New Mexico Aquatic Invasive Species Management Plan

Prepared by:

New Mexico Aquatic Invasive Species Advisory Council

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EXECUTIVE SUMMARY

Aquatic invasive (nuisance) species (AIS) are a growing concern in New Mexico. Having already negatively impacted several native species and humans, AIS are poised to cause further ecologic, economic, and human health problems. More than 100 species have been recorded in New Mexico and more are expected to invade. Various agencies and organizations are currently addressing AIS on a "single-species" basis. These efforts, however, are not coordinated and are woefully inadequate in scope and degree to address the risks AIS pose to the public, our economy, and natural ecosystems. Recognizing that a coordinated statewide approach is needed, the involved agencies and organizations collectively propose the New Mexico State Aquatic Invasive Species Management Plan (NMPlan) as a necessary first step towards establishing a workable framework to successfully confront present and future AIS problems in the State.

The federal Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, amended by the National Invasive Species Act of 1996, calls for the development of state and regional management plans to control AIS. Once a state plan is approved by the national Aquatic Nuisance Species Task Force and the Governor, state agencies are eligible to receive federal matching funds for activities specified in the management plan. The NMPlan is based on guidance provided by the New Mexico Aquatic Invasive Species Advisory Council, the national ANS Task Force, and approved state plans.

The goal of the NMPlan: ***That the potentially harmful ecologic, economic, and social impacts resulting from the presence of AIS in New Mexico are precluded or minimized through prevention and management of introduction, population growth, and dispersal into, within, and from New Mexico.***

To achieve this goal the following actions are proposed:

- establish a New Mexico Aquatic Invasive Species Advisory Council (AISAC);
- secure an executive order from the Governor requiring full participation of involved state agencies on the AISAC;
- secure funds appropriated by the state legislature to support an AIS program, including the expansion of law enforcement authority;
- create a state-level Invasive Species Coordinator position;
- establish a database for cataloging AIS in the state;
- initiate a system to rank AIS based on threat level;
- develop a monitoring system for documenting the presence and distribution of AIS in the state;
- adopt a list of AIS prohibited from entry into the state;
- prevent the movement of AIS into, within, and out of the state;
- minimize the impact of established AIS on native biota, ecosystems, and the public;

- devise a rapid-response system for detecting, investigating, and eradicating newly reported AIS or populations;
- organize educational and outreach efforts to increase public awareness of AIS;
- establish a system to coordinate AIS management efforts between state, federal, tribal, regional, and local agencies, and private organizations; and
- outline research goals and mechanisms to fund management efforts.

The NMplan provides background information on environmental and economic impacts posed by AIS, describes pathways of entry into the state, and identifies existing regulatory authorities and programs that address invasive species at state, regional, and national levels. This plan includes a problem definition and ranking system that identifies AIS priority classes. Ranking AIS based on threat level not only facilitates prevention of introductions and mitigation of impacts, it also enables agencies to direct management strategies and financial resources more efficiently.

The *AIS Management Strategy* section lists six objectives wherein problems, current agency activities, and gaps in these authorities are addressed by identifying strategies and actions needed to reduce or eliminate the threats and effects of AIS in New Mexico. These tasks are summarized in the *Implementation Table* which designates the lead entities and a timetable for completing individual actions.

The strategies outlined in the NMPlan will generate actions to achieve desired future conditions and outcomes. A necessary step in the implementation of this plan will be program monitoring and evaluation of performance indicators referable to the goal and objectives of the plan. To support and inform implementation of this plan, the New Mexico AISAC will adopt the philosophy of adaptive management in which monitoring and evaluation are employed to measure progress toward achieving the goal, to assess the efficacy of strategies to meet the stated objectives, and to maintain awareness of and adapt to changing information or conditions. Program monitoring and evaluation will require oversight, evaluation, and reporting.

LIST OF ACRONYMS AND ABBREVIATIONS

Acronyms and abbreviations used for the agencies, organizations, and positions implementing AIS strategies and actions on the following pages.

AIS –	Aquatic invasive species
AISAC –	Aquatic Invasive Species Advisory Council (New Mexico)
ANS –	Aquatic Nuisance Species
ANSTF –	Aquatic Nuisance Species Task Force
APHIS –	Animal & Plant Health Inspection Service
BLM –	Bureau of Land Management
BoR –	Bureau of Reclamation
BP –	U.S. Department of Immigration and Naturalization, Border Patrol
CoE –	Army Corps of Engineers
Coord –	Invasive Species Coordinator
DoA –	U.S. Department of Agriculture
DoD –	U.S. Department of Defense
DoI –	U.S. Department of the Interior
DoT –	U.S. Department of Transportation
EMNRD –	Energy, Minerals, and Natural Resources Department (State Parks)
EPA –	Environmental Protection Agency
Fed –	All federal agencies
Gov –	Governor
ISC –	Interstate Stream Commission
LE –	law enforcement
Leg –	New Mexico Legislature
NANPCA –	Non-indigenous Aquatic Nuisance Prevention and Control Act
NISA –	National Invasive Species Act
NMBA –	New Mexico Border Authority
NMDA –	New Mexico Department of Agriculture
NMDGF –	New Mexico Department of Game and Fish
NMDH –	New Mexico Department of Health
NMDT –	New Mexico Department of Tourism
NMDOT –	New Mexico Department of Transportation
NMED –	New Mexico Environment Department
NMEDD –	New Mexico Economic Development Department
NMPED –	New Mexico Public Education Department
NMFS –	National Marine Fisheries Service
NMPlan –	New Mexico Aquatic Invasive Species Management Plan
NOAA –	National Oceanic and Atmospheric Administration
NZMS –	New Zealand mud snail
OSE –	Office of State Engineer
Private –	Private businesses, citizens, citizen groups, etc.
QM –	quagga mussel
State –	All state agencies
Tribes –	All Native American Indian Tribes

University –	University of New Mexico, New Mexico State University, Highlands University
USCG –	U.S. Coast Guard
USFWS –	U.S. Fish and Wildlife Service
USFS –	U.S. Forest Service
USGS –	U.S. Geological Survey
USNPS –	U.S. National Park Service
WGA –	Western Governor's Association
WMD –	water management districts
WNV -	West Nile Virus
WRP –	Western Regional Panel
ZM –	zebra mussel

INTRODUCTION

Introduction of nonnative species to the United States is a growing problem, reported to cost the nation $137 billion annually (Pimentel et al. 2000, Lodge et al. 2006). When transplanted outside their native range, nonnative species are often freed from the controlling effects of competitors, predators and pathogens, resulting in rapid population increase and range expansion. Nonnative aquatic invasive species (AIS) can be especially detrimental due to the importance of the nation's aquatic and hydrologic resources. As their populations expand, AIS often impede municipal and industrial water systems, can cause public health problems, displace native species, degrade ecosystems, and reduce recreational and commercial fishing opportunities. To date, AIS have caused significant ecological and socio-economic problems throughout North America. Costs from damage and controlling nonnative fish alone reach $5.4 billion per year and the cost of controlling aquatic plants ranges from $2,000 to $6,000/hectare/year (Pimentel 2003). Addressing the issue of AIS is particularly difficult with increasing globalization, the great extent of our coastal areas, and the inherent connectivity of hydrologic units. Although awareness of AIS is increasing, aquatic invaders continue to be introduced into the United States and into new habitats at an alarming rate.

In 1990, the Non-indigenous Aquatic Nuisance Prevention and Control Act (NANPCA) was passed to address AIS problems in the United States. While programs created by this legislation were initially aimed at problems in the Great Lakes region, passage of the National Invasive Species Act (NISA) in 1996 established a national goal of preventing new introductions and limiting the dispersal of existing AIS in the United States. Under section 1204 of NISA, states are authorized to present a comprehensive management plan to the federal ANS Task Force for approval. These state plans must identify those areas or activities within the state, for which technical, enforcement, or financial assistance is needed to eliminate or reduce the environmental, public health, and safety risks associated with ANS. Plan approval allows the state to receive up to a 75 percent federal cost share to implement a plan. The New Mexico Aquatic Invasive Species Management Plan (NMPlan) was developed to meet the requirements of NISA, following guidelines established by the federal ANS Task Force (2005) and reliance upon other state plans.

The impacts of AIS to New Mexico have not been as visible compared to other states, such as in Florida or those in the Great Lakes Region, where invaders like water hyacinth and the zebra mussel, respectively, require hundreds of millions of dollars annually for control and mitigation. Relative to neighboring states of Arizona, Colorado and Texas, New Mexico has experienced fewer introductions of ANS (USGS 2005a), which places our state in an opportune situation to act before problems become too expensive, or ecological damage becomes too severe, to manage effectively. However, more than 100 AIS occur in New Mexico (see Appendix B) and many are beginning to seriously impact wildlife. Many of the AIS now established are the result of intentional efforts from bait bucket introductions and sport fisheries management, commerce (horticultural practices), and release of aquarium pets and plants. Restrictions now prohibit or impede further unauthorized introductions; however, the threat of accidental introductions continues to grow. Many AIS, not currently in New Mexico, occur in neighboring states (USGS

2005a). Their arrival is likely either by natural expansion via shared drainages or by the ever-increasing movement of recreationists and their equipment. As well, New Mexico's growing aquaculture trade provides another avenue of introduction of AIS. Perhaps more subtle is the threat from the global aquarium trade and an increased interest in the aquacultural industry for food production (tilapia, marine shrimp, Australian crayfish). This situation is in turn complicated by the abundance of suitable aquatic habitat created through the impoundment of rivers and New Mexico's warm climate, where escapees, whether intentional or not, may establish viable populations.

As a state in the arid Southwest, New Mexico's approximately 5,948 miles of perennial streams and estimated 482,000 acres of wetlands (CRWUA 2005) are an extremely valuable resource (Figure 1). They provide habitat for wildlife, enrich the lives of the public, and generate income through recreation, agriculture and industry. Despite its aridity, New Mexico has a rich and unique aquatic biodiversity. Sixty-six species of native fish occur in the state, many of them endemic (Carlson and Muth 1989). However, nonnative fish (75 species) now outnumber native species and some of these nonnatives can negatively affect native populations**,** contributing to their decline, with 30% of native fish species threatened (Warren and Burr 1994, Boydstun et al. 1995). Several non-vertebrate AIS also threaten New Mexico fisheries. Whirling disease (*Myxobolus cerebralis*), first recorded in New Mexico in 1998, can infect stocked rainbow trout and native cutthroats, devastating fisheries. Golden alga (*Prymnesium parvum*), responsible for extensive fish kills in the lower Pecos River since 1988, was recently reported (2005) in private ponds near Eunice and Roswell.

Information from the Biota Information System of New Mexico (BISON-M) indicates that of 829 taxa of vertebrates known to reliably occur in New Mexico, 627 (76%) utilize aquatic, semi-aquatic or riparian habitats during some or all of their life stages. Introduction, establishment, and stocking of nonnative species have already impacted 19 taxa of wildlife listed as Threatened or Endangered under the New Mexico Wildlife Conservation Act. One federally Threatened species, the Chiricahua leopard frog (*Rana chiricahuensis*) has been adversely affected by several nonnative aquatic species.

The exotic Asian clam (*Corbicula fluminea*) is now found in many surface waters throughout the state. Nonnative freshwater mussels, the giant floater (*Pyganodon grandis*) and paper pondshell (*Utterbackia imbecillis*), are reported from impoundments (Canadian River, lower Pecos River) and in the middle Rio Grande mainstem, respectively. These established populations are likely the result of bait bucket introductions and underscore concerns that zebra mussels (ZM) and quagga mussels (QM) (*Dreissena polymorpha* and *D. bugensis*, respectively), now found in adjacent Arizona (QM) and Colorado (ZM), may likely spread by similar pathways to surface waters of New Mexico, resulting in detrimental economic and ecological impacts.

AIS, such as Eurasian watermilfoil (*Myriophyllum spicatum*) and Brazilian waterweed (*Egeria densa*), both present in New Mexico, have the potential to impact the state on multiple levels. These two plants grow very rapidly and can reach high densities. In one area of North Carolina, when first reported Eurasian watermilfoil covered approximately

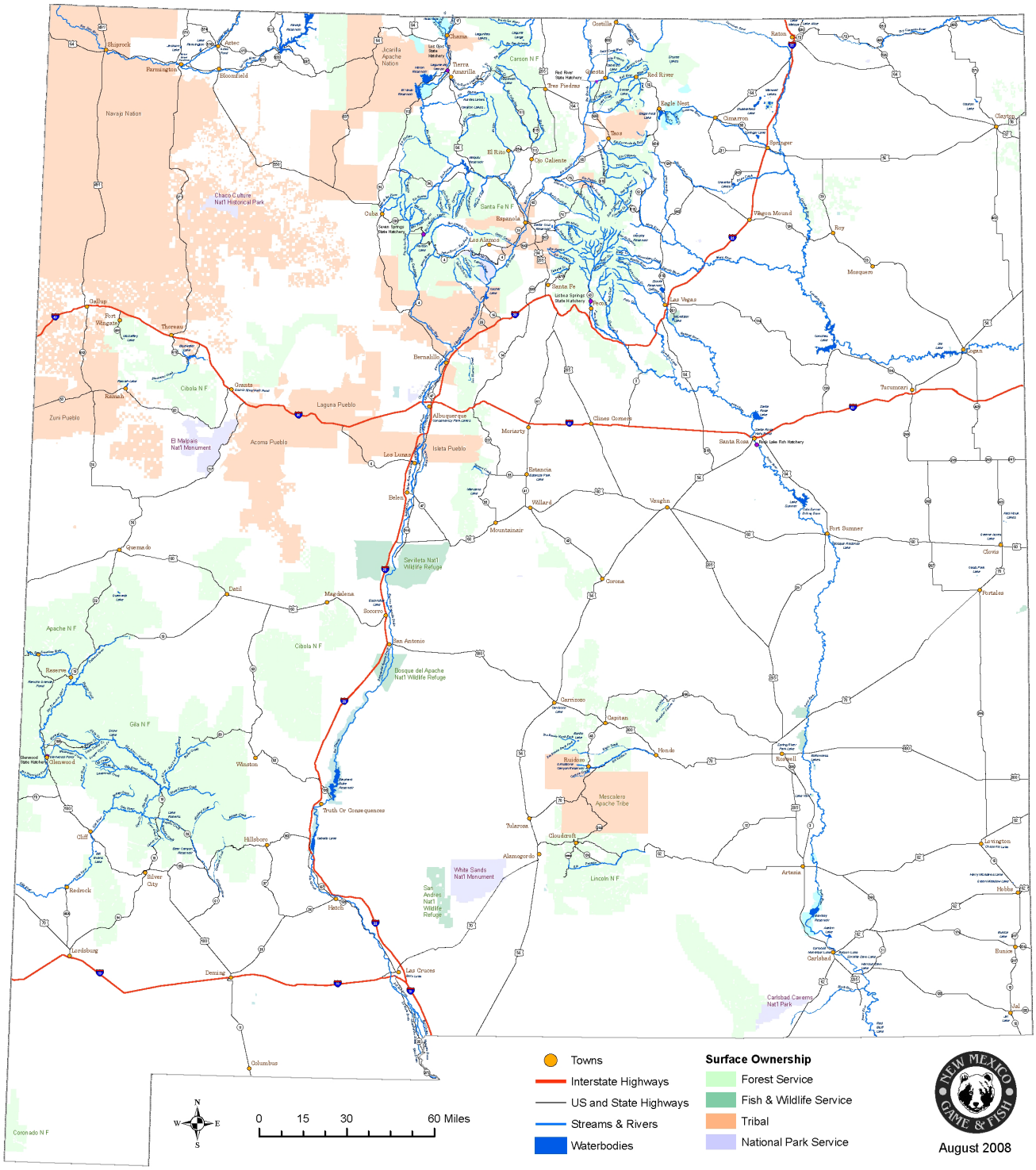

Figure 1. Surface waters and major transportation routes in New Mexico.

200 to 400 hectares. A year later, 26,800 hectares were infested. These invasive plants can displace native plants, reduce waterfowl populations, and decrease levels of dissolved oxygen in waterbodies, resulting in fish die-offs (Frodge et al. 1995). New Mexico's extensive network of irrigation systems is particularly threatened by AIS. Eurasian watermilfoil and Brazilian waterweed impede water flow and clog pumps and intake pipes. In Washington state, about $1 million is spent annually to control Eurasian watermilfoil. In New Mexico, where water resources are scarce and agriculture is heavily dependent on irrigation, economic impacts from these types of AIS could be costly. Invasive aquatic plants can slow water movement, creating stagnant pools that are ideal breeding grounds for mosquitoes. This potentially compounds the impact from another introduced species, West Nile Virus (WNV), a mosquito-vectored pathogen. First recorded in the state in 2002, WNV has been recorded in 30 of 33 counties. In 2003, 209 human cases were reported, with 4 deaths in 2004. Additionally, horses and several species of wildlife are at risk from WNV. Economically, costs of WNV can be high. In 2002, 329 cases were reported in Louisiana with an estimated cost of $20.1 million (Zohrabian 2004).

The few species described above and their impacts offer a glimpse of the present and future problem posed by AIS in the state, underpinning the need to develop a comprehensive plan to address AIS related issues. Currently, efforts focused on managing the impacts of AIS in New Mexico are conducted by only a few federal, state, and local agencies. However, these efforts are not sufficiently coordinated or funded to prevent further introductions or additional damage to economic and environmental resources from the impacts of AIS already present. The NMPlan provides a framework for coordinating efforts to prevent additional introductions, to contain AIS already present, and to manage AIS in New Mexico. The NMPlan will be reviewed annually to incorporate advances in research and updated information on the distribution of AIS.

PROCESS AND PARTICIPATION

Addressing the problem of AIS in New Mexico will entail a large-scale and long-term effort, requiring funding and coordination from multiple agencies, organizations, and individuals (stakeholders). As the agency coordinating this strategic planning effort, the NMDGF prepared a preliminary draft plan and requested broad-based stakeholder participation from representatives of State and Federal agencies, Tribes, municipalities, water management districts, NGOs, and the private sector to serve on the New Mexico Aquatic Invasive Species Advisory Council (AISAC). The AISAC revised the preliminary draft plan and subsequently solicited public comment on the draft plan during a 30-day review period (see Appendix I, *Public Comment*). Management and financial responsibilities identified under the NMPlan (see *AIS Management Strategy*) are to be refined by all stakeholders as funding becomes available. The NMPlan is a viable first step towards identifying and integrating existing AIS activities, including the

development and implementation of new programs. Funding and future plan revisions will be necessary to achieve our goal.

EXISTING AUTHORITIES AND PROGRAMS

This section provides a brief discussion of nonnative species authorities and programs in New Mexico, as well as regional activities, federal law, and international agreements. The policies regarding nonnative species are controlled and enforced by a network of regulatory agencies and organizations.

Federal

No single federal agency has clear authority over all aspects of AIS management, but many agencies have programs and responsibilities that address aspects of the problem, such as importation, interstate transport, exclusion, control, and eradication. Federal activities on AIS management are coordinated through the National Aquatic Nuisance Species Task Force (NANSTF). In February 1999, President Clinton signed Executive Order (EO) 13112, which requires all federal agencies to collaborate in developing a national invasive species management plan that will include terrestrial and aquatic species. A brief description of the President's Executive Order, the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA), and the National Invasive Species Act (NISA) is provided below. Additional information on NISA Section 1204 is provided in Appendix C. See Appendix D for details of EO 13112. Various federal laws relevant to AIS issues in New Mexico are described in Appendix E.

Executive Order 13112 on Invasive Species

President Clinton signed EO 13112 on Invasive Species (64 Fed. Reg. 6183, Feb. 8, 1999), on February 3, 1999. The EO seeks to prevent the introduction of invasive species, 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 National Invasive Species Management Plan was finalized on January 18, 2001. It can be found on the Council website at www.invasivespecies.gov.

Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 (NANPCA; Title I of P. No.101-646, 16 U.S.C. 4701 et seq.)

This Act established a federal program to prevent the introduction of, and to control the spread of, introduced ANS and the brown tree snake. The U.S. Fish and Wildlife Service (USFWS), the U.S. Coast Guard (USCG), the Environmental Protection Agency (EPA), the Army Corps of Engineers (CoE), and the National Oceanic and Atmospheric Administration (NOAA) share responsibilities for implementing this effort. They act

cooperatively as members of the national Aquatic Nuisance Species Task Force (ANSTF). The purposes of NANPCA are:

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

Under NANPCA, state governors are authorized to submit comprehensive management plans to the Task Force for approval that identify areas or activities for which technical and financial assistance is needed. Grants are authorized to states for implementing approved management plans, with a maximum federal share of 75% of the cost of each comprehensive management plan. The state (or private) contribution is 25% of total program costs.

National Invasive Species Act (NISA; P. L. No.104-332)

In 1996, the Congress reauthorized and amended NANPCA, creating NISA. The amended act addressed the need to expand efforts beyond ballast water and zebra mussels, and to address additional avenues of introduction and the variety of nonnative species associated with those pathways. As well, NISA established provisions to create additional regional panels around the country to interact with the ANS Task Force and provide regional and local recommendations, planning, and an infrastructure for action.

U.S. Fish and Wildlife Service programs

The USFWS provides federal funding for implementation of state and regional ANS (AIS) management plans which have been approved by the ANS Task Force. One of the major USFWS efforts on AIS is the 100th Meridian Initiative. The goals of this Initiative are to 1) prevent the spread of zebra mussels and other AIS in the 100th meridian jurisdictions of the West and 2) monitor and control zebra mussels and other AIS if detected in these areas. These goals will be attained through the implementation of the following six components: 1) information and education, 2) voluntary boat inspections and boater surveys, 3) involvement of those who haul boats for commercial purposes, 4) monitoring, 5) rapid response, and 6) evaluation.

This Initiative represents the first large-scale concerted effort, working with resource agencies (federal, state, provincial), tribal entities, potentially affected industries and

other interested parties, to begin addressing the pathway to prevent the spread of zebra/quagga mussels. The success of this Initiative depends on the commitment of these groups to combat the spread of this destructive invader.

Based on a 2007 statewide risk assessment of water bodies in New Mexico, stakeholders (state and federal agencies, NGOs, water user groups) from New Mexico and Colorado formed the Rio Grande Basin Team under the 100th Meridian Initiative (more information: http://www.100thmeridian.org/RioGrandeRT.asp). The objectives of this team are to: define zebra mussel and quagga mussel threats to Rio Grande resources; prioritize prevention actions for high-risk waters and identify those actions which can be accomplished with existing resources; develop an outline for future collaborative work; and develop long-term strategies to prevent zebra mussel and quagga mussel introduction into the basin.

The USFWS is an active participant on the New Mexico AISAC and the Rio Grande Basin Team.

Regional

Western Regional Panel (WRP)

The WRP on ANS was formed under a provision in NISA. The initial, organizational meeting of the WRP was held in 1997. The WRP was formed to help limit the introduction, spread, and impacts of ANS into western North America. This panel includes representatives from federal, state and local agencies, including private, environmental, and commercial interests.

The purposes of the WRP, as described in NISA, are to:

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

Western Governor's Association (WGA)

The WGA was established in 1984 to address key policy and governance issues common to the 18 Western states, two territories and one commonwealth. 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; 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 (APHIS). Resolution 98-018 was followed by Resolution 02-21, Undesirable Aquatic, Riparian, and Invasive Species, and most recently by Resolution 04-12, Undesirable Aquatic, Riparian, and Invasive Species. The 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. The entire Resolution 04-12 is in Appendix E.

U.S. Army Corps of Engineers, South Pacific Division, Albuquerque District (CoE)

The CoE is currently involved in more than 30 projects throughout the state. In other states, the CoE coordinates activities between federal, state, and local agencies and organizations working on AIS related projects. The CoE is an active participant on the New Mexico AISAC and the Rio Grande Basin Team.

Tribal

There are 22 federally recognized Tribes in New Mexico. Tribal lands with reservoirs, lakes, rivers and streams represent watersheds that commonly cross state and tribal boundaries. A coherent strategy for AIS depends on addressing all waters of the region. However, federal reserved lands are subject to federal, not state law. Tribes are also empowered to develop Tribal laws under the Clean Water Act and other authorities. 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 AIS problems that commonly transcend jurisdictional boundaries.

State

In New Mexico, state and local agencies can play a major role controlling the spread of nonnative species. States have authority to decide which species can be imported and/or released. However, the U.S. 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. Although many state agencies have some authority to regulate AIS, no centralized authority or management structure exists to coordinate AIS activities in New Mexico. This section describes the existing laws, regulations, and policies related to AIS that various state agencies have for managing AIS (also see Appendix F).

New Mexico Border Authority (NMBA)
The New Mexico Border Authority oversees development and promotion of our International Ports of Entry located at Santa Teresa, Columbus, and Antelope Wells. The NMBA seeks to create partnerships with public and private stakeholders involved in international trade activities, travel (businesses, tourists), and dissemination of information related to regulations and procedures affecting leisure and commercial travel through New Mexico's ports of entry.

New Mexico Department of Agriculture (NMDA)
Agriculture and Environmental Services Division – This division of the NMDA, operating through various bureaus, administers pesticide use laws through product registration, applicator licensing, and inspections; directs pest detection surveys, quarantines, and regulates the sale of live plants and cut flowers; provides dairy farm and plant inspection permitting; regulates distribution of feed, seed, and fertilizer products through product registration and inspections; houses the state chemist and state seed laboratories. The NMDA is an active participant on the New Mexico AISAC.

