incorporated the plan is circulated for a broader public review.

Washington Aquatic Nuisance Species Planning Committee

Attendees of the Inaugural Meeting -

Acheson, Don APHETI	Aitkin, Kevin US Fish & Wildlife Service	Anderson, Kevin Puget Sound Water Quality Action Team
Antieau, Clay Washington State Dept of Transportation	Athren, Jim US Army Corp of Engineers	Barton, Justine US Environmental Protection Agency
Brancato, Mary Sue NOAA	Brown, Wendy Washington Dept of Natural Resources	Buck, Rep. Jim Washington State House of Representatives
Cooper, Diane Taylor Shellfish	Copping, Andrea Sea Grant	Dauma, Steve Washington Dept of Fish & Wildlife
Descoteaux, Phillipe Petco	Douglas, Debbie Petco	Dvornich, Karen University of Washington

Emmett, Kathleen
Washington Dept of Ecology

Fyfe, David
Northwest Indian Fisheries

Geck, Jay
Washington Attorney General's Office

Granger, Pete
Washington Fish Growers

Hamel, Kathy
Washington Department of Ecology

Hess, Wayne
Velox Technologies, Inc.

Heimer, Dave
Washington Dept of Fish & Wildlife

Hickey, Barbara
University of Washington

Higgins, Patrick
Canadian Consulate

Irish, Jim
Bonneville Power

Jacobsen, Ken
Washington State Senate

Jamieson, Glen
Canada Department of Fisheries and Oceans

Jolly, Carol
Executive Policy Advisor to the Governor

Joubert, Moya
City of Seattle Utilities

Kempton, Wayne
Velox Technologies, Inc.

Kirkeby, Lila
Washington State Patrol

Koenings, Jeff
Washington Department of Fish & Wildlife

Lantz, Lisa
State Weed Board

Lerner, Nancy
Sea Grant

Mahaffy, Mary
US Fish & Wildlife Service

Mahoney, Jerry
Port of Olympia

Martin, Stephen
US Army Corp of Engineers

McKay, Nancy
Puget Sound Water Quality Action Team

Meacham, Pam
Washington Department of Fish & Wildlife

Metzgar, Roy
City of Everett

Milne, David
The Evergreen State College

Montgomery, Darla
US Navy

Moon, Vic
Washington State Senate Staff

Murray, Bernard
Recreational Boaters Association

Nason, Dick
Chelan County PUD

Norman, Don
Adopt A Beach

Phelps, Kris
Nisqually Tribe

Oke, Bob
Washington State Senate

Reeves, Blain
Washington Department of Agriculture

Regala, Debbie
Washington State House of Representatives

Reichard, Sara
University of Washington

Riggs, Sharon
Padilla Bay Reserve

Robinson, Anne
US Environmental Protection Agency

Rockwell, Craig
US Army Corp of Engineers

Rogers, Russell
Washington Dept of Fish & Wildlife

Rohr, Dennis
D. Rohr & Associates

Ruesink, Jennifer, PhD
University of Washington

Rupp, John B.
Tacoma Aquarium

Rumball-Petre, Rose
National Parks Management

Saunders, Stephen
Washington Dept of Ecology

Schroeder, Lynn
NW Marine Trade Assn

Smith, Scott
Washington Dept of Fish & Wildlife

Smith, Tim
Washington Dept of Fish & Wildlife

Stenvall, Charles
US Fish & Wildlife Service

Strathman, Robert
University of Washington

Swartout, Mark
Thurston Co

Therien, Ned
Washington Department of Health

Thomas, Ken
Bellingham Public Utilities

Townley, Jim
Columbia River Steamship Operators

Walker, Julia
APHETI

Wecker, Miranda
University of Washington

Wessels, Tom
Washington Dept of Agriculture

Wisehart, Bruce
People for Puget Sound

Woodley, Chris
USCG

The State Plan was reviewed and discussed at the Aquatic Nuisance Species Coordinating Committee Meeting - April 13, 2001

List of Attendees

Acheson, Don
APHETI

Aitkin, Kevin
US Fish & Wildlife Service

Bohlman, Robert T.
Marine Exchange of Puget Sound

Cooper, Diane
Taylor Shellfish

Curl, Herbert
Audubon Society

Dauma, Steve
Washington Dept of Fish & Wildlife

Dickison, Jeff
Skokomish Tribe

Dumbauld, Brett
Washington Department of Fish and Wildlife

Dvornich, Karen
University of Washington

Fisch, Lisa
Senator Regalla's Office

Fishel, Jeff
Washington Department of Ecology

Fogelson, Clare
City of Bellingham

Heimer, Dave
Washington Dept of Fish & Wildlife

House, Marcia
University of Washington

Hutchins, Harry
Puget Sound Steamship Operators Association

Irish, Jim
Bonneville Power

Joubert, Moya
City of Seattle Utilities

Kirkeby, Lila
Washington State Patrol

Lantz, Lisa
State Weed Board

Mahaffy, Mary
US Fish & Wildlife Service

Martin, Stephen
US Army Corp of Engineers

Meacham, Pam
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Milne, David
The Evergreen State College

Montgomery, Darla
US Navy

Moore, Allen
Washington Department of Ecology

Murray, Bernard
Recreational Boaters Association

Nason, Dick
Chelan County PUD

Olson, Steve
APHETI

Phelps, Kris
Nisqually Tribe

Phillips, Stephen
Pacific States Marine Fisheries

Reeves, Blain
Washington Department of Agriculture

Riggs, Sharon
Padilla Bay Reserve

Rogers, Russell
Washington Dept of Fish & Wildlife

Rohr, Dennis
D. Rohr & Associates

Robertson, Bill
Seattle Aquarium

Rupp, John B.
Tacoma Aquarium

Schneidler, Dave
Port of Seattle

Smith, Scott
Washington Dept of Fish & Wildlife

Sturgis, Linda
United States Coast Guard

Symms, Steve
NYKLine

Sytsma, Mark
Portland State University

Walker, Julia
APHETI

Wessels, Tom
Washington Dept of Agriculture

Aquatic Nuisance Species Coordinating Committee Summary of Comments from April 13, 2001 Meeting

An electronic copy of portions of the draft management plan that have been completed was distributed a week prior to the meeting, so members could be prepared to comment. Hard copies were available at the meeting. The committee briefly reviewed each segment of the plan. Suggestions for changes were as follows:

- Add the full language of the Aquatic Nuisance Species Committee law (RCW 77.60.130) near the acknowledgment section to explain how the committee came to be.

- Under **Nonnative Species Authorities and Programs** (pg5) add reference to Puget Sound Water Quality Action Team.

- General ANS comment: make sure that we consider adding species that spend only part of their life cycle in the water – mosquito's such as those that carry the west Nile virus were given as an example.

- Add a paragraph in the Nonnative Species Authorities and Programs that addresses jurisdictional issues of Tribal lands. Jeff Dickison will work with Pam on drafting this.

- Add appropriate references to regional activities and coordination issues to acknowledge the role DNR, WDFW and the Noxious Weed Control Board play in Spartina and Loosestrife programs (pg 5-6)

- Add a paragraph on the Western Regional Panel.

- Under the **Nonnative Species Problems and Concerns in the State of Washington** Section (page8) the first reference to "priority species" should define or specify how these are determined. (Possibly in an appendix.)

- Be consistent in the use of terms. i.e., nonnative vs nonnative, etc.

- In the list of priority species consider listing only the genus (e.g. as broad as possible) unless more than one species is referenced, then use specific names where and when it is appropriate (e.g. native Spartina).

- In the **Accomplishments** section that addresses Spartina, mention that Puget Sound Action Team adopted Spartina as an indicator of environmental health in Puget Sound.

- In the **Accomplishments** section that addresses green crab mention industry participation and cooperation.

- Make the **Accomplishments** section easier to read by breaking it down and using summary headings and bulleted lists where applicable.

- Under **Management Actions** (pg 18) make sure that the same terms (e.g. nonnative rather than nonindigenous, etc.) are used consistently across all sections of the plan.

- Consider adding language to clarify that not all nonnative species are nuisance species.

- In 2A3b add in a task that the WDFW and the Dept of Agriculture would look at improving screening procedures for plants as well as animals.

- In Objective 3 remove or change the term 'invasive species' to 'aquatic nuisance species'.

- Make sure we are not confusing 'strategic action' and 'task' items. (e.g. some strategic actions do not have tasks listed to implement them. It was suggested that these should somehow be listed as tasks. Upon review, these strategic actions are strategies, and that the implementing tasks are not broken down because they are implied within the strategies.)

- In 3D3d consider adding language referencing monitoring loosestrife as well as the other species listed there.

GENERAL QUESTION: It is unclear how or why certain species are prioritized over others. The rationale(s) for picking the priority species is not clear. In Oregon they could not agree on priorities, so they chose to use a 'management classification' scheme. Washington may be using a similar method but doing it implicitly.

- Change the Washington plan to use management classes. An ad-hoc group was formed to develop this procedure. The group consists of: Pam Meacham, WDFW; Lisa Lantz, Washington State Noxious Weed Control Board; Tom Wessels, Department of Agriculture; Mark Sytsma, Portland University; Don Atchison, APHETI (Don is a biologist and a retired teacher); Kevin Anderson, of the Puget Sound Action Team will be invited to join when he returns the end of this month. We will reference the Oregon Plan. NOTE: We will also be looking at consistency in terminology and tasks between the two plans.

- Add a task in Objective 3 to monitor intentional introductions of species that might become ANS. NOTE: we expect to cover this with the development of a screening and classification process.

- 5A – Problem description was questioned, pointing out that aquacultural species are selected to meet a market demand and can't be substituted. This problem description

was intended to address environmental not commercial marketing concerns.

- 5A2 and 5C – make sure that we reference WSU and all appropriate educational institutions.

- Objective 6- will be much more specific for the December report to the legislature.

- Glossary - In some cases several definitions were listed (with references cited). It was decided that where Shafland and Lewis were one of the options, that may be the best reference authorities. We will check the original sources for the usage of the definitions, and where available a definition listed in law will be used – always going to the highest court or the broadest use if more than one legal definition is available.

  Puget Sound Water Quality Action Team submitted a written list of suggestions following the meeting. These included:
  - Explain how the update differs from the plan published in 1998 in the executive summary
  - provide the legal definition of ANS contained in RCW 77.60 and distinguish between NIS authorized for introduction and accidental introductions
  - insert an explanation of the role the ANS coordinating committee played in developing and implementing the state plan
  - explain how the plan will be implemented and coordinated with other programs, include language to assure that ANS activities identified in the plan that are carried out in Puget Sound are included in the biennial Puget Sound Water Quality Work Plan, which is submitted to the Governor and Legislature for funding considerations every two years
  - recommend the role and mission of the Puget Sound Water Quality Action Team be listed with other authorities and programs
  - clarify the rationale and criteria for listing priority species
  - assure that all ongoing ANS programs receive equal consideration and emphasis
  - include the estuarine species Asian clam (*Potamorcorbula amurensis*) in the priority species list as well as other species identified in Ralph Elston's 1997 "Pathways and Management of Marine Nonindigenous Species" report
  - identify the role the Action Team played in providing funds on various ANS education and monitoring projects and the role the Puget Sound program plays in filling significant policy gaps in the prevention and control of ANS species in the Puget Sound Basin and in the shared waters with Canada
  - add a new task in 1A1 coordinating ANS management programs and activities within the Puget Sound Basin by implementing the *2000 Puget Sound Water Quality Management Plan* ANS program and ensure that actions to implement the state ANS plan are identified in the Action Team work plan for funding consideration

- in 2A add a task that includes reporting progress on tasks 2A4, 2A5, and 2A7 to the Puget Sound Council and the Action Team
- add the Action Team as a participant in task 4A1
- clarify whether people listed under “Public Review Information” reviewed the document or contributed to it
- add a description of the Puget Sound Water Quality Action and Council policy and planning role regarding the protection of Puget Sound biological integrity to appendix D.

Appendix C
Reported Nonnative Species of Washington

Freshwater Animals and Plants

List of Nonnative Freshwater Animal Species

Family	Common name	Species name	Reference
Class: Malacostraca (Crayfish, Crabs and Lobsters)			
	Japanese Mitten Crab	*Eriocheir japonica* (de Haan)	2
	Red Swamp Crayfish	*Procambarus clarkii* (Girard)	4
Class: Gastropoda (Freshwater Snails)			
	Chinese Mystery Snail	*Cipangopaludina chinensis malleata* (Reeve 1863)	6
	Japanese Mystery Snail	*Cipangopaludina japonicus* (Martens 1861)	1
	New Zealand Mudsnail	*Potamopyrgus antipodarum* (Gray 1843)	1
	Mimic Lymnaea	*Pseudosuccinea columella* (Say 1817)	1
	Big-Ear Radix	*Radix auricularia* (Linnaeus 1758)	1
Class: Bivalvia (Freshwater Clams and Mussels)			
	Asiatic clam	*Corbicula fluminea* (Müüller 1774)	1
	Asiatic clam	*Corbicula* sp.	1
Class: Osteichthyes (Fishes)			
Clupeidae (Herrings)	American Shad	*Alosa sapidissima*	8
Family: Salmonidae (Salmons, Trouts, Chars, Graylings, and Whitefishes)	Lake Whitefish	*Coregonus clupeaformis* (Mitchill)	8
	Golden Trout	*Oncorhynchus aquabonita* (Jordan)	8
	Lahontan Cutthroat Trout	*Oncorhynchus clarki henshawi* (Gill and Jordan)	8
	Atlantic Salmon	*Salmo salar* (Linnaeus)	8
	Brown Trout	*Salmo trutta* (Linnaeus)	8
	Brook Trout	*Salvelinus fontinalis* (Mitchill)	8
	Lake Trout	*Salvelinus namaycush* (Walbaum)	8
	Arctic Grayling	*Thymallus arcticus* (Pallas)	8