Bureau of Entomology and Nursery Industries:

- The *New Mexico Pest Control Act* [76-6-1 to 76-6-39] provides the authority to carry out operations or measures to locate, suppress, control, eradicate, prevent or retard the spread of pests. "Pest" means any insect, disease or other organism of any character causing or capable of causing injury or damage to any plants or parts thereof or any processed, manufactured or other products of plants. This provision includes the authority to quarantine all or part of the state, to inspect areas suspected of infestation, and to abate the threat from actual or suspected infestations of pests.

- The *New Mexico Plant Protection Act* [76-5-11 to 76-5-28] provides the authority for the state to inspect nurseries and florists to ensure stock is free from plant pests. "Plant pests" means any organisms injurious to plants and plant products which in the normal course of events could be transported with the plant, including but not limited to the phyla arthropoda, mollusca or nemathelminthes as well as weeds, fungi, bacteria, viruses or parasitic plants, which cause pathological or detrimental physiological conditions in plants. This provision also includes the authority to regulate the transport into the state and the sale and transport within the state to ensure plant stock is pest free.

- The *New Mexico Harmful Plant Act* [76-7A-1 to 76-7A-11] provides the authority to prevent the introduction, spread or dissemination of a harmful plant in the state. "Harmful plant" means any plant, seeds or other parts of a plant the board declares by regulation to be a harmful plant. This provision includes the authority to quarantine all or part of the state, as well as any domestic livestock, captive wildlife or captive stray animals suspected of exposure to a harmful plant, to make inspections areas suspected of harboring harmful plants, and to abate the threat from harmful plants.

Bureau of Feed, Seed, and Fertilizer:

- The *New Mexico Commercial Feed Law* [76-19-1 to 76-19-14] authorizes the state to establish limits on the amount of weed seeds in commercial feeds. "Commercial feed" means all materials which are distributed for use as feed or for mixing in feed for animals other than man, except: (1) unmixed or unprocessed whole seeds; or (2) unground hay, straw, stover, silage, cobs, husks and hulls when not mixed with other materials. This provision includes the authority to inspect and detain any commercial feeds not meeting labeled specifications.

- The *New Mexico Seed Law* [76-10-11 to 76-10-22] authorizes the regulation of sale and transport of seeds into and within the state. Inclusive, is the authority to regulate labeling and allowable limits of noxious weed seeds. "Noxious weed seeds" includes prohibited noxious weed seeds and restricted noxious weed seeds. "Prohibited noxious weed seeds" are seeds of weeds which, when established, are highly destructive and are not controlled in this state by the cultural practices commonly used. "Restricted noxious weed seeds" are the seeds of weeds which are very objectionable in fields, lawns and gardens in this state and are very difficult to control by cultural practices commonly used.

- The *New Mexico Noxious Weed Act of 1963* [76-7-23 to 76-7-30] and the amended 1978 *New Mexico Noxious Weed Management Act*, provide the authority to declare a weed as noxious. "Noxious weed" means any species of plant which is liable to be detrimental or destructive, and difficult to control or eradicate. Under the act, the sale, distribution or planting of a noxious weed into or within the state is illegal and penalties exist to prevent such. This includes the authority to inspect any facility or ground where noxious weed seeds are sold, stored, transported or planted.

Bureau of Pesticide Management:

- The *New Mexico Pesticide Control Act* [76-4-1 to 76-4-39] provides authority to regulate all pesticides and pesticide applicators, including aquatic pesticides. It also provides for training and education of pesticide applicators. The administrative rules of this Act require special training and management plan development for the use of aquatic herbicides.

<u>Agricultural Programs and Resources Division</u> – This division of the NMDA is the agricultural liaison for the director/secretary and handles agricultural issues analyses, cooperative predatory and wild animal and rodent pest program, and supervises farm and range improvement fund activities, and the soil and water conservation program.

- The *New Mexico Livestock Code, Article 15 Predatory Animals and Rodent Pest* [77-15-1 to 77-15-5] authorizes the state to cooperate in the control of rodent pests.

- The *New Mexico Soil and Water Conservation District Act* [73-20-25 to 73-20-48] recognizes the value of New Mexico's water resources and authorizes their administration. Inclusive is the need to preserve the state's waters to protect the health and welfare of the people of the state and to preserve and conserve its wildlife and natural resources.

New Mexico Energy, Minerals and Natural Resources Department (EMNRD)
The NM State Parks Division of EMNRD is responsible for administering and enforcing the state boating laws and regulations on all waters in the state. Other functions include waterways management planning, maintaining boating facilities for state parks, administering the state boating accident database, cooperating with the United States Coast Guard, and assisting other local, state and national agencies that also have water recreation management responsibilities. This Division does not have any policies directly related to the movement of AIS, nor does it have specific authority to prevent the introduction of AIS into Park or State waters. State Parks is an active member on the New Mexico AISAC and the Rio Grande Basin Team.

New Mexico Department of Game and Fish (NMDGF)
Various articles under New Mexico Statutes Annotated, Chapter 17, *Game and Fish and Outdoor Recreation*, regulate the importation of fish and game into the State and their movement within the State. The importation of any live animals, birds or fish into New Mexico, except domesticated animals or domesticated fowl or fish from government hatcheries, is subject to approval by the NMDGF under NMSA 17-3-32. Shipment of game animals, birds and fish to officers of other states is regulated under NMSA17-3-30. The taking of bait fish from State waters for the purpose of sale and the movement of bait fish within the state is regulated under NMSA17-3-27. NMDGF is signatory to the New Mexico Strategic Plan for Managing Noxious Weeds (see below). The NMDGF is an active participant on the New Mexico AISAC and the Rio Grande Basin Team.

New Mexico Environment Department (NMED)
The basic authority for water quality management in New Mexico is provided through the State Water Quality Act [74-6-1]. This law establishes the Water Quality Control Commission, which is administratively attached to the NMED, and specifies its duties and powers. The duties and powers of the Commission include adoption of a comprehensive water quality management program, the development of a continuing planning process, the administration of loans and grants from the federal government, the adoption of water quality standards, and the adoption of regulations "to prevent or abate water pollution in the state or in any specific geographic area or watershed of the state...or for any class of waters." The NMED is an active participant on the New Mexico AISAC and the Rio Grande Basin Team.

Various sub-parts of the Standards for Interstate and Intrastate Surface Waters [20.6.4 NMAC] included components directly and indirectly applicable to AIS in New Mexico. Factors affecting growth of undesirable aquatic life [20.6.4.13 E] and the application of piscicides [20.6.4.13 F] are addressed.

New Mexico Economic Development Department (NMEDD)
The NMEDD focuses on growing economic-based businesses to foster a sustained rise in New Mexico's production of goods and services. The NMEDD does not have any policies directly related to the economic impacts of AIS.

New Mexico Department of Health (NMDH)
The NMDH has the potential to cooperate on the management and control of AIS within New Mexico. Under State statutes, the NMDH has the authority to investigate, control and abate the causes of disease, especially epidemics, sources of mortality and other conditions of public health [24-1-3C] and to establish, maintain and enforce isolation and quarantine [24-1-3D].

New Mexico Department of Transportation (NMDOT)
The mission of the NMDOT is to plan, build, and maintain a quality state-wide transportation network which will serve the social and economic interests of New Mexico's citizens. NMDOT focuses on most modes of travel (transit, rail, aviation and highways), with a commitment to traffic safety, environmental protection, and complete planning, design and engineering services. NMDOT is signatory to the New Mexico Strategic Plan for Managing Noxious Weeds (see below).

New Mexico Tourism Department (NMDT)
The NMTD creates, promotes, and develops economic benefit to the state through a visitor industry that will benefit New Mexico economically, environmentally and culturally. The NMTD serves potential and current visitors by fulfilling requests for information, by offering statewide visitor information centers, and through the efforts of the marketing, advertising and media relations. The Department works with local communities to establish funding in regional advertising and cooperative marketing programs; and has a strong presence in volunteer activities statewide, from helping with non-profit organizations to its annual litter awareness campaign. The NMDT does not have any policies addressing AIS issues.

Interstate Stream Commission (ISC)
The ISC is overseen by the State Engineer, who has power over supervision, measurement, appropriation, and distribution of all surface and groundwater in New Mexico. The ISC is specifically responsible for statewide water planning and protecting New Mexico's right to water under 8 interstate stream basins. The ISC participates in special projects to address a variety of interests in water delivery and other water issues affecting interstate water basins of New Mexico. The ISC does not have any policies addressing AIS issues. The ISC is an active participant on the New Mexico AISAC and the Rio Grande Basin Team.

Office of the State Engineer (OSE)
The OSE is charged with administering the state's water resources, and has authority over the supervision, measurement, appropriation, and distribution of all surface and groundwater in New Mexico, including streams and rivers that cross state boundaries. The State Engineer is also Secretary of the ISC and oversees its staff. The OSE does not have any policies addressing AIS issues. The ISC is an active participant on the New Mexico AISAC and the Rio Grande Basin Team.

New Mexico Strategic Plan for Managing Noxious Weeds, 2000-2001
In 2001, motivated by existing weed law, the state's own Executive Order on noxious weeds along with EO 13112, New Mexico wrote, and 33 groups signed, a new

Memorandum of Understanding (MOU). The 18 July 2001 MOU draws together all levels of land managers to participate and support Coordinated Weed Management Areas (CWMAs) in New Mexico. All signatories of the agreement will participate in the CWMAs to: inventory, manage, prevent, and eradicate whenever possible, plants designated as noxious pursuant to the New Mexico Noxious Weed Management Act of 1978. The 33 partners will use the New Mexico Strategic Plan for Managing Noxious Weeds, as a basis for coordination. The signatories, in this statewide effort, include: federal and state agencies, the military, and many tribal councils.

PROBLEM DEFINITION AND RANKING

For centuries humans have intentionally transported plants and animals (e.g., corn, wheat, roses, cattle, trout) around the globe, moving species from their native lands and introducing them to new areas. Many introductions of nonnative species have been beneficial, providing food, clothing, and recreational opportunities for humans. For example, NMDGF uses nonnative species such as rainbow trout (*Oncorhynchus mykiss*), largemouth bass (*Micropterus salmoides*) and walleye (*Sander vitreum*) in its fisheries management programs. In many cases these management practices have created economically valuable fisheries. New Mexico anglers in 2001 recorded almost 2.5 million fishing days and spent over $211 million, generating $81 million in wages and salaries and 3,922 jobs (ASA 2001).

However, numerous nonnative species have the potential to manifest significant adverse impacts on New Mexico's economic, ecologic, and social resources. The NMPlan bases the definition for aquatic invasive species as outlined in *Executive Order 13112 on Invasive Species*, signed by President Clinton on February 3, 1999. This order states that an "invasive species" is a nonnative species whose introduction into an aquatic ecosystem causes or is likely to cause harm to the economy, environment, or human health or safety.

It is therefore critical to take preventative measures that reduce or eliminate threats and effects of AIS. Threats are evidenced by the degree of negative impacts AIS species may have upon the State's environment, industry, and economy. Negative impacts include:

- fouling of water intakes, control structures, and irrigation pumps;
- impeded water flow and interference with efficiency of water delivery systems;
- increased risk of flooding due to clogging of lake and reservoir outlets;
- fouling of water-based equipment (e.g., boat hulls, motors, waders);
- decreased recreational opportunities (e.g., fishing, hunting, boating, swimming);
- increased safety concerns for swimmers;
- economic impact to water-based operations of industry and to recreationists;
- decrease in property values;
- alteration of freshwater nutrient cycling pathways;
- disruption of aquatic food webs;

- displacement of native fauna;
- stunted growth of game and sport fishes;
- loss of biodiversity; and
- increased biotic and abiotic stress on aquatic taxa listed as state or federally threatened or endangered.

When dealing with invasive species, prevention is always the preferred goal, as "an ounce of prevention is worth a pound of cure." Prevention is achieved by blocking the introduction of AIS into the state or, if already present, to isolate the problem in its current location. In order to achieve this, it is critical to describe and understand the pathways of introduction into and across New Mexico. Equally important is the need to identify and rank AIS according to the threat each poses. Classifying AIS is based on a multitude of criteria including: previously documented impact on native species, habitats, or commercial activities; similarity between source and uninvaded environments; proximity of source population of AIS to uninvaded areas; presence of established pathways of introduction; and presence of threatened native species in areas of potential introduction.

Ranking AIS based on threat level not only facilitates preventing introductions and mitigating impacts, it enables management agencies to direct limited financial resources more efficiently. In recognition of the known threats, impacts, and potential problems of certain AIS and the state's current management capabilities, a system to classify species was developed that recommends management activities for each classification. Yet, because impacts either do not occur immediately or may not be apparent until well after establishment, effort must also be devoted to assessing the overall impacts of nonnative species, regardless of their classification. The following are examples of species targeted by the NMPlan. This listing is not comprehensive, but is provided to illustrate species in each priority class.

AIS Priority Classes

Priority Class 1

Priority Class 1 species are currently not known to occur in the wild in New Mexico, but have a high potential to invade and for which there are limited or no known management techniques. Appropriate management for this class includes prevention of introductions and eradication of pioneering populations. Examples of species that need to be addressed under this priority class are:

Giant Salvinia (*Salvinia molesta*)

Giant salvinia is a free-floating aquatic fern with submerged leaves that function as modified roots. It is considered to be one of the world's worst aquatic pests, and in favorable environments, plants may be expected to double in volume within a week (Mitchell and Tur 1975). Giant salvinia forms extensive mats that can completely cover water surfaces resulting in the degradation of natural habitats by shading native plants, reducing available dissolved oxygen, and creating large amounts of decaying plant

material. The mats may grow up to three feet thick, hindering management by chemical control; giant salvinia reproduces so rapidly that infestations quickly outpace available management techniques. Giant salvinia can clog water intakes, which interferes with irrigation, drainage, and electrical generation.

Giant salvinia is native to southeastern Brazil, but it has invaded many areas of the world. Within a year of its 1998 discovery in the U.S., giant salvinia was found in six states and over a dozen local watersheds. Its arrival in the US has been linked to sales from commercial nurseries around the country. Human transport will likely spread giant salvinia locally, with plants adhering to and carried overland on anything entering infested waters, including boats, trailers, vehicular wheels, and other gear. In the US, it has been observed in at least 12 states, including Arizona and Texas. Its expected range includes USDA hardiness zone 7a, which encompasses the southern third of New Mexico and northward to Albuquerque (USGS 2005b). Although not found in the wild, in 2000 nursery inspectors from NMDA discovered plants in commercial greenhouses in three New Mexico counties (i.e., Bernalillo, Luna, Sandoval; USGS 2005c). *Cyrtobagous salviniae*, a weevil that feeds on *Salvinia spp*., has been used successfully as a biocontrol agent in several countries, and is being released as part of control efforts in the Lower Colorado River as well as Texas and Louisiana. Triploid (sterile) grass carp have proven as an effective biocontrol agent for AIS plants in New Mexico, Texas, and Louisiana.

Water hyacinth (*Eichhornia crassipes*)

Water hyacinth is native to South America but has naturalized many warm areas of the world: Africa, Asia, Australia, Central America, India, New Zealand, and North America (Canada, southern US, western states [AZ, CA, CO, OR, TX, WA]). Water hyacinth grows over a wide variety of wetland types from lakes, streams, ponds, waterways, ditches, and backwater areas. This free-floating perennial plant is a very aggressive invader and can form thick mats that interfere with navigation, recreation, irrigation, and power generation. These mats competitively exclude native submerged and floating-leaved plants. Low oxygen conditions develop beneath water hyacinth mats which can impede water flow and create good breeding conditions for mosquitoes. Water hyacinth is a severe environmental and economic problem in all of the gulf coast states of the US.

With the increasing popularity of water gardening and home ponds, water hyacinth is now sold by many nurseries for its unusual appearance, attractive flowers, and ability to remove nutrients from the water. Water hyacinth is thought to be cold-sensitive and unable to survive temperatures below 20 degrees F. Because water hyacinth reproduces sexually by seeds, the chances are higher of developing a cold-tolerant ecotype than if it reproduced only vegetatively.

Mechanical controls such as harvesting are ineffective for large scale problems, very expensive, and cannot keep pace with the rapid plant growth in large water systems. Triploid grass carp have been used as an effective biocontrol agent for AIS plants in the Rio Grande basin of New Mexico. Three insects have been released as biological control agents of water hyacinth (two weevil species [*Neochetina* spp.] and a moth [*Sameodes albiguttalis*]), but have not proven efficacious for large scale water hyacinth infestations.

The aquatic herbicides 2, 4-D, diquat and a combination of diquat and complexed copper have proven effective. Fair control of water hyacinth is obtained with endothall dipotassium salt, endothall dipotassium salt and complexed copper, endothall dimethylalkylamine salts, and glyphostate. For more information use the following links: http://www.ecy.wa.gov/programs/wq/plants/weeds/aqua010.html and http://www.protectyourwaters.net/hitchhikers/plants_water_hyacinth.php.

Viral Hemorrhagic Septicemia (VHS) Virus

VHS virus occurs in both marine and fresh water environments. VHS is indigenous to eastern and western Europe, Japan, and the Pacific Coast (from California to Alaska) and Atlantic Coast of North America. Since at least 2003, VHS virus has been present in the Great Lakes-St. Lawrence River system, where in 2005 and 2006 a highly virulent and easily transmissible strain (IVb) caused massive die-offs of native fishes (e.g., muskies, northern pike, walleye, lake whitefish, freshwater drum, yellow perch, gizzard shad, redhorse, emerald shiners, smallmouth bass, bluegill, and black crappie).

Fishes are susceptible to infection at any age, but juvenile fish are generally more susceptible than adults. VHS virus is transmitted between fish via their urine and reproductive fluids; it cannot enter eggs and infect fish before hatching. Virus particles in the water infect gill tissue first, and then move to the internal organs and the blood vessels, causing hemorrhages in the internal organs, muscle and skin. Fish can also be infected when they eat an infected fish.

Fish mortality from VHS virus is greatest at 38–54º F and is very rare above 60º F. The virus becomes inactive after 24 hours at 68ºF in water, but can persist in water for five days at 39º F. Such viral virulence is well within surface water temperature regimes in New Mexico, thus underpinning threats to our fishery resources.

There is evidence of infections transferred between farmed and free-living fishes in European inland waters and coastal areas. The potential for transport with bait fish is demonstrated by the virus' recovery in cell culture from frozen Pacific herring after two freeze/thaw cycles in a conventional freezer. Waterfowl might also play a role in moving the virus, but it does not survive passage through the gut of birds. In the hatchery environment, mechanical transfer of VHS virus on animate or inanimate objects presents a substantial hazard. The virus has been isolated from feral fish in waters receiving hatchery effluent, and can persist in water for several days. These transport mechanisms pose threats of VHS virus transmission to cold and warm water fisheries in New Mexico. Fisheries professionals should use Hazard Analysis and Critical Control Point planning, or HACCP, to prevent the spread of the virus; it's a simple and orderly strategic planning tool that helps identify and manage risks in natural resources management.

The economic impact from large scale die-offs of game fishes could be profound. The effects of VHS to endangered species conservation and commercial fisheries could be equally significant. For more information visit: http://www.seagrant.umn.edu/fisheries/vhs_virus_facts and http://www.fws.gov/fisheries/nfhs/VHS.htm.

Quagga Mussel (*Dreissena bugensis)* and Zebra Mussel (*Dreissena polymorpha*)
Native to the Black and Caspian seas of eastern Europe, quagga and zebra mussels were first discovered in the North America in the late 1980s in the Great Lakes. Dreissenid mussels were likely introduced from the Black Sea via ballast water discharge from European freighters. By 1994, these species had invaded 19 states in the Mississippi River drainage. From 2001 to 2003, zebra mussels spread to Oklahoma, Kansas, and Nebraska. In January 2007, quagga mussels were discovered in lakes Mead, Havasu and Mojave on the lower Colorado River and in two major aqueducts that supply water to southern California and Arizona. In November 2007, zebra mussels were reported from Pueblo Reservoir, Pueblo Colorado, some 90 miles from the New Mexico state border. In January 2008, zebra mussels were reported in San Justo Reservoir, San Benito County, central California.

Dreissenid mussels and their larvae (veligers) can survive several days of overland transport from infested waters by clinging to vegetation attached to hauled boats, boat hulls, or in live wells, engine cooling systems, or bait buckets. Dead zebra mussels have been discovered on trailered boats in Montana, Arizona, and New Hampshire. Live zebra mussels have been found at California agricultural check stations on boats hauled from the Midwest. These instances underscore the importance of human-mediated dispersal of these AIS, which have likely been transported across New Mexico's borders. Both mussels are prolific fouling organisms with great potential to cause ecologic and economic damage in the southwestern region (Kennedy 2007). Surface waters of New Mexico are fully capable of supporting and sustaining zebra mussels or quagga mussels. Nationwide expenditures to control these invasive mussels in water intake pipes, filtration equipment, and electric generating plants are estimated at $3.1 billion over 10 years.

Red-rim melania (*Melanoides tuberculatus*)
Although this aquatic herbivorous snail is native to northern and eastern Africa and southeastern Asia, it presently inhabits subtropical and tropical areas throughout the world (Gulf States Marine Fisheries Commission 2003). Red-rim melania was first imported into California by the aquarium industry as early as the 1930s, where the species spread from accidental or purposeful release by aquarium and water-garden hobbyists (Benson 2005). Since then this snail has invaded 16 states (AZ, CA, CO, FL, HA, LA, MT, NC, NV, OR, UT, SD, TX, VA, WY). Other pathways of human-mediated dispersal may be responsible for introductions, as researchers and fishermen using aquatic equipment (seines, nets, waders) may inadvertently spread snails to uninfested waters. Transfer of aquatic plants from infested surface waters or aquaria may also facilitate spread of this species.

This snail evokes broad interest since it serves as a transmission vector for several dangerous parasites of humans and numerous wildlife species. Red-rim melania serves as an intermediate host for the human Chinese liver fluke and Oriental lung fluke, however these trematodes have not yet been found in red-rim melania in the US. It is also an intermediate host for the eye fluke, an ocular parasite of waterfowl which occasionally infects mammals. Adult stages of this parasite have been isolated from

piscivorous birds (Green Heron, Great Egret) in Texas. In the US, this snail is a host for a parasitic "gill trematode" that affects the health of wild and cultured (tropical) fish species (Mitchell et al. 2005). This is particularly germane for native species, as known fish hosts include eight families (Centrarchidae, Characidae, Cyprinidae, Cyprinodontidae, Ictaluridae, Percidae, Percichthyidae, Poeciliidae) represented in New Mexico, including federal and state listed species (Pecos gambusia, Mexican tetra, greenthroat darter). The gill trematode is carried by federally-protected aquatic birds and is found in ranid frogs. Red-rim melania have been reported to competitively displace native gastropods, posing concern for endemic populations of hydrobiid snails of New Mexico.

The red-rim melania can be purchased in many pet shops and over the internet. This species flourishes in waters with salinity from 0 to 30 ppt and temperatures from 18 to 32ºC—physicochemical regimes typical of surface waters of New Mexico. Eradication using molluscicides has proven effective in ornamental fish ponds, but such pesticides are of limited use in larger through-flowing systems, and are not recommended in small spring-fed streams where native aquatic fauna may be adversely affected by toxic chemicals. Movement between sites can be prevented by disinfecting aquatic equipment in a hot water bath or soaking in a quaternary ammonium solution (10 ppm for 24 hrs.).

New Zealand Mudsnail (*Potamopyrgus antipodarum*)
Native to New Zealand, this species was discovered in 1987 in the middle Snake River, Idaho. They are now found in all western states, except New Mexico. These tiny snails (~7 mm long) are parthenogenic (clonal) livebearers with a high reproductive potential. Densities of mudsnails can be extremely high (300,000 to 750,000 snails/m^2). *Potamogyrpus antipodarum* has been shown to alter appreciably primary production in some streams. Limited research has documented decreases in populations of native macroinvertebrates in several rivers infested by mudsnails. Although adapted to a variety of aquatic habitats (estuaries, lakes, streams), mudsnails can withstand extended periods of desiccation (20-50 days on damp substratum). These life history attributes place recreationists (angler, hikers) and aquatic researchers who may contact infested waters as high-risk transport agents for spreading populations to new areas. Fish stocking and transfers from hatcheries may accelerate the spread and introduction of mudsnails, as the species has been reported to survive passage through the gastrointestinal tract of trout. These findings pose concerns that mudsnails have the potential to impact native aquatic species, fisheries, and ecosystems in the western USA. For more information visit: http://www.esg.montana.edu/aim/mollusca/nzms/id.html.

Channeled (or Golden) Applesnail (*Pomacea* spp.*)*
These amphibious snails are widely distributed in lakes, ponds and swamps throughout their native range in southeastern Brazil, Argentina, Bolivia, Paraguay, and Uruguay. Applesnails were introduced to Southeast Asia around 1980, as a local food resource and potential gourmet export item. The markets never developed, applesnails escaped or were released, and they became a serious agricultural pest in rice fields throughout many Indo-Pacific countries (Cowie 2005). Human-mediated dispersal via trade pathways (e.g., live food, aquaculture, water-garden nursery, pet/aquarium, illicit importation)

resulted in the spread of applesnails to Central America and the Caribbean (Bronson 2002). In the US, nonnative populations *Pomacea* spp. are established in Alabama, Arizona, California, Florida, Georgia, Hawaii, South Carolina, and Texas (Howells 2003, http://www.manandmollusc.net/Odessa/apple-snail.html.).

The systematics of *P. canaliculata* is an area of ongoing research (Cowie et al. 2006, http://www.cofc.edu/~fwgna/species/ampullariidae/p_canaliculata.html). On the basis of mtDNA sequence data, populations in Georgia have been referred to *Pomacea insularum* (Rawlings et al. 2007). While morphological distinction between adult *P. canaliculata* and *P. insularum* seems negligible, there are suggestive differences in egg mass morphology (Florida Fish & Wildlife Commission). Currently in Florida, the aquarium industry is producing and marketing the native spiketopped applesnail (*Pomacea bridgesi*) as the "Golden Apple Snail." Snails of the genus *Pomacea* are not native to New Mexico, but are sold in-state by the aquarium industry.

Water currents are one of the main means of dispersal within a watershed, especially irrigation canals. This species' tolerance of water temperatures down to 50ºF, combined with its lung and gill respiratory system, high reproductive potential and voracious appetite, poses concerns for thermally-derived surface waters of New Mexico. Potential impacts could involve consumption of native aquatic vegetation leading to habitat modification, as well as competitive interactions with the native aquatic fauna, including hydrobiid snails endemic to thermal spring systems.

Tilapia (*Oreochromis spp., Sarotherodon sp.* and *Tilapia spp.*)
Tilapia are potential competitors with native fish for spawning areas, food, and space, as well as potential vectors for parasites and diseases. Populations of various species of tilapia are established in Arizona and Texas where these invasions have coincided with reductions of native fish species. Tilapia (possibly *Tilapia aurea*) was introduced into New Mexico at two locations prior to 1990 as fish stockings. While these populations did not survive, the NMDGF has received and approved importation requests for small-scale, contained food industry operations at two facilities in the state. The current threat is from humans illicitly translocating live fish from approved facilities or from range expansion via shared drainages.

Asian Carps (Bighead, Black, Silver, and Common)
Common carp have been introduced legally or illegally and have spread into nearly every state in the US. Bighead and silver carps are spreading rapidly but are found mainly in the Mississippi River drainage basin. Black carp have been collected in the Mississippi River but are not thought to have established reproducing populations at this time. Asian carps represent a significant threat to aquatic ecosystems because they are large-bodied fishes with ravenous appetites and high reproductive potential; accordingly, these fish pose a significant risk to aquatic ecosystems. They can weigh up to 100 pounds, and can grow to a length of more than four feet. Asian carps may out-compete native fish, causing severe hardship to local fishing industries. Boaters have been injured by silver carp jumping out of the water and into or over boats in response to outboard motors. Researchers anticipate that Asian carps pose many threats to native fish and aquatic

ecosystems. Silver and bighead carp compete for plankton with native fish. Black carp threaten imperiled native freshwater mollusks, as they feed almost exclusively on mussels and snails. The U.S. Fish and Wildlife Service added all forms of live silver carp, largescale silver carp, and black carp (gametes, viable eggs, and hybrids) to the list of injurious fish under the Lacey Act (Federal Register 2007a, 2007b). For more information use the following links: http://www.epa.gov/grtlakes/invasive/asiancarp/ and http://www.umesc.usgs.gov/invasive_species/asian_carp.html.

Priority Class 2

Priority Class 2 species are present and established in New Mexico, but with impacts that may be mitigated or controlled through appropriate management. These species can be managed by actions that involve mitigation of impact, control of population size, and prevention of dispersal to other waterbodies. Examples of species addressed under this priority class are:

Whirling Disease (*Myxobolus cerebralis*)

Whirling disease is a protozoan parasite that affects the nervous system of salmonids. This parasite has a two-host life cycle: salmonids and a common aquatic worm. A free-swimming stage enters young trout and attacks the cartilage, eventually crippling the fish. The whirling disease 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. It now occurs in the wild in 11 western states and is a major problem in some, such as Montana. There, it has decimated trout populations in some watersheds: the rainbow trout population in the Madison River has declined by 90% since the introduction of the disease. In New Mexico, whirling disease was first reported (1998) from the Moreno drainage near Eagle Nest Lake, and in the state hatchery system in 1999. More recently trout caught in the San Juan River tested positive. The potential economic impact to the state's trout fisheries is great and minimizing spread of the disease is imperative.

Asian fish tapeworm (*Bothriocephalus acheilognathi*)

Imported to the US in the 1970s, grass carp (*Ctenopharyngodon idella*) carried the Asian fish tapeworm, which is now also widely established in the US. The Asian tapeworm was first recorded in the Utah stretch of the San Juan River in 1994, and is now reported in upstream reaches of New Mexico (Utah Dept. of Agriculture 1997). Several studies demonstrated the ability of the parasite to infect many species of fish in the families Poeciliidae and Cyprinidae, including species of chub, shiner, and minnow (Brouder and Hoffnagle 1997, Clarkson et al. 1997, Kuperman et al. 2005). The negative effects of the Asian tapeworm on carp are well known and it now appears the parasite is pathogenic in native fish. In Arizona younger age classes of bonytail chub (*Gila elegans*) infected with the Asian tapeworm were stunted and when stressed had lower survival rates compared to uninfected chub (USGS 2005d). Recent evidence also suggests infection can result from piscivory of infected fish, and not solely from preying upon the infected intermediate copepod host as previously thought. Eradicating any fish parasite is very difficult in a

large waterbody, therefore it is crucial to focus efforts on containing the Asian tapeworm to already infested waters of New Mexico.

Hydrilla (*Hydrilla verticillata*)

Hydrilla was imported into the United States from Asia in the early 1950s for use in aquaria, and was likely introduced into the wild near Tampa and Miami, Florida. Hydrilla is currently the most abundant aquatic plant in Florida, where it grows in thick surface mats and displaces native vegetation. Distribution in the US now ranges from Connecticut southward along the coast to Texas. The plant is also present in California and Arizona. In New Mexico hydrilla is reported from Sandoval County. Introduction of hydrilla into new waterbodies is most likely to occur by recreational boats and equipment carrying plant fragments from infested habitats. Elsewhere in the US, hydrilla has reached 40° N latitude, therefore it has the potential to invade and proliferate in most waters of New Mexico.

Hydrilla causes major problems with water use. In drainage and irrigation canals, it greatly reduces flow and causes clogging, which can result in flooding and damage to canal banks, structures, and pumps. In utility cooling reservoirs, hydrilla can disrupt flows necessary for adequate water-cooling. In addition to interfering with recreational and commercial vessel navigation, hydrilla hampers swimming, alters native vegetation communities, and can damage sport fish populations. Management includes herbicides and physical removal of all plant fragments from waterbodies, boats, lines, and fishing gear. Sterile (triploid) grass carp could be an effective biocontrol agent for hydrilla, as this management technique has proven efficacious for AIS plants in the Rio Grande basin of New Mexico.

Purple Loosestrife (*Lythrum salicaria*)

Purple loosestrife, an erect perennial herb with showy flowers, is a wetland invader that was imported from Europe in the early 1800s as an ornamental and for its medicinal value. Purple loosestrife adapts readily to natural and disturbed wetlands. As this species establishes and expands, it outcompetes and replaces native grasses, sedges, and other flowering plants that provide a higher quality source of nutrition for wildlife. The highly invasive nature of purple loosestrife allows it to form dense, homogeneous stands that restrict native wetland plant species and reduce wildlife habitat. It is found in most of the lower 48 states and could invade all. Purple loosestrife is adapted to a variety of wetland habitats, including river and stream banks, the edges of ponds, lakes, and reservoirs, and wet meadows. It reproduces vegetatively and by seeds, with each plant capable of producing millions of seeds per year, which are dispersed by birds and other animals. Purple loosestrife is still sold by nurseries in many states, though 24 states have listed it as a noxious weed and prohibit its sale. Small infestations can be managed by hand-pulling or herbicide application. Physical removal needs to be done before flowering and mowing is not effective. For larger areas biocontrol agents are more promising. Four insect species from Europe have been approved by the USDA for controlling purple loosestrife. Three of these insect species have been released across the US and Canada. The leaf-feeding beetle, *Galerucella calmariensis,* has provided successful control of the target weed in as little as 3 years reducing plant populations by as much as 100%. The

impact of introduced beetles on native, non-target species is considered low.

Nutria (*Myocastor coypus*)
A large rodent native to South America, nutria were introduced into New Mexico in the 1950s (Carter and Leonard 2002). In the late 1990s, they remained abundant in isolated locations and still persist in the upper Rio Hondo drainage of southeastern New Mexico. They occur as far north as Washington and Michigan and thus have the potential to invade most aquatic habitats in New Mexico. Due to the ecological and economic impact they cause, nutria have been nominated for the Invasive Species Specialist Group list of "100 of the World's Worst Invaders." Nutria, like most rodents, are extremely prolific. This trait combined with a lack of predators in their introduced ranges often results in an overabundance of nutria. At high population levels, nutria impact native species, such as muskrat (*Ondatra zibethicus*), through competition, consumption of native plants, and transformation of vegetated wetlands to open water, which can impact waterfowl and other aquatic species. In states such as Louisiana, nutria burrowing damages canals, impoundments and levees, costing millions of dollars annually in mitigation.

Priority Class 3

Priority Class 3 represent species that are firmly established throughout New Mexico and that may have both ecological and economic impacts, but feasible management techniques are not currently available. These species warrant further evaluation to determine the extent of their distribution and effort to prevent introduction to new waterbodies. Research is often required to clarify their actual and potential impact on state resources and to develop control methods. Invasive plant risk assessment and ranking methods are available to facilitate impact analyses (e.g., http://www.natureserve.org/library/invasiveSpeciesAssessmentProtocol.pdf and http://www.npwrc.usgs.gov/resource/literatr/aprs/index.htm). Examples of species addressed under this priority class are:

Chytrid fungus (*Batrachochytrium dendrobatidis*)
Chytridiomycosis is an infectious disease that affects amphibians worldwide. Caused by the chytrid fungus, chytridiomycosis is capable of causing sporadic deaths in some amphibian populations and 100% mortality in others. Amphibian chytrid fungus is hypothesized to have originated in Africa, and has been disseminated worldwide through the international trade in African clawed frogs (*Xenopus laevis*) for use in human pregnancy assays beginning in the mid-1930s. The disease has been implicated in mass die-offs and species extinctions of frogs in the past 15 years, but its true impact on populations remains uncertain and is under investigation. Chytrid fungi typically live in water or soil, although some are parasites of plants and insects. They reproduce asexually and have spores that "swim" through the water. Only the amphibian chytrid fungus is known to infect vertebrate species. Individual frogs are thought to contract the disease when their skin comes into contact with water that contains spores. Much is still unknown about the biology of the fungus and the disease in the wild, including how the fungus survives in the absence of amphibian populations, and how it spreads.

Interactions between the fungus and environmental factors which may in turn affect the physiological response of infected individuals are considered important.

Didymo or rocksnot (*Didymosphenia geminata*)
Didymo is a native alga (see *Glossary* for definition of "alga") from northern Europe and Vancouver Island, Canada (Kilroy 2004). Over the past several years, a pattern of expanding range and nuisance populations has developed in North America, Europe and New Zealand (Spading and Elwell 2007). It has been introduced into several western states, including California, Colorado, Idaho, Montana, Utah, and Wyoming. Davis (2008) confirmed the first record of didymo in the upper watershed of the Pecos River near Cowles, New Mexico.

Didymo is likely spread by human-assisted means, such as on boats, fishing equipment, and footwear. It appears to prefer oligotrophic habitats (low in nutrients and organic productivity), but can be found in any freshwater streams, rivers, and lakes. The apparent increase in invasiveness of didymo may be related to various factors, including climatic changes, altered grazer communities, or genetic changes. Didymo can undergo explosive growth creating massive algal blooms, which can significantly impact stream ecosystem function, including the ability to alter biotic community structure, foodweb dynamics, and hydraulics of streams and rivers. Didymo represents a significant strain on regional and national economies through impacts to tourism, fisheries, and hydropower.

In collaboration with the US Forest Service and Trout Unlimited, state agencies (NMDGF, NMED) are monitoring the didymo invasion in the upper Pecos watershed, and have posted streamside Stop Aquatic Hitchhikers! signage and information urging anglers to remove, disinfect, and dry all fishing tackle and gear after fishing didymo infested or uninfested waters.

Golden Alga (*Prymnesium parvum*)
First reported in New Mexico and Texas waters in the 1980s (NMDGF 2004), golden alga (see *Glossary* for definition of "alga") may have been present in the Pecos River since the 1960s (Rhodes and Hubbs 1992). Recently, golden algal blooms (2002-2007) have caused extensive fish kills in Brantley, Bataan, and Carlsbad Municipal reservoirs in the lower Pecos River; blooms in isolated ponds near Eunice and Roswell were reported in 2005 (NMDGF 2004, NMDGF 2005). Golden alga produces a toxin that is lethal to gill-breathing organisms (e.g., larval insects, mollusks, crustaceans, fish, amphibians), resulting in suffocation. Blooms usually occur in winter and early spring. On large water bodies it is virtually impossible to eradicate. The NMDGF is currently monitoring golden alga and is investigating the causes for its spread.

Arundo (*Arundo donax)*, Brazilian waterweed (*Egeria densa*), Parrotfeather (*Myriophyllum aquaticum*), Eurasian watermilfoil (*M. spicatum*), Curly pondweed (*Potamogeton crispus*) and other aquatic nonindigenous plants.
These species have been introduced through their use in aquaria and water gardens. Once they become established in a waterbody, they quickly grow into dense mats that shade out native plants and algae, reduce fish habitat and impede recreational use. These

species reproduce rapidly. Plant fragments capable of establishing new colonies when disturbed by recreational activity, and are easily transported to new waterbodies through fouling of boat props and trailers. These plants infest many drainages in New Mexico. Of these, Eurasian watermilfoil is the most widely distributed, occurring in at least seven drainages (Little Colorado, Rio Grande Headwaters, Rio Grande Elephant Butte, Upper Canadian, Upper Cimarron, Upper Gila, and Upper Rio Grande). Arundo is a bamboo-like perennial grass that infests riparian areas, floodplains, and irrigation ditches. This aquatic plant is established in Sandoval, Bernalillo, Guadalupe, Sierra, Dona Ana, and Otero counties of New Mexico. Parrotfeather is present in Bernalillo, Valencia, Socorro, Sierra, Dona Ana, and Colfax counties of New Mexico. Curly pondweed is recorded in the Little Colorado, Rio Grande Elephant Butte, and Prairie Dog Town Red Fork drainages (USGS 2005a).

Nonnative crayfish (*Orconectes* spp., *Procambarus* spp.)
Four species of nonnative crayfish (*Orconectes rusticus*, *O. virilis, O. immunis*, *Procambarus clarkii*) have been introduced to New Mexico (Lang and Mehlhop 1996, NMDGF files). Common pathways of introduction can include release as live-bait or forage base by anglers, intentional release of aquarium pets or school study organisms, and escapees from aquaculture. Nonnative crayfish possess many characteristics of a successful invader: habitat generalists, broad dietary preferences, high reproductive potential, and aggressiveness towards other species (Kats and Ferrer 2003). As omnivores, crayfish forage on plants and invertebrates, non-consumptively destroy aquatic vegetation, prey upon various life stages of vertebrates, and may out-compete fish for food and shelter. Invasive crayfish frequently displace native crayfish by transmission of disease or parasites, predation, and competition. Introduction of nonnative crayfish to Arizona has been detrimental to native aquatic biota and ecosystems (Fernandez and Rosen 1996a, b, c). The ecologic and economic impacts of naturalized populations of nonnative crayfish are well-recognized worldwide (Taylor et al. 1996, 2007; Lodge *et al.* 2000a; Williams et al. 2001; de Moor 2002). Environmentally sound methods to eradicate or control introduced populations of crayfish have not been developed adequately.

Asian Clam (*Corbicula fluminea*)
Asian clams have had one of the most rapid range expansions of any non-indigenous species in North America. *Corbicula fluminea* is found in lotic and lentic habitats over its native range in southeastern Asia (China, Korea, southeastern Russia). Introduction of this species in North America is attributed to Chinese immigrants who used Asian clams as food (Sinclair 1971). Viable populations on the west coast of the US were likely established sometime prior to 1938. Since that time it has spread across the continent and is present in streams, canals, lakes, and reservoirs in 38 states (Balcom 1994). This species was first reported in the Mesilla Valley of Texas and New Mexico in 1964 (Metcalf 1966), and is now found in suitable habitats throughout the middle and lower reaches of the Rio Grande, Canadian River, and Pecos River, including some headwater streams in New Mexico.

Asian clams are a serious biofouling pest throughout the US, especially in agricultural and industrial water distribution systems. Asian clams are drawn into intake pipes. Live animals, empty shells and body tissues obstruct water flow through irrigation gates and canals, condenser tubes, valves, and service water systems. Buoyant dead clams clog intake screens. In 1980, the costs of correcting this problem in the eastern US were estimated at $1 billion annually. Given this species high growth and reproductive rates (densities may range from 10-130,000 clams/m^2), concerns exist for the capacity of the Asian clam to alter trophic and nutrient dynamics of aquatic systems and to displace native bivalves.

Humans are responsible for the dispersal of this clam. In the US, it is sold as fish bait. The species is marketed as "pygmy" or "gold" clams through the aquarium trade. Invasive pathways include: waterbird-mediated transport, inadvertent or intentional releases (e.g., anglers, aquarists, classroom researchers), and transport in ship ballast waters or hull shipments of conglomerates. The crawling larva (pediveliger) has made it possible for this species to spread rapidly both upstream and downstream in any drainage to which it is introduced.

Eradication or control in water-based industrial systems include chemical, thermal, and mechanical treatments. Annual drying of irrigation canals may effectively control populations in water delivery systems. Environmentally sound methods of removal or control in surface waters have not been developed.

Bullfrog (*Rana catesbeiana*)
The bullfrog is one of the most widely distributed amphibians on the North American continent. The species has been introduced widely throughout the West (Rosen and Schwalbe 1995). In New Mexico, bullfrogs occur statewide at lower elevations wherever suitable habitat exists. The status of bullfrog populations across the state is unclear: those west of the Continental Divide are introduced, whereas those east of the Divide may be introduced or native (Degenhardt et al. 1996). As generalist predators and prolific breeders, they are thought to compete with and prey on native anurans, and may be the cause of localized extinctions of native wetland herpetofauna (Degenhardt et al. 1996). Bullfrog larvae can impact benthic algae and thus alter aquatic community structure.

Priority Class 4

Priority Class 4 species are not present in New Mexico and are currently considered to have a low potential to invade and establish, either because of physiological or dispersal limits. These species warrant proactive measures to prevent their importation or introduction to the State. Research is recommended to evaluate their invasive potential, including management techniques that may prove effective elsewhere for naturalized populations. Examples of species addressed under this priority class include:

Round Goby (*Neogobius melanostomus*)
In 1990, the round goby was introduced, via ballast water, into the Great Lakes system on the Michigan-Ontario border. Populations of native fish species have declined in areas

where this goby has become abundant. The round goby preys on darters, other small fish, and lake trout eggs and fry in laboratory experiments (Marsden and Jude 1995). The potential range of the round goby includes New Mexico. However, pathways of introduction into New Mexico are limited in comparison to AIS found in neighboring states that share drainages (e.g., tilapia in AZ) or those that can survive overland transport on equipment (e.g., zebra or quagga mussels, New Zealand mudsnail).

Australian Crayfish (Family Parastacidae)

All nine genera of Australian crayfish belong to the family Parastacidae. Among this diversity of taxa, which exceeds 100 species, Australia has some of the most colorful, lavishly ornamented, and largest species of freshwater crayfish in the world. Such physical attributes have attracted commercial interests in this resource for aquaculture, food, and pet trade industries, not only in Australia, but in similar markets worldwide. Three species, the yabby (*Cherax destructor*), redclaw (C. *quadricarinatus*) and marron (*C. tenuimanus*), are exploited commercially for international markets in New Zealand, Southeast Asia, Central and South America, Africa, and the United States (Masser and Rouse 1997). In the US, redclaw is cultured in research facilities at Kentucky State University and Auburn University, Alabama. At least six species of *Cherax* are sold in pet stores throughout the US (AL, AZ, CA, ID, LA, NV, OR, WA) and are readily available over the internet.

Numerous examples worldwide chronicle the release (accidental or intentional) or escape of exotic crayfish held in captivity, and the subsequent establishment of naturalized populations (Taylor et al. 1996, 2007; Lodge et al. 2000a; Williams et al. 2001; de Moor 2002). Nonnative crayfish are well-establish in aquatic habitats throughout New Mexico; many of these systems represent watersheds shared with adjacent states where invasive crayfish are problematic (e.g. Arizona; see Fernandez and Rosen 1996a, b, c). In New Mexico, surface waters derived from thermal groundwater sources (Summers 1976) are capable of supporting viable populations of *Cherax* species.

Both NMDGF and Arizona Game and Fish Department have reviewed and denied requests to import Australian *Cherax* species for the aquaculture and food industries. Requests to import Australian crayfish will likely increase as current research seeks to improve methods for breeding, rearing, and holding of captive populations in the US. Such advances will facilitate the supply of domestically reared stock and lower production costs, which inherently confers increased product marketability to the aquaculture, pet/aquarium, food, and culinary industries. As emphasized in Lodge et al. (2000b), stakeholders with vested interests in all facets of economic development and resource management will need to exercise prudence when considering requests to import exotic crayfish to New Mexico.

AIS MANAGEMENT STRATEGY

The goal of the NMPlan is:

That the potentially harmful ecological, economic, and social impacts resulting from the presence of AIS in New Mexico are precluded or minimized through prevention and management of introduction, population growth, and dispersal into, within, and from New Mexico.

To achieve this goal the following actions are proposed:

- establish a New Mexico Aquatic Invasive Species Advisory Council (AISAC);
- secure an executive order from the Governor requiring full participation of involved state agencies on the AISAC;
- secure funds appropriated by the state legislature to support an AIS program, including the expansion of law enforcement authority;
- create a state-level Invasive Species Coordinator (Coord) position;
- establish a database for cataloging AIS in the state;
- initiate a system to rank AIS based on threat level;
- develop a monitoring system for documenting the presence and distribution of AIS in the state;
- adopt a list of AIS prohibited from entry into the state;
- prevent the movement of AIS into, within, and out of the state;
- minimize the impact of established AIS on native biota, ecosystems, and the public;
- devise a rapid-response system for detecting, investigating, and eradicating newly reported AIS or populations;
- organize educational and outreach efforts to increase public awareness of AIS;
- establish a system to coordinate AIS management efforts between state, federal, tribal, regional, and local agencies, and private organizations; and
- outline research goals and mechanisms to fund management efforts.

The parties supporting this strategy understand that it is a non-binding statement of consensus. This plan is intended as a general understanding and agreement on how to approach AIS management in New Mexico. This strategic plan is an attempt to coordinate individual efforts into a more comprehensive AIS management program, where the sum of collective efforts ends up greater than sum of the parts. A cooperative, concerted effort will result in a win-win situation for the economy, environment and the citizens of New Mexico.

It is not possible to address all potential invaders, their impacts, and the constraints and

contingencies that may develop. Consequently, the NMPlan is intended to be adaptable to changing circumstances. Although all strategies and actions identified in this plan are important, the formation of the AISAC and funding to support the Coordinator are critical to effective AIS management in New Mexico. Activities and priorities of the NMPlan will be under continual review. An annual report will be produced by the AISAC, which will include recommendations for updating and modifying management activities and priorities. Ultimately, the Coord will oversee all initiatives of the NMPlan.

Acronyms that follow are defined in the *List of Acronyms and Abbreviations*. When used under the *Recommended Strategies and Actions* to achieve plan *Objectives*, the term "State" refers to the EMNRD, ISC, NMDA, NMDGF, NMDH, NMED, and OSE. Other state agencies are listed parenthetically where their expertise is considered useful to achieve specific plan *Objectives* (e.g., State [NMEDD, NMDT]). The term "Fed" refers to the BP, BoR, BLM, CoE, DoA, EPA, USFS, USFWS, USGS, and USNPS. A non-governmental organization (NGO) is a non-profit, legally constituted organization created by private persons or organizations with no participation or representation of any government. The term "municipalities" (MUN) includes entities of governance by counties and cities. The term "Private" may include, but is not necessarily limited to: citizens, business, lake associations, outdoor recreation groups, watershed groups, marinas, etc. The term "water management districts" (WMD) pertains to quasi-governmental agencies that manage and distribute water.

In accordance with the federal guidelines set forth by ANSTF, the NMDGF developed a preliminary draft AIS management plan and then solicited stakeholder interest to serve on the New Mexico AIS Advisory Council (AISAC). The AISC's initial tasks were to organize itself and to manage the review and revision of the draft NMPlan. During a 30-day public comment period, representatives from all stakeholder groups and potentially affected publics were requested to advise the AISAC regarding revisions of the plan, including their role(s), management tasks, and financial responsibilities as tentatively identified under the *Objectives* and *Implementation Table*.

Objective 1: COORDINATE AND IMPLEMENT A COMPREHENSIVE AIS MANAGEMENT PLAN.

Problem Addressed: Threats posed by AIS have not been recognized by agencies or adequately addressed in New Mexico. Although adverse impacts from AIS in New Mexico may have been somewhat limited to date, proactive measures are needed to prevent new introductions and further damage from occurring. There is no clear state authority or agency charged with limiting and managing AIS. When the issue is undertaken, most management activities are focused on isolated problems and do not approach AIS in a comprehensive, interagency manner. The lack of coordination, oversight, and funding has allowed many invasive species to become established in New Mexico and permits new introductions.