Family	Common name	Species name	Reference
Family: Esocidae (Pikes)	Grass Pickerel	*Esox americanus vermiculatus* (LeSueur)	8
	Northern Pike	*Esox lucius* (Linnaeus)	8
	Tiger Muskellunge (hybrid)	Hybrid of northern pike (*Esox lucius*) and muskellunge (*Esox masquinongy*)	8
Family: Cyprinidae (Minnows)	Goldfish	*Carassius auratus* (Linnaeus)	8
	Grass Carp (Triploid=sterile)	*Ctenopharyngodon idella* (Valenciennes)	8
	Common Carp	*Cyprinus carpio* (Linnaeus)	8
	Golden Shiner	*Notemigonus crysoleucas* (Mitchill)	8
	Fathead Minnow	*Pimephales promelas* (Rafinesque)	8
	Tench	*Tinca tinca* (Linnaeus)	8
Family: Cobitidae (Loaches)	Oriental Weatherfish	*Misgurnus anguillicaudatus* (Cantor)	8
Family: Ictaluridae (Catfishes)	Black Bullhead	*Ameiurus melas* (Rafinesque)	8
	Yellow Bullhead	*Ameiurus natalis* (LeSueur)	8
	Brown Bullhead	*Ameiurus nebulosus* (LeSueur)	8
	Blue Catfish ? (1999 WA. Fishing Guide)	*Ictalurus furcatus* (LeSueur)	7
	Channel Catfish	*Ictalurus punctatus* (Rafinesque)	8
	Tadpole Madtom	*Noturus gyrinus* (Mitchill)	8
	Flathead Catfish	*Pylodicticis olivaris* (Rafinesque)	8
Family: Cyprinodontidae (Killifishes)	Banded Killifish	*Fundulus diaphanus* (LeSueur)	8
Family: Poeciliidae (Livebearers)	Mosquitofish	*Gambusia affinis* (Baird and Girard)	8
Family: Percichthyidae (Temperate Basses)	Striped Bass	*Morone saxatilis* (Walbaum)	8
Family: Centrarchidae (Sunfishes)	Rock Bass	*Ambloplites rupestris* (Rafinesque)	8
	Green Sunfish	*Lepomis cyanellus* (Rafinesque)	8
	Pumpkinseed	*Lepomis gibbosus* (Linnaeus)	8
	Warmouth	*Lepomis gulosis* (Cuvier)	8
	Bluegill	*Lepomis macrochirus* (Rafinesque)	8
	Smallmouth Bass	*Micropterus dolomieui* (Lacepede)	8

Family	Common name	Species name	Reference
	Largemouth Bass	*Micropterus salmoides* (Lacepede)	8
	White Crappie	*Pomoxis annularis* (Rafinesque)	8
	Black Crappie	*Pomoxis nigromaculatus* (LeSueur)	8
Family: Percidae (Perches)	Yellow Perch	*Perca flavescens* (Mitchill)	8
	Walleye	*Stizostedion vitreum vitreum* (Mitchill)	8
Class: Amphibia (Amphibians)			
Family: Ranidae (True Frogs)	Bull Frog	*Rana catesbeiana*	3
	Green Frog	Rana clamitans	3
Class: Reptilia (Reptiles)			
Family: Chelydridae (Snapping Turtles)	Snapping Turtle	*Chelydra serpentina* (Linnaeus)	5
Family: Emydidae (Emydid Turtles)	Common Slider	*Trachemys scripta* (Schoepff)	5
Family: Trionychidae (Softshell Turtles)	Softshell Turtle	*Trionyx* spp.	6
Class: Mammalia (Mammals)			
Family: Myocastoridae (Mycastorid Rodents)	Nutria	*Myocastor coypus* (Molina)	

Table courtesy of Kevin Aitkin - U.S. Fish & Wildlife service

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6. Eric Warner, Muckleshoot Indian Tribe, pers. comm. (2000)
7. Washington Department of Fish and Wildlife. 1999. Washington Fishing Guide: Where to catch fish in the Evergreen State. Washington Department of Fish and Wildlife, Olympia, Washington.
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Descriptive Information on Freshwater Animal Species

These species are not known to be present in Washington, or have limited populations, but have a known potential for invasiveness. Appropriate management for these species includes prevention of introductions and eradication of pioneering populations.

Mitten Crab (*Eriocheir sinensis* and *Eriocheir Japonica*)

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 Japanese mitten crab was identified from the lower Columbia River near Astoria. 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 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 larvae will be carried by ocean currents to adjacent estuaries 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.

Dreissenia ssp.

Zebra Mussel (*Dreissena polymorpha*) and **Quagga mussel (*Dreissena bugensis*)**

General Information: The zebra mussel is a small freshwater bivalve mollusk native to the drainage basins of the Caspian, Black, and Aral seas of eastern Europe. Unlike native North American mussels, the zebra mussel has free–floating, planktonic larvae that can remain in the water column for up to four weeks before setting. This unique life history characteristic allows the larvae (veligers) to be transported for long distances in water currents, and for them to remain viable in standing water, such as that found in boat bilges and bait buckets for long periods of time. This characteristic facilitated their rapid expansion in western Europe in the 1800s and in North America in the last decade.

Zebra mussels have also demonstrated unusual adaptive ability when it comes to attachment substrate and colonization characteristics. They readily attach to any hard surface including natural objects like rock, gravel, course sand, aquatic vegetation, even other shellfish, and to manmade surfaces such as concrete, plastic, metal, and fiberglass. They form dense colonies of up to 75,000 individuals per square meter in areas where food is readily available. As a result, zebra mussels pose a significant clogging threat to any water conveyance structure including water intake and diversion screens at hydroelectric dams, agricultural, municipal and industrial water supplies, and fish hatcheries. They are also known to have serious impacts on fishways and navigation locks.

An adult zebra mussel is relatively small, reaching an average size of only about five centimeters. Their average life span is three to five years, but individuals can live up to 10 years. They often reach sexual maturity in their first year of life, and spawn continuously when water temperature exceed 55 degrees. Each female is capable of producing up to one million

eggs per year. Zebra mussels require good water quality, a plentiful supply of phytoplankton, and calcium levels above 25 ppm. Under these conditions, they can dramatically alter the ecosystem, eliminating native mussels and grazing most of the available plankton from the water column, severely altering the food chain and depressing populations of many culturally, recreationally and commercially important fish and wildlife species.

North American/Washington Distribution: The initial introduction of zebra mussels into North America is believed to have occurred in Lake St. Clair (Great Lakes Basin) sometime between 1986 and 1988. The most likely source of introduction being the discharge of freshwater ballast from an inland–based cargo ship trading in Europe. They have now become firmly established in all of the Great Lakes as well as the Mississippi, Hudson, Ohio and other major river drainages in twenty eastern states and two Canadian provinces, all east of the Continental Divide.

Zebra mussels have not yet become established in any water west of the Continental Divide to our current knowledge. California has inspected boats at agricultural border inspection stations since 1993, and have reported at least twenty five incidences to date of zebra mussels being transported on the hulls of large boats being transported into the state from the Great Lakes region.

There were unconfirmed reports of zebra mussels being observed by workers at two large Lake Washington boat yards in 1997. Several subsequent inspections of these vessels, and the surrounding lake bottom in 1997 did not produce any documented evidence of zebra mussel presence. However, based on these reliable reports, it is possible that Lake Washington has already been exposed to contamination by zebra mussels. As a result of an investigation of these reports, it was determined that there is an active boat resale market operating for large vessels purchased from the Great Lakes which are hauled by truck to Lake Washington for resale. Washington Department of Fish and Wildlife has entered into an agreement with the Washington State Patrol Commercial Vehicle Inspectors to inspect commercially hauled boats at the ports of entry. To date one boat with zebra mussels has been reported.

Pathways of Introduction: The most probable path of introduction for zebra mussels into Washington is either from adult mussels attached to the hull of boats transported from affected areas in the east, or from larvae found in untreated bilge water in these transported vessels. Since adult zebra mussels can live out of the water for up to four days, and veligers remain free–floating and almost undetectable in any water source for up to four weeks, it is very possible for live mussels to be transported from a freshwater port in the east to a freshwater port in Washington. The Columbia River and Lake Washington are the two most likely locations for such an introduction.

Another important pathway for a possible zebra mussel introduction is from the importation of live aquatic organisms, principally fish and plants, from affected areas. Grass carp and a number of other fish species, including tropical aquarium species, are commonly imported into

Washington from eastern states. The aquatic gardening industry also imports a significant number of aquatic plants. Zebra mussel adults or veligers are potential "hitchhikers" with these shipments.

Other potential vectors for zebra mussels include a direct ballast water introduction at a freshwater port facility, or an intentional introduction. Because of their effectiveness at filtering large quantities of water, there may be a temptation by some to use the zebra mussel to improve water clarity in lakes with large algal blooms resulting from non–point pollution.

Other Management Considerations: In the east, where zebra mussels have become established, they have been responsible for hundreds of millions of dollars in damage to all types of water dependant uses. They have been responsible for dramatic and irreversible changes to native ecosystems, resulting in the near extinction of some native species and a dramatic shift in the abundance and distribution of others.

A risk assessment completed by Washington Department of Fish and Wildlife in 1994 shows that zebra mussels would thrive in many Washington waters if they were introduced. The Columbia River and Lake Washington, two incredibly important environmental and economic waterways in this state, would both support heavy infestations of zebra mussels. The Columbia River, in particular, with its many dams, water diversions, pump screens, navigation locks, fishways, fish screens and hatcheries would be devastated by zebra mussel populations like those already observed in other regions of North America.

Asian or Asiatic clam (*Corbicula fluminea*)

The genus *Corbicula* is native to temperate to tropical southern Asia west to the eastern Mediterranean and Africa and south into central and eastern Australia. The first introduction in the U.S. was in the Columbia River near Knappton in 1938. The initial introduction was though to be deliberate, as a food item used by Chinese immigrants. It is now found in 38 states and the District of Columbia. The most prominent effect of the introduction of the Asiatic clam into the U.S. has been biofouling, especially of complex power plant and industrial water systems. It has also been documented to cause problems in irrigation canals and pipes and drinking water supplies. It alters benthic substrate, and competes with native species for limited resources. Estimated annual damage nationwide is about $1 billion.

New Zealand Mud Snail *(Potamopyrgus antipodarum)*

A native of New Zealand, but long established in Australia and Europe, this species was discovered in North America in 1987 in Idaho's Snake River. Between Shoshone Falls and the C.J.Strike Dam, population levels may exceed 100,000 snails per square meter. The snails have recently become established in the lower Columbia River near Astoria. Ballast water transfer is the suspected source of this species. However, birds and sport anglers may also be spreading this pest to additional drainages. Although no effects on native species have yet been observed, scientists are concerned about competition with native mollusks for resources and habitat because of the mud snail's high reproductive capacity.

Louisiana red swamp crayfish ***(Procambarus clarkii)***
The red swamp crayfish (*Procambarus clarkii*) has been found in Pine Lake near Seattle. This is a known invasive species sold by many biological supply companies and shipped into many states. It has greatly reduced local flora and fauna, increased turbidity, and lead to the loss of bird species in areas where it has been introduced. The crayfish measures about four inches long, has a bumpy shell, bright red pincers and red bellies. They burrow into nests near the water line and lay about 100 eggs at a time, about half of which hatch. They winter over by burrowing in just below the water line. The swamp crayfish is native to Louisiana, where some 60 million are farmed each year. It has been introduced in several states for aquacultural purposes. It is also popular with aquarium hobbiests, and for use as live bait by fishermen. The crayfish are very hardy, and there is no doubt they will reproduce. They compete with native species for food sources such as snails, small plants, tadpoles and bottom feeding insects.

Whirling Disease ***(Myxobolus cerebralis)***
Whirling disease is a protozoan parasite that affects the nervous system of trout and salmonid species. This parasite has a two-host life cycle: fish and a common aquatic worm. A free-swimming stage enters young fish where it attacks their cartilage. This parasite was first introduced to the United States from Europe in the 1950s, probably in infected trout. The disease spread as these infected trout were distributed among hatcheries or were stocked in open waters. The disease now occurs in the wild in 11 states. While whirling disease is not a major problem in eastern states, it is severe in some western states, and has decimated some trout populations. So far its severe damage has been primarily to wild rainbow trout, although other salmonid species can become infected. The rainbow trout population in the Madison River (MT) has declined by 90% since the introduction of whirling disease. Although several states are spending tens of millions of dollars annually to control whirling disease, no national or international cost estimates have been established. Whirling disease exists in several watersheds in Oregon.

Round Goby ***(Neogobius melanostomus)***
The round goby was introduced, via ballast water, into the vicinity of the St. Clair River sometime in the late 1980's. In areas where the goby has become abundant, numbers of native fish have declined. In laboratory experiments by Marsden and Jude the goby was found to prey on lake trout eggs, fry, darters and other small fish. The potential range of the goby includes Washington.

Nonnative fish (rainbow, brook and brown trout, American Shad, common carp, bass, walleye, and other warmwater species), amphibians (bullfrogs),and other vertebrates (nutria)
Several species have been introduced, both intentionally and unintentionally, into Washington and are well established in some areas. The impacts of introduced fishes on native fish species include predation, introduction of disease and parasites, competition for food and habitat, and hybridization. While many introduced fish species are the basis of recreational fisheries that

provide substantial economic benefits to local economies, management should be directed at limiting their spread into waters where they currently do not occur.