Establishment of a NMPlan with appropriate implementation, authority and resources will permit effective prevention and management of AIS. Most importantly, native species and their habitats, in addition to the state's ecologic and economic resources, can be protected from the negative impacts of AIS.

Current Agency Activities

New Mexico Department of Agriculture
New Mexico Strategic Plan for Managing Noxious Weeds, 2000-2001. The NMDA has developed a strategy for addressing weed problems in New Mexico. The Weed Plan is a multilateral agreement between federal and state agencies, and local organizations. Currently, the Strategic Plan for Managing Noxious Weeds is being implemented at the local (county or multi-county) level, primarily on Cooperative Weed Management Areas. Soil and Water Conservation Districts are also implementing weed control in accordance with the Strategic Plan for Managing Noxious Weeds. This plan has not been funded, but grants have been obtained for specific projects (Jim Wanstall, Noxious Weed Coordinator, Department of Agriculture, pers. com.)

New Mexico Department of Game and Fish
Since 1997 the NMDGF has represented the State of New Mexico on the Western Regional Panel (WRP) of the Aquatic Nuisance Species Task Force and the 100th Meridian Initiative. AIS activities to date include: attending WRP meetings, annual correspondence with the ANSTF regarding agency and state-level AIS actions, responding to regional and national AIS surveys coordinated through the ANSTF and the WGA, distribution of AIS education and outreach materials (zebra mussel and New Zealand mudsnail watch cards, bait bucket bumper stickers), and collaborative efforts with State Parks to post AIS "Stop Aquatic Hitchhikers" signage at state-owned boat ramps and public fishing stream access points. NMDGF is currently acting as the lead agency coordinating development of the NMPlan. NMDGF implements its own Integrated Pest Management Plan for noxious weeds and works with some Cooperative Weed Management Areas.

United States Fish and Wildlife Service
In 2001, the Region 2 ANS Coordinator initiated contact with State agencies to increase the awareness of existing and potential AIS issues in New Mexico. Since then the Coordinator has served an influential role directing and supporting current efforts towards development of the NMPlan, implementation of prevention and early detection programs, and dissemination of public information and outreach materials.

Gaps in State Management Programs and Authorities

- Existing authorities under the New Mexico Administrative Code do not adequately address current issues related to AIS.
- Many of these authorities are unclear in their scope or means of application.

- There is no single agency in New Mexico State Government designated with an overall mandate to develop and implement an AIS program.
- Activities are insufficiently coordinated in the state and within the region.
- Lack of funding results in staffing shortages and unaccomplished projects.
- The New Mexico Border Authority (NMBA) and Transportation Authority are not involved in AIS monitoring.

Recommended Strategies and Actions

The suggested lead stakeholder(s) for each action is indicated in parentheses. Designation of responsible parties will need to be determined jointly among cooperating entities and may be subject to change. Each action will require cooperation, collaborations and participation of state and federal agencies, the Tribes, municipalities, private industry, and public interest groups.

Strategy 1A: Coordinate all AIS management programs and activities within New Mexico.

1A1. Organize and administer the New Mexico Aquatic Invasive Species Advisory Council (AISAC). (Gov, State, Tribes, Fed, NGO, Private, MUN, WMD)

1A2. Create and fund an Invasive Species Coordinator (Coord) position. The Coord will be a member of AISAC whose responsibilities may be divided between the AIS program and invasive species issues. (Gov, Leg, AISAC, State, Fed)

1A3. Identify and coordinate with key personnel in state, federal and tribal governments, and private, MUN and WMD entities for AIS responsibilities. (Gov, Coord, AISAC, State, Tribes, Fed, NGO, Private, MUN, WMD)

1A4. Develop a list of all established nonnative aquatic species present in New Mexico and develop management strategies for dealing with them as listed by priority class. (Coord, AISAC)

1A5. Consult with the ANSTF Executive Secretary and the National Invasive Species Council to develop a set of uniform definitions and terms to describe AIS. (Coord, AISAC)

1A6. Develop an AIS management course for agency personnel and others. (Coord, AISAC, Fed)

1A7. Develop AIS assessment guidelines as needed for federal state, tribal and local government or other governing bodies. (Coord, AISAC)

1A8. Conduct an annual forum focused on AIS in New Mexico to update current status and potential management alternatives. (Coord, AISAC, Fed)

Strategy 1B: Participate in and support regional, federal, and international efforts to control AIS.

1B1. Participate in the ANS Task Force's WRP. (Coord, AISAC)

1B2. Support the 100th Meridian Initiative. (Gov, Coord, AISAC)

1B3. Coordinate with neighboring US and Mexican states on AIS issues, and develop shared-basin AIS initiatives. (Gov, Coord, AISAC, NMBA, OSE, ISC)

Strategy 1C: Increase existing funding and resources for AIS management and establish new funding and resources.

1C1. Pursue stable funding sources for AIS management in New Mexico by seeking federal funding from the NISA, state legislature, and other available sources. (Coord, AISAC, State, Tribes)

1C2. Develop partnerships with private groups to fund prevention and eradication efforts. (Coord, AISAC, State, Tribes, Fed, NGO)

Strategy 1D: Review and evaluate State efforts addressing AIS.

1D1. Conduct a periodic assessment of AIS species presence and abundance in New Mexico. (Coord, AISAC, State, Tribes, Fed, MUN, WMD)

1D2. Evaluate and update the NMPlan as needed, with annual progress reports and a five-year program report. (Coord, AISAC)

OBJECTIVE 2: PREVENT THE INTRODUCTION OF AIS INTO NEW MEXICO.

Problem Addressed: There are many different pathways by which new species can arrive in New Mexico. Species that provide sport fishing opportunities, erosion control, food, and aesthetic enjoyment have been intentionally brought to New Mexico and released into the wild or escaped from private ponds or holding facilities. Humans may unintentionally introduce AIS through various recreational, economic development, and management activities. AIS in neighboring states and Mexico may disperse into New Mexico by natural means, such as transport on animals or by range expansion.

Understanding how these pathways function as conduits for AIS into New Mexico is critical for intercepting species and preventing introductions. Although, factors such as proximity to source populations of AIS and similarities in habitat requirements make it possible to assess some of the species which pose a threat of invading New Mexico, little is known regarding most of the potential AIS and their pathways into the state. Yet, the most effective method to control AIS and their impacts is to prevent their introduction.

Implementation of a program that reviews and regulates which species are intentionally allowed into New Mexico, and monitors the pathways by which species can be unintentionally transported into New Mexico, is necessary to slow the rate at which new species become introduced or established. Under this program, provisions would exist for monitoring the pathways by which species can be intentionally transported into New Mexico.

Current Agency Activities

New Mexico Department of Agriculture
Through the annual nursery inspections, NMDA maintains a program to inspect nurseries for plant pests. The New Mexico Noxious Weed Act authorizes NMDA to declare a weed as noxious, in turn making sale, planting or distribution into or within the state illegal.

New Mexico Department of Game and Fish
The NMDGF regulates the importation of all non-domesticated animals into the state, except fish from government hatcheries.

Gaps in State Prevention Programs and Authorities

- Lack of an AIS coordinator with appropriate authority to design and implement a prevention program.
- Limited authority and funding to quarantine species and points of origin.
- Limited authority, funding, and staff to enforce laws relating to AIS.
- New plant species are not reviewed before importation.
- No coordinated inspection program among law enforcement authorities for trailered boats crossing state borders via major interstate traffic routes or watercraft in transit on intrastate transportation routes.
- No boat inspection or decontamination training for law enforcement.
- No inspection of watercrafts prior to launch into state waters during water-based activities (e.g., fishing tournaments, boating events, etc.).
- Limited collaboration between state authorities and the pet/aquarium industry to create public awareness of the problems of AIS and to prevent accidental and purposeful introductions.
- Limited enforcement ability over mail order or internet sales of organisms.
- NMBA has limited role.

Recommended Strategies and Actions

The lead agency for each action is indicated in parenthesis. Each task will require coordination, collaboration, and participation of other state and federal agencies, tribal authorities, private industry, and public interest groups.

Strategy 2A: Research and address potential AIS and their pathways of introduction.

2A1. Review existing AIS programs from other states and jurisdictions to evaluate their success in preventing adverse impacts from AIS. (Coord, AISAC)

2A2. Describe invasion pathways and identify high-risk waterbodies. (Coord, AISAC, University)

2A3. Develop a system for prioritizing AIS with the greatest threat of unintentional introduction. The EPA's Guidelines for Ecological Risk Assessment, Generic Nonindigenous Aquatic Organisms Risk Analysis Process, and the Australian Weed Risk Assessment System represent potential models for ranking AIS. (Coord, AISAC, University)

2A4. Research invasiveness of aquatic plant species currently imported. (EMNRD, NMDA, APHIS, University)

2A5. Create a list of prohibited AIS for distribution to agencies, enforcement authorities, MUN, and WMD. (Coord, AISAC, State, Tribes, Fed)

2A6. Develop and implement an inspection program for trailered boats and water-based equipment entering and traveling in New Mexico. (Coord, AISAC, EMNRD, NMDGF, NMDPS, NMDOT)

2A7. Establish a boat washing program to reduce AIS spread and investigate installing washing stations at public and tribal boat ramps. (Coord, AISAC, EMNRD, BoR, CoE, Tribes, USNPS, USFWS, Private [marinas])

2A8. Work with importers to identify and monitor the potential for importation practices that could introduce AIS into uncontrolled environments. (Coord, AISAC, NMDGF, NMDA, NMEDD, APHIS, Private)

2A9. Develop and implement a Hazard Analysis and Critical Control Point (HAACCP) planning strategy for hatchery, field, and survey crews to minimize the risk of unintentional hitchhiking AIS introductions. (Coord, AISAC, State, Tribes, Fed, Tribes, WMD)

2A10. Inform Governor, Legislature, and staff (administrators, managers, technical personnel) of agencies (state, federal, tribes, municipal), NGO, and private entities about AIS issues and pathways of introduction. (Coord, AISAC, State, Tribes, Fed)

Strategy 2B: Increase enforcement and awareness of existing laws controlling the transport, propagation, sale, collection, possession, importation, purchase, cultivation, distribution, and introduction of AIS.

2B1. Identify existing authorities for regulations and permitting processes to prevent the introduction and spread of AIS, including gaps in current rules, regulations, and policies. (Coord, AISAC, State, Tribes, Fed)

2B2. Based on gaps identified in 2B1, fund expansion of State regulatory authorities to increase prevention, control, and eradication of AIS in New Mexico, as required by future needs assessment. (Gov, Leg)

2B3. Seek additional enforcement authority as needed to provide comprehensive permitting processes to prevent and control AIS introduction and spread. (Coord, AISAC, State [ENMRD, NMDGF, NMDA], Tribes)

2B4. Increase the priority for enforcing AIS laws. (All LE authorities: State, Tribes, Fed)

2B5. Train enforcement personnel on AIS identification, state regulations, and watercraft inspection and decontamination methods. (Coord, State, Tribes, Fed)

2B6. Distribute information on AIS laws to businesses that import or sell aquatic organisms. (Coord, State [NMEDD], Tribes, Fed)

2B7. Increase awareness of existing penalties for the intentional introduction of any nonindigenous species to New Mexico's waters. (Coord, AISAC, State, Tribes, Fed)

2B8. Assess efficacy of existing AIS regulations and penalties and revise when necessary. (Coord, AISAC, State, Tribes)

Strategy 2C: Promote legislation and regulations that establish or increase the state's authority to control the introduction of new species.

2C1. Establish the authority to stop, inspect, detain, and require cleaning of any vehicle, vessel or water-based equipment containing or infested with AIS that is traveling in New Mexico. (Gov, Leg, State, Tribes)

2C2. Increase the ability of the State to regulate the importation of aquatic organisms. (Gov, Leg, State, Tribes)

2C3. Establish the authority to quarantine waterbodies to prevent AIS from spreading and to contain AIS for future eradication. (Gov, Leg, State, Tribes)

2C4. Require risk management planning, such as Hazard Analysis and Critical Control Point (HAACCP), be available to assess that intentionally imported organisms at risk of spreading AIS are free of diseases, parasites, and other unpermitted hitchhiking organisms. (Fed, EMNRD, NMDA, NMDGF, Tribes)

2C5. Develop or amend existing cooperative agreements with adjacent states, including Mexican states, sharing common waters to address AIS. (Gov, Leg, Coord, ISC, OSE, adjacent states [AZ, CO, KS, OK, TX, Chihuahua]).

2C6. Develop legislation and rules to prevent the introduction of AIS into private ponds, including increased authority to inspect ponds, remove AIS species and provide penalties for illegal introductions of AIS into private ponds. (Gov, Leg, State, Private)

OBJECTIVE 3: DETECT, MONITOR, AND ERADICATE PIONEERING AIS.

Problem Addressed: When an invasive species arrives there is often a window of opportunity to eradicate small pioneering populations before they become established or

expand beyond an isolated location. However, AIS are often not detected until nuisance populations are formed, or in some instances response times are delayed, allowing populations to increase rapidly. Usually, it is too late or too expensive to eradicate a species once it has reached a nuisance level, and when management is conducted after a population is well-established, costly long-term monitoring activities will be required to control the population and reduce economic and environmental impacts.

By initiating a monitoring program and rapid response plan, the State will be able to detect and manage pioneering infestations at a point when the species can be eradicated in the most cost-effective manner. An effective monitoring program requires a cooperative network among stakeholders, supportive laws, and permanent funding.

Current Agency Activities

New Mexico Department of Agriculture
NMDA conducts surveys for agricultural and invasive pests. The Department has the authority to quarantine water bodies and take measures to retard or prevent the spread of aquatic invasive plants within the state.

New Mexico Department of Game and Fish
The NMDGF regulates the movement of non-domestic animals within and across the state boundary, and actively manages some naturalized AIS and pioneering populations that may affect native wildlife. By adopting a policy of "not-knowingly-stocking whirling disease positive fish," the Fisheries Management Division has implemented a statewide monitoring program to track (GIS-based mapping) the status of this parasite in infested and uninfested salmonid populations, while also testing for presence of whirling disease in hatchery stock and in native and managed trout populations. Staff of the Nongame and Endangered Species Program, tasked with monitoring the conservation status of native aquatic fauna (crustaceans, mollusks, amphibian, reptiles, fish, birds, mammals), document and track some Priority Class 2 and 3 AIS, and actively manage their control (containment, eradication) and movement. Biologists and District Officers of the four Area Offices coordinate intra-agency field activities for AIS management activities (e.g., nonnative fish removal, golden algae monitoring) and enforce game and non-game laws and regulations promulgated under NMSA Chapter 17 pertaining to importation and movement of fish and wildlife. Water-based management activities on state wildlife areas require delivery systems free of AIS to insure efficient movement of water. NMDGF actively participates on the Rio Grande Basin Team, a working subgroup of the 100th Meridian Initiative, and annual meetings of the 100th Meridian Initiative and the Western Regional Panel.

New Mexico Environment Department
The Surface Water Quality Bureau conducts surveys to monitor water quality for factors that contribute to impairment and undesirable aquatic life [20.6.4.13 E NMAC]. These surveys include biological monitoring that could potentially address AIS concerns. See Standards for Interstate and Intrastate Surface Waters [20.6.4 NMAC].

United States Fish and Wildlife Service
In 2005 the New Mexico Fishery Resources Office, in collaboration with the Region 2 ANS Coordinator, US Army Corps of Engineers and NM State Parks, initiated a zebra mussel monitoring program at three state parks (Conchas Lake, Heron Lake, Elephant Butte) and two sites on the Rio Chama. Site selection at that time was based on location to nearest confirmed ZM states (i.e., Oklahoma), propensity for high boater traffic and angler use, and unique boating opportunities (i.e., sail boating, bass tournaments). There is no confirmed report of ZM or QM in New Mexico waters. Notwithstanding, ZM are now (2008) reported in Colorado, approximately 90 miles north of the state line. Under the 100th Meridian Initiative, stakeholders from New Mexico and Colorado formed (2007) the Rio Grande Basin Team to: identify zebra/quagga mussel threats to Rio Grande resources, detect and monitor dreissenid veligers in Navajo Reservoir and mainstem impoundments within the basin, and develop a long-term strategy to prevent zebra/quagga mussel introduction into the basin.

Gaps in State Monitoring and Eradication Programs and Authorities

- Current AIS monitoring efforts are inadequate.
- Authority to quarantine is not comprehensive for all potential AIS.
- The authority and funding to quickly deal with new AIS is lacking.
- Response time to an invasion is slow due to a lack of funding and contingency plans.
- Surface water quality standards lack biological criteria for impairment due to AIS.

Recommended Strategies and Actions

Strategy 3A: Implement a surveillance and early detection program.

3A1. Identify high-risk water bodies. (Coord, AISAC, State, Tribes, Fed, NGO, Universities)

3A2. Develop a monitoring and surveillance program for high-risk AIS as determined by the AISAC. (Coord, AISAC, State, Tribes, Fed)

3A3. Conduct annual monitoring and surveillance of high-risk water bodies and associated water delivery infrastructure(s). (State, Tribes, Fed, MUN, WMD)

3A4. Encourage and train citizen-based monitoring networks to work in cooperation with state and federal agencies and tribal entities. (Coord, ASIAC, State, Tribes, Fed, NGO, Private)

3A5. Under the Standards for Interstate and Intrastate Surface Waters [20.6.4 NMAC], develop criteria (human health, domestic water supply, and biological) for impairment of surface water quality due to undesirable aquatic life (AIS). (State [NMED, NMDGF])

Strategy 3B: Develop an early response mechanism to deal with detected and potential AIS.

3B1. Develop a Rapid Response Plan for AIS species. (Coord, AISAC)

3B2. Identify funding sources to implement Rapid Response Plan actions. (Coord, AISAC)

3B3. Implement Rapid Response Plan for AIS species. (Coord, State, Tribes, Fed, MUN, NGO, WMD, Private)

3B4. Develop targeted HAACCP plans to address the spread of AIS. (Coord, AISAC, State, Tribes, Fed)

Strategy 3C: Eradicate pioneering populations of AIS.

3C1. Develop an eradication program for AIS in early stages of invasion. (Coord, AISAC)

3C2. Implement an eradication program for AIS in early stages of invasion. (Coord, AISAC, State, Tribes, Fed, MUN, NGO, WMD)

OBJECTIVE 4: WHERE FEASIBLE, CONTROL OR ERADICATE ESTABLISHED AIS THAT HAVE SIGNIFICANT IMPACTS.

Problem Addressed: Once established AIS often create the most noticeable impacts, yet they are often impossible to eradicate or control. Management activities are most economically effective when they are directed at limiting the impacts of a population or stopping that population from spreading to new waterbodies.

In situations where AIS have previously invaded, management activities must focus on situations where there is a clear and significant impact on local economies, native species, and where the control or eradication of specific populations is economically and technically feasible.

Current Activities

New Mexico Department of Agriculture
NMDA conducts surveys for agricultural and invasive pests and plants. The Department has the authority to quarantine water bodies and take measures to retard or prevent the spread of aquatic invasive plants within the state.

New Mexico Department of Game and Fish
The NMDGF regulates the movement of non-domestic animals within and across the state boundary, and actively manages some naturalized and pioneering AIS populations that may affect native aquatic wildlife and important fisheries. Nonnative fish removal is practiced to protect native fish populations, endangered fishes, and important sport fisheries.

Gaps in State Control and Eradication Programs and Authorities

- No state agency has a clear program directed at controlling or eradicating AIS.
- There is no AIS Coordinator to organize state efforts to control or eradicate AIS.

Recommended Strategies and Actions

Strategy 4A: Limit the dispersal of established AIS into new waterbodies or into new areas of a water body or drainage.

4A1. Establish a boat washing program to reduce AIS spread and investigate installing wash stations at public boat ramps (See 2A6). (Coord, State, Fed, Tribes)

4A2. Limit the spread of existing AIS, by reducing the access to existing populations through the use of warning signs, buoys, and possible closures in infested areas. (Coord, State, Tribes, Fed, Private)

4A3. Include AIS information on signs and kiosks at infested waterbodies. (Coord, State, Tribes, Fed, MUN, WMD)

Strategy 4B: Control known nuisance populations where economically and technically feasible.

4B1. Implement management programs to control Priority Class 2 and 3 species. (State [EMNRD, NMDGF, NMDA], Tribes, Fed, MUN, WMD)

OBJECTIVE 5: INCREASE AND DISSEMINATE KNOWLEDGE OF AIS IN NEW MEXICO THROUGH DATA COMPILATION AND RESEARCH.

Problem Addressed: Little is known about the extent and magnitude of the AIS problem in New Mexico. In fact many more nonindigenous species probably occur in New Mexico than are recognized. First, it is essential to determine the extent of the AIS problem within the state. Information on the number, taxonomy, and distribution of AIS in New Mexico is spread currently across several data sources, often with inconsistencies, thus making it difficult to assess the situation. This information needs to be compiled and organized under one database that is readily and easily accessible to agency personnel and the public. A centralized "hotline" system for reporting the presence of AIS needs to be developed, which is coordinated with a rapid response system. Research should be implemented on the biology of AIS and their impacts on native species and habitats. Additionally, new methods of control and eradication for established AIS need to be pursued in coordination with other state and federal agencies, and research institutions.

Current Agency Activities

New Mexico Department of Agriculture
The Department administers the Noxious Weed list.

New Mexico Department of Game and Fish
Various divisions within the agency are engaged in AIS education and outreach. The Public Information and Outreach Division (PIO) disseminates AIS information and educational materials through state-federal match programs (Project Wild/Aquatic, Fishing Skills, Fisheries Monitoring/Watershed Watch) and Natural History Workshops designed as teacher enrichment opportunities. The PIO publishes press releases and articles on resource management concerns posed by AIS issues. Intra-agency efforts also include technical presentations to area staff and the public that address AIS, such as zebra mussels, nonnative fish, whirling disease, and golden alga. The BISON-M Species Lists/Species Accounts, developed by the NMDGF and currently administered by Conservation Management Institute of Virginia Tech, provides information on the biology and distribution of animals in New Mexico, including AIS. Other information for AIS is maintained within files of individual biologists regarding impacts to various species of protected wildlife.

Federal Agencies
Numerous federal agencies (e.g., USFWS, USGS, USDA) and other agencies compile lists of AIS, invasive species, and weeds.

Gaps in State Programs and Authorities

- Incomplete knowledge of the number and distribution of AIS.
- Poor understanding of the basic biology and impacts of AIS.
- Management options are limited.
- Limited funding is available to conduct research and management activities.

Recommended Strategies and Actions

Strategy 5A: Facilitate the collection and dispersal of information, research, and data on AIS in New Mexico.

5A1. Create and coordinate a central database and repository of information on AIS in New Mexico. (Coord, AISAC, University, Fed)

5A2. Build and maintain a database and a website on AIS in New Mexico which is coordinated with other relevant websites and agencies. (Coord, University, Fed)

5A3. Utilize existing field personnel to document the distribution and abundance of AIS. (State, Tribes, Fed, MUN, NGO, Private, WMD, University)

5A4. Develop and maintain a list of taxonomic experts for AIS identification which is coordinated with national and regional lists of experts. (Coord, AISAC)

Strategy 5B: Research AIS for their impact on native biota utilizing regional efforts & literature searches.

5B1. Develop a better understanding of life histories and impacts of introduced aquatic plants and animals. (Coord, State, Tribes, Fed, University)

5B2. Continue to monitor native aquatic biota, including species most likely to be impacted by AIS. (State, Tribes, Fed, University)

5B3. Evaluate the potential for aquarium pets, live food fish, hatchery stock, and shellfish to serve as vectors of disease and parasites to humans and native aquatic wildlife. (Coord, State [NMHD], Tribes, Fed, University)

Strategy 5C: Research alternative management techniques for their effect on AIS and native species.

5C1. Investigate the relationship between human-induced disturbance of aquatic and riparian systems and AIS invasion, establishment, and impacts. (Coord, State, Tribes, Fed, University)

5C2. Investigate and develop new and innovative methods of managing AIS. (Coord, State, Tribes, Fed, University)

5C3. Evaluate herbicide and pesticide effects. (Coord, State, Tribes, Fed, University)

OBJECTIVE 6: INFORM THE PUBLIC, POLICY MAKERS, NATURAL RESOURCE WORKERS, PRIVATE INDUSTRY, AND USER GROUPS ABOUT THE RISKS AND IMPACTS OF AIS.

Problem Addressed: The lack of awareness concerning AIS impacts is one of the largest management obstacles. Few people understand the threat alien species pose and the role humans play in the transport and introduction of invasives. Uninformed people, through the dumping of an aquarium or a bait bucket, launching of a contaminated boat, or stocking of a private pond, have introduced and spread many AIS. The improper importation and holding of organisms has allowed species to escape, or caused the receipt of unwanted organisms mixed in with intentionally imported ones. Many policymakers, natural resource administrators, and private interest groups have facilitated the intentional introductions of species for certain economic or recreational purposes without understanding the effects these species would have on native species. Introductions, either intentional or unintentional, can be eliminated or curtailed by educating people of their potential to transfer nonindigenous species to New Mexico. It is not only important to prevent the spread of AIS species within the state, but also prevent the spread throughout shared drainages with adjacent states. New Mexico shares six major hydrologic units (Arkansas River, Upper Colorado River, Lower Colorado River [Gila], Pecos River, Rio Grande, and Texas Gulf) with adjacent states. Each of these drainages harbors unique biotas and aquatic communities. The potential spread of AIS within and among these basins can adversely affect native biota, ecosystems, and regional economies. It is critical to inform people about the risks and impacts of AIS.

Current Agency Activities

New Mexico Department of Game and Fish and State Parks (EMNRD)

NMDGF and EMNRD, working in collaboration with the USFWS, have posted "Stop Aquatic Hitchhikers" signage (boat ramp, stream fishing) at public access points on state and federal lands, and each agency distributes bait bucket bumper stickers and "Watch Cards" for zebra mussels and New Zealand mudsnails. NMDGF has included the "Stop Aquatic Hitchhikers" message in the 2008 "New Mexico Fishing Rules & Regulations."

Gaps in State Education Programs and Authorities

- AIS are not addressed as an issue per se.
- AIS education and outreach has not garnered the attention of legislators, policymakers, and government administrators.
- Insufficient AIS information is disseminated to the public.
- Few natural resource workers have the training to identify AIS.
- Little information is provided to agency and private personnel about AIS.
- Few efforts involve potentially interested citizens in AIS issues.

Recommended Strategies and Actions

Strategy 6A: Inform the public about AIS, and how their actions can help prevent the spread and reduce the impacts of AIS.

6A1. Incorporate AIS information into boat operator and hunter and angler education classes. (NMDGF, EMNRD)

6A2. Create an educational curriculum on AIS for schools. (Coord, AISAC, State [NMPED], Tribes)

6A3. Create an "AIS Traveling Trunk" modeled after NMDGF's "Wildlife Trunks" or the University of Minnesota Sea Grant Program's "Zebra Mussel Mania Traveling Trunk." (Coord, AISAC, NMDGF, EMNRD)

6A4. Produce press releases and public service announcements (PSAs) on specific AIS. (Coord, AISAC, State [NMEDD], Tribes, Fed)

6A5. Create articles, videos, billboards, a Traveler Information System (TIS), web-based media and identification cards concerning AIS. Expand on the current "Watch Card" system. (Coord, AISAC, State, Tribes, Fed)

6A6. Distribute information on AIS at various state museums, conferences, shows, tournaments, public gatherings, and sporting goods vendors. (Coord, State [NMEDD, NMTD], Tribes, Fed, MUN, NGO, Private, WMD)

6A7. Include information on AIS in state hunting, fishing, and boating regulations. (NMDGF, EMNRD)

6A8. Develop a "New Mexico Friendly" plant labeling system in conjunction with the nursery industry. (Coord, NMDA, EMNRD)

6A9. Inform policymakers on the extent, impact, and potential for harm of AIS. (Coord, AISAC, State, Tribes, Fed, NGO)

6A10. Expand statewide participation and partnerships by networking with national public education campaigns (Stop Aquatic Hitchhikers, Protect Your Waters, Habitattitude™) to increase awareness of AIS issues, to disseminate educational material, and to foster responsible management of unwanted pets. (Coord, AISAC, EMNRD, NMDGF, NMED, NGO, Private)

6A11. Develop working relationships with sporting groups and conservation organizations to foster outreach and educational activities relating to AIS, including providing information, training, and incentives for AIS-related activities which help prevent the spread of AIS. (Coord, AISAC, State, Tribes, Fed, NGO, Private)

Strategy 6B: Train natural resources personnel in AIS identification.

6B1. Conduct identification seminars for field personnel of state, federal, tribal, and municipal governments. (Coord, State, Tribes, Fed, University)

Strategy 6C: Inform private industry on AIS identification, their effects, and the laws regulating them.

6C1. Create and distribute pamphlets for the nursery industry, pet stores, bait dealers and other relevant businesses identifying AIS, the laws regulating them, and their effects in natural systems. (Coord, State [NMDGF, NMEDD, NMDA], Fed)

6C2. Provide information on AIS to fishing tournament organizers. (Coord, NMDGF, EMNRD, Fed)

6C3. Identify and provide AIS information to all other persons or businesses operating on water bodies. (Coord, State [EMNRD, NMDGF, NMDA, NMEDD], Tribes, Fed, Private)

IMPLEMENTATION TABLE

The following table identifies tasks and responsibilities of stakeholders. Funding required to carryout the proposed actions will be determined in conjunction with assessments from cooperating State and Federal agencies. Funds for implementing the NMPlan will be administered by the Coord as a member of the AISAC. Although all actions identified in the NMPlan are important, formation of the AISAC and funding to support the Coord are critical to effective AIS management in New Mexico. The Coord will seek additional funding to implement other elements of the NMPlan. This model has proven effective in the state of Washington and is under development in Arizona and implementation in Oregon.

Objectives/Actions		Implementing Organization	Funding (in thousands) and Personnel Requests											
			FY 09						FY 10					
			State and Other Funds		Federal Funds		Totals		State and Other Funds		Federal Funds		Totals	
#	Description		Agency	$	Agency	$	$	FTE	Agency	$	Agency	$	$	FTE
Objective 1: Coordinate and implement a comprehensive management plan.														
Strategy 1A: Coordinate all AIS management programs and activities within New Mexico														
1A1	Organize AISAC	Gov, State, Tribes, Fed, NGO, Private, MUN, WMD	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
1A2	Create & fund Coord	Gov, Leg, AISAC, State, Fed	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
1A3	Identify & coordinate with federal, tribal & private support staff	Gov, Coord, AISAC, State, Tribes, Fed, NGO, Private, MN, WMD	State	0		0	0	0						
1A4	AIS list	Coord, AISAC	See 1A2, State	-		0	0	0						
1A5	AIS terms & definitions	Coord, AISAC	See 1A2, State	-		0	0	0						
1A6	AIS training course	Coord, AISAC, Fed	See 1A2, State	-	USFWS	-	-	-						
1A7	AIS assessment guidelines	Coord, AISAC	See 1A2, State	-										
1A8	Annual forum	Coord, AISAC, Fed	State	-	USFWS				State	-	USFWS	-	-	-
Strategy 1B: Participate in and support regional, federal, and international efforts to control AIS.														
1B1	Western Regional Panel	Coord, AISAC	See 1A2, State	-	USFWS	-	-	-	See 1A2, State	-	USFWS	-	-	-
1B2	100th Meridian Initiative	Gov, Coord, AISAC	See 1A2, State	-	USFWS	-	-	-	See 1A2, State	-	USFWS	-	-	-

Objectives/Actions		Implementing Organization	Funding (in thousands) and Personnel Requests											
			FY 09						FY 10					
			State and Other Funds		Federal Funds		Totals		State and Other Funds		Federal Funds		Totals	
#	Description		Agency	$	Agency	$	$	FTE	Agency	$	Agency	$	$	FTE
1B3	Interstate & Mexican coordination	Gov, Coord, AISAC, NMBA, ISC, OSE	See 1A2, State	-					See 1A2, State	-				
Strategy 1C: Increase existing funding resources for AIS management and establish new funding and resources.														
1C1	Pursue stable funding	Coord, AISAC, State, Tribes							State	-				
1C2	Develop private partnerships	Coord, AISAC, State, Tribes, Fed, NGO	See 1A1 & 1A2	-					See 1A1 & 1A2	-				
Strategy 1D: Review and evaluate State efforts addressing AIS.														
1D1	Assess AIS status	Coord, AISAC, State, Tribes, Fed, MUN, MWD	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
1D2	Update NMPlan	Coord, AISAC	See 1A1 & 1A2	-					See 1A1 & 1A2	-				
Object 1: Totals														
Objective 2: Prevent the introduction of AIS into New Mexico.														
Strategy 2A: Research and address potential AIS and their pathways of introduction.														
2A1	Review existing AIS programs	Coord, AISC	State	-	USFWS									
2A2	Invasion pathways & high-risk waterbodies	Coord, AISAC, University	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
2A3	AIS ranking system	Coord, AISAC, University							State	-	USFWS	-	-	-
2A4	Research imported plants	EMNRD, NMDA, APHIS, University	State	-	APHIS	-	-	-	State	-	APHIS	-	-	-
2A5	Prohibited AIS list	Coord, AISAC, State, Tribes, Fed	State	-					State	-				
2A6	Boat inspection program	Coord, AISAC, State, Tribes, Fed	State	-					State	-				
2A7	Boat wash stations	AISAC, EMNRD, BoR, CoE, Tribes, USFWS, USNPS, Private (marinas)	State	-	Federal Agencies	-	-	-	State	-	Federal Agencies	-	-	-

Objectives/Actions		Implementing Organization	Funding (in thousands) and Personnel Requests											
			FY 09						FY 10					
			State and Other Funds		Federal Funds		Totals		State and Other Funds		Federal Funds		Totals	
#	Description		Agency	$	Agency	$	$	FTE	Agency	$	Agency	$	$	FTE
2A8	Work with importers	Coord, AISAC, NMDGF, NMDA, NMEDD, APHIS, Private	State	-					State	-				
2A9	Field personnel plan	Coord, AISAC, State, Tribes, Fed, WMD	State	-					State	-				
2A10	Inform agency & organization staff	Coord, AISAC, State, Tribes, Fed	State	-	Federal Agencies				State	-	Federal Agencies			
Strategy 2B: Increase enforcement and awareness of existing laws controlling the transport, propagation, sale, collection, possession, importation, purchase, cultivation, distribution, and introduction of AIS.														
2B1	Identify regulations & permitting authorities	Coord, AISAC, State, Tribes	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
2B2	Expand state permitting program	Gov, Leg	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
2B3	Seek additional permitting authority	Coord, AISAC, State (EMNRD, NMDGF, NMDA), Tribes	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
2B4	AIS law enforcement	All LE authorities: State, Tribes, Fed	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
2B5	Train enforcement personnel	Coord, State, Tribes, Fed	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
2B6	Distribute information to importers	Coord, State (NMEDD), Tribes, Fed	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
2B7	Publicize penalties	Coord, AISAC, State, Tribes, Fed	State	-					State	-				
2B8	Examine regulations & penalties	Coord, AISAC, State, Tribes												
Strategy 2C: Promote legislation and regulatory rules that establish or increase the state's authority to control the introduction of new species.														
2C1	Authority to detain	Gov, Leg, State, Tribes												
2C2	Increase import regulation	Gov, Leg, State, Tribes												
2C3	Authority to quarantine	Gov, Leg, State, Tribes												
2C4	Disease & pest free imports	EMNRD, NMDGF, NMDA, Tribes												

Objectives/Actions		Implementing Organization	Funding (in thousands) and Personnel Requests											
			FY 09						FY 10					
			State and Other Funds		Federal Funds		Totals		State and Other Funds		Federal Funds		Totals	
#	Description		Agency	$	Agency	$	$	FTE	Agency	$	Agency	$	$	FTE
2C5	Interstate & Mexican cooperative agreements	Gov, Leg, Coord, ISC, OSE, AZ, CO, KS, OK, TX, Chihuahua												
2C6	Legislation to prevent AIS introduction to private ponds	Gov, Leg, State, Private												
Object 2: Totals														
Objective 3: Detect and eradicate pioneering aquatic invasive species.														
Strategy 3A: Implement a surveillance and early detection program.														
3A1	Identify high-risk waterbodies	Coord, AISAC, State, Tribes, Fed, NGO, Universities	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
3A2	Develop monitoring/surveillance program	Coord, AISAC, State, Tribes, Fed												
3A3	Conduct monitoring/surveillance of high-risk waterbodies & water delivery systems	State, Tribes, Fed, MUN, MWD												
3A4	Encourage citizen-based monitoring	Coord, AISAC, State, Tribes, Fed, NGO, Private	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
3A5	Develop criteria for impairment of surface water quality standards due to undesirable aquatic life (AIS)	State (NMED, NMDGF)	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
Strategy 3B: Develop an early response mechanism to deal with detected and potential AIS.														
3B1	Develop Rapid Response Plan	Coord, AISAC	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
3B2	Identify funding for Rapid Response Plan	Coord, AISAC	See 1A1 & 1A2	-					See 1A1 & 1A2	-				
3B3	Implement Rapid Response Plan	Coord, AISAC, State, Tribes, Fed, MUN, NGO, WMD, Private	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
3B4	Develop HAACCP plans	Coord, AISAC, State, Tribes, Fed	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
Strategy 3C: Eradicate pioneering populations of AIS.														

Objectives/Actions		Implementing Organization	Funding (in thousands) and Personnel Requests											
			FY 09						FY 10					
			State and Other Funds		Federal Funds		Totals		State and Other Funds		Federal Funds		Totals	
#	Description		Agency	$	Agency	$	$	FTE	Agency	$	Agency	$	$	FTE
3C1	Develop eradication program for pioneering AIS	Coord, AISAC	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
3C2	Implement eradication program for pioneering AIS	Coord, AISAC, State, Tribes, Fed, MUN, NGO, WMD	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
Object 3: Totals														
Objective 4: Where feasible, control or eradicate established AIS that have a significant impact.														
Strategy 4A: Limit the dispersal of established AIS into new waterbodies or into new areas of a waterbody or drainage.														
4A1	Boat wash stations	Coord, AISAC, State, Fed, Tribes	State	-	Federal Agencies	-	-	-	State	-	Federal Agencies	-	-	-
4A2	Limit access to AIS populations	Coord, State, Tribes, Fed, Private	State	-	Federal Agencies	-	-	-	State	-	Federal Agencies	-	-	-
4A3	AIS information & signage	Coord, State, Tribes, Fed, MUN, WMD	State	-	Federal Agencies	-	-	-	State	-	Federal Agencies	-	-	-
Strategy 4B: Limit the dispersal of established AIS to new waterbodies or to new areas of a waterbody.														
4B1	Control Priority Class 2 & 3 AIS	State (EMNRD, NMDGF, NMDA), Tribes, Fed, MUN, WMD	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
Object 4: Totals														
Objective 5: Increase knowledge of AIS in New Mexico through compiling data and conducting research.														
Strategy 5A: Facilitate the collection and dispersal of information, research, and data on AIS in New Mexico.														
5A1	Create AIS database & reference material repository	Coord, AISAC, University, Fed	State	-	USGS	-	-	-	State	-	USGS	-	-	-
5A2	Maintain AIS database & website	Coord, University, Fed	State	-	USGS	-	-	-	State	-	USGS	-	-	-
5A3	Document AIS distribution & abundance	State, Tribes, Fed, MUN, NGO, WMD, Private, University	State See 1A3	-	Federal Agencies	-	-	-	State See 1A3	-	Federal Agencies	-	-	-
5A4	Maintain list of AIS taxonomic experts	Coord, AISAC		-		-	-	-		-		-	-	-

Objectives/Actions		Implementing Organization	Funding (in thousands) and Personnel Requests											
			FY 09						FY 10					
			State and Other Funds		Federal Funds		Totals		State and Other Funds		Federal Funds		Totals	
#	Description		Agency	$	Agency	$	$	FTE	Agency	$	Agency	$	$	FTE
Strategy 5B: Research AIS for their impact on native biota utilizing regional efforts & literature searches.														
5B1	AIS life history & impact	Coord, State, Fed, Tribes, University	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
5B2	Continue monitoring native aquatic biota	State, Tribes, Fed, University	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
5B3	Evaluate AIS as vectors (disease, parasites)	Coord, State (NMHD), Tribes, Fed, University	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
Strategy 5C: Research management alternatives for their effect on AIS and native species.														
5C1	Investigate AIS & anthropogenic relationships	Coord, State, Tribes, Fed, University	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
5C2	New AIS management methods	Coord, State, Tribes, Fed, University	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
5C3	Herbicide & pesticide effects	Coord, State, Tribes, Fed, University	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
Object 5: Totals														
Objective 6: Inform the public, policy makers, natural resource workers, private industry, and user groups about the risks and impacts of AIS.														
Strategy 6A: Inform the public about AIS, and how their actions can help prevent the spread and reduce the impacts of AIS.														
6A1	Include AIS information in hunter/boater classes	NMDGF, EMNRD	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6A2	Education curriculum	Coord, AISAC, State (NMPED), Tribes	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6A3	AIS Traveling Trunk	Coord, AISAC, NMGF, EMNRD	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6A4	Press releases & PSAs	Coord, AISAC, State, Tribes, Fed	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6A5	Produce articles, videos, billboards, TIS, web media, AIS ID cards	Coord, AISAC, State (NMEDD), Tribes, Fed	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-

Objectives/Actions		Implementing Organization	Funding (in thousands) and Personnel Requests											
			FY 09						FY 10					
			State and Other Funds		Federal Funds		Totals		State and Other Funds		Federal Funds		Totals	
#	Description		Agency	$	Agency	$	$	FTE	Agency	$	Agency	$	$	FTE
6A6	Distribute AIS information	Coord, State (NMEDD, NMTD), Tribes, Fed, MUN, NGO, Private, WMD	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6A7	Include AIS information in hunting, fishing & boating regulations	NMDGF, EMNRD	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6A8	Develop "NM Friendly" plant labeling system	Coord, NMDA, EMNRD	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6A9	In form decision makers about AIS	Coord, AISAC, State, Tribes, Fed, NGO												
6A10	Network with aquatic education programs	Coord, AISAC, EMNRD, NMDGF, NMED, NGO, Private	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6A11	Foster outreach with sporting & conservation organizations	Coord, AISAC, State, Tribes, Fed, NGO, Private												
Strategy 6B: Train natural resources personnel in AIS identification.														
6B1	AIS Identification seminars	Coord, State, Tribes, Fed, University	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
Strategy 6C: Inform private industry in AIS identification, their effects, and the laws regulating them.														
6C1	Nursery, pet store and bait dealer pamphlets	Coord, State (NMDGF, NMDA, NMEDD), Fed	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6C2	Provide information at fishing tournaments	Coord, NMDGF, EMNRD, Fed	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
6C3	Distribute AIS information to others	Coord, State, Tribes, Fed, Private	State	-	USFWS	-	-	-	State	-	USFWS	-	-	-
Object 6: Totals														
NMPlan Totals			FY 09						FY 10					
			State and Other Funds		Federal Funds		Totals		State and Other Funds		Federal Funds		Totals	
			Agency	$	Agency	$	$	FTE	Agency	$	Agency	$	$	FTE
				-		-	-	-		-		-	-	-

PROGRAM MONITORING AND EVALUATION

The strategies outlined in the NMPlan will generate actions to achieve desired future conditions and outcomes. A necessary step in the implementation of this plan will be program monitoring and evaluation of performance indicators referable to the goal and objectives of the NMPlan. To support and inform implementation of this plan, it is recommended that the AISAC adopt a philosophy of adaptive management in which monitoring and evaluation are employed to measure progress toward achieving the goal, to assess the efficacy of prioritized strategies to meet the stated objectives, and to maintain awareness of and adapt to changing information or conditions. Program monitoring and evaluation will require oversight, evaluation and reporting.

Oversight

The AISAC will be responsible for coordinating the oversight process to inform all stakeholders of the progress towards implementing the plan. The role of AISAC will be to examine the level of achievement on tasks identified in the prioritized strategic actions (see *AIS Management Strategy*).

Evaluation

To afford an objective evaluation process, performance indicators may be required that not only examine progress, but also identify funding needs to successfully implement the plan. Evaluation should also incorporate information from those groups or individuals that will be affected by plan implementation. The evaluation process may also require revisions to the NMPlan, which will be the shared responsibility of the Coordinator and the ASIAC.

Reporting

The Coordinator and the AISAC will prepare and disseminate an annual progress report to all stakeholders. This report will include an evaluation of success towards achieving the goal and stated objectives of the NMPlan.

The Coordinator and the AISAC will prepare and disseminate a 5-year AIS program status report to all stakeholders. This plan will inform stakeholders of the progress of plan implementation, program needs, and future directions relative to adjacent states and regional planning efforts.

GLOSSARY

Accidental introduction: an unintended introduction made as a result of a species utilizing humans or human delivery systems as vectors for dispersal outside its natural range.

Aquatic invasive (or nuisance) species: a nonnative species whose introduction into an aquatic ecosystem causes or is likely to cause harm to the economy, environment, or human health or safety.

Alga (singular; algae, plural): a group of aquatic, photosynthetic organisms ranging from unicellular to multicellular forms, and generally possess chlorophyll but lack true roots, stems and leave characteristic of terrestrial plants.

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

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

Control: suppressing, reducing, or managing invasive species populations, preventing spread of invasive species from areas where they are present.

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 techniques: methods, efforts, actions, or programs to prevent introductions or to control infestations of AIS that minimize adverse environmental impacts (The impact of management actions should be less than the impact of the AIS.).

Eradicate (extirpate): the act or process of eliminating an invasive species.

Intentional introduction: an introduction made deliberately by humans, involving the purposeful movement of a species outside of its natural range and dispersal potential. (Such introductions may be authorized or unauthorized.)

Introduction: the movement, by human agency, of a species, subspecies, or lower taxon (including any part, gametes or propagule that might survive and subsequently reproduce) outside its natural range (past or present). This movement can be either within or between political entities (e.g., country or state).

Native species (indigenous): means a species, subspecies, or lower taxon, occurring within its natural range (past or present) and dispersal potential (i.e. within the range it occupies naturally or could occupy without direct or indirect introduction or care by humans.)

Nonnative species: (alien, nonindigenous, foreign, exotic) a species, subspecies, or lower taxon occurring outside of its natural range (past or present) and dispersal potential (i.e. outside the range it occupies naturally or could not occupy without direct or indirect introduction or care by humans) and includes any part, gametes or propagule of such species that might survive and subsequently reproduce.

Pathogen: a microbe or other organism that causes disease.

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

Waterbody: any specified area of water, including springs, ponds, lakes, reservoirs, streams, rivers, canals, and irrigation ditches.

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

LITERATURE CITED

American Sportfishing Association. 2001. Economic Impact of Sportfishing. http://www.asafishing.org/asa/statistics/economic_impact/state_reports_freshwater.html

Aquatic Nuisance Species Task Force. 2005. Guidance for state and interstate Aquatic Nuisance Species Management Plans. Arlington, VA. http://www/anstaskforce.gov.state_guidance.htm

Balcom, N.C. 1994. Aquatic immigrants of the Northeast, No. 4; Asian clam, *Cobicula fluminea*. Connecticut Sea Grant College Program. http://www.sgnis.org/publicat/nespp_4.htm

Benson, A. 2006. *Melanoides tuberculatus*. USGS Nonindigenous Aquatic Species Database, Gainesville, FL. http://nas.er.usgs.gov/queries/FactSheet.asp?speciesID=1037

Boydstun, C., P. Fuller, and J.D. Williams. 1995. Nonindigenous fish. Pp. 431-433, *In* LaRoe, E. T., Farris, G. S., Puckett, C. E., Doran, P. D., and Mac, M. J., editors. Our living resources: a report to the nation on the distribution, abundance, and health of US plants, animals, and ecosystems. Department of the Interior, National Biological Service, Washington, D.C.

Bronson, C.H. 2002. Apple Snails. *P. canaliculata*: Tropical and Subtropical Agricultural Pest. Technical Bulletin Number 3:9.

Brouder, M.J., and T.L. Hoffnagle. 1997. Distribution and prevalence of the Asian fish tapeworm, *Bothriocephalus acheilognathi*, in the Colorado River and tributaries, Grand Canyon, Arizona, including two new host records. Journal of the Helminthological Society of Washington 64:219-226.

Carlson, C.A. and R.T. Muth. 1989. The Colorado River: lifeline of the American Southwest. Proceedings of the international large river symposium, Canadian Special Publication of Fisheries and Aquatic Sciences 106:220-239.

Carter, J., and B.P. Leonard. 2002. A review of the literature on the worldwide distribution, spread of, and efforts to eradicate the coypu (*Myocastor coypus*). Wildlife Society Bulletin 30:162-175.

Clarkson, R.W., A.T. Robinson, and T.L. Hoffnagle. 1997. Asian tapeworm (*Bothriocephalus acheilognathi*) in native fishes from the Little Colorado River, Grand Canyon, Arizona. Great Basin Naturalist 57:66-69.

Colorado River Water Users Association. 2005. New Mexico. http://www.crwua.org/nm/crwua_nm.htm

Courtenay, W.R., Jr., D.A. Hensley, J.N. Taylor, and J.A. McCann. 1984. Distribution of exotic fishes in the continental United States. Pp. 41-77, *In* Distribution, Biology, and Management of Exotic Fishes, eds. W.R. Courtenay, Jr. and J.R. Stauffer, Jr. John Hopkins University Press, Baltimore. 430 pp.

Cowie, R.H. 2005. *Pomacea canaliculata*. Global Invasive Species Database. http://www.issg.org/database/species/ecology.asp?si=135&fr=1&sts=

Cowie, R.H., K.A. Hayes, and S.C. Thiengo. 2006. What are apple snails? Confused taxonomy and some preliminary resolution. Pp. 3-23, *In* R. C. Joshi & L. S. Sebastian (eds.), Global advances in ecology and management of golden apple snails. Philippine Rice Research Institute, Nueva Ecija.

Cox, G.W. 2001. An Inventory and Analysis of the Alien Plant Flora of New Mexico. The New Mexico Botanist No. 17.

Davis, D. 2008. Reconnaissance report for site inspection to Pecos River and Panchuela Creek. Surface Water Quality Bureau, New Mexico Environment Department, Santa Fe, NM. 5 pp.

Degenhardt, W.G., C.W. Painter, and A.H. Price. 1996. Amphibians & Reptiles of New Mexico. University of New Mexico Press, Albuquerque. 431pp.

de Moor, I. 2002. Potential impacts of alien freshwater crayfish in South Africa. African Journal of Aquatic Science 27:125-139.