List of Nonnative Freshwater Plants

Common Name	Scientific Name	Habitat	WSNWCB Status	WDOA Status
Plants that are currently causing problems in Washington				
Brazilian Elodea	*Egeria densa*	Submersed species	State listed noxious weed	On the Prohibited List
Eurasian Watermilfoil	*Myriophyllum spicatum*	Submersed species	State listed noxious weed	On the Prohibited List
Fanwort	*Cabomba caroliniana*	submersed species	State listed noxious weed	On the Prohibited List
Fragrant waterlily	*Nymphaea odorata*	Floating leaved in shallow water		
Garden Loosestrife	*Lysimachia vulgaris*	Wet areas and along shorelines	State listed noxious weed	On the Prohibited List
Giant Hogweed	*Heraceum mantegazzianum*	Grows in wet areas	State listed noxious weed	On the Prohibited List
Hydrilla	*Hydrilla verticillata*	Submersed species	State listed noxious weed	On the Prohibited List
Indigo Bush	*Amorpha fruticosa*	Grows along stream corridors	State listed noxious weed	On the Prohibited List
Japanese Knotweed	*Polygonum cuspidatum*	Wet areas	State listed noxious weed	
Parrotfeather	*myriophyllum aquaticum*	Mat–forming emergent grows along lake and river shorelines	State listed noxious weed	On the Prohibited List
Purple Loosestrife	*Lythrum salicaria*	Wet areas, freshwater to brackish wetlands	State listed noxious weed	On the Prohibited List
Reed Canary Grass	*Phalaris arundinacea*	Wet areas from freshwater wetland, streambanks, wet meadows	State listed noxious weed	
Saltcedar	*Tamarix ramosissima*	Wet areas	State listed noxious weed	On the Prohibited List

Common Name	Scientific Name	Habitat	WSNWCB Status	WDOA Status
Swollen Bladderwort	*Utricularia inflata*	Floating species with no roots		On the Prohibited List
Wand Loosestrife	*Lythrum vargatum*	Wet areas, wetlands	State listed noxious weed	On the Prohibited List
Water primrose	*Ludwigia hexapetala*	Mat–forming emergent species	State listed noxious weed	On the Prohibited List
Water Starwort	*Callitriche stagnalis*	Submersed to emergent plant		
Yellow Floating Heart	*Nymphoides peltata*	Floating leaved in shallow water	State listed noxious weed	On the Prohibited List
Yellow Iris	*Irsi pseudacorus*	Emergent along lake and river shorelines		
Plants with Apparent Limited Distribution and Weedy Potential				
African elodia	*Lagarosiphon major*	Submersed species		On the Prohibited List
Bur Arrowhead	*Sagittaria rigida*	emergent – wet areas	Not currently listed	Not currently listed
Cattail	*Typha angustifolia*	emergent, shoreline plant	Not currently listed	Not currently listed
Hairy willow herb	*Epilobium hirsutum*	shorelines, muddy soils	Not currently listed	On the Prohibited List
European frog-bit	*Hydrocharis morsus-rana*	free-floating plant		On the Prohibited List
Flowering Rush	*Butomus umbellatus*	shorelines	Not currently listed	On the Prohibited List
Marsh dew flower, Asian spiderwort, Aneilima	*Murdannia keisak*	shorelines -wet areas		On the Prohibited List
Slender-leaved or brittle naiad	*Najas minor*	submersed		On the Prohibited List
Slender or grass-leafed Arrowhead	*Sagittaria graminea*	emergent – wet areas	Not currently listed	On the Prohibited List
Water chestnut, bull nut	*Trapa natans*	submersed or floating		On the Prohibited List
Species of Concern Being Sold in Washington, But Not Established in the Wild				
Asian Anacharis	*Egeria najas*	submersed species (sold as an aquarium plant)	Not currently listed	Not currently listed

Common Name	Scientific Name	Habitat	WSNWCB Status	WDOA Status
Water Hyacinth	*Eichornia spp.*	floating plant with dangling roots (sold as an aquatic garden plant)	Not currently listed	Not currently listed
Introduced Plant Species, But Not Causing Problems				
Black Nightshade	*Solanum nigrum*	shorelines – wet areas	Not currently listed	Not currently listed
Bulbous Rush	*Juncus bulbosus*	shallow water	Not currently listed	Not currently listed
Climbing Nightshade	*Solanum dulcamara*	shorelines – wet areas	Not currently listed	Not currently listed
Common Forget Me Not	*Myosotis scorpioides*	wet areas	Not currently listed	Not currently listed
Curly Leaf Pondweed	*Potamogeton crispus*	submersed	Not currently listed	Not currently listed
Marsh Pepper	*Polygonum hydropiper*	shorelines	Not currently listed	Not currently listed
Pennywort	*Lysimachia nummularia*	wet areas - shorelines	Not currently listed	Not currently listed
Tapegrass	*Vallisneria americana*	(intentionally introduced for habitat)	Not currently listed	Not currently listed
Water Cress	*Nasturtium officinale*	cold water streams	Not currently listed	Not currently listed
Wild Rice	*Zizania aquatica*	emergent	Not currently listed	Not currently listed

WDOA - Washington Department of Agriculture; WSNWCB - Washington State Noxious Weed Control Board

Descriptive Information on Freshwater Plant 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 State 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 nonnative 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.

Hydrilla (*Hydrilla verticillata*)

Monecious *Hydrilla verticillata* was discovered in Pipe Lake and Lake Lucerne in King County in May 1995. When discovered, the population of hydrilla was well established throughout these lakes. The two lakes are connected via a narrow channel so there appears to have been only one original introduction. Because there is a patch of hybrid waterlilies (*Nymphaea spp.*) in the lake, we suspect that hydrilla was introduced as a contaminant on the waterlily rhizomes. This is the northernmost introduction of hydrilla in North America and the only known introduction of this species in the Pacific Northwest. Surveys of nearby lakes show that hydrilla is confined to this location within King County. Annual statewide surveys from 1994 have not detected other hydrilla populations in Washington. Both Pipe Lake and Lake Lucerne are privately owned lakes. There is no public access and only electric motors are allowed. We believe these factors help keep hydrilla confined to this lake system.

Because of problems caused by hydrilla elsewhere in the United States, Washington State and King County initiated an eradication program for hydrilla. To date, the project has cost several hundred–thousand dollars. Hydrilla is proving more difficult to manage than Eurasian watermilfoil, because in addition to propagating via fragmentation, it also reproduces through the formation of subterranean turions (tubers), overwintering buds called turions, and by seed (potentially, but not considered to be an important mode of reproduction). The tubers appear to be long–lived in the sediment. There was hydrilla germination from tubers after three years of herbicide treatment. The lakes were treated with the aquatic herbicide Sonar in 1995, 1996, and

1997, and we anticipate the project continuing for several years until eradication is achieved and we find no more hydrilla for at least three years.

Hydrilla is a Class A weed on the State Noxious Weed List and it is on the Washington State Department of AgricultureQuarantine List.

Brazilian Elodea (*Egeria densa*)

Egeria densa is best known as anacharis, a South American species that is a widely sold aquarium plant. There are records of Brazilian elodea from Long Lake, Kitsap County from the early 1970s. We do not know if it was present in Washington prior to that date. In 1997, Brazilian elodea was known from 15 locations, all within western Washington. Because of the pattern of distribution within the state, we believe that most introductions occurred when aquarium contents were discarded into lakes. Some introductions probably also occurred from boat transport from an infested lake into an uninfested waterbody. Because all Brazilian elodea plants in the United States are male, reproduction occurs primarily through the formation of fragments and also by rhizome spread. Brazilian elodea also can form hardened–overwintering structures on the ends of rhizomes, making this plant resistant to herbicide treatment. Brazilian elodea grows very densely, filling the water column with vegetation and displacing native species. Economic impacts are mainly to lake residents and local and state governments as control costs. Up to several hundred–thousand dollars per year is spent on managing the growth of this problematic species. Although resistant to herbicide treatment, Brazilian elodea is a preferred forage species for triploid grass carp. Brazilian elodea appears to have been eradicated in Silver Lake, Cowlitz County by triploid grass carp.

Brazilian elodea is a class B weed on the State Noxious Weed List and it is on the Washington State Department of AgricultureQuarantine List.

Parrotfeather (*Myriophyllum aquaticum*)

Myriophyllum aquaticum or parrotfeather milfoil is a South American species that has been extensively sold throughout the United States as an aquatic garden plant and also as an aquarium plant. Parrotfeather has extremely attractive emergent vegetation that makes it a desirable water garden plant. There are herbarium records for parrotfeather as early as 1944 in southwestern Washington. We suspect that parrotfeather was introduced as a garden plant and escaped via flooding or by being deliberately planted. Its current distribution is confined to western Washington. It has been known to overwinter in winter climates more harsh than eastern Washington, so it could survive if introduced there.

Parrotfeather grows as a sprawling mat in shallow water or muddy banks and has up to a foot of bright green emergent growth from tough rhizomes. It forms dense monotypic stands and alters water chemistry. Because all parrotfeather plants in the United States are female, parrotfeather does not reproduce by seed. It, too, forms viable fragments and also spreads via its tough rhizomes. It is very resistant to herbicide treatment and is not palatable to triploid grass carp. Parrotfeather has infested drainage canals in southwestern Washington and diking districts

spend about $100,000 per year managing its growth. Parrotfeather is a potential threat to the extensive irrigation canals in eastern Washington.

Parrotfeather is a class B weed on the State Noxious Weed List and is on the Washington State Department of AgricultureQuarantine List.

Water Chestnut ***(Trapa natans)***
Water chestnut, scientific name (Trapa natans L.), is an annual aquatic plant, with both surfacing and submersed leaves. Surfacing leaves are triangular with toothed edges and an inflated petiole, or leaf stalk, and form a rosette on the water surface. Submersed leaves are feather-like; each leaf is divided into segments that are whorled around the leaf stem. White flowers form in the axils of the surfacing leaves in July. Fruit are nut-like and "woody" with typically four sharp, barbed spines that are sharp enough to penetrate shoe leather. Long cord-like rarely branching stems can attain lengths of up to 16 feet, forming dense floating mats and making the waters inaccessible to boaters. This noxious plant also severely limits the passage light into the water, a critical element of a well-functioning aquatic ecosystem, reduces oxygen levels which may increase the potential for fish kills, out competes native vegetation and is of little value to wildfowl. Water chestnut grows in freshwater lakes and ponds and slow moving streams and rivers. It prefers calm, shallow, nutrient-rich waters. A true annual, water chestnut reproduces by overwintering seeds. Single-seeded woody nut like seed pods produced from pollinated flowers the previous year germinate in early spring. A single seed pod may give rise to 10 to15 plant rosettes. Each rosette can produce up to 15 to 20 seeds. Ungerminated seeds may remain viable for up to 12 years. However, most seeds probably germinate in the first two years. (Vermont Agency of Natural Resources Website). This plant would do well if introduced into Washington Waters. It is listed on the aquatic plant and weed quarantine list.

Descriptive Information on Freshwater Plant Species of Concern

These species are not known to be present in Washington, or have limited populations, but have a known potential for invasiveness. Appropriate management for these species includes prevention of introductions and eradication of pioneering populations.

Water Hyacinth ***(Eichornia crassipes)***
Water hyacinth is native to the American tropics, probably originating in the swamps associated with the great river systems of northern and central South America. It reproduces mostly by clonal propagation, but seeds also play a role in its survival and colonization. Massive colonies can grow when introduced into areas where disruption in the natural ecological balance by human activities such as impounding of flowing waters by dams, channeling and allowing the buildup of eutrophication has occurred. The plant is able to grow under a wide range of nutrient and environmental conditions, and develops at an astounding rate, effectively out-competing other native aquatics. This rapid growth can result in huge amounts of biomass, impacting water

quality. Excessive infestation by this weed can affect accesses to water, navigation, irrigation and fisheries.

Water Hyacinth is often found in the Columbia River sloughs near Longview; the source of the plants is unknown. Natural reproduction is possible, as recently, a robust stand of water hyacinth was found in a cooling-water pond in Vancouver, Washington. The plant has a high potential for invasiveness, although it may not be able to winter over in most Washington waters.

Giant salvinia ***(Salvinia molesta)***
Giant salvinia is a free-floating aquatic fern with submerged leaves that act as modified roots. As plants mature and aggregate into mats the leaves fold and compress into upright chains. The plant grows rapidly to cover the surface of lakes and streams, spreading by fragmenting. The thick floating mats shade and crowd out important native plants, reduce oxygen content, and degrade water quality for fish and other organisms. Mats up to three feet thick have been reported, which hinders management by chemical control. Giant salvinia can clog water intakes for irrigation and electrical generation. It is easily carried overland on anything that has entered infested waters, including boats, trailers, vehicle wheels, intakes and gear.

Giant salvinia is native to Brazil, and was introduced as an ornamental pond plant. It has spread to six states in the U.S., and its expected range includes USDA hardiness zone 8. The plant has the potential to invade Washington Water bodies, causing severe ecological and economic problems. It may be able to winter over in some eastern Washington lakes. At present, the Washington Department of Agriculture feels that there are no lakes with water temperatures high enough (70 to 80 degrees C) to promote the rapid growth that makes the plant so invasive.

Descriptive Information on Freshwater Emergent Plant Species

Purple Loosestrife (*Lythrum salicaria*)
Purple loosestrife (*Lythrum salicaria*) is classified on the Washington State Noxious Weed List as a Class B Designate species and is on the Washington Department of Agriculture Quarantine List. Control is designated in all areas of Washington except a small part of central Grant County. Purple loosestrife is a large perennial plant, which grows in and along water bodies, wetlands and areas with high watertables in many counties throughout Washington. It is very dominant, forming monocultures and displacing desirable wetland species. It grows six to ten feet tall from a woody root crown, produces ten to fifty stems, many purple flowers during July to September, more than one million very small seeds per plant, and dies back to the root crown in late fall. Purple loosestrife does not produce rhizomes but readily re–sprouts from its woody root crown and larger broken off root fragments. It has little tolerance for overhead shade from trees, one of its few weaknesses. Being an attractive plant it has sometimes been transplanted

by gardeners. However, the current Washington State Department of Agriculture quarantine on movement of seed or plant material will help eliminate this problem.

Dense stands of purple loosestrife have very little or no wildlife value, displace desirable habitat features, and may reduce shallow water habitats for fish. They also nearly eliminate shoreline recreational values. Once established, this plant is very difficult to eliminate.

Purple loosestrife can invade even undisturbed herbaceous plant communities. It usually gets established as one plant and maintains at this level for two to five or more years. During this time it builds a seed bank in adjacent soil. When unknown conditions occur, it will start spreading, and in a few years can occupy most sites, where adapted, in a given area. Once established as a large stand, soil seed reserves quickly accumulate. This assures continuation of an infestation for at least six years, even with active control of seedlings and adult plants, and no additional seed production. Seed transport can occur in water, become attached to animals, birds, boats, trailers, people or anything that moves through an area when seeds are being cast. Seeds have no mechanical attachment mechanism, but are very tiny and adhere easily to wet surfaces.

Purple loosestrife can also spread vegetatively by broken off plant parts. Any live stem or part of a stem has the ability to sprout roots and top growth from each node, if it lands in a moist environment. These can quickly develop new plants (e.g., farther down stream in an uninfested area). Plant parts can also be carried on boat, trailers or other vehicles. However, this is not so likely as with true aquatic weed species.

Control is usually done with "Rodeo" herbicide from early summer to early fall. This herbicide is effective with full plant coverage. Selectivity can be achieved by application to maintain adjacent desirable plants. Mowing can be used, but is usually not possible in shoreline or wet land situations. Bio–control may be successful with use of three insects specific to this species including: *Nanophyes sp.* a flower feeding weevil, *Hylobius sp.* a root boring weevil, and *Hylobius sp.* a leaf feeding beetle. *Hylobius* has been effective in Grant County, Washington and in western Oregon.