Federal Register. 2007a. Injurious Wildlife Species; Silver Carp (*Hypophthalmichthys molitrix*) and Largescale Silver Carp (*Hypophthalmichthys harmandi*). 50 CFR Part 16, RIN 1018–AT29. 72(131):37459-37469.

Federal Register. 2007b. Injurious Wildlife Species: Black Carp (*Mylopharyngodon piceus*). 50 CFR Part 16, RIN 1018–AG70. 72(201):59019-59035.

Fernandez, P.J., and P.C. Rosen. 1996a. A microcosm study of the effects of an introduced crayfish (*Orconectes virilis*) on aquatic plants, invertebrates, and herpetofauna from Arizona. *In*: Effects of the introduced crayfish *Orconectes virilis* on native aquatic herpetofauna in Arizona. Final Report, IIPAM Project No. I94054. Heritage Program, Arizona Game and Fish Department, Phoenix, AZ.

Fernandez, P.J., and P.C. Rosen. 1996b. Effects of an introduced crayfish (*Orconectes virilis*) on the stream habitat of the Chiricahua leopard frog (*Rana chiricahuensis*) at Three Forks, White Mountains, Arizona. *In*: Effects of the introduced crayfish *Orconectes virilis* on native aquatic herpetofauna in Arizona. Final Report, IIPAM

Project No. I94054. Heritage Program, Arizona Game and Fish Department, Phoenix, AZ.

Fernandez, P.J., and P.C. Rosen. 1996c. Evidence for crayfish effects on Sonoran mud turtles (*Kinosternon sonoriense*) and associated fauna in a central Arizona stream. *In*: Effects of the introduced crayfish *Orconectes virilis* on native aquatic herpetofauna in Arizona. Final Report, IIPAM Project No. I94054. Heritage Program, Arizona Game and Fish Department, Phoenix, AZ.

Frodge, J.D., D.A. Marino, and G.L. Thomas. 1995. Mortality of largemouth bass (*Micropterus salmoides*) and steelhead trout (*Oncorhynchus mykiss*) in densely vegetated littoral areas of Lake Washington and Keevies Lake, Washington tested using in situ bioassay. Pp. 343-358, *In* Pauley, G. B. and S. A. Bonar, editors. The Biology, Management and Stocking Rates of Triploid Grass Carp, *Ctenopharyngodon idella*, and Their Effects on Plant Community, Fish Assemblage, and Water Quality of Several Pacific Northwest Lakes. Final Report to the Washington Department of Ecology.

Gulf States Marine Fisheries Commission. 2003. Fact sheet for *Melanoides tuberculata* (Muller, 1774). http://www.nis.gsmfc.org/nis_factsheet.php?toc_id=144

Howells, R.G. 2003. *Pomacea canaliculata*: channeled apple snail: releases threat on U. S. Agriculture and Aquatic Environments. ANS Digest 5 (1).

Kats, L.B. and R.P. Ferrer. 2003. Alien predators and amphibian declines: review of two decades of science and the transition to conservation. Diversity and Distributions 9:99-110.

Kennedy, T. A. 2007. A *Dreissena* risk assessment for the Colorado River Ecosystem. U. S. Geological Survey, Open-File Report 2007-1085.

Kilroy, C. 2004. A new alien diatom, *Didymosphenia geminata* (Lyngbye) Schmidt: its biology, distribution, effects and potential risks for New Zealand fresh waters. Prepared for Environment Southland by National Institute of Water and Atmospheric Research, Ltd. http://www.biosecurity.govt.nz/pests-diseases/plants/didymo/didyo-schmidt-report.pdf

Kuperman, B.I., V.E. Matey, M.L. Warburton, & R.N. Fisher. 2005. *Bothriocephalus acheilognath* infection of fish in southern California. http://www.werc.usgs.gov/sandiego/pdfs/warburton3623.pdf

Lang, B.K. and P. Mehlhop. 1996. Distribution of freshwater mussels (Unionidae) of the Canadian River drainage: New Mexico and Texas. Segment I. Survey of freshwater bivalve mollusks of the Canadian River, New Mexico. Final Report submitted to the National Biological Service, State Partnership Program, Washington, D.C.

Lodge, D.M., C.A. Taylor, D.M. Holdich, and J. Skurdal. 2000a. Nonindigenous crayfishes threaten North American freshwater biodiversity: lessons form Europe. Fisheries 25(8):7-20.

Lodge, D.M., C.A. Taylor, D.M. Holdich, and J. Skurdal. 2000b. Reducing impacts of exotic crayfish introductions: new policies needed. Fisheries 25(8):21-23.

Lodge, D.M., S. Williams, H.J. MacIsaac, K.R. Hayes, B. Leung, S. Reichard, R.N. Mack, P.B. Moyle, M. Smith, D.A. Ando, J.T. Carlton, and A. McMichael. 2006. Biological invasions: recommendations for U.S. policy and management. Ecological Applications 16(6):2035-2054.

Marsden, J.E., and D.J. Jude. 1995. Round gobies invade North America. Fact sheet produced by Sea Grant at Ohio State University, Columbus, OH.

Masser, M.P. and D.B. Rouse. 1997. Australian red claw crayfish. Alabama Cooperative Extension System, Auburn University, Southern Regional Aquacultural Center, SRAC Publication No. 244.

McCann, J.A. 1984. Involvement of the American Fisheries Society with exotic species, 1969-1982. Pp. 1-7, *In* Distribution, Biology, and Management of Exotic Fishes, eds. W.R. Courtenay, Jr. and J.R. Stauffer, Jr. John Hopkins University Press, Baltimore. 430pp.

Metcalf, A.L. 1966. *Corbicula manilensis* in the Mesilla Valley of Texas and New Mexico. The Nautilus 80(1):16-20.

Mitchell, A.J., R.M. Overstreet, A.E. Goodwin, and T.M. Brandt. 2005. Spread of an exotic fish-gill trematode: a far-reaching and complex problem. Fisheries 30(8):11-16.

Mitchell, D S. and N.M. Tur. 1975. The rate of growth of *Salvinia molesta* (*S. auriculata Auct.*) in laboratory and natural conditions. Journal of Applied Ecology 12:213-225.

New Mexico Department of Fish and Game. 2004. New Mexico Wildlife News. June 10.

New Mexico Department of Fish and Game. 2005. New Mexico Wildlife News. February 28.

Pimentel, D., Lach, L., Zuniga, R., and Morrison, D. 2000. Environmental and Economic Costs of Non-indigenous Species in the United States. BioScience 50:53-65.

Pimentel, D. 2003. Economic and Ecological Costs Associated with Aquatic Invasive Species. Pp. 3-5, *In* Proceedings of the Aquatic Invaders of the Delaware Estuary Symposium. Malvern, Pennsylvania. May 20, 2003.

Rawlings, T.A., K.A. Hayes, R.H. Cowie, and T.M. Collins. 2007. The identity, distribution, and impacts of non-native apple snails in the continental United States. BMC Evolutionary Biology 7:97.

Rhodes, K., and C. Hubbs. 1992. Recovery of Pecos River fishes from red tide fish kill. Southwestern Naturalist 37:178-187.

Rosen, P.C., and C.R. Schwalbe. 1995. Bullfrogs: introduced predators in southwestern wetlands. Pp. 452-454, *In* Laroe, E.T., G.S. Farris, C.E. Puckett, P.D. Doran, and M. J. Mac, editors. Our Living Resources: A Report to the Nation on the Distribution, Abundance, and Health of U.S. Plants, Animals, and Ecosystems. U.S. Department of the Interior, National Biological Service, Washington, D.C. 530 pp.

Sinclair, R.M. 1971. Annotated bibliography on the exotic bivalve Corbicula in North America, 1900-1971. Sterkiana 43:11-18.

Spalding, S. and L. Elwell. 2007. Increase in nuisance blooms and geographic expansion of the freshwater diatom *Didymosphenia geminata*: recommendations for response. U. S. Environmental Protection Agency and Federation of Fly Fishers, White Paper, 33 pp.

Summers, W.K. 1976. Catalog of thermal waters of New Mexico. New Mexico Bureau of Mines & Minerals. Hydrologic Report 4. 79 pp.

Taylor, C.A., M.L. Warren, Jr., J.F. Fitzpatrick, Jr., H.H. Hobbs III, R.F. Jezerinac, W.L. Pflieger, and H. W. Robison. 1996. Conservation status of crayfishes in the United States and Canada. Fisheries 21(4):25-38.

Taylor, C.A., G.A. Shuster, J. E. Cooper, R. DiStefano, A.G. Eversole, P. Hamr, H.H. Hobbs III, H.W. Robison, C. E. Skelton, and R.E. Thoma. 2007. A reassessment of the conservation status of crayfishes in the United States and Canada after 10+ years of increased awareness. Fisheries 32(8):372-389.

U.S. Geological Survey. 2005a. Nonindigenous Aquatic Species (NAS) information resource. http://www.nas.er.usgs.gov/

U.S. Geological Survey. 2005b. Nonindigenous Aquatic Species (NAS) information resource. http://salvinia.er.usgs.gov/html/predicted_range.html

U.S. Geological Survey. 2005c. Nonindigenous Aquatic Species (NAS) information resource. http://www.salvinia.er.usgs.gov/html/news_and_notes.html

U.S. Geological Survey. 2005d. Fisheries and Aquatics Bulletin, Fisheries: Aquatic and Endangered Resources (FAER) Program. Volume IV, Issue 1, Spring.

Utah Department of Agriculture. 1997. Aquaculture Newsletter, Fish Health Program. http://www.ag.utah.gov/animind/aqnews2.html

Warren, M.L., Jr. and Burr, B.M. 1994. Status of freshwater fishes of the United States: overview of an imperiled fauna. Fisheries 19:6-18.

Williams, E.H. Jr., L. Bunkley-Williams, C.G. Lilyestrom, and E.A.R. Ortiz-Corps. 2001. A review of recent introductions of aquatic invertebrates in Puerto Rico and implications for the management of nonindigenous species. Caribbean Journal of Science 37:246-251.

Zohrabian A., Meltzer M.I., R. Ratard, K. Billah, N.A. Molinari, K. Roy, et al. 2004. West Nile Virus economic impact, Louisiana, 2002. Emerging Infectious Diseases (serial on the Internet). http://www.cdc.gov/ncidod/EID/vol10no10/03-0925.htm

APPENDICES

Appendix – A

LIST OF PRIORITY AIS FOR NEW MEXICO

Priority Class 1 (see definition above)
Giant salvinia (*Salvinia molesta*)
Water hyacinth (*Eichhornia crassipes*)
VHS virus (viral hemorrhagic septicemia virus)
Quagga mussel (*Dreissena bugensis*)
Zebra mussel (*Dreissena polymorpha*)
Red-rim melania (*Melanoides tuberculatus*)
New Zealand mudsnail (*Potamopyrgus antipodarum*)
Channeled (Golden) applesnail (*Pomacea* spp.)
Tilapia (*Oreochromis spp., Sarotherodon sp., Tilapia spp.*)
Asian Carps (Bighead, Black, Silver, Largescale Silver)

Priority Class 2
Whirling Disease (*Myxobolus cerebralis*)
Asian fish tapeworm (*Bothriocephalus acheilognathi*)
Hydrilla (*Hydrilla verticillata*)
Purple Loosestrife (*Lythrum salicaria*)
Nutria (*Myocastor coypus*)

Priority Class 3
Chytrid fungus (*Batrachochytrium dendrobatidis*)
Didymo or rocksnot (alga) (*Didymosphenia geminata*)
Golden alga (*Prymnesium parvum*)
Arundo (*Arundo donax),* Brazilian waterweed (*Egeria densa*), Parrotfeather (*Myriophyllum aquaticum*), Eurasian watermilfoil (*M. spicatum*), Curly pondweed (*Potamogeton crispus*) and other aquatic nonindigenous plants
Nonnative crayfish (*Orconectes* spp*., Procambarus clarkii*)
Asian clam (*Corbicula fluminea*)
Bullfrog (*Rana catesbeiana*)

Priority Class 4
Round Goby (*Neogobius melanostomus*)
Australian crayfish (Family Parastacidae)

Appendix – B

LIST OF AQUATIC NONNATIVE SPECIES REPORTED FROM NEW MEXICO

This list of aquatic nonnative species reported from New Mexico is derived primarily from the USGS Nonindigenous Aquatic Species (NAS) information database, NMDGF BISON-M list, agency reports, and the published literature. Taxa listed below reflect records of single specimens, established populations, eradicated populations, failed stocking attempts or introductions, and greenhouse occurrences. The table is organized by broad taxonomic categories. Species and subspecies within a category are alphabetized by scientific name. An "X" inserted in species names indicates a hybrid taxon. The "origin" of these species is modeled after terminology in McCann (1984) but modified here as: *nonnative* (NN)−any species (alien, nonindigenous, foreign, exotic; see Glossary) introduced to New Mexico by humans from another state or foreign land; *transplanted* (T)−any native species moved within the state by humans into an ecosystem outside their natural range. This list is a preliminary effort and will be updated and modified with new information.

Common Name	Scientific Name	Source*	Origin†
PLANT			
Arundo	*Arundo donax*	9	NN
Brazilian waterweed	*Egeria densa*	1	NN
Hydrilla	*Hydrilla verticillata*	9	NN
Parrot-feather	*Myriophyllum aquaticum*	1	NN
Eurasian watermilfoil	*Myriophyllum spicatum*	1	NN
Water-cress	*Nasturtium officinale*	1	NN
Curly pondweed	*Potamogeton crispus*	1	NN
Golden alga	*Prymnesium parvum*	4	NN?
Purple loosestrife	*Lythrum salicaria*	3	NN
COELENTRATE – HYDROZOAN			
Freshwater jellyfish	*Craspedacusta sowerbyii*	1	NN
CRUSTACEAN – COPEPOD			
Calanoid copepod	*Eurytemora affinis*	1	NN
CRUSTACEAN – CRAYFISH			
Calico crayfish	*Orconectes immunis*	4	NN
Rusty crayfish	*Orconectes rusticus*	1,2	NN
Northern crayfish	*Orconectes virilis*	1,2	T
Red swamp crayfish	*Procambarus clarkii*	1,2	NN
MOLLUSK – BIVALVE			
Asian clam	*Corbicula fluminea*	1,2	NN
Giant floater	*Pyganodon grandis*	5	NN
Paper pondshell	*Utterbackia imbecillis*	5	T
MOLLUSK – GASTROPOD			
Big-ear radix	*Radix auricularia*	1	NN

FISH			
Inland silverside	*Menidia beryllina*	1,2	NN
White sucker	*Catostomus commersoni*	1	NN
Rio Grande sucker	*Catostomus plebeius*	1	T
Rock bass	*Ambloplites rupestris*	1,2	NN
Green sunfish	*Lepomis cyanellus*	1	T
Warmouth	*Lepomis gulosus*	1,2	NN
Bluegill	*Lepomis macrochirus*	1	T
Longear sunfish	*Lepomis megalotis*	1	T
Redear sunfish	*Lepomis microlophus*	1	NN
Smallmouth bass	*Micropterus dolomieu*	1,2	NN
Spotted bass	*Micropterus punctulatus*	1,2	NN
Largemouth bass	*Micropterus salmoides*	1	T
Pacu	*Piaractus* sp.	7	NN
Striped Rafael's catfish	*Platydoras costatus*	7	NN
White crappie	*Pomoxis annularis*	1,2	NN
Black crappie	*Pomoxis nigromaculatus*	1,2	NN
Mexican tetra	*Astyanax mexicanus*	1	T?
Tilapia	*Oreochromis, Sarotherodon, Tilapia sp.*	1,2	NN
Gizzard shad	*Dorosoma cepedianum*	1	T
Threadfin shad	*Dorosoma petenense*	1,2	NN
Zebra danio	*Brachydanio rerio*	1,2	NN
Central stoneroller	*Campostoma anomalum*	1,2	NN
Goldfish	*Carassius auratus*	1	NN
Grass carp	*Ctenopharyngodon idella*	1,2	NN
Red shiner	*Cyprinella lutrensis*	1	T
Common carp	*Cyprinus carpio*	1,2	NN
Rio Grande chub	*Gila pandora*	1	T
Plains minnow	*Hybognathus placitus*	1	T
Golden shiner	*Notemigonus crysoleucas*	1,2	NN
Arkansas River shiner	*Notropis girardi*	1	T
Suckermouth minnow	*Phenacobius mirabilis*	1	T
Fathead minnow	*Pimephales promelas*	1	T
Bullhead minnow	*Pimephales vigilax*	1,2	NN
Flathead chub	*Platygobio gracilis*	1	T
Longfin dace	*Agosia chrysogaster*	1	T
Speckled dace	*Rhinichthys osculus*	1	T
Tench	*Tinca tinca*	1,2	NN
Sheepshead minnow	*Cyprinodon variegatus*	1	NN
Northern pike	*Esox lucius*	1,2	NN
Gulf killifish	*Fundulus grandis*	1	NN
Plains killifish	*Fundulus zebrinus*	1	T
Rainwater killifish	*Lucania parva*	1	T
Brook stickleback	*Culaea inconstans*	1,2	NN
Sargo	*Anisotremus davidsonii*	1,2	NN
Black bullhead	*Ameiurus melas*	1	T
Yellow bullhead	*Ameiurus natalis*	1,2	NN
Brown bullhead	*Ameiurus nebulosus*	1	NN
Blue catfish	*Ictalurus furcatus*	1	T
Channel catfish	*Ictalurus punctatus*	1	T

Flathead catfish	*Pylodictis olivaris*	1	T
White bass	*Morone chrysops*	1,2	NN
Wiper	*Morone chrysops x saxatilis*	1	NN
Striped bass	*Morone saxatilis*	1,2	NN
Yellow perch	*Perca flavescens*	1,2	NN
Bigscale logperch	*Percina macrolepida*	1	T
Walleye	*Stizostedion vitreum*	1,2	NN
Mosquitofish, western	*Gambusia affinis*	1	T
Pecos gambusia	*Gambusia nobilis*	1	T
Sailfin molly	*Poecilia latipinna*	1,2	NN
Guppy	*Poecilia reticulata*	1,2	NN
Cutthroat trout	*Oncorhynchus clarkii*	1,2	NN
Snake River cutthroat trout	*Oncorhynchus clarkii carmichaeli*	1	NN
Rio Grande cutthroat trout	*Oncorhynchus clarkii virginalis*	1	T
Cutbow trout	*Oncorhynchus clarkii x mykiss*	1	NN
Gila trout	*Oncorhynchus gilae*	1	T or ?
Coho salmon	*Oncorhynchus kisutch*	1,2	NN
Rainbow trout	*Oncorhynchus mykiss*	1,2	NN
Kokanee	*Oncorhynchus nerka*	1,2	NN
Landlocked Atlantic salmon	*Salmo salar sebago*	1	NN
Brown trout	*Salmo trutta*	1,2	NN
Brook trout	*Salvelinus fontinalis*	1,2	NN
Dolly Varden	*Salvelinus malma*	1	NN
Lake trout	*Salvelinus namaycush*	1,2	NN
Arctic grayling	*Thymallus arcticus*	1	NN
Bairdiella	*Bairdiella icistia*	1	NN
Spotted seatrout	*Cynoscion nebulosus*	1	NN
Orangemouth corvina	*Cynoscion xanthulus*	1	NN
Black drum	*Pogonias cromis*	1	NN
Red drum	*Sciaenops ocellatus*	1	NN
AMPHIBIAN			
Bullfrog	*Rana catesbeiana*	8	NN
Green frog	*Rana clamitans*	2	T or ?
REPTILE			
Snapping turtle	*Chelydra serpentina serpentina*	1	T
Malayan snail-eating turtle	*Malayemys subtrijuga*	1	NN
Red-eared slider	*Trachemys scripta elegans*	1	T
Yellow-bellied slider	*Trachemys scripta scripta*	1	NN
Texas spiny softshell	*Apalone spinifera emoryi*	1	T
MAMMAL			
Nutria	*Myocastor coypus*	2	NN

* - Source codes: 1 - USGS NAS; 2 - NMDGF BISON-M; 3 – Cox 2001; 4 – NMDGF files; 5 – Lang and Mehlhop (1996); 6 – Courtenay et al. (1984); 7 – UNM, Museum of Southwestern Biology, Division of Fishes; 8 – Degenhardt et al. (1996); 9 – Middle Rio Grande Conservancy District files

† - Origin codes: NN – alien, nonindigenous, foreign, exotic; T – native transplant within New Mexico.

Appendix – C

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) 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 – D

EXECUTIVE ORDER 13112

Executive Order 13112 of February 3, 1999

Invasive Species

By the authority vested in me as President by the Constitution and the laws of the United States of America, including the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended (16 U.S.C. 4701 et seq.), Lacey Act, as amended (18 U.S.C. 42), Federal Plant Pest Act (7 U.S.C. 150aa et seq.), Federal Noxious Weed Act of 1974, as amended (7 U.S.C. 2801 et seq.), Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.), and other pertinent statutes, to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause, it is ordered as follows:

Section 1. Definitions.

(a)"Alien species" means, 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.

(b) "Control" means, as appropriate, eradicating, suppressing, reducing, or managing invasive species populations, preventing spread of invasive species from areas where they are present, and taking steps such as restoration of native species and habitats to reduce the effects of invasive species and to prevent further invasions.

(c) "Ecosystem" means the complex of a community of organisms and its environment.

(d) "Federal agency" means an executive department or agency, but does not include independent establishments as defined by 5 U.S.C. 104. (e) "Introduction" means the intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.

(f) "Invasive species" means an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

(g) "Native species" means, 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.

(h) "Species" means a group of organisms all of which have a high degree of physical and genetic similarity, generally interbreed only among themselves, and show persistent differences from members of allied groups of organisms.

(i) "Stakeholders" means, but is not limited to, State, tribal, and local government agencies, academic institutions, the scientific community, nongovernmental entities

including environmental, agricultural, and conservation organizations, trade groups, commercial interests, and private landowners.

(j) "United States" means the 50 States, the District of Columbia, Puerto Rico, Guam, and all possessions, territories, and the territorial sea of the United States.

Sec. 2. Federal Agency Duties. (a) Each Federal agency whose actions may affect the status of invasive species shall, to the extent practicable and permitted by law.

1) identify such actions;

2) subject to the availability of appropriations, and within Administration budgetary limits, use relevant programs and authorities to: (i) prevent the introduction of invasive species; (ii) detect and respond rapidly to and control populations of such species in a cost-effective and environmentally sound manner; (iii) monitor invasive species populations accurately and reliably; (iv) provide for restoration of native species and habitat conditions in ecosystems that have been invaded; (v) conduct research on invasive species and develop technologies to prevent introduction and provide for environmentally sound control of invasive species; and (vi) promote public education on invasive species and the means to address them; and

3) not authorize, fund, or carry out actions that it believes are likely to cause or promote the introduction or spread of invasive species in the United States or elsewhere unless, pursuant to guidelines that it has prescribed, the agency has determined and made public its determination that the benefits of such actions clearly outweigh the potential harm caused by invasive species; and that all feasible and prudent measures to minimize risk of harm will be taken in conjunction with the actions.

(b) federal agencies shall pursue the duties set forth in this section in consultation with the Invasive Species Council, consistent with the Invasive Species Management Plan and in cooperation with stakeholders, as appropriate, and, as approved by the Department of State, when Federal agencies are working with international organizations and foreign nations.

Sec. 3. Invasive Species Council. (a) An Invasive Species Council (Council) is hereby established whose members shall include the Secretary of State, the Secretary of the Treasury, the Secretary of Defense, the Secretary of the Interior, the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Transportation, and the Administrator of the Environmental Protection Agency. The Council shall be Co-Chaired by the Secretary of the Interior, the Secretary of Agriculture, and the Secretary of Commerce. The Council may invite additional Federal agency representatives to be members, including representatives from subcabinet bureaus or offices with significant responsibilities concerning invasive species, and may prescribe special procedures for their participation. The Secretary of the Interior shall, with concurrence of the Co-Chairs, appoint an Executive Director of the Council and shall provide the staff and administrative support for the Council.

(b) The Secretary of the Interior shall establish an advisory committee under the Federal Advisory Committee Act, 5 U.S.C. App., to provide information and advice for consideration by the Council, and shall, after consultation with other members of the Council, appoint members of the advisory committee representing stakeholders. Among other things, the advisory committee shall recommend plans and actions at local, tribal, State, regional, and ecosystem-based levels to achieve the goals and objectives of the Management Plan in section 5 of this order. The advisory committee shall act in cooperation with stakeholders and existing organizations addressing invasive species. The Department of the Interior shall provide the administrative and financial support for the advisory committee.

Sec. 4. Duties of the Invasive Species Council. The Invasive Species Council shall provide national leadership regarding invasive species, and shall:

(a) oversee the implementation of this order and see that the Federal agency activities concerning invasive species are coordinated, complementary, cost-efficient, and effective, relying to the extent feasible and appropriate on existing organizations addressing invasive species, such as the Aquatic Nuisance Species Task Force, the Federal Interagency Committee for the Management of Noxious and Exotic Weeds, and the Committee on Environment and Natural Resources;

(b) encourage planning and action at local, tribal, State, regional, and ecosystem-based levels to achieve the goals and objectives of the Management Plan in section 5 of this order, in cooperation with stakeholders and existing organizations addressing invasive species;

(c) develop recommendations for international cooperation in addressing invasive species; develop, in consultation with the Council on Environmental Quality, guidance to Federal agencies pursuant to the National Environmental Policy Act on prevention and control of invasive species, including the procurement, use, and maintenance of native species as they affect invasive species;

(d) facilitate development of a coordinated network among Federal agencies to document, evaluate, and monitor impacts from invasive species on the economy, the environment, and human health;

(e) facilitate establishment of a coordinated, up-to-date information-sharing system that utilizes, to the greatest extent practicable, the Internet; this system shall facilitate access to and exchange of information concerning invasive species, including, but not limited to, information on distribution and abundance of invasive species; life histories of such species and invasive characteristics; economic, environmental, and human health impacts; management techniques, and laws and programs for management, research, and public education; and

(f) prepare and issue a national Invasive Species Management Plan asset forth in section 5 of this order.

Sec. 5. Invasive Species Management Plan. (a) Within 18 months after issuance of this order, the Council shall prepare and issue the first edition of a National Invasive Species Management Plan (Management Plan), which shall detail and recommend performance-oriented goals and objectives and specific measures of success for Federal agency efforts concerning invasive species. The Management Plan shall recommend specific objectives and measures for carrying out each of the Federal agency duties established in section 2

(a) of this order and shall set forth steps to be taken by the Council to carry out the duties assigned to it under section 4 of this order. The Management Plan shall be developed through a public process and in consultation with Federal agencies and stakeholders.

(b) The first edition of the Management Plan shall include a review of existing and prospective approaches and authorities for preventing the introduction and spread of invasive species, including those for identifying pathways by which invasive species are introduced and for minimizing the risk of introductions via those pathways, and shall identify research needs and recommend measures to minimize the risk that introductions will occur. Such recommended measures shall provide for a science-based process to evaluate risks associated with introduction and spread of invasive species and a coordinated and systematic risk-based process to identify, monitor, and interdict pathways that may be involved in the introduction of invasive species. If recommended measures are not authorized by current law, the Council shall develop and recommend to the President through its Co-Chairs legislative proposals for necessary changes in authority.

(c) The Council shall update the Management Plan biennially and shall concurrently evaluate and report on success in achieving the goals and objectives set forth in the Management Plan. The Management Plan shall identify the personnel, other resources, and additional levels of coordination needed to achieve the Management Plan's identified goals and objectives, and the Council shall provide each edition of the Management Plan and each report on it to the Office of Management and Budget. Within 18 months after measures have been recommended by the Council in any edition of the Management Plan, each Federal agency whose action is required to implement such measures shall either take the action recommended or shall provide the Council with an explanation of why the action is not feasible. The Council shall assess the effectiveness of this order no less than once each 5 years after the order is issued and shall report to the Office of Management and Budget on whether the order should be revised.

Sec. 6. Judicial Review and Administration. (a) This order is intended only to improve the internal management of the executive branch and is not intended to create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any other person.

(b) Executive Order 11987 of May 24, 1977, is hereby revoked.

(c) The requirements of this order do not affect the obligations of Federal agencies under 16 U.S.C. 4713 with respect to ballast water programs.

(d) The requirements of section 2(a)(3) of this order shall not apply to any action of the Department of State or Department of Defense if the Secretary of State or the Secretary of Defense finds that exemption from such requirements is necessary for foreign policy or national security reasons.

WILLIAM J. CLINTON

THE WHITE HOUSE,
February 3, 1999

Appendix – E

FEDERAL LAWS ADDRESSING AIS IN NEW MEXICO

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
APHIS	Plant Protection Act (2000)	Consolidates & modernizes several major statutes (Plant Quarantine Act, Federal Plant Pest Act, Federal Noxious Weed Act, Organic Act of 1944, & others), replacing them with one flexible statutory framework providing the ability to prohibit or restrict imports, exports, & interstate movement; assess higher civil penalties; issue subpoenas; conduct inspections without a warrant; cooperate with industry & others in "quality assurance" programs; recover costs related to disposal of abandoned shipments; & take emergency action. By expanding the definition of "noxious weed" the Act enables APHIS to address a broader range of weed problems.	Plants & plant material; plant pests; noxious weeds; & biological control agents.	Unintentional & intentional introduction.	
All federal agencies	EO 13112 (Feb. 1999)	Defines invasive species ("any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem"). Directs all federal agencies to: -address invasive species concerns; -refrain from actions likely to increase invasive species problems. Creates interagency Invasive Species Council. Calls for National Invasive Species Management Plan to better coordinate federal agency efforts.	All	Unintentional and intentional introductions: escape, release.	www. Invasivespecies.gov
USFWS USCG EPA CoE NOAA	NISA (1996)	Reauthorized & amended NANPCA to mandate regulations to prevent introduction & spread of ANS into Great Lakes through ballast water. Authorized funding for research on ANS prevention & control. Required a ballast water management program to demonstrate technologies & practices to prevent alien species	ANS & brown tree snake.	Unintentional introductions: ballast water	http://www.nemw.org/nisa.htm

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
		from being introduced. Modified composition of ANS Task Force. Required Task Force to develop & implement comprehensive program to control the brown tree snake in Guam			
DoA DoI	Agreement on the Application of Sanitary & Phytosanitary Measures (SPS Agreement) (1995)	A supplementary agreement to the World Trade Organization Agreement. Provides a uniform interpretation of the measures governing safety & plant & animal health regulations. Applicable to all sanitary & phytosanitary measures directly or indirectly affecting international trade. Sanitary & phytosanitary measures are defined as any measure applied: a) to protect animal or plant life or health within (a Members' Territory) from entry, establishment or spread of pests, diseases, disease carrying organisms; b) to prevent or limit other damage within the (Members Territory) from the entry, establishment or spread of pests (annex A).	Pests, diseases, disease-carrying organisms, or disease-causing organisms.	Importation	http://www.wto.org/goods/spsagr.htm
USFWS	Wild Bird Conservation Act (1992)	Regulates importation of foreign wild birds.	Birds & nonnative parasites & diseases transported by foreign birds	Importation	http://international.fws.gov/global/law102.html
USFWS USCG EPA CoE NOAA	NANPCA (1990)	Established ANS Task Force to: identify areas where ballast water does not pose an environmental threat; assess whether aquatic nuisance species threaten the ecological characteristics & economic uses of US waters (other than the Great Lakes); determine the need for controls on vessels entering US waters (other than Great Lakes); identify & evaluate approaches for reducing risk of adverse consequences associated with intentional introduction of aquatic species. Directs Coast Guard to issue regulations to prevent the Introduction & spread of aquatic nuisance species into the Great Lakes through ballast water. Directs CoE to develop a program of research & technology	ANS	Unintentional introductions: ballast water.	http://www.anstaskforce.gov/toc.htm

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
		to control zebra mussels in & around public facilities & make information available about control methods.			
DoI	Convention on International Trade in Endangered Species (CITES) (1975)	Represents alternate model for regulating invasive species not already covered by the other agreements. Convention intended to prevent harm in exporting country; however, can be applied when species is endangered in exporting country & considered an invasive in importing country.	Species of flora & fauna which are threatened or endangered in exporting countries (Appendices I, II & III-see web site).	Intentional introductions through trade: export, re-export, import & introduction from the sea.	http://international.fws.gov/global/citestxt.html (For appendices, see: http://international.fws.gov/global/cites.html)
DoD	Convention on the prohibition of the development, production and stockpiling of bacteriological (biological) and toxin weapons and on their destruction (Biological Weapons Convention) (1975)	Article I prohibits parties from developing, producing, stockpiling, acquiring or retaining microbial or other biological agents which are not justified by exclusively peaceful purpose. Article II requires parties to destroy or divert to peaceful purpose all such agents within 9 months of entry into force of the Convention.	"Microbial or other biological agents… whatever their origin or method of production, of types & in quantities that have no justification for prophylactic, protective or other peaceful purposes." Allows for "international exchange of bacteriological agents & toxins & equipment for the processing, use or production of bacteriological agents & toxins for peaceful purposes."	"Weapons, equipment or means of delivery designed to use such agents or toxins for hostile purposes."	http://sun00781.dn.net/nuke/control/bwc/text/bwc.htm

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
Federal land management agencies	Federal Noxious Weed Act of 1974	Although the Plant Protection Act superseded & repealed most of the Federal Noxious Weed Act, it left intact Section 15 (management of undesirable plants on Federal lands). Requires Federal land management agencies to develop & establish a management program for control of undesirable plants on federal lands under the agencies' jurisdiction. Requires those agencies to coordinate management where similar programs are being implemented on state & private lands in the same area.	Noxious weeds; undesirable plant species.	Control on Federal lands.	http://refuges.fws.gov/FICMNEWFiles/FederalNoxiousWeedAct.html
USFWS NMFS	Endangered Species Act (1973)	Protects endangered species. When nonnative invasive species threaten endangered species, this act could be used as basis for their eradication.	Alien species posing a danger to endangered species.	Not specified.	http://endangered.fws.gov/esa.html
All	National Environmental Policy Act (1970)	Requires federal government agencies to consider the environmental effects of their actions through preparation of environmental impact statements (or environmental assessments to determine whether a full EIS is required). Effects of nonnative species, if harmful to the environment, must be included in the EIS.	Nonnative species posing harm to the environment.	Intentional introductions related to major federal actions.	http://es.epa.gov/oeca/ofa/nepa.html
APHIS	International Plant Protection Convention (1952)	Applies primarily to quarantine pests in international trade. Creates an international regime to prevent spread & introduction of plant & plant product pests premised on exchange of phytosanitary certificates between importing & exporting countries' national plant protection offices. Parties have national plant protection organizations established according to the Convention with authority in relation to quarantine control, risk analysis & other measures required to prevent the establishment & spread of all invasive alien species that, directly or indirectly, are pests of plants. Parties agree to cooperate on information exchange & on the development of International Standards for Phytosanitary Measures.	Pests of plants or plant products: "any form of plant or animal life, or any pathogenic agent, injurious or potentially injurious to plants or plant products" Quarantine pests involved with international trade: "pest of potential national economic importance to the country endangered	"Storage places, conveyances, containers and any other object or material capable of harboring or spreading plant pests, especially where international transportation is involved." Packing material or matter of any kind	http://www.fao.org/legal/treaties/004t-e.htm

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
			thereby & not yet present there, or present but not widely distributed & being actively controlled"	accompanying plant products; storage places; or transportation facilities.	
EPA	Federal Insecticide, Fungicide, and Rodenticide Act (1947)	Gives EPA authority to regulate importation & distribution of substances, including organisms, which are intended to function as pesticides.	Biological control agents (In terms of biological control agents, EPA currently regulates only eukaryotic & prokaryotic microorganisms under FIFRA. Other biocontrol agents are exempt because they are "adequately regulated" by another agency, i.e., APHIS.).	Intentional introduction .	http://www.epa.gov/pesticides/fifra.htm
APHIS AMS	Federal Seed Act (1939)	Requires accurate labeling & purity standards for seeds in commerce. Prohibits importation & movement of adulterated or misbranded seeds	Seeds	Intentional introduction through trade.	
APHIS	Act of March 2, 1931, often referred to as the Animal Damage Control Act	Gives APHIS authority to control wildlife damage on federal, state, or private land. Protects: field crops, vegetables, fruits, nuts, horticultural crops, commercial forests; freshwater aquaculture ponds & marine species cultivation areas; livestock on public & private range & in feedlots; public & private buildings & facilities; civilian & military aircraft; public health .	Damaging species (nutria, blackbirds, European starlings, monk parakeets).	Unintentional introductions.	
DoI	Lacey Act (1900; amended in 1998)	Prohibits import of a list of designated species & other vertebrates, mollusks, & crustacea that are "injurious to	Species injurious to human beings or	Intentional introduction &	

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
		human beings, to the interests of agriculture, horticulture, forestry, or to wildlife or the wildlife resources of the United States." Declares importation or transportation of any live wildlife as injurious & prohibited, except as provided for under the Act, **but** allows import of almost all species for scientific, medical, education, exhibition, or propagation purposes.	resources.	trade .	

Appendix – F

NEW MEXICO STATE LAWS ADDRESSING AIS

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
NMDA / Agriculture & Environmental Services Division / Bureau of Entomology & Nursery Industries	New Mexico Pest Control Act [76-6-1 to 76-6-39]	Provides the authority to carry out operations or measures to locate, suppress, control, eradicate, prevent or retard the spread of pests. This provision includes the authority to quarantine all or part of the state, to inspect areas suspected of infestation, & to abate the threat from actual or suspected infestations of pests.	"Pest" means any insect, disease or other organism causing (or capable of) damage to any plants or its parts or plant products.	Intentional & unintentional	http://nmdaweb.nmsu.edu/DIVISIONS/AES/ent.html
	New Mexico Plant Protection Act [76-5-11 to 76-5-28]	Provides the authority for the state to inspect nurseries & florists to ensure stock are free from plant pests. This provision also includes the authority to regulate the transport into the state & the sale & transport within the state to ensure plant stock is pest free.	"Plant pests" are organisms injurious to plants & plant products which could be transported with the plant, including phyla arthropoda, mollusca or nemathelminthes as well as weeds, fungi, bacteria, viruses or parasitic plants.		
	Mexico Harmful Plant Act [76-7A-1 to 76-7A-11]	Provides the authority to prevent the introduction, spread or dissemination of a harmful plant in the state. This provision includes the authority to quarantine all or part of the state, as well as any domestic livestock, captive wildlife or captive stray animals suspected of exposure to a harmful plant, to make inspections areas suspected of harboring harmful plants, & to abate the threat from harmful plants.	"Harmful plant" means any plant, seeds or other parts of a plant the board declares by regulation to be a harmful plant.		
NMDA / Agriculture & Environmental Services	New Mexico Commercial Feed	Authorizes the state to establish limits on the amount of weed seeds in commercial feeds. This provision includes the authority to inspect & detain any commercial feeds not meeting labeled specifications.	"Commercial feed" means all materials which are distributed for use as feed or for mixing in feed for animals other than man,	Intentional & unintentional	http://nmdaweb.nmsu.edu/DIVISIONS/AES/f

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
Division / Bureau of Feed, Seed, & Fertilizer	Law [76-19-1 to 76-19-14]		except: (1) unmixed or unprocessed whole seeds; or (2) unground hay, straw, stover, silage, cobs, husks & hulls when not mixed with other materials.		eed.html
	Mexico Seed Law [76-10-11 to 76-10-22]	Authorizes the regulation of sale & transport of seeds into & within the state. Inclusive, is the authority to regulate labeling & allowable limits of noxious weed seeds.	"Noxious weed seeds" includes prohibited noxious weed seeds & restricted noxious weed seeds. "Prohibited noxious weed seeds" are seeds of weeds which, when established, are highly destructive & are not controlled in this state by the cultural practices commonly used. "Restricted noxious weed seeds" are the seeds of weeds which are very objectionable in fields, lawns & gardens in this state & are very difficult to control by cultural practices commonly used.		
	New Mexico Noxious Weed Act of 1963 [76-7-23 to 76-7-30] & the amended 1978 New Mexico Noxious	Provide the authority to declare a weed as noxious. Under the act, the sale, distribution or planting of a noxious weed into or within the state is illegal & penalties exist to prevent such. This includes the authority to inspect any facility or ground where noxious weed seeds are sold, stored, transported or planted.	"Noxious weed" means any species of plant which is liable to be detrimental or destructive, & difficult to control or eradicate.		

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
	Weed Management Act				
NMDA / Agriculture & Environmental Services Division / Bureau of Pesticide Management	New Mexico Pesticide Control Act [76-4-1 to 76-4-39]	Provides authority to regulate all pesticides & pesticide applicators, including aquatic pesticides. It also provides for training & education of pesticide applicators. The administrative rules of this Act require special training & management plan development for the use of aquatic herbicides	NA	NA	http://nmdaweb.nmsu.edu/DIVISIONS/AES/pest.html
NMDA / Agricultural & Resources Division	New Mexico Livestock Code, Article 15 Predatory Animals & Rodent Pest [77-15-1 to 77-15-5]	Authorizes the state to cooperate in the control of rodent pests.	Rodents	Intentional or unintentional	http://nmdaweb.nmsu.edu/DIVISIONS/apr.html
	New Mexico Soil & Water Conservation District Act [73-20-25 to 73-20-48]	Recognizes the value of New Mexico's water resources & authorizes their administration. Inclusive is the need to preserve the state's waters to protect the health & welfare of the people of the state & to preserve & conserve its wildlife & natural resources.			
NMDGF	New Mexico	Regulate the importation of fish & game into the state & their movement within the state. To protect game	Fish & game animals	Intentional	http://www.wildlife.sta

Department or Agency	Authority	Provisions	Organisms Addressed	Pathways or Means of Transport	Website
	Chapter 17, Game & Fish & Outdoor Recreation (various articles)	animals, birds & fish from introduced infectious or contagious diseases the importation of any live animals, birds or fish into this state, except domesticated animals or domesticated fowl or fish from government hatcheries, without first obtaining a permit from the NMDGF is regulated under 17-3-32. Shipment of game animals, birds & fish to officers of other states is regulated under 17-3-30. The taking of bait fish from state waters for the purpose of sale is regulated under 17-3-27.			te.nm.us/apps_permit/index.htm
NMED / Water Quality Control Commission	State Water Quality Act [74-6-1]	Establishes the Water Quality Control Commission, administratively attached to the NMED, & specifies its duties & powers. The duties & powers of the Commission include adoption of a comprehensive water quality management program, the development of a continuing planning process, the administration of loans & grants from the federal government, the adoption of water quality standards, & the adoption of regulations "to prevent or abate water pollution in the state or in any specific geographic area or watershed of the state...or for any class of waters." Various sub-parts of the Standards for Interstate & Intrastate Surface Waters [20.6.4 NMAC] included components directly & indirectly applicable to ANS in New Mexico. Factors affecting growth of undesirable aquatic life [20.6.4.13 E] & the application of piscicides [20.6.4.13 F] are addressed.	Unspecified	NA	http://www.nmenv.state.nm.us/wqcc/index.html#Legislation
NMDH	NM Statutes, Chapter 24. Health & Safety, Public Health	Authority to investigate, control & abate the causes of disease, especially epidemics, sources of mortality & other conditions of public health [24-1-3C] & to establish, maintain & enforce isolation & quarantine [24-1-3D].	Unspecified	Intentional or unintentional	http://www.health.state.nm.us/

Appendix – G

WGA Policy Resolution 04-12

Undesirable Aquatic, Riparian, and Invasive Species

June 22, 2004
Santa Fe, New Mexico

SPONSOR: Governors Locke and Rounds

A. <u>BACKGROUND</u>

1. Invasive or undesirable aquatic, riparian and terrestrial species influence the productivity, value, and management of a broad range of land and water resources in the West. These undesirable species have significant negative economic, social and ecological impacts which include, but are not limited to:
   a. reduction of the yield and quality of desirable crop forage plants;
   b. poisoning of livestock;
   c. reduction of native biodiversity resulting in a growing number of threatened, endangered and extinct species;
   d. adverse affects upon human health through allergies, poisoning, and harboring vectors;
   e. degradation of natural aquatic systems including obstruction of water flow in irrigation and drainage systems;
   f. reduction of the value of streams, lakes, reservoirs, oceans, and estuaries for fish and wildlife habitat, and public water supply;
   g. high cost of control;
   h. increase in facilities maintenance costs such as power plants, water treatment plants, etc.;
   i. detracting from the aesthetics and recreational value of wildlands, parklands, and other areas; and
   j. decreased real estate property value and increased costs of property development;
   k. competition with or transmission of diseases to wild Pacific salmon or other important marine and aquatic species.

2. Undesirable species are those listed on a state or federal recognized list of noxious, nuisance or deleterious species.

3. Aquatic invasive species such as the zebra mussel, giant salvinia, and Eurasian watermilfoil are spreading into more western water-bodies each year. The most common source for these species is via recreational

watercraft movement and from supplies sold by aquatic plant and animal suppliers. No western state has implemented a program that is capable of adequately preventing or reducing the spread of these aquatic invasive species. The economic and environmental damage from aquatic invasive species will continue to rise in western states without a well-organized and adequately funded effort to implement prevention programs in each state. It is estimated that the cost for control and cleaning for zebra mussels alone where they have already infested waters in the US is $3 billion. Similarly, Giant salvinia is choking off waterways including those of the Colorado River.

B. GOVERNORS' POLICY STATEMENT

1. The Western Governors recognize that the spread of invasive, undesirable species results from the combination of human behavior, susceptibility of invaded environments, and the biology of the invading species, and that these characteristics are not dictated by geopolitical boundaries, but rather by ecosystem-level components which often span state borders. The Western Governors support coordinated, multistate management and eradication actions preventing the spread, intentional and unintentional introductions, and control of undesirable aquatic and terrestrial species on land and in the water. The principal objectives will be to maintain properly functioning natural systems, agriculture productivity, enhancing resource and environmental protection, and the protection of human health. Control programs will be those that are economically practicable in relationship to the long-term impacts an introduced nuisance species will cause.

2. In pursuit of these objectives, programs for the control and/or eradication of unauthorized, undesirable aquatic and terrestrial species need to incorporate education, prevention, and early detection and rapid response techniques and be based upon Integrated Pest Management (IPM) concepts and practices. IPM involves the use of all suitable techniques, including biological, chemical, physical (mechanical and manual), cultural measures (environmental manipulation), and public awareness programs.

3. The western governors strongly encourage all natural resource land management agencies, local governments, universities and the private sector to collaborate and form partnerships to prevent new unauthorized introductions; for the enhancement, development and implementation of IPM programs; and to work together to find creative new approaches for protecting and restoring natural, agriculture, and recreational resources, including the use of challenge grants.

4. The Western Governors urge full funding support for federal programs that manage invasive species on federal lands and provide assistance to states in the management of invasive species, including the national invasive species act and programs at the U.S. Department of Agriculture Animal, Plant, and Health Inspection Service (APHIS) which provides valuable services in the detection and elimination of undesirable species of insects and plant diseases. Their services are essential for states relying on trade and export services to maintain strong trade and export functions.

5. The Western Governors recognize the importance of, and need for, a coordinated western regional approach to aquatic invasive species.

C. GOVERNORS' MANAGEMENT DIRECTIVE

1. This resolution is to be posted on the Western Governors' Association website and it should be referenced and used as appropriate by Governors and staff.

2. The Western Governors Association shall obtain necessary resources and work with appropriate partners to facilitate the development and coordination of western strategies to limit the spread of undesirable aquatic and terrestrial species. The executive director is authorized to obtain federal staff support under the Intergovernmental Personnel Act if necessary in connection with this directive.

3. Of particular importance will be:

   a. Development and harmonization of uniform, and scientifically based species lists;

   b. Establishing consistent and effective policies and procedures to prevent transport, sale and dispersal of undesirable species, particularly those under eradication in specific states;

   c. Development of uniform public educational and awareness media that create effective communication to the public throughout the western states; and

   d. Facilitation of development of appropriate K-12 school science curricula which recognizes that the introduction, spread and impacts of undesirable species present a serious environmental threat from "biological pollution" and that engendering environmental stewardship is best accomplished with early education.

4. WGA shall convene an Aquatic Invasive Species Working Group to develop, fund, and implement a comprehensive program to prevent the spread of aquatic invasive species in the water resources of the western states. The Working Group shall partner with the Western Regional Panel on Aquatic Invasive Species, the Western States Water Council, and the Western Association of Fish and Wildlife Agencies.

This resolution was originally adopted in 1998 as WGA resolution 98-018 and was readopted as 02-21.

Appendix – H

New Mexico Strategic Plan for Managing Noxious Weeds 2000-2001

The spread of noxious weeds has been called one of the most serious environmental threats of our time. Every day, an additional 4,600 acres of public lands are infested with noxious weeds. Spotted knapweed infestations in some areas of Montana have reduced winter elk forage by 50- 90 percent. Noxious weed infestations are now the second leading cause of native species being listed as threatened or endangered. Watersheds dominated by noxious weeds are often less efficient in absorbing and storing water. Invasive species often lack the characteristics of native species necessary for soil protection, resulting in increased soil erosion. Aquatic noxious weeds can lower the water quality of surface water and cause extensive fish kills.

In addition to the environmental devastation wreaked by noxious weeds, they are a serious economic problem. The total direct and secondary economic impacts of spotted knapweed in Montana are estimated to be $42 million annually. Similarly, the economic losses caused by leafy spurge in Montana, Wyoming, North Dakota, and South Dakota are estimated at $129 million each year. Annual control of Hydrilla in the United States costs approximately $25 million. Rangelands infested with Russian knapweed, a serious problem in New Mexico, typically suffer reductions in livestock carrying capacity of 50 percent or more.

Many other western states have conducted noxious weed management programs for years, some have trust funds in excess of a million dollars to help with management costs; however, most feel like they are still losing the battle. Across the West, people are recognizing that weed management efforts done by individuals are not only costly, they are often ineffective. Over and over again, it has been shown that weeds do not respect fences or property boundaries. If we are going to be successful, we must work together.

Although New Mexico citizens have only recently begun to recognize noxious weeds as an important environmental and economic problem, we are making headway. Progress has been achieved due to dedicated New Mexicans who have worked to increase awareness, build-local management capacity, comply with federal and state laws, and to begin actually controlling infestations. The strategic plan is an attempt to coordinate the individual efforts into a noxious weed management program where the sum of the efforts ends up greater than the parts. A cooperative, concerted effort will result in a win-win situation for the environment and the citizens of New Mexico.