Saltcedar (*Tamarix ramosissima*)

Saltcedar is an aggressive multi–stemmed shrub or small tree (5 to 20 feet tall) growing along stream banks, wetlands, or areas with a high watertable. It produces very small, scale like leaves, which are deciduous. Flowering starts in May or June, with seed production quickly following. Reproduction is mostly by very tiny seeds, that could be wind blown or carried by birds or animals. New plants can start vegetatively from broken off branches which fall in a moist environment. Root sprouting is also common, particularly if the main shoots are damaged. Seedlings usually sprout at the waters edge or in saturated soil. They grow slowly at first, but become very competitive with existing vegetation.

Once established, saltcedar is a high water user and its roots can follow water to great depths. It has been known to reduce stream flows and dry up springs and wetlands. This characteristic gives it an additional competitive advantage over other established plants.

Saltcedar has a very high tolerance for soil salinity. It also takes up salts, which pass through the plant, and are secreted by leaves on to the soil under the canopy spread. This increases surface salinity, often beyond competing or understory vegetation tolerance. This and other strong competitive advantages result in mono–culture stands of saltcedar, greatly reducing wildlife habitat values.

Saltcedar has spread extensively throughout the southwest United States along river and stream channels, lake shores and similar areas, where it eliminates diverse riparian plant communities, including trees and understory plants. This greatly lowers wildlife habitat values of areas which should support high species diversity and abundance. In Washington, saltcedar is currently established only in a limited area in parts of Grant, Adams, Franklin, and Benton Counties. Saltcedar is classified on the Washington State Noxious Weed List as a Class C Weed. This is likely to be re–evaluated to a B–Designate species, where it currently occurs in the south central Columbia Basin.

Common Reed ***(Phragmites australis) or (Phragmites communis)***
Phragmites is a feather-topped perennial grass that tends to take over disturbed marsh or wetland areas. The plant does well in both freshwater and marine areas. It is thought to be native to New England, with specimens having been found in 3000-year-old saltmarsh peat cores in Connecticut. Others contend it is a European import. A varigated-leaf form of the reed is often grown as an ornamental. The plant is highly invasive and spreads at an incredible rate, by a variety of methods. The plant forms fluffy seed heads, shoots that fall over act as horizontal runners, and the rhizomes (tuberous roots) act as horizontal underground stems. The plant has been known to raise the soil levels by as much as nine millimeters a year as it builds up The plant is difficult to eradicate. Cutting and burning seems to invigorate the plants, and disking chops it up into bits, each of which can produce a new plant. Herbicides like Rodeo will kill it. However, a few surviving shoots will rapidly take over again. To remove it from an acre or two of disturbed wetland, and prevent its return, is a major endeavor likely to consume hundreds of man-hours.

Marine Animals and Plants

Nonnative Marine Species of Washington State and British Columbia, Canada

Division or Phylum	Scientific name/Common name	Natural range	Reference
Plant List			
Chlorophyta	*Codium fragile tomentosoides* dead man's fingers	Japan	a

Division or Phylum	Scientific name/Common name	Natural range	Reference
Diatomacea	*Pseudonitzchia australis*	Australasia	a
Phaeophyta	*Sargassum muticum* Japanese weed	Japan	a, b
Rhodophyta	*Gelidium vagum*	NW Atlantic	a, b
Rhodophyta	*Lomentaria hakodatensis*	Japan	a, b
Angiosperm	*Spartina alterniflora* smooth cordgrass	NW Atlantic	a
Angiosperm	*Spartina Anglica*	England	d
Angiosperm	*Spartina Patens*	NW Atlantic	d
Angiosperm	*Zostera japonica* Japanese eelgrass	Japan	a, b
Animal List			
Amoebae (Rhizopoda)	*Forminifera Trochammina hadai*	Japan	d
Porifera	*Cliona spp.* boring sponge	N Atlantic?	#, a
Porifera	*Halichondria bowerbanki* Bowerbank's halichondria	N Atlantic	a, b
Porifera	*Microciona prolifera* red beard sponge	NW Atlantic	a, b
Cnidaria (Hydrozoa)	*Bougainvillia muscus* (=B.ramosa)	N Atlantic	d
Cnidaria (Hydrozoa)	*Cladonema radiatum*	NW Atlantic	d
Cnidaria (Hydrozoa)	*Cordylophora caspia* freshwater hydroid	Black and Caspian Seas	a
Cnidaria (Hydrozoa)	*Obelia spp.*	N Atlantic	#, a
Cnidaria (Scyphozoa)	*Aurelia labiata*	N Pacific	d
Cnidaria (Anthozoa)	*Diadumene lineata*	Asia	d
Cnidaria (Anthozoa)	*Haliplanella luciae* orange–striped green anemone	Japan	a, b
Cnidaria (Anthozoa)	*Nematostella vectensis*	cosmopolitan	d
Platyhelmenthes (Turbellaria)	*Pseudostylochus ostreophagus*	Japan	a, b
Annelida (Oligochaeta)	*Limnodriloides monothecus*	NW Atlantic	#, a
Annelida (Oligochaeta)	*Paranais frici*	Black and Caspian Seas	#, a
Annelida (Oligochaeta)	*Tanais spp.*	?	c
Annelida (Oligochaeta)	*Tubificoides apectinatus*	N Atlantic	#, a
Annelida (Polychaeta)	*Capitella capitata*	?	c
Annelida (Polychaeta)	*Capitella spp*	N Atlantic? W Pacific?	#, a

Division or Phylum	Scientific name/Common name	Natural range	Reference
Annelida (Polychaeta)	*Heteromastus filiformis*	NW Atlantic	a
Annelida (Polychaeta)	*Hobsonia florida*	?	c
Annelida (Polychaeta)	*Neanthes succinea*	(cosmopolitan)	d
Annelida (Polychaeta)	*Pionosyllis uraga*	N Atlantic	a, b
Annelida (Polychaeta)	*Polydora cornuta* (=ligni) mudworm	N Atlantic	a, b
Annelida (Polychaeta)	*Pseudopolydora kempi*	Indian Ocean? NW Pacific?	a
Annelida (Polychaeta)	*Pseudopolydora paucibranchiata*	Japan	d
Annelida (Polychaeta)	*Pygospio elegans*	?	c
Annelida (Polychaeta)	*Streblospio benedicti*	Atlantic	a, b, c
Annelida (Polychaeta)	*Tharyx tessalata*	Atlantic	a, b
Mollusca (Gastropoda, Opisthobranchia)	*Cumanotus beaumonti* polyp aeolis	NW Atlantic	#, a
Mollusca (Gastropoda, Prosobranchia)	*Batillaria cumingi*	?	b
Mollusca (Gastropoda, Prosobranchia)	*Batillaria zonalis* (=attramentaria or *B. cumingi*) Japanese false cerith	NW Pacific	a
Mollusca (Gastropoda, Prosobranchia)	*Cecina manchurica*	NW Pacific	a
Mollusca (Gastropoda, Prosobranchia)	*Ceratostoma inornatum* Japanese oyster drill	NW Pacific	a, b
Mollusca (Gastropoda, Prosobranchia)	*Crepidula fornicata* Atlantic slipper	NW Atlantic	a, b
Mollusca (Gastropoda, Prosobranchia)	*Crepidula plana* e. white slipper shell	NW Atlantic	a
Mollusca (Gastropoda, Prosobranchia)	*Nassarius obsoletus* (=Ilyannassa obsoleta) Eastern mud snail	NW Atlantic	a, b
Mollusca (Gastropoda, Prosobranchia)	*Nassarius fraterculus* Japanese nassa	NW Pacific	a
Mollusca (Gastropoda, Prosobranchia)	*Ocenebra inornata* (=japonica) Japanese hornmouth	Japan	a, b
Mollusca (Gastropoda, Prosobranchia)	*Potamopyrgus antipodarum* New Zealand mud snail	New Zealand	a
Mollusca(Gastropoda, Prosobranchia)	*Purpura clavigera*	?	b
Mollusca (Gastropoda, Prosobranchia)	*Urosalpinx cinerea* Atlantic oyster drill	NW Atlantic	a, b

Division or Phylum	Scientific name/Common name	Natural range	Reference
Mollusca (Gastropoda, Pulmonata)	*Myosotella myosotis* (=Ovatella)	Europe?	a
Mollusca (Bivalvia)	*Corbicula fluminea* Asian clam	China, Korea, Japan	a
Mollusca (Bivalvia)	*Crassostrea gigas* Japanese oyster (a) Pacific oyster (b)	Japan	a, b
Mollusca (Bivalvia)	*Crassostrea virginica* Eastern oyster (a) American oyster (b)	NW Atlantic	a, b
Mollusca (Bivalvia)	*Gemma gemma*	?	b
Mollusca (Bivalvia)	*Musculista senhousia* Japanese mussel	Japan, China	a, b
Mollusca (Bivalvia)	*Mya arenaria* softshell clam	N Atlantic	a, b
Mollusca (Bivalvia)	*Mytilus complex* blue mussel	N Atlantic	b
Mollusca (Bivalvia)	*Mytilus galloprovincialis*	NE Atlantic, Mediterranean	d
Mollusca (Bivalvia)	*Nuttallia obscura* dark mahogany or purple varnish clam	Japan? Korea?	a, b
Mollusca (Bivalvia)	*Petricola pholadiformis* false angelwing	NW Atlantic	a
Mollusca (Bivalvia)	*Teredo navalis* naval shipworm	Atlantic	a, b
Mollusca (Bivalvia)	*Trapezium liratum* Japanese trapezium	NW Pacific	a, b
Mollusca (Bivalvia)	*Venerupis philippinarum* Japanese littleneck clam	W Pacific	a, b
Arthropoda (Amphipoda)	*Ampithoe valida*	NW Atlantic	a
Arthropoda (Amphipoda)	*Caprella mutica*	Sea of Japan	d
Arthropoda (Amphipoda)	*Chelura terebrans*	Atlantic	a
Arthropoda (Amphipoda)	*Corophium acherusicum*	N Atlantic	a
Arthropoda (Amphipoda)	*Corophium insidiosum*	N Atlantic	a, c
Arthropoda (Amphipoda)	*Eochelidium sp.*	Japan, Korea	d
Arthropoda (Amphipoda)	*Grandidierella japonica*	Japan	c
Arthropoda (Amphipoda)	*Jassa marmorata*	NW Atlantic	d
Arthropoda (Amphipoda)	*Melita nitida*	NW Atlantic	a
Arthropoda (Amphipoda)	*Parapleustes derzhavini*	W Pacific	d

Division or Phylum	Scientific name/Common name	Natural range	Reference
Arthropoda (Copepoda)	*Choniostomatid copepod*	?	D
Arthropoda (Copepoda)	*Mytilicola orientalis*	W Pacific	a, b
Arthropoda (Copepoda)	*Nippoleucon hinumensis*	?	c
Arthropoda (Copepoda)	*Pseudodiaptomus inopinus*	Asian N Pacific	d
Arthropoda(Cirripedia)	*Balanus improvisus* bay barnacle	N Atlantic	a
Arthropoda (Decapoda)	*Exopalaemon modestus*	China, Korea, Russia?	a
Arthropoda (Decapoda)	*Homarus americanus* American lobster	Atlantic	b
Arthropoda (Isopoda)	*Limnoria tripunctata* gribble	Atlantic	a, b
Kamptozoa	*Barentsia benedeni*	Europe	#, a
Bryozoa (Ectoprocta)	*Bowerbankia gracilis* creeping bryozoan	NW Atlantic?	#, a
Bryozoa (Ectoprocta)	*Bugula sp 1 and sp 2*	?	d
Bryozoa (Ectoprocta)	*Bugula stolonifera*	NW Atlantic	d
Bryozoa (Ectoprocta)	*Cryptosula pallasiana*	N Atlantic	a
Bryozoa (Ectoprocta)	*Schizoporella unicornis*	NW Pacific	a
Chordata (Tunicata)	*Botrylloides violaceus*	Japan	d
Chordata (Tunicata)	*Botryllus schlosseri*	NE Atlantic	d
Chordata (Tunicata)	*Ciona intestinalis*	N Atlantic	a
Chordata (Tunicata)	*Ciona savignyi*	Japan	d
Chordata (Tunicata)	*Styela clava*	N China to Okhotsk Sea	#, a
Chordata (Tunicata)	*Molgula manhattensis*	NW Atlantic	d
Chordata (Fish)	*Salmo salar* Atlantic salmon	Atlantic	a, b

Species present in Kozloff(1987) and probably established in NW, but locality requires further confirmation.

a Ruiz, G. M. and Hines, A. H. 1997. The risk of nonnative species invasion in Prince William Sound associated with oil tanker traffic and ballast water management: pilot study. Prepared for the Regional Citizens' Advisory Council of Prince William Sound, P.O. Box 3089, Valdez, Alaska 99686. 47 pp plus figures and tables. Table 1 includes only those nonnative species identified in the NW region (Washington and British Columbia) from table _ of Ruiz and Hines (1997).

b Jamieson, Glen. Exotics noted for BC waters. Not exhaustive.

c Zipperer, Victoria Teresia. 1996. Ecological Effects of the Introduced Cordgrass, Spartina alterniflora, on the Benthic Community Structure of Willapa Bay, Washington. Master's Thesis, University of Washington, School of Fisheries.

d Mills, Claudia 1998 Puget Sound Expedition **http://faculty.washington.edu/cemills/PSrecords.html**

Descriptive Information on Marine Plant Species

Smooth Cordgrass (*Spartina alterniflora*)

Spartina is a large (2 to 5 feet tall) rhizomatous grass which grow in saltwater tide flats and estuaries. This plant has tall course culms and leaves that die back to the root crown each winter. It often gets established as a single seedling and expands vegetatively in a distinctive circular clone. Smooth Cordgrass produces little seed with relatively low viability. Seed distribution probably occurs through transport by water or birds to new locations. It is classified by the Washington State Noxious Weed List as a B, B–Designate species.

This plant is native to the eastern coast of both North and South America. It has become established along some Pacific coastlines in North America, where it becomes an aggressive dominant plant. It grows in mud, sand, and cobble substrates, in areas where tides move in and out each day. No species from the *Spartina* genus are native to the Washington coast. Smooth Cordgrass grows in tideflats where little or no vegetation normally occurs. There is little competition to the establishing seedlings. As they develop into circular clones, roots and top growth collect and stabilize silt moving by tidal action. This raises the clone's elevation above the adjacent tideflat. As a number of colones began to merge into one large cordgrass meadow monoculture, the amount of silt collected is enough to change that site into high meadow. When this occurs site conditions are changed dramatically taking out native eelgrass and eliminating highly productive tideflats. This takes reduces habitat for shore birds and wading birds, waterfowl, fish and other wildlife dependent on food produced in nonvegetated intertidal areas

Largest infestations of this species occurs in Willapa Bay in Pacific County. In adjacent Grays Harbor Bay some seedlings and small clones have been found and treated. This area has no know infestations now, but will require constant monitoring to ensure cordgrass is not allowed to establish here.

Common Cordgrass (*Spartina anglica*)

This species of cordgrass is a rhizomatous, perennial, with stout culms and narrow leaves. It may grow from one foot to over three feet tall on various substrates from clay or muck to sandy sites. Common cordgrass is a hybrid which has resulted from the crossing of *S. maritima* and *S. alterniflora*, so its form is variable, but it produces viable seeds. It occurs on tideflats, in estuaries and river mouths, and along other saltwater shorelines. Monocultures develop rapidly from established plants by extension of rhizomes, eliminating other desirable species like

eelgrass. It often gets started on inter–tidal areas where no other native vegetation occurs, so little competition available to limit this plants spread.

It is native to the east coast of both North and South America, but has been planted widely as shoreline stabilization and livestock forage along the coasts of England, New Zealand, and in other areas.

Common cordgrass is a very efficient silt collector of tidally moved material. Gently sloping tideflats can quickly be turned into upland sites, which eliminates the production of invertebrates and other food sources for fish, waterfowl, shore and wading birds, and other wildlife. When these meadows form, it also affects water flow patterns of other plant communities, further changing their habitat values.

Spartina anglica is classified on the Washington State Noxious Weed List as a Class B–Designate species in Whatcom, Skagit, Snohomish, and Island Counties. It may be found in other counties which front on saltwater areas.

Brown Alga ***(Sargassum muticum)***
Brown Alga was first reported in Willapa Bay in 1953 as a pest in commercial oyster beds, and is now common along the Pacific Northwest coastal region. The alga grows very rapidly and tolerates a wide range of environmental conditions. It tends to form large canopies, and has the potential to affect ecological communities and possibly displaces some native algae. Aside from hand pulling in commercial oyster beds no management activities have been undertaken.

Japanese Eelgrass or Sea Grass ***(Zostera japonica)***
Japanese eelgrass is thought to have been introduced as live packing material for Pacific seed oysters shipped from Asia to Washington until the mid 1970's. Some wildlife managers consider the sea grass to have beneficial uses as occurs high on the intertidal area and is thus more accessible than native sea grasses to herbivorous birds, etc. It provides habitat and food for herbivorous invertebrates and may also provide food chain support and shelter for some fisheries. However, interactions of native and Japanese sea grasses and patterns of natural or anthropogenic disturbance are not fully known or understood. It is though that *Z. japonica* may facilitate invasion by *Spartina spp* and that it may interfere with oyster ground culture operations in some areas.

Culerpa ***(Caulerpa taxifolia)***
Caulerpa is a green alga native to tropical waters that typically grows in small, isolated patches. It is popular as an aquarium species. In the mid 1980's this species was released or escaped from the Oceanographic Museum of Monaco and began to rapidly spread. Today the infestation near the museum covers many thousands of acres, and has spread to France and Spain and the northwestern Mediterranean. Small populations have been found in California a lagoon near Carlsbad and in Huntington Harbor. Intensive management actions are underway. It is thought that coastal water temperatures may limit the spread to Northern California or Southern Oregon.

Descriptive Information on Marine Animal Species

European Green Crab (*Carcinus maenas*)

General Information: The European green crab (*Carcinus maenas*) is a small shore crab (adults measure about 3" across) whose native distribution is along the coasts of the North and Baltic Seas. Although known by the common name of green crab, the shell (carapace) color can vary from dark, mottled green to orange or red, with yellow patches on the dorsal carapace. The crab is an able and effective forager—capable of learning and improving upon its food gathering skills. Studies have shown that the green crab is quicker and more dexterous than most crabs, and can open bivalve shells in more ways than other crabs. One adult crab reportedly can eat forty half–inch clams each day and can devour crabs as large as itself. Green crabs also prey on numerous other organisms—making these crabs potential competitors for the food sources of native fish and bird species.

The recent arrival of the green crab on the west coast United States is cause for concern. The green crab has already invaded numerous coastal communities outside of its native range, including South Africa, Australia, and both coasts of North America. An able colonizer and efficient predator, this small shore crab has the potential to significantly alter any ecosystem it invades. It has been blamed for the collapse of the soft–shell clam industry in Maine.

Distribution: The Atlantic coasts of Europe and northern Africa, from Norway and the British Isles south to Mauritania. Occupies protected rocky shores and cobbles to sandflats and tidal marshes. Lives in a wide range of salinities (5-30 ppt) and temperatures (5-30E C).

North American/Washington Distribution: . The first report of this species along the Pacific coast of North America was from Willapa Bay, Washington, in 1961. This was apparently an isolated incident with no other reports from the west coast until 1989-90 when they were discovered in San Francisco Bay, California. It is widely believed that the most likely vector for their transport to San Francisco Bay was through ballast water exchange or in seaweed used as packing material for fishing bait. It has since become well established in California and has steadily spread northward, occurring in Oregon in 1997, Washington in 1998, and British Columbia in 1999. This range extension up the West coast is most likely due to larval transport via strong northward moving ocean currents.

Other Management Considerations: The green crab feeds on many organisms, including clams, oysters, mussels, marine worms, and small crustaceans. Since it can also prey on juvenile crabs and shellfish, a northward spread to the Washington coast and Puget Sound could put our Dungeness crab, clam, and oyster fisheries at risk, and the green crab may compete with native fish and bird species for food. In Bodega Bay, California, a significant reduction in population abundance of clam and native shore crab is already evident since the arrival of the green crab in 1993. In addition, the green crab is an intermediate host to a marine worm that can harm the health of local shore birds.

Asian Clam ***(Potamocorbula amurensis*)**
The marine Asian clam, or Amur River Corbula threatens to alter the ecosystems which invades by altering the food web. Introduced into northern San Francisco Bay in 1986, the clam has attained densities of nearly 50,000 clams per square meter in some areas. The clam consumes bacterioplankton, phytoplankton, and zooplankton and has eliminated the annual summer phytoplankton bloom by its ability to filter the water column at least once, and possibly twice, per day. *P. amurensis* is also thought responsible for a reduction in particulate organic carbon. With less food available for larval and other benthic filter feeders, the relative populations of native species could shift. The clam is tolerant to broad variations in salinity and temperatures, and could do well in Washington bays and in the tidal reaches of rivers.

Japanese Oyster Drill ***(Ceratostoma inornatum*)**
The Japanese oyster drill was introduced when Pacific oysters were imported from Japan during the early 1900s. The Japanese oyster drill is among the most damaging of pests found in oyster beds. In drill infested areas of Washington, up to 25% mortality occurs in outplanted oyster seed, production costs increase by nearly 20%, and net profits decrease by as much as 55% due to drill predation. State waters are classified by WDFW as restricted with respect to diseases, pests, or predators that can threaten aquaculture stocks and native flora and fauna. A process is in place to monitor shellfish movements between designated areas to reduce the risk of spreading the drill to areas where it is not currently present.

Asian Copepod ***(Pseudodiaptomus inopinus)***
It was discovered in a1990 survey that the lower Columbia River had been invaded by this species of Asian copepod. The impact of this introduced species on commercially important species, such as Pacific salmon, is unknown at this time. It is possible it may prove to be a substantial prey resource for small fish. However, other Asian copepod species have been implicated in recruitment failure in fisheries in California because they out compete native prey species, and are not a suitable replacement either because they are adept at evading predators or their pattern of reproduction does not coincide with periods of fish feeding in the estuary. Further study is needed on this species.

Mediterranean Mussel ***(Mytilus galloprovincialis)***
The Mediterranean mussel is widely cultured in Washington, and has been for several years. It was initially introduced from California for aquacultural purposes because the native mussel *M. trossulus* is subject to a leukemialike disease that causes high losses during summer months. *M. galloprovincialis* also has a higher fecundity than *M. trossulus* and *M. edulis.* Concerns have been expressed regarding the mussel reproducing in the wild, and degradation of the environment around aquaculture sites.

Atlantic Salmon ***(Salmo salar)***
Atlantic Salmon are farmed in net pens in both Washington and British Columbia. The industry produces several tons annually, with a farm sale value in the millions of dollars. Concerns have been raised regarding the potential for Atlantic salmon to compete with native salmon for habitat, or to introduce diseases and degrade the environment around salmon aquaculture sites.

Appendix D
Nonnative Species Authorities and Programs

Regulated Pathways of Introduction for Nonnative Species

Aquaculture

Historically, culture of finfish and shellfish served as a primary path for both the intentional and unintentional introduction of nonnative species. Intentional introductions of the Pacific oyster to the Washington coast early in the century brought several unwanted species introductions including the oyster drill and (*Spartina)* cordgrass. Cultured nonnative species can also escape from captivity. The aquaculture industry is now heavily regulated to minimize introductions, and is the most heavily regulated pathway of nonnative species introductions.

Statutes are implemented through the Washington administrative Code (WAC) by the Washington Department of Fish and Wildlife. Most regulations concern aquaculture disease; a few address deleterious exotics (both plants and animals); proposals for the importation of nonnative species are subject to the State Environmental Policy Act (SEPA).

The Washington Department of Fish and Wildlife Hatcheries Program uses passive and active approaches to prevent the importation of pests or disease along with intentional introductions of finfish to Washington State. Prior to any import or transfer of finfish a transport application must be completed and approved by a Director designee ("Director"). This permit allows the agency to critique the health history of the fish and also to provide any operational constraints after the transfer or import occurs. This procedure is codified in Revised Code of Washington (RCW) 75.08.285, Prevention and Suppression of Diseases and Pests. The Director may prohibit the introduction, transportation, or transplanting of food fish, shellfish, organisms, material, or other equipment which, in the Director's judgment, may transmit any disease or pests affecting food fish or shellfish.

Additionally, RCW 77.12.020 allows for the classification of wildlife; if the director determines that an introduced species of the animal kingdom, not native to Washington, is dangerous to the environment or wildlife of the state, the Director may request its designation as deleterious exotic wildlife. The Commission may also designate deleterious wildlife. The Hatcheries Program also participates in the Pacific Northwest Fish Health Protection Committee; this organization has adopted guidelines for the control of fish pathogens. Additionally, the Washington Department of Fish and Wildlife has participated in the preparation of the publication, "*Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State, October 1997*."

Public Aquaria, the Aquarium Trade, and Plant Nurseries

Wholesale importers, culture facilities, wholesale and retail pet stores, and nurseries transport and sell nonnative fresh and saltwater plants, fish, and invertebrates. The release or escape of specimens into the wild by the industry and the hobbyist aquarium owner has led to unwanted introductions. The common goldfish, for example, has become a nuisance species in eastern Washington These species are regulated by Washington Department of Fish and Wildlife for invertebrates and fish and by the Washington State Department of Agriculture for plants. Public aquarium facilities must be approved by the Washington Department of Fish and Wildlife. The sale of aquatic plants requires a nursery license.

Research Institutions

Private and public research laboratories, schools, and aquariums use nonnative species for testing, teaching, and research. Accidental release of specimens can occur when strict protocols for animal management are not followed or when protocols do not exist. Specimens may also be intentionally released or may escape. The Washington Administrative Code that applies to public aquaria and the aquarium trade also applies to research institutions. Public and private institutions are required to obtain a permit for invertebrate nonnative species introductions, and controls are required on effluent release.

Live and Processed Seafood

Packing materials for live seafood such as seaweed and seawater, contain a number of living organisms and provide an opportunity for species introductions when unused product, packing materials and shipping containers are disposed of improperly. Live organisms either in or on live seafood may pose an additional threat. Shellfish in tanks are subject to Washington Department of Fish and Wildlife regulation while those on ice are not. An administrative code prohibits the release of shellfish or their holding water and the Washington Department of Fish and Wildlife inspects holding areas for edible shellfish.

Ballast Water

Ballast discharge and hull fouling are two ways boats and ships can introduce organisms. Ballast water can contain aquatic plants, animals, and pathogens. Marine vessels take on and discharge millions of tons of ballast water daily in ports and harbors around the world. The discharge of ballast water is considered a major pathway for aquatic introductions because of the high volume of water carried as ballast. Ballast water is regulated under 16 United States Code Section 4701, et seq., as implemented via 33 Code of Federal Regulations, part 151(1998). In Washington State it is also regulated under RCW 77.120 (2000).

77.120
Ballast water management.

RCW 77.120.005
Findings.

The legislature finds that some nonindigenous species have the potential to cause economic and environmental damage to the state and that current efforts to stop the introduction of nonindigenous species from shipping vessels do not adequately reduce the risk of new introductions into Washington waters.

The legislature recognizes the international ramifications and the rapidly changing dimensions of this issue, and the difficulty that any one state has in either legally or practically managing this issue. Recognizing the possible limits of state jurisdiction over international issues, the state declares its support for the international maritime organization and United States coast guard efforts, and the state intends to complement, to the extent its powers allow it, the United States coast guard's ballast water management program.

[2000 c 108 § 1.]

RCW 77.120.010
Definitions.

The definitions in this section apply throughout this chapter unless the context clearly requires otherwise.

(1) "Ballast tank" means any tank or hold on a vessel used for carrying ballast water, whether or not the tank or hold was designed for that purpose.

(2) "Ballast water" means any water and matter taken on board a vessel to control or maintain trim, draft, stability, or stresses of the vessel,without regard to the manner in which it is carried.

(3) "Empty/refill exchange" means to pump out, until the tank is empty or as close to empty as the master or operator determines is safe, the ballast water taken on in ports, estuarine, or territorial waters, and then refilling the tank with open sea waters.

(4) "Exchange" means to replace the water in a ballast tank using either flow through exchange, empty/refill exchange, or other exchange methodology recommended or required by the United States coast guard.

(5) "Flow through exchange" means to flush out ballast water by pumping in mid-ocean water at the bottom of the tank and continuously overflowing the tank from the top until three

full volumes of water have been changed to minimize the number of original organisms remaining in the tank.

(6) "Nonindigenous species" means any species or other viable biological material that enters an ecosystem beyond its natural range.

(7) "Open sea exchange" means an exchange that occurs fifty or more nautical miles offshore. If the United States coast guard requires a vessel to conduct an exchange further offshore, then that distance is the required distance for purposes of compliance with this chapter.

(8) "Recognized marine trade association" means those trade associations in Washington state that promote improved ballast water management practices by educating their members on the provisions of this chapter, participating in regional ballast water coordination through the Pacific ballast water group, assisting the department in the collection of ballast water exchange forms, and the monitoring of ballast water. This includes members of the Puget Sound marine committee for Puget Sound and the Columbia river steamship operators association for the Columbia river.

(9) "Sediments" means any matter settled out of ballast water within a vessel.

(10) "Untreated ballast water" includes exchanged or unexchanged ballast water that has not undergone treatment.

(11) "Vessel" means a self-propelled ship in commerce of three hundred gross tons or more.

(12) "Voyage" means any transit by a vessel destined for any Washington port.

(13) "Waters of the state" means any surface waters, including internal waters contiguous to state shorelines within the boundaries of the state.

[2000 c 108 § 2.]

RCW 77.120.020
Application of chapter.

(1) This chapter applies to all vessels carrying ballast water into the waters of the state from a voyage, except:

(a) A vessel of the United States department of defense or United States coast guard subject to the requirements of section 1103 of the national invasive species act of 1996, or any vessel of the armed forces, as defined in 33 U.S.C. Sec. 1322(a)(14), that is subject to the uniform national discharge standards for vessels of the armed forces under 33 U.S.C. Sec. 1322(n);

(b) A vessel (i) that discharges ballast water or sediments only at the location where the ballast water or sediments originated, if the ballast water or sediments do not mix with ballast water or sediments from areas other than open sea waters; or (ii) that does not discharge ballast water in Washington waters;

(c) A vessel traversing the internal waters of Washington in the Strait of Juan de Fuca, bound for a port in Canada, and not entering or departing a United States port, or a vessel in

innocent passage, which is a vessel merely traversing the territorial sea of the United States and not entering or departing a United States port, or not navigating the internal waters of the United States; and

(d) A crude oil tanker that does not exchange or discharge ballast water into the waters of the state.

(2) This chapter does not authorize the discharge of oil or noxious liquid substances in a manner prohibited by state, federal, or international laws or regulations. Ballast water containing oil, noxious liquid substances, or any other pollutant shall be discharged in accordance with the applicable requirements.

(3) The master or operator in charge of a vessel is responsible for the safety of the vessel, its crew, and its passengers. Nothing in this chapter relieves the master or operator in charge of a vessel of the responsibility for ensuring the safety and stability of the vessel or the safety of the crew and passengers.

[2000 c 108 § 3.]

RCW 77.120.030
Authorized ballast water discharge.

The owner or operator in charge of any vessel covered by this chapter is required to ensure that the vessel under their ownership or control does not discharge ballast water into the waters of the state except as authorized by this section.

(1) Discharge into waters of the state is authorized if the vessel has conducted an open sea exchange of ballast water. A vessel is exempt from this requirement if the vessel's master reasonably determines that such a ballast water exchange operation will threaten the safety of the vessel or the vessel's crew, or is not feasible due to vessel design limitations or equipment failure. If a vessel relies on this exemption, then it may discharge ballast water into waters of the state, subject to any requirements of treatment under subsection (2) of this section and subject to RCW 77.120.040.

(2) After July 1, 2002, discharge of ballast water into waters of the state is authorized only if there has been an open sea exchange or if the vessel has treated its ballast water to meet standards set by the department. When weather or extraordinary circumstances make access to treatment unsafe to the vessel or crew, the master of a vessel may delay compliance with any treatment required under this subsection until it is safe to complete the treatment.

(3) The requirements of this section do not apply to a vessel discharging ballast water or sediments that originated solely within the waters of Washington state, the Columbia river system, or the internal waters of British Columbia south of latitude fifty degrees north, including the waters of the Straits of Georgia and Juan de Fuca.

(4) Open sea exchange is an exchange that occurs fifty or more nautical miles offshore. If the United States coast guard requires a vessel to conduct an exchange further offshore, then that distance is the required distance for purposes of compliance with this chapter.

[2000 c 108 § 4.]

RCW 77.120.040
Reporting and sampling requirements.

The owner or operator in charge of any vessel covered by this chapter is required to ensure that the vessel under their ownership or control complies with the reporting and sampling requirements of this section.

(1) Vessels covered by this chapter must report ballast water management information to the department using ballast water management forms that are acceptable to the United States coast guard. The frequency, manner, and form of such reporting shall be established by the department by rule. Any vessel may rely on a recognized marine trade association to collect and forward this information to the department.

(2) In order to monitor the effectiveness of national and international efforts to prevent the introduction of nonindigenous species, all vessels covered by this chapter must submit nonindigenous species ballast water monitoring data. The monitoring, sampling, testing protocols, and methods of identifying nonindigenous species in ballast water shall be determined by the
department by rule. A vessel covered by this chapter may contract with a recognized marine trade association to randomly sample vessels within that association's membership, and provide data to the department.

(3) Vessels that do not belong to a recognized marine trade association must submit individual ballast tank sample data to the department for each voyage.

(4) All data submitted to the department under subsection (2) of this section shall be consistent with sampling and testing protocols as adopted by the department by rule.

(5) The department shall adopt rules to implement this section. The rules and recommendations shall be developed in consultation with advisors from regulated industries and the potentially affected parties, including but not limited to shipping interests, ports, shellfish growers, fisheries, environmental interests, interested citizens who have knowledge of the issues, and appropriate governmental representatives including the United States coast guard.

(a) The department shall set standards for the discharge of treated ballast water into the waters of the state. The rules are intended to ensure that the discharge of treated ballast water poses minimal risk of introducing nonindigenous species. In developing this standard, the department shall consider the extent to which the requirement is technologically and practically feasible. Where practical and appropriate, the standards shall be compatible with standards set by the United States coast guard and shall be developed in consultation with federal and state agencies to ensure consistency with the federal clean water act, 33 U.S.C. Sec. 1251-1387.

(b) The department shall adopt ballast water sampling and testing protocols for monitoring the biological components of ballast water that may be discharged into the waters of the state under this chapter. Monitoring data is intended to assist the department in evaluating the risk of new, nonindigenous species introductions from the discharge of ballast water, and to evaluate the accuracy of ballast water exchange practices. The sampling and testing protocols must consist of cost-effective, scientifically verifiable methods that, to the extent practical and without compromising the purposes of this chapter, utilize easily measured indices, such as

salinity, or check for species that indicate the potential presence of nonindigenous species or pathogenic species. The department shall specify appropriate quality assurance and quality control for the sampling and testing protocols.

[2000 c 108 § 5.]

RCW 77.120.050
Pilot project -- Private sector ballast water treatment operation.

The shipping vessel industry, the public ports, and the department shall promote the creation of a pilot project to establish a private sector ballast water treatment operation that is capable of servicing vessels at all Washington ports. Federal and state agencies and private industries shall be invited to participate. The project will develop equipment or methods to treat ballast water and establish operational methods that do not increase the cost of ballast water treatment at smaller ports. The legislature intends that the cost of treatment required by this chapter is substantially equivalent among large and small ports in Washington.

[2000 c 108 § 6.]

RCW 77.120.060
Report to legislature -- Results of chapter.

The legislature recognizes that international and national laws relating to this chapter are changing and that state law must adapt accordingly. The department shall submit to the legislature, and make available to the public, a report that summarizes the results of this chapter and makes recommendations for improvement to this chapter on or before December 1, 2001, and a second report on or before December 1, 2004. The 2001 report shall describe how the costs of treatment required as of July 1, 2002, will be substantially equivalent among ports where treatment is required. The department shall strive to fund the provisions of this chapter through existing resources, cooperative agreements with the maritime industry, and federal funding sources.

[2000 c 108 § 7.]

RCW 77.120.070
Violation of chapter -- Penalties.

(1) Except as limited by subsection (2) or (3) of this section, the director or the director's designee may impose a civil penalty or warning for a violation of the requirements of this chapter on the owner or operator in charge of a vessel who fails to comply with the requirements imposed under RCW 77.120.030 and 77.120.040. The penalty shall not exceed five thousand dollars for each violation. In determining the amount of a civil penalty, the

department shall consider if the violation was intentional, negligent, or without any fault, and shall consider the quality and nature of risks created by the violation. The owner or operator subject to such a penalty may contest the determination by requesting an adjudicative proceeding within twenty days. Any determination not timely contested is final and may be reduced to a judgment enforceable in any court with jurisdiction. If the department prevails using any judicial process to collect a penalty under this section, the department shall also be awarded its costs and reasonable attorneys' fees.

(2) The civil penalty for a violation of reporting requirements of RCW 77.120.040 shall not exceed five hundred dollars per violation.

(3) Any owner or operator who knowingly, and with intent to deceive, falsifies a ballast water management report form is liable for a civil penalty in an amount not to exceed five thousand dollars per violation, in addition to any criminal liability that may attach to the filing of false documents.

(4) The department, in cooperation with the United States coast guard, may enforce the requirements of this chapter.

[2000 c 108 § 8.]

RCW 77.120.080
Legislative review of chapter -- Recommendations.

By December 31, 2005, the natural resources committees of the legislature must review this chapter and its implementation and make recommendations if needed to the 2006 regular session of the legislature.

[2000 c 108 § 9.]

RCW 77.120.900
Severability -- 2000 c 108.

If any provision of this act or its application to any person or circumstance is held invalid, the remainder of the act or the application of the provision to other persons or circumstances is not affected.

[2000 c 108 § 11.]

The Washington Department of Fish and Wildlife is to implement the law, and develop administrative rules. The first rule, (WAC 220-77-090) requiring vessels to report ballast water discharges went into effect in September of 2000. Two additional rules establishing standards and setting protocols for testing of treated ballast water and ballast water that has undergone exchange will be established in the fall of 2001.

WAC 220-77-090 Ballast water management and control---Reporting and sampling requirements.

(1) At least 24 hours before a vessel subject to Chapter 108, Laws of 2000, enters Washington waters intending to discharge ballast water, or 24 hours prior to the actual discharge of the ballast water, the master of the vessel must report ballast water management information in written or electronic form to the Washington Department of Fish and Wildlife. This information may be submitted by filing a ballast water report pursuant to 1Title 33 CFR Part 151.2045, or the report may be forwarded through a recognized marine trade association in a timely manner. Failure to comply may trigger civil penalties under Section 8 Chapter 108, Laws of 2000.

(2) WDFW, with assistance from recognized marine trade associations, will compile the ballast water management information required under subsection (1) of this section, compare ballast water reports with vessel arrivals, determine vessel reporting rates, and evaluate the adequacy of ballast water exchange monitoring.

(3) WDFW may at reasonable times and in a reasonable manner, during a vessel's scheduled stay in port, take samples of ballast water and sediment, may examine ballast water management records, and may make other appropriate inquires to assess the compliance of vessels with ballast water reporting and control requirements.

(4) No vessel may discharge ballast water into state waters if the ballast water has a salinity level less than thirty parts per thousand combined with viable aquatic organisms, unless specifically exempted in Chapter 108, Laws of 2000.

Washington State Noxious Weed Control Board Classification of Weeds

Within the Washington State Noxious Weed Control Board, Washington weeds are classified as follows:

Class A weeds have a limited distribution in Washington. The statewide goal for these species is eradication.

Class B weeds are weeds that are established in some regions of Washington, but are of limited distribution or not present in other regions of the state. Because of the differences in distribution, treatment of Class B weeds varies between regions of the state. In regions where a Class B weed is unrecorded or of limited distribution, prevention of seed production is required. In these areas, the weed is a Class B–designate, meaning it is designated for mandatory control. In regions where a Class B species is already abundant or widespread, control is a local option. In these areas, the weed is a Class B–non–designate, with containment, gradual reduction, and prevention of further spread being the chief goals.

Class C weeds may be characterized as already widely established in Washington or of special interest to the state's agricultural industry. Placement on the list allows counties to enforce

control if locally desired. Other counties may choose to provide education or technical consultation.

A Monitor List of nonnative species is also maintained. While there is no legal or regulatory aspect to the monitor list, information collected about the weed once it is placed on the Monitor List may be used to justify its future classification as a Class A, B, or C weed.

Washington Department of Agriculture Quarantine List

Many noxious weeds and other invasive nonnative species are prohibited for sale in Washington state by the Department of Agriculture under the plant quarantine act. Several terrestrial noxious weed seeds and plants are prohibited under WAC 16-752-610. A separate *Lythrum* quarantine (WAC 16-752-400 - 415) addresses purple loosestrife and wand loosestrife (*L salicaria* or *L.virgatum*) and all hybrid crosses or named cultivars of those species including : morden pink, morden gleam, morden rose, the beacon, fire candles, brightness, lady sackville, Mr. Robert, Robert's happy, roseum superbum, purple spire, rose queen, the rocket, dropmore purple and tomentosum.

Prohibited wetland and aquatic plants are listed under WAC 16-752-505.

Washington Department of Ecology Aquatic Weeds Program

Monitoring and Surveys

The Washington Department of Ecology has been active in surveying Washington water bodies for aquatic plants since 1994. The purpose is to assess the aquatic plant communities, develop an aquatic plant species list for each waterbody, and to look for and document the presence of freshwater nonnative plants. Since 2000, about 900 lakes, rivers, and ponds throughout the state have been surveyed. Because aquatic weeds are generally spread by boating activities, those water bodies with public boat launching facilities are most commonly targeted for surveys. At each site all plants are identified to the lowest taxonomic group possible, a subjective density value is assigned to each plant, the sediment is described, and water visibility (Secchi disk depth), and alkalinity data are collected.

Efforts are concentrated on the aquatic plants listed as noxious weeds by the Washington State Noxious Weed Control Board. There are also other nonnative species of concern that are being monitored. These are plants that have apparently been introduced as ornamentals and subsequently escaped into Washington waters. Because many plants that become problem weeds experience a lag time during which the population builds and adapts to the environment, these species are being monitored for expansion and invasive tendencies (see species list).

When pioneering colonies of invasive species are noted during a survey, the local government (usually county weed board staff and county staff) and lake residents are contacted with this

information. Often a public meeting is arranged and the locals are urged to apply for grant funds to remove the invading species when it is in the first stages of invading a new waterbody. Lake Sutherland in Clallam County is an example of a lake where milfoil was detected early in its invasion by Ecology staff. Funding was provided to the Weed Board and an eradication effort using diver handpulling and installation of bottom barriers was initiated in 2000.

Details of the plant surveys and other activities are summarized in the Aquatic Plant Technical Assistant Program reports from 1994, 1995, 1996, 1997, 1998, 1999, and 2000.

Research

The Washington Department of Ecology is in the final year of providing funding to the University of Washington to evaluate the efficacy of using a Eurasian watermilfoil eating weevil (*Euhrychiopsis lecontei*) to control milfoil in Washington State. The University conducted surveys on water bodies in Washington to determine the distribution and abundance of *E. lecontei* in the state and gathered information about water quality and other factors that might influence the distribution and abundance of weevils. They are currently performing nutritional studies on eastern and western Washington milfoil to determine whether nutritional differences influence the abundance of the milfoil weevil in waterbodies. When the research is completed, a list of factors that make a waterbody suitable for weevil establishment will be provided to the Department of Ecology.

The Washington Department of Ecology encourages and partners with federal agencies for research projects in Washington waters. We are currently investigating forming a *Phragmites* taskforce for the management of this apparently nonnative invader, partnering with the US Army Corps of Engineers and other agencies. We are partnering with the US Army Corps of Engineers on a milfoil eradication project in 2001 on Loomis Lake in Pacific County. The impacts of the aquatic herbicide Sonar® will be evaluated on aquatic plant biomass and species diversity pre- and for three years post-treatment.

Ecology is partnering with industry and WDFW to assess low dose applications of an aquatic herbicide called endothal to manage Eurasian watermilfoil at low levels in Kress Lake. Kress Lake is a small fishing lake managed by WDFW.

Education and Technical Outreach

The following educational materials dealing with freshwater nonnative species and/or the management of these species have been produced by the staff of the Aquatic Weeds Program for general education purposes and most are available from the department's publication office at (360) 407-7472.

- *A Citizen's Manual for Developing Integrated Aquatic Vegetation Management Plans* (this book walks lake residents and others through the steps needed to develop an integrated aquatic plant management plan).
- *Aquatic Plant Control* (a brochure that discusses the methods used to control aquatic plants).
- "*Nonnative, Invasive Aquatic Plants*" (a brochure that uses line drawings and descriptions to describe some of Washington's nonnative freshwater species). This brochure, along with a zebra mussel identification card, is being included with information that is handed to each purchaser of a new boat in Washington.
- "*Milfoil—An Aggressive Water Weed*" (a brochure about milfoil that advises boaters to remove aquatic plants from trailers, propellers, and fishing gear and provides some information about milfoil in Washington).
- *How to Prepare Aquatic Plants for Mailing* (a fact sheet that tells the public and others how to mail aquatic plants to Ecology for identification).
- *Milfoil - The Unwelcome Guest* (a video about Eurasian watermilfoil in Washington).
- *Eurasian Watermilfoil Orientation and Identification* (a video about Eurasian watermilfoil identification in Washington).
- An Aquatic Plant Identification Guide for Washington's Freshwater Plants has been years in development and will be published by the Department of Ecology by June 30, 2001. It describes 105 freshwater plants using line drawings and color photographs of most species. Rare and endangered aquatic species and invasive nonnative species are highlighted. Copies will be available at libraries, for sale at the State Printer, and the information in the guide will be provided over the Internet. Ecology and other resource agencies are encouraging lake groups to survey their lakes each year to detect invasions of nonnative species like Eurasian watermilfoil and purple loosestrife. Having an aquatic plant identification manual available will increase the ability of lake groups, weed board staff, and local and state agency staff to identify aquatic plants. Early identification of nonnative invasive plants will result in cost–effective management and containment of these infestations.
- Aquatic Plant Web Site – The Washington Department of Ecology maintains information, both technical and non–technical, about aquatic plants on their web site. Many of their publications are available online. Visit their site at http://www.wa.gov/ecology/wq/plants/aquahome.html.
- Boat Launch Signs – Milfoil signs were placed on public boat launches throughout Washington during the late 1980s. Updated signs will be placed at launches throughout the state. The signs, a cooperative project between the Department of Ecology, Department of Fish and Wildlife, and Parks and Recreation, will have space for decals of plant or animal invasive species present in the waterbody. On water bodies where there are no problem freshwater nonnative species, a sign warning boaters to clean all plants and animals off their boats, trailers, and fishing gear and cautioning people not to dump aquariums will be placed at the boat launches.

The following technical assistance and technical outreach activities are ongoing:

- Plant Identification Service – Washington Department of Ecology staff identify aquatic plants sent in to the Department from the public and others. Early identification of problem species often leads to their eradication and/or containment.
- Workshops, conferences, presentations – Staff routinely give talks about freshwater nonnative species to lake groups, institutions of higher learning, nursery groups, pesticide applicator groups, and at state, regional, and national conferences. Staff are active participants in state, regional, and national lake and aquatic plant organizations. Also much technical assistance is provided during one–on–one conversation with the general public about nonnative species.
- Annual training on invasive, aquatic plant management - Ecology began providing annual training about the management of invasive aquatic plants in 2000.

Funding to Local and State Governments for Aquatic Plant Management Projects

The Washington Department of Ecology provides grants to state and local governments to help control nonnative aquatic weeds. Grant projects must address prevention and/or control of freshwater, invasive, nonnative aquatic plants. The types of activities funded include:

- planning (development of an integrated aquatic plant management plan);
- education, monitoring, implementation of integrated vegetation plans;
- monitoring;
- implementation of integrated vegetation plans (control);
- pilot/demonstration projects; and
- surveillance and mapping projects.

Grants are competitive and are awarded on an annual basis. Staff experienced with aquatic plant management evaluate the applications. Generally about $300,000 is available during each annual funding cycle. An additional $100,000 per year is available on a year–round basis for early infestation grants. The purpose of early infestation grants is to provide immediate financial assistance to local or state governments to eradicate or contain a pioneering invasion of a nonnative freshwater aquatic plant.

In water bodies with well–established populations of nonnative, freshwater invasive aquatic plants, the development of an integrated aquatic plant management plan is required before grants can be awarded for implementation (control or eradication projects).

Under the grant program a number of eradication/management projects for freshwater nonnative species have been funded.

Eradication Projects

The Washington Department of Ecology is currently funding a hydrilla eradication project in partnership with King County and the cities of Covington and Maple Valley. Because this is the

first known population of hydrilla in the Northwest, aggressive action has been taken to attempt its eradication. Since 1995 the lake has been treated with the systemic aquatic herbicide fluridone (brand name Sonar®). The tuber density has been markedly reduced since 1995. By 2000 the plants were confined to a narrow band in the deeper waters of the littoral zone. The strategy is to now treat the narrow zone of plants using Sonar® slow release pellets. *Monoecious hydrilla* tubers (the variety of hydrilla in Washington) can remain viable in the laboratory for up to four years and they may last longer in cool water environments. Eradication efforts will continue until hydrilla is not detected for three years following the last treatment.

Many Washington lakes have undergone treatment efforts aimed at eradicating noxious aquatic weeds. Below are some lakes where the targeted weed has not been observed for at least two years post treatment.

- Surfside Lake, Pacific County
- Goss Lake, Island County
- Silver Lake, Cowlitz County
- Killarney Lake, King County
- Steel Lake, King County
- Carlisle Lake, Lewis County
- Long Lake, Thurston County

There are also a number of other lake groups either planning for milfoil eradication or in the first few years after treatment. The majority of these lakes were treated using grant funds from Ecology. These include:

- Island Lake, Mason County;
- Mason Lake, Mason County;
- Lake Sutherland; Clallam County;
- Loomis Lake, Pacific County
- Scott Lake, Thurston County;
- Clear Lake, Pierce County;
- Lake Twelve, King County;
- Lake Wilderness, King County;
- The Little Pend Oreille Chain of Lakes, Stevens County;
- Loon Lake, Stevens County;
- Black Lake, Stevens County;
- Lake Sacheen, Pend Oreille County;
- Davis Lake, Pend Oreille County;
- Fan Lake, Pend Oreille County;
- Diamond Lake, Pend Oreille County;
- Lake Shoecraft, Snohomish County;
- Lake Roesiger, Snohomish County;
- Lake McMurray, Skagit County; and
- Campbell Lake, Skagit County.

Corrected Gap in the Aquatic Plant Management Program

The State Legislature provided funding to the Department of Ecology to evaluate new herbicides, to review new information on existing herbicides, to evaluate other management products, and to revise the state Environmental Impact Statements. The 1992 EIS was revised in 2001. State residents are now able to legally use some new aquatic plant management tools for noxious weed control.

Washington now has an effective spot treatment systemic herbicide for the control of pioneer colonies of plants like Eurasian watermilfoil. This was the result of legislative action that allows the use of 2,4-D for early infestations of milfoil where milfoil occupies 20 percent or less of the littoral zone of a waterbody. The revised 2001 EIS also allows for the use of 2,4-D under an Ecology permit.

Current Known Gaps in Washington State Programs

We are funding plant control projects for *Egeria densa* (Lake Limerick, Big Lake, Plummer Lake, Chehalis River) and *Myriophyllum aquaticum* (Chehalis River), but have not had much success in eradicating these species once they enter a waterbody.

Currently much more funding is needed in order to prepare for the invasion of the ANS in the animal category, specifically, funding for the green crab and the zebra mussel invasion. In addition to funding, public education of the problem is seen as a critical need as well.

Gaps in the Washington State Noxious Weed Law

Under state weed law, management of weeds is dependent upon land ownership. Most of Washington's lakebeds are owned by the "state," but it is impossible to easily determine who the "state" is and no state agency wants to take responsibility for the ownership of lakebeds. Even if land ownership were determined, the funding needed to control all aquatic plant species would be tens of millions of dollars per year. Therefore, unlike most terrestrial species where land ownership is readily determined and control can be mandated, in most cases the ownership of the aquatic beds remains a mystery.

Gaps in the Aquatic Weeds Program

- The Aquatic Weeds Program is limited to funding projects in water bodies with public boat launching facilities. Sometimes an infestation of a noxious species in a private waterbody threatens downstream water bodies. The State Legislature needs to change the law to allow the Washington Department of Ecology to fund control work in these private waters to protect downstream public waters.
- The low level of funding available for aquatic plant management projects limits the number of projects.

- Grant projects are selected for funding based on who applies for grants, rather than where the dollars should be best targeted to contain or eradicate infestations based on distribution or other factors.

Regional Authorities and Activities

Aquatic Nuisance Species Coordinating Committee
Created by the Washington State Legislature of 2000 to foster state, federal, tribal, and private cooperation on aquatic nuisance species issues. The mission of the committee is to minimize the unauthorized or accidental introduction of nonnative aquatic species and give special emphasis to preventing the introduction and spread of aquatic nuisance species.

Federally Recognized Tribes
There are 28 federally recognized Tribes with reservation lands in the State of Washington. These reservation lands include marine and freshwater shorelines, lakes, and in some cases entire watershed systems. Clearly, a coherent strategy for aquatic nuisance species depends on addressing all waters of the region. However, federal reserved lands like Indian reservations and military bases are subject to federal, not state law. Tribes are also empowered to develop Tribal laws under the Clean Water Act and other authorities and some have done so. With the myriad of authorities and regulations that apply to waters of this region it is of critical importance that there exists a well-coordinated strategy for a problem that overrides jurisdictional boundaries.

Tribes have been active participants in many of the strategies of the Aquatic Nuisance Species Management Plan. The Tribes with Puget Sound and coastal reservations are typically directly involved with shellfish production, as an industry and for ceremonial and subsistence purposes. Risks to shellfish populations from nonnative species like the European Green Crab not only threaten shellfish harvesters' livelihoods, but in the case of Tribes, it also threatens their culture. As a result, Tribes have been actively involved in assessing the invasion of green crab and deploying resources to combat this threat. Individual Tribes may also take actions on problems that are particular to their reservations.

Oregon and Washington Sea Grant
Oregon and Washington have set up the Marine Invasive Species Team (MIST). MIST is a collaborative, region-wide effort to provide natural resource managers, industry, local government, and the public with access to the broadest possible pool of university research and expertise on this subject. The project has produced educational materials including "Aquatic Invasive Species (Guide to the Least Wanted in the PNW)". MIST is also producing an educational video on mitten crab, which will be released in early 2001.

Puget Sound Water Quality Action Team
The Puget Sound Water Quality Action Tam works with tribal and local governments, community groups, citizens and businesses, and state and federal agencies to develop and carry out two-year work plans that guide protection of water quality and biological resources in the

sound. The Puget Sound Council, comprised of representatives from all of the above stakeholder groups, advises the Action Team on work plan priorities and tracks the progress of implementation of the plans. The plans guide the efforts of these groups to address challenging water quality issues facing the Puget Sound Region. The Action Team produces a number of publications to inform citizens about the health of Puget Sound, as well as a quarterly newsletter featuring articles about regional conservation and restoration initiatives. The Action Team's Public Involvement and Education Fund is one of the powerful tools available to help protect and improve Puget Sound's water quality and marine resources. It puts money and motivation into the hands of dedicated individuals, businesses, non-profit organizations and local and tribal governments that create and nurture environmental programs in their communities

Pacific Ballast Water Group

The Pacific Ballast Water Group (PBWG) was formed by representatives from the shipping industry, state and federal agencies, environmental organizations, and others who recognized the need for a cooperative and coordinated regional approach to ballast water management for prevention of invasive species introduction on the West Coast. The discharge of ballast water is a major pathway for the transfer of potentially harmful aquatic organisms and pathogens around the world. The PBWG meets regularly and is currently addressing ballast water discharge standards development and interjurisdictional issues related to ballast water management on the West Coast.

Pacific States Marine Fisheries Commission/Bonneville Power Administration Aquatic Nuisance Species Program for the Columbia River Basin

In 1999, the Bonneville Power Administration (BPA), recognizing the potential impact to its operations, funded the Pacific States Marine Fisheries Commission (PSMFC) to carry out an ANS prevention program for the Columbia River Basin (CRB). Zebra mussels pose a serious economic and ecological threat to the CRB's multiple uses, such as agricultural, navigation, boating, fishing, industrial, and hydroelectric operations. The program also addresses mitten crabs, which have caused problems in the San Francisco Bay Delta.

One of the goals of this regional program is to develop an ANS plan for the Columbia River Basin. Other actions undertaken in collaboration with PSU's Center for Lakes and Reservoirs (CLR) include ANS outreach and inspection in Oregon, Washington, Idaho, and Wyoming, and mitten crab outreach in the lower Columbia River.

The Western Regional Panel

The Western Regional Panel (WRP) on Aquatic Nuisance Species was formed under a provision in NISA. The initial, organizational meeting of the WRP was held at Portland State University in 1997. The WRP was formed to help limit the introduction, spread, and impacts of aquatic nuisance species into western North America. This panel includes representatives from Federal, State and local agencies and from private environmental and commercial interests. The purposes of the WRP, as described in NISA are to:

- Identify Western Region priorities for responding to aquatic nuisance species;
- make recommendations to the Task Force regarding an education, monitoring (including inspection), prevention, and control program to prevent the spread of the zebra mussel west of the l00th Meridian;
- coordinate, where possible, other aquatic nuisance species program activities in the West not conducted pursuant to the Act;
- develop an emergency response strategy for Federal, State, and local entities for stemming new invasions of aquatic nuisance species in the region;
- provide advice to public and private individuals and entities concerning methods of preventing and controlling aquatic nuisance species infestations; and
- submit an annual report to the Task Force describing activities within the western region related to aquatic nuisance species prevention, research and control.

Western Governors Association

The Western Governors' Association (WGA) is developing a new program to address undesirable nonnative aquatic and terrestrial species in the West because of the significant economic and ecological harm they cause. On June 30, 1998, the Western Governors passed Resolution 98-018, Undesirable Aquatic and Terrestrial Species, to develop and coordinate Western strategies and to support management actions to control and prevent the spread and introduction of undesirable species; to support the use of Integrated Pest Management concepts; to encourage broad-based partnerships; and to urge adequate support for the U.S. Department of Agriculture - Animal and Plant Health Inspection Service. WGA has formed a working group of state and federal agencies, industry, non-governmental organizations and academia to develop Western strategies to limit the spread of these species.

Federal Agencies Regulating the Transport of Live Aquatic Products

Federal Agencies Regulating the Transport of Live Aquatic Products (Olson and Linen 1997).

	Restrict Movement Into U.S.	Restrict Interstate Movement	Regulate Product Content or Labeling
Plants	APHIS DOD Customs DEA	APHIS AMS	APHIS AMS
Fish	FWS Customs USCG	FWS	FWS

Federal Agencies Regulating the Transport of Live Aquatic Products (Olson and Linen 1997).

	Restrict Movement Into U.S.	Restrict Interstate Movement	Regulate Product Content or Labeling
Invertebrates	APHIS FWS ARS FWS PHS Customs USCG	APHIS FWS	FWS

List of abbreviations and descriptions of authority (Olson and Linen 1997)

Organization	**Description**
APHIS	The Animal and Plant Health Inspection Service, U.S. Department of Agriculture, has broad mandates related to the importation and interstate movement of exotic species, under the Federal Plant Pest Act, the Plant Quarantine Act, and several related statues. The primary concern is species that pose a risk to agriculture. Restricts the movements of agricultural pests and pathogens into the country by inspecting, prohibiting, or requiring permits for the entry of agricultural products, seeds, and live plants and animals. Restricts interstate movements of agricultural plant pests and pathogens by imposing domestic quarantines and regulations. Restricts interstate transport of noxious weeds under the Federal Noxious Weed Act.
AMS	The Agricultural Marketing Service, U.S. Department of Agriculture, works closely with states in regulating interstate seed shipments. Regulations require accurate labeling and designation of “weeds” or “noxious weeds” conforming to the specific state's guidelines.
ARS	The Agricultural Research Service, U.S. Department of Agriculture, the research branch of USDA, conducts and funds research on the prevention, control, or eradication of harmful nonnative species often in cooperation with APHIS. Projects include aquaculture techniques and disease diagnosis and control.
DEA	The Drug Enforcement Agency restricts imports of a few nonnative plants and fungi because they contain narcotics substances.
DOD	The Department of Defense has diverse activities related to nonnative species. These relate to its movements of personnel and cargo and management of land holdings. Armed forces shipments are not subject to APHIS inspections. Instead, the DOD uses military customs inspectors trained by APHIS and the Public Health Service.
FWS	The Fish and Wildlife Service, U.S. Department of the Interior, has responsibility for regulating the importation of injurious fish and wildlife under the Lacey Act. Maintains a limited port inspection program. In 1990, FWS inspectors inspected 22 percent of the wildlife shipments at international ports of entry. Interstate movement of state–listed injurious fish and wildlife is a federal offense and therefore potentially subject to FWS enforcement. Also provides technical assistance related to natural resource issues and fish diseases to state agencies and the private sector (aquaculture in particular). Helps control the spread of fish pathogens.

List of abbreviations and descriptions of authority (Olson and Linen 1997)

Organization	Description
NOAA and NMFS	The National Oceanic and Atmospheric Association and National Marine Fisheries Service, U.S. Department of Commerce, inspect imported shellfish to prevent the introduction of nonnative parasites and pathogens. Cooperative agreements with Chile and Australia; Venezuela has requested a similar agreement.
PHS	The Public Health Service, U.S. Department of Health and Human Services, regulates entry of organisms that might carry or cause human disease.
Customs	Customs Service, U.S. Department of the Treasury. Customs personnel inspect passengers, baggage, and cargo at U.S. ports of entry to enforce the regulations of other federal agencies. They inform interested agencies when a violation is detected and usually detain the suspected cargo for an agency search.
USCG	The Coast Guard, U.S. Department of Treasury, was given certain responsibilities under the Nonnative Aquatic Nuisance Prevention and Control Act of 1990, relating to preventing introductions (mostly dealing with ballast water exchange).

Federal Law Addressing Aquatic Nuisance Species

The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990

The Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 created the Interagency Aquatic Nuisance Species Task Force. This group is required to develop a program to prevent, monitor, and control unintentional introductions of nonnative species, and to identify and evaluate approaches for reducing risk of adverse consequences associated with intentional introductions of aquatic species. They are also to determine the need for controls on vessels entering U.S. waters other than the great lakes. Under this act the U.S. Coast Guard is directed to issue regulations to prevent the introduction and spread of ANS into the Great Lakes through ballast water. The Corps of Engineers are to develop a program of research and technology to control zebra mussels in and around public facilities and make information available on control methods. Many of the agencies that in some way regulate the introduction of species are represented on this task force.

The National Invasive Species Act of 1996

The National Invasive Species Act of 1996 re-authorizes and amends the Nonnative Aquatic Nuisance Prevention and Control Act of 1990 (the "Zebra Mussel Act"). It expands the scope of the Act beyond the zebra mussel and ballast water and begins to "address introductions and infestations of [nonnative aquatic] species that may be as destructive as the zebra mussel." To this end, the Act authorizes a Western Regional Panel to identify priorities for the western region; develop emergency response strategies for stemming new invasions; and advise public and private sectors concerning the prevention and control of nonnative species. Furthermore, the Act advises state and Tribal governments to prepare invasive species management plans and provides for ecological surveys to study species attributes and patterns of invasions.

Finally, the National Invasive Species Act of 1996 authorizes U.S. spending $1.25 million to "fund research on aquatic nuisance species prevention and control in San Francisco Bay and the Pacific Coast."

The expanded scope of the National Invasive Species Act of 1996 demonstrates that federal efforts to control the transport and accidental release of nonnative species are becoming more stringent. Concern over the disastrous spread of the zebra mussel has heightened public awareness of the issue and, as a consequence, government regulations are likely to become more developed in coming years.

Alien Species Prevention and Enforcement Act (1992)
Makes it illegal to ship plants and animals whose shipment is prohibited under the Lacey act or the Federal Plant Pest or Plant Quarantine Act through the U.S. Mail.

Federal Seed Act (1939)
Requires accurate labeling and purity standards for seeds in commerce and prohibits the importation and movement of adulterated or misbranded seeds.

Federal Plant Pest Act (1957)
Regulates packing and shipping materials and containers, as well as ships, to control the unintentional and intentional introduction or importation of plant pests. (Department of Agriculture /APHIS)

Plant Protection Act (1998)
Consolidates and modernizes all major statutes pertaining to plant protection and quarantine (Federal Noxious Weed Act, Plant Quarantine Act). Permits APHIS to address all types of weed issues, increases the maximum civil penalty for violations, and authorizes APHIS to take both emergency and extraordinary emergency actions to address incursions of noxious weeds.

Federal Noxious Weed Act (1974)
Defines noxious weeds and prohibits their import into or through the United States. Authorizes APHIS to restrict the introduction and spread of nonnative noxious weeds through port-of-entry and follow-up activities. Authorizes permanent restrictions and emergency regulations to control intentional introductions and importations.

Plant Quarantine Act (1912)
Gives APHIS the authority to regulate importation and interstate movement of nursery stock and other plants (field-grown florist stock, trees, shrubs, vines, etc.) that may carry harmful pests and diseases. The act preempts state quarantines in interstate commerce.

Organic Act of 1944
Gives APHIS the authority to conduct pest eradication programs.

Animal Damage Control Act (1931)

Protects field and horticultural crops, commercial forests, freshwater aquacultural ponds and marine species cultivation areas, livestock on public and private range land and feedlots, and public and private buildings and facilities from the introduction of damaging species by giving APHIS authority to control wildlife damage on federal, state, or private land.

Lacey Act (1900; amended in 1998)
The Act prohibits the import of a list of designated species as well as other invertebrates, mollusks, and crustacea that are deemed as injurious to humans, or the natural resources of the United States. However it does allow for import of almost all species for scientific, medical, educational, exhibition or propagation purposes.

Convention on Great Lakes Fisheries Between the United States and Canada (1955)
The convention established the Great Lakes Fisheries Commission whose purpose is to control and eradicate the nonnative, highly invasive Atlantic sea lamprey from the Great Lakes.

North American Agreement on Environmental Cooperation (1994)
Article 10(2)(h) allows the Council of the Commission on Environmental Co-operation to develop recommendations regarding nonnative species which may be harmful.

Federal Insecticide, Fungicide, and Rodenticide Act
Gives the EPA the authority to regulate importation and distribution of substances, including biological control organisms, that are intended to function as pesticides.

National Environmental Protection Act (1970)
Requires federal agencies to consider the environmental effects of their actions through preparation of environmental impact statements, including effects of nonnative species that may be harmful to the environment. However, permits for importing nonnative species into containment facilities or for interstate movement between interstate containment facilities are excluded from NEPA requirements. The act allows APHIS to approve and issue permits for import of nonnative species following preparation of an environmental assessment rather than an environmental impact statement.

Executive Order 13112
President Clinton signed Executive Order 13112 on Invasive Species, on February 3,1999, revoking President Carter's 1977 Executive Order 11987 on nonnative species. The new Executive Order seeks to prevent the introduction of invasive species and provide for their control and minimize their impacts through better coordination of federal agency efforts under a National Invasive Species Management Plan to be developed by an interagency Invasive Species Council. The Order directs all federal agencies to address invasive species concerns as well as refrain from actions likely to increase invasive species problems. The Invasive Species Council, supported by an advisory committee, is also to develop recommendations for international cooperation, promote a network to document and monitor invasive species impacts,
and encourage development of an information-sharing system on invasive species.

The Council is to complete the first edition of its National Plan by August, 2000, and recommend goals and objectives for invasive species management, research need, and measures to minimize the risk of species introductions. This plan is to be updated biennially to report on progress toward achievement of recommended goals and objectives. The effectiveness of this Order is to be assessed at least once every 5 years, with a report to the Office of Management and Budget on whether the Order should be revised.

Executive Order 13186 (66FR3853, January 17,2001)
This order was signed by President Clinton on January 10,2001. It addresses the responsibilities of federal agencies to protect migratory birds. Section 3(e) directs each agency, within the scope of its statutory authority and to the extent possible within budgetary limits to control the import, export, and establishment in the wild of live exotic animals and plants that may be harmful to migratory bird resources. The order may be found at (http://www.nara.gov/fedreg/eo2001c.html).

Wild Bird Conservation Act (1992)
Regulates the introduction of nonnative parasites and diseases carried by imported foreign wild birds.

Endangered Species Act
Permits the eradication of nonnative invasive species that pose a danger to local endangered species.

International Instruments Addressing Nonnative Species

Additional International Agreements Addressing Nonnative Species include:

- The General Agreement on Tariffs and Trade (GATT) in which Article XX(b) acknowledges the need for parties to protect themselves from harmful exotic species. This article legitimizes trade restraints, such as quarantine regulations, that are necessary to protect the life or health of humans, animals, or plants;
- International Plant Protection Convention (1952)
  Applies primarily to plant pests or pathogens that may be in packing material or any kind of accompanying plant products. Creates an international regime to prevent the spread and introduction of plant and plant product pests premised on exchange of Phytosanitary certificates between the plant protection offices of the importing and exporting countries. Participating parties exchange information, cooperatively develop standards, and have national plant protection organizations established according to the convention with authority to do risk analysis of potential pest or invasive species and to quarantine them. The International Plant Protection Convention (1972), covering agricultural pests;
- Convention on International Trade in Endangered Species (1975)
  An alternate model for regulating invasive species not already covered by the International Plant Protection Convention or other agreements. It is intended to prevent harm to species of flora and fauna which are threatened or endangered in the exporting

countries. However, it can be also applied when an endangered species in the exporting country is considered an invasive species in the importing country.

- Agreement on the Application of Sanitary and Phytosanitary Measures (1995)
  This is a supplementary agreement to the World Trade Organization Agreement that provides a uniform interpretation of the measures governing safety and plant and animal health regulations. It applies to all sanitary and Phytosanitary measures that directly or indirectly affect international trade. The purpose is to protect animal or plant life or health within a member's territory from entry, establishment or spread of pests, disease, or disease carrying organisms.
- The International Convention on Biological Diversity (signed 1993, but not yet ratified by the U.S. Senate) which contains a provision to control, eradicate, or prevent the introduction of those alien species that threaten ecosystems, habitats, or species;
- The United Nations Convention on the Law of the Sea, the sole multinational convention with provisions specific to marine introductions. The U.S. has not signed this agreement.
- The United Nations Conference on Environment and Development (UNCED 1992) (a/k/a "Agenda 21") "Protection of the Oceans, All Kinds of Seas, Including Enclosed and Semi–enclosed Seas, and Coastal Areas and The Protection, Rational Use and Development of Their Living Resources."

Furthermore, there are a number of global bilateral or multilateral treaties that indirectly affect exotic species, including:

- The Convention Concerning the Protection of World Cultural and Natural Heritage (1973);
- The Convention on Wetlands of International Importance (1985) (especially involved with waterfowl habitat);
- The Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (1942).
- Agreed Measures for the Conservation of Antarctic Fauna and Flora
- Convention on the Conservation of Antarctic Marine Living Resources
- Protocol to the Antarctic Treaty on Environmental Protection
- Convention on Migratory Species of Wild Animals
- Agreement concerning Cooperation in the Quarantine of Plants and theri Protection against Pests and Diseases
- Convention on the Law of Non-navigational Uses of International Watercourses
- Program on Action for the Development of Small Island Developing States
- Biosafety Protocol to the Convention on Biodiversity

Appendix E
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