Statement of Endorsement and Support

Supporting Organizations:

Federal

- United States Animal and Plant Health Inspection Service
- United States Bureau of Indian Affairs
- United States Bureau of Land Management
- United States Fish and Wildlife Service
- United States Federal Highway Administration
- United States Forest Service
- United States National Park Service
- United States Natural Resources Conservation Service

State

- New Mexico Environment Department
- New Mexico Department of Agriculture
- New Mexico Department of Game and Fish
- New Mexico Oil Conservation Department
- New Mexico Soil and Water Conservation Commission
- New Mexico State Forestry Division
- New Mexico State University Cooperative Extension Service
- New Mexico State Highway and Transportation Department
- New Mexico State Land Office
- New Mexico State University

Organizations

- New Mexico Association of Conservation Districts
- New Mexico Association of Counties
- New Mexico Cattle Growers Association
- New Mexico Farm and Livestock Bureau
- New Mexico Native Plant Society
- New Mexico Vegetation Management Association
- New Mexico Wool Growers, Inc.
- Resource Conservation and Development Associations
- Sierra Club -Rio Grande Chapter

The parties supporting this strategy understand that it is a non-binding statement of consensus. This plan is intended as a general understanding and agreement on how to approach noxious weed management in New Mexico.

INTRODUCTION

The New Mexico Strategic Plan for Managing Noxious Weeds addresses eight broad issues critical in building a strong and successful statewide noxious weed management program.

I. **Coordination, Cooperation, and Partnership**
- Effective and Consistent Coordination and Cooperation
- Dispute Resolution
- Roles of Cooperating Entities

II. **Organization of Cooperative Weed Management Area (CWMA)**
- Support and Success of CWMAs
- Expanding the Use of Cooperative Agreements and Resource Sharing
- Develop and Expand Interest Group Partnerships
- Early Detection of New Infestations
- Statewide Coordination of CWMAs

III. **Awareness and Education**
- Expand Understanding of Impacts Associated with Noxious Weeds
- Weed Management Continuing Education

IV. Funding and Resources
- Obtain Adequate Funding
- Expand the Use of Incentives to Fund Effective Weed Programs

V. Inventory, Mapping, and Monitoring
- Locate and Map Noxious Weed Infestations

VI. Assessments and Adaptive Planning
- Integrate Weed Management into Resource Management Activities
- Provide Statewide Weed Management Program Direction

VII. Research and Technology
- Obtain Support for Accelerated Research and Technology Development
- Facilitate Communication Between Researchers and Land Managers

The strategic plan has a dual purpose: 1) to heighten the awareness among citizens of the degradation to New Mexico lands and waters caused by the explosive spread of nonnative weeds, along with the resulting negative economic impact; and 2) to bring about greater statewide coordination; cooperation; and action to halt or minimize the spread of such weeds in an ecologically sound manner; and restore infested lands and waters to a healthy and productive condition.

I. COORDINATION, COOPERATION, AND PARTNERSHIPS

Individual efforts are critical, yet coordination can serve as a multiplier for those efforts. Successful coordination depends on everyone's participation. Coordination affects every aspect of the weed program. Specific ways to increase coordination on specific issues will be addressed throughout the strategic plan. This section is intended to establish the framework to improve coordination.

Effective and Consistent Coordination and Cooperation

Issue: *The expediency with which we act is critical in determining the success of conto1 attempts. We cannot waste valuable time in deadlock over disputes concerning any aspect of weed management.*

Actions: Methods of dispute resolution will be identified. These methods will be utilized whenever conflicts arise which are significant enough to halt or delay noxious weed management.

A noxious weed summit will be held on a yearly basis to facilitate communication and networking between all entities involved with or affected by noxious weeds.

The New Mexico Noxious Weed Advisory Group (NWAG) is an informal group consisting of representatives from agencies and interest groups. They will meet, as needed, to discuss issues, problems, and opportunities associated with noxious weeds.

A noxious weed web page will be developed to post noxious weed activities, projects, problems encountered, and opportunities.

Forums will be held in different regions of the state to allow private property owners, public resource managers, and other concerned entities an opportunity to discuss current noxious weed situations and issues in the area.

A newsletter will be developed to keep noxious weed managers abreast of news and opportunities relevant to noxious weeds.

Efforts should be made to contact and communicate with individuals, who are opposed to noxious weed control, as well as individuals or groups with special needs.

New Mexico's weed management strategy is intended to complement the objectives of agency and inter-agency weed management strategies (i.e., Bureau of Land Management (BLM), *Partners Against Weeds* action plan, the Forest Service (FS), *Stemming The Invasive Tide*, and the national interagency strategy, *Pulling Together*), as well as the National Invasive Species Management Plan, but with a specific focus on opportunities and problems in New Mexico.

Participants of CWMAs should take an active role in supporting their federal agency partner's public outreach requirements in order to facilitate weed management on public lands.

Issue: *The noxious weed issue impacts many different types of organizations and agencies. In order to prevent duplication of efforts and to make use of resources in the most efficient method, it is important to identify what roles the different entities fulfill.*

Actions: It is important that CWMAs are designed to encourage participation from each of the types of groups outlined below. Broad participation from different groups will ensure the success of the CWMA. The primary roles of the supporting agencies and organizations have been defined below:

Conservation Organizations will educate their memberships, the Legislature, the Congressional delegation, school groups and teachers, and the general public. They will use their meetings, newsletters, web sites, and workshops to inform these audiences about noxious weed problems, their sources and possible solutions, and to raise support for ecologically appropriate control programs. Knowledgeable members of conservation organizations will provide early detection of weed invaders. Members will, on occasion, volunteer labor for weed control efforts.

Soil and Water Conservation Districts are an important link between private individuals and government agencies. They will work to provide training and help with awareness and outreach. In many areas of the state, they will provide leadership and coordinate efforts between the many partners necessary for an effective CWMA.

Trade/Industry Organizations will help educate their membership on Best Management Practices (BMP) to prevent and manage weed infestations, as well as the deleterious effects of noxious weeds on their industry. They will work with the noxious weed coordinator and have representation on the New Mexico NWAG to ensure the industry's needs and concerns are addressed.

Government Agencies will work to address noxious weed problems within the scope of the role of the agency. The New Mexico Department of Agriculture will work to coordinate noxious weed management efforts throughout the state. The primary concern of land management agencies shall be to manage noxious weed infestations on lands administered by their agency and to protect those lands from new infestations. Cooperative Extension service will educate the public about the negative impacts of noxious weed infestations and work with private landowners to develop vegetation management plans. They will serve as the single point of contact if the CWMA does not designate another entity or individual.

Private Land Owners will manage noxious weed infestations on private land in the manner they feel is most appropriate for their needs. They are encouraged to participate in CWMAs. Of utmost importance under New Mexico's Noxious Weed Act is the recognition of their private property rights.

II. ORGANIZATION OF WEED MANAGEMENT PROGRAMS

Issue: *Diverse topographical, climatic, soil composition, precipitation, and cultural factors across the state mean that noxious weed problems will need customized, local solutions.*

Actions: The purpose of a CWMA is to facilitate cooperation among all landowners and land managers in order to manage weed problems within an area. Cooperators in a CWMA work together to jointly prioritize weed management efforts in their area. The supporters of this plan agree to encourage and support the proliferation of community-based CWMAs.

Because of the diverse climatic, topographical, and cultural settings across the state, the organization and operational aspects of CWMAs will be best dictated by local entities familiar with the opportunities and challenges of that particular area.

The area encompassed in the CWMA is determined by the individuals participating in the CWMA. Careful consideration should be used in defining the boundaries of a CWMA.

Success, Efficiency and Support of CWMAs

Issue: *The success CWMAs is dependent upon the level of cooperation from the general public, interest groups, private industries, and land management agencies. It is critical that the time, effort, and resources invested in the CWMAs are utilized in the most effective manner.*

Actions: The organizations and agencies comprising NWAG will take an active role in providing support for CWMAs.

Whenever possible, CWMAs should take advantage of strategies that have proven to be effective in other areas and adapt those strategies to fit the local area.

CWMAs should develop yearly management plans that clearly identify the goals and objectives of their program. The plan should also list, by priority, specific actions to be accomplished during the course of the year. It is recommended that the list be extended beyond what is possible with existing budget constraints. If additional funding sources become available, the CWMA is able to utilize additional funds without having to reevaluate their priorities for the year. The management plan should also outline a monitoring and evaluation system. At a minimum, the system should be capable of

determining: 1) weed populations trends, 2) effectiveness of decisions, priorities, and management strategies; 3) effectiveness of treatment actions; 4) awareness of potential invaders in adjacent areas; and 5) the "Measures of Success" or expected outcomes of a coordinated weed management program.

Expand the Use of Cooperative Agreements and Resource Sharing

Issue: *Because of limited resources, CWMAs and their participants are often unable to independently acquire and maintain modern weed control and mapping equipment, computers and software, and the seasonal workers necessary to sustain an effective management program.*

Actions: Facilitation and encourage the development of cooperative agreements for sharing skills and resources. This could include, but is not limited to, the sharing of personnel, equipment, computer technology, any materials for integrated weed management, inventory and monitoring data, and educational materials. Cooperators will also share skills of available experts and technicians and jointly sponsor training and informational meetings.

It is important to recognize that the authority of a CWMA does not negate or supercede the decision-making ability of the individual landowners or managers involved in the CWMA. Formation of CWMAs is not intended to take over decision-making power, but rather to provide a mechanism for coordination between all the involved decision makers.

A resource directory will be developed listing individuals from government, universities, agricultural organizations, task force groups, weed management associations, and conservation organizations with particular weed management expertise and skills. The directory will be made available to local landowners and groups as a resource for organizing CWMAs, providing technical and leadership training, and assisting in resolving weed issues.

Agencies should identify equipment, computer applications, and other types of capital resources that would benefit cooperative weed programs. Cooperating agencies will list these resources and make the list available to applicable CWMAs.

Develop and Expand Interest Group Partnerships

Issue*: Noxious weeds tend to erroneously viewed as an agricultural problem. Other interest groups, which may have substantial expertise and resources, are often not included in noxious weed management efforts, particularly at the local level.*

Actions: Facilitate the creation of Intergovernmental Agreements that utilize joint powers agreements between New Mexico State University, New Mexico Department of

Agriculture, the county in which a CWMA is located, and any other group that should be included in the agreement.

Actively seek wide involvement from organizations such as garden clubs, native plant societies, conservation, real estate, hunting and fishing, recreation, and foundation groups to provide greater opportunities for them to be involved in CWMA activities and the state weed program as a whole.

Establish partnerships with groups such as the 4-H; FFA; Boy Scouts; Girl Scouts; litter-patrol groups; outdoor volunteer groups; and with elementary, secondary, and high schools to develop future leadership and to add a significant volunteer resource pool to local weed management capability.

Encourage Agriculture and Extension Education to take steps to incorporate weed awareness into 4-H and FFA activities. Also encourage involvement in noxious weed programs as part of the community-service activities of these groups.

Develop Early Detection Systems

***Issue*:** *Early detection of newly arrived noxious weeds is a critical element of integrated weed management.*

Actions: Ensure that all integrated weed management plans contain provisions and mechanisms for early detection and control of noxious weeds. Stress the need for immediate, decisive action for control of new discoveries.

Whenever possible, CWMAs should provide a point of contact to the New Mexico Department of Agriculture. These points of contact will be placed on the internet web site. The default contact person for reporting new infestations of noxious weeds in an area will be the county extension agent.

Statewide Coordination of CWMAs

Issue: *Weed problems are most effectively dealt with at the local level; however, statewide coordination of these programs will improve the efficiency of individual CWMAs, allow the state to prioritize resource allocation, and measure the state's progress in dealing with noxious weeds.*

Actions: Individual CWMAs should report yearly activities including inventories, control measures implemented, and monitoring results to the state weed coordinator. This will provide the information necessary for decisions regarding the state's noxious weed list, funding priorities, and baseline data to measure progress or failures in dealing with

noxious weeds. Additionally, the information will aid in awareness projects and provide accountability and credibility to the state's noxious weed program.

The Guidelines for Coordinated Management of Noxious Weeds: Development of Management Areas will be made available to CWMA staff/volunteers to reference.

III. AWARENESS, EDUCATION AND INVOLVEMENT

Expand Understanding of Impacts, Prevention, and Management of Noxious Weeds

Issue: *More citizens need to understand how the spread of noxious weeds negatively impacts the environment, economy, and the natural resources.*

Actions: Develop and disseminate information about the characteristics and impacts of noxious weeds on the environment, economy, recreational opportunities, and quality of life in New Mexico. This information will also be incorporated into information about related issues such as threatened and endangered species, water quality, and wildfire.

Develop a noxious weed speaker's guild. The guild would consist of people willing to give presentations, workshops, and seminars on the issues. The list of people should be available on the internet. When there is a need for a speaker, organizers will be able to choose a speaker who is close geographically or who would be appropriate for specific audiences.

Develop BMPs for industries including, but not limited to, construction, transportation, mining, agriculture, silviculture, recreation industries to limit the spread of noxious weeds.

Emphasize the need for prevention practices through awareness and education programs. Develop educational pamphlets and workshops that address topics such as the use of weed-free seed and forage; animal grooming to reduce the risk of transporting noxious weed seed; cleaning and washing construction equipment; avoiding the use of gravel, fill, or top soil contaminated with weed seed; and maintaining high impact human-use areas in a weed free condition.

Provide weed identification and management training to citizens and landowners to raise their awareness about noxious weeds commonly found in their area.

School children are a population that should be targeted specifically with programs geared to their age group for noxious weed awareness.

Information about the impacts of noxious weeds and the need to manage them wi11 be integrated into public education environmental curricula. "Whenever possible, it wi11 be made available at the state or regional levels to take advantage of economies-of-scale.

Develop a "traveling trunk" containing a variety of weed awareness activities and exercises for grades K-12 that can be distributed to schools.

Issue: *Raising public awareness and understanding requires a well-planned and financed long- term program. To capture public interest and mobilize citizens to help stop the spread of noxious weeds also requires the immediate attention of the local, state, and national media.*

Actions: Cooperatively utilize professional public information specialists to develop a statewide information program and coordinate television spots, ad campaigns, and public service announcements.

Issue: *Increased actions from local, state, and national officials in dealing with noxious weeds first requires greater awareness and understanding from New Mexico citizens, landowners, and elected officials. Increasing the understanding of the risks associated with noxious weeds, and the kinds and amounts of resources needed to effectively manage noxious weeds across New Mexico is critical to weed management.*

Actions: The development of CWMAs will bring greater awareness and support from citizens and landowners. Public support will likely rise with an assurance that public funds are used effectively.

Cooperating county, state, all federal land management agencies will highlight and recognize local weed management successes and achievements.

Create more effective informational brochures, videos, and educational materials and distribute them widely. Develop briefing packages; presentations; and tours for national, state, and local officials.

Issue: *Simply creating awareness of the problem is not enough, it is important that people or groups who are aware of the problem become involved in the solution.*

Actions: Ask private industry to include noxious weed awareness campaigns with their private advertising campaigns.

Involve general public with weed scouting or weed lookout programs in which they receive weed identification booklets and are asked to report noxious weed infestations.

Work with public school administrators to include more noxious weed awareness activities in school curriculums.

Involve homebuilders associations and real estate agents to disseminate information on noxious weeds to new homeowners, homebuilders, and people moving to New Mexico from out of state.

Encourage local nurseries, and greenhouses to offer alternative ornamental plants that are not noxious or invasive weeds. Ask for their help educating gardeners on the negative effects of using noxious weeds in landscaping.

Develop a slogan or poster contest to engage creative minds in generating noxious weed awareness messages.

Provide recognition and encourage awards for weed professionals and landowners as incentives to build and maintain an effective weed management program.

Upgrade Weed Management Continuing Education

Issue: *There is a need to provide frequent, consistent, and up-to-date information for weed management professionals and cooperators because of constant changes in weed management personnel, tools, techniques and research findings.*

Actions: Training opportunities are offered by the New Mexico Vegetation Management Association, Range Management Association, New Mexico State University, New Mexico Crop Producers Association, and other interested groups. Based on the review and assessment, and with support of New Mexico State University and Cooperative Extension educators, training curricula will be broadened arid advertised to reach a larger audience.

Research topics and training seminars will be summarized and available via the Internet.

Interested organizations will sponsor training workshops for noxious weed identification, control methodologies, mapping applications, and any other topics of interest to weed managers.

1V. FUNDING AND RESOURCES

Obtain Adequate Funding

Issue: *Funding for all elements of integrated weed management are chronically short statewide. The current rate of spread of noxious weeds and the introduction of new*

species far outstrips the capability to contain them. State and federal resources are far from adequate to deal with the scope of the problem across millions of acres of New Mexico lands.

Actions: Encourage and support federal, state, and private funding at levels that are commensurate with size of the problem. The supporters will encourage counties to finance an active participatory noxious weed program.

Expand the Use of Incentives to Fund Effective Noxious Weed Programs.

Issue: *There is a lack of consistency in the implementation of noxious weed management programs at all levels.*

Actions: Try to develop a cost-share program to encourage landowners, local officials, and noxious weed managers to develop implement quality programs.

V. INVENTORY, MAPPING, AND MONITORING

Locate and Map Noxious Weed Infestations

Issue: *Noxious weed infestations are not consistently identified and delineated. Complete up-to-date inventories, displaying the distribution and severity of weed infestations, are available in only a few areas. Knowing where noxious weeds are located is paramount to: (1) raising public awareness; (2) generating support and funds for quality programs; (3) developing effective integrated management plans with specific control actions; and (4) assessing the economic and social impact of noxious weeds.*

Actions: Encourage and support development of integrated weed management plans with an effective inventory that enables the NW AG to:

- identify and record the location of noxious weeds;
- calculate total acreage infested for each noxious weed on the state list; and
- determine rate of spread for each weed by comparing inventories from year to year.

Cooperatively review inventory/mapping procedures and database structure used across the state to assess the compatibility of existing programs. Adopt or develop a compatible inventory and information system with a minimum set of standardized protocols that can be used by federal, state, and county agencies in the mapping and management of noxious weeds.

> Implementation: Agencies and CWMAs should use the national inventory standards developed by the North American Weed Management Association

(NAWMA). These standards are minimum standards and can be adapted to fit individual needs.

Develop or designate a repository to combine inventory information collected by separate entities. The repository should be capable of providing a statewide look at noxious weed acreage and distribution patterns. The repository will not be capable of replacing data management capabilities and needs of the participating entities. Its purpose will be twofold: 1) to help develop awareness of the weed problems in New Mexico; and 2) to help set priorities concerning noxious weeds at the state level.

Efforts should be made to share inventory information with surrounding states and Mexico.

Implementation: Agencies and CWMAs should the Southwest Exotic Plant Mapping Project (SWEMP) as the repository for New Mexico noxious weed inventories. The project is managed by the United State Geographical Service and will be compatible with the NAWMA Guidelines mentioned above by 2001. Information concerning noxious weed inventories is available to the public through the SWEMP website at http://www.usgs.nau.edu/swemp/

VI. ASSESSMENTS AND ADAPTIVE PLANNING

Integrate Weed Management into Resource Management Activities

Issue: *Although considerable progress is occurring, weed management is still viewed professionally as a distinct activity or "program," rather than an integral part of other natural resource management activities such as outdoor recreation, grazing, timber, fire, wildlife, wilderness, transportation, and urban area management.*

Actions: Cooperators will work through their individual agencies and constituencies, units of government, and CWMAs to assure that risk assessments are included in all proposed projects and actions that have the potential to introduce or spread noxious weed infestations.

Managers will be encouraged to incorporate effective, science based, and ecologically sound weed management measures in land use, resource development, and restoration plans or in any activity that may involve land surface disturbance.

Provide Statewide Weed Management Program Direction

Issue: *State program priorities and direction are important management elements that can complement local programs.*

Actions: Clarify the criteria and process used to designate state noxious weeds. Use an adaptive approach with an objective rating system to determine if weeds should be added or removed from the noxious weed list. Assure the designation procedure is compatible with the early detection/eradication strategy.

Regularly communicate with surrounding states to identify new and existing weed species that pose the greatest risk for expansion in New Mexico. Develop and publish a "hot list" of the potentially most dangerous noxious weeds and encourage early detection and control. Distribute "alerts" with weed photographs and biological data.

Cooperatively develop a set of recommended statewide prevention practices. Work toward broad application of these practices across all lands. Encourage CWMA cooperators to develop effective prevention practices and guidelines in local and regional management plans.

Appendix – I

PUBLIC COMMENT

The draft New Mexico Aquatic Invasive Species Management Plan (NMPlan) was available for public comment during a 30 day period ending August 15, 2008. The NMDGF issued a press release to local and regional news sources, followed by an email to members of the New Mexico AISAC requesting them to post similar information. The Associated Press circulated this press release to news outlets nationwide. New releases posted on the NMDGF web site are distributed to:

- Approximately 200 news outlets statewide, including major cities and border communities in neighboring states: newspapers, radio and television stations, and news organizations.
- 24 Native American Tribes.
- Approximately 100 contacts representing civic groups.
- Approximately 30 contacts representing conservation and sporting groups.
- All NMDGF employees.
- State Game Commission.
- Governor's office and administration.

The public comments received are included in this appendix followed by a response (bold-faced text) from the AISAC.

During the 30-day public comment period, the AISAC also requested preliminary review of the NMPlan by the Aquatic Nuisance Species Task Force. A summary of the ANSTF comments, with responses from the AISAC, is provided below.

Comment #1: Email from Ondrea Hummel:

From: Hummel, Ondrea C SPA [mailto:Ondrea.C.Hummel@usace.army.mil]
Sent: Thursday, August 14, 2008 10:27 AM
To: Lang, Brian, DGF
Subject: FW: NM AIS Plan comments

Hi Brian - Here are some comments that I got on the plan. Let me know if you have any questions. Thanks!

Ondrea Hummel
Senior Biologist, Environmental Resources Section

U.S. Army Corps of Engineers
Albuquerque District
4101 Jefferson Plaza NE
Albuquerque, NM 87109
505-342-3375
505-342-3668 fax
www.spa.usace.army.mil

From: Price, Dana M SPA
Sent: Wednesday, July 16, 2008 12:24 PM
To: Hummel, Ondrea C SPA
Subject: NM AIS Plan

Hi Ondrea,

I looked at the AIS Plan. Very thorough.

One comment: On p. 23, Strategy 2A, some other ranking methods for invasive species that perhaps should be mentioned are:

1: TNC/NatureServe: Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. Version 1. NatureServe, Arlington, Virginia.
http://www.natureserve.org/library/invasiveSpeciesAssessmentProtocol.pdf

2: USGS APRS Implementation Team. 2000. Alien plants ranking system version 5.1. Jamestown, ND: Northern Prairie Wildlife Research Center Online.
http://www.npwrc.usgs.gov/resource/literatr/aprs/index.htm (Version 30SEP2002).

A few typos I noticed:

On p.1, near bottom, second bullet, remove "o" from "ion"; phrase should read "state agencies in the AISAC".

p. 4, last line, remove comma after "Eurasian watermilfoil"

p. 16, last para: subject-verb agreement- either "Mechanical control such as harvesting is ineffective" or "Mechanical controls such as harvesting are ineffective"

Whole doc., Consistent spelling (watermilfoil vs. water-milfoil or water milfoil; appears all 3 ways in different places)

Response to Ondrea Hummel's Comments: All changes and additions were incorporated into the plan.

Comment #2: Email from the Middle Rio Grande Conservancy District, July 15, 2008:

Using electronic document changes, the MRGCD provided up-to-date information on the distribution of several AIS plants in New Mexico, including management and control techniques.

Response to MRGCD Comments: These changes were incorporated into the final draft. As a result, hydrilla was moved from Priority Class 1 to Priority Class 2, and Arundo (*Arundo donax*) was added to Priority Class 3.

Comment #3: Email from the Aquatic Nuisance Species Task Force:

From: Darren_Benjamin@fws.gov [mailto:Darren_Benjamin@fws.gov]
Sent: Tuesday, August 19, 2008 12:09 PM
To: Lang, Brian, DGF; bob_pitman@fws.gov; david_britton@fws.gov; don_maclean@fws.gov
Cc: Joe_Starinchak@fws.gov
Subject: Preliminary ANSTF Comments on the NM AIS Plan

Brian -

Attached are the comments we received in conjunction with the ANS Task Force's (ANSTF) preliminary review of the New Mexico State Aquatic Invasive Species Management Plan. They are provided for your consideration and I hope you find them useful. If you have any questions or would like clarification, just let me know.

1) Comments from Fish and Wildlife Service staff person Don MacLean:
2) Comments from ANSTF member Herbert Frost, National Park Service:
3) Comments from ANSTF member Paul Zajicek, representing the National Association of State Aquaculture Coordinators:

1. Overall, a well-written plan that is nicely organized and focused in its goals and objectives. Of great benefit to Plan readers, especially folks outside of New Mexico, would be to include a New Mexico map and a description of the water resources within the state (i.e., major rivers, lakes, man-made impoundments, etc).
2. The authors have offered control methods for most of the aquatic plants identified (Priority 1 species) except hydrilla (page 16). New Mexico uses triploid grass carp in concert with other states (Texas and Louisiana) associated with the Rio Grande basin as a preferred method to control hydrilla. The several aquatic plants mentioned on page 23 are also consumed by grass carp.

3. VHS virulence is limited to waters between 37 and 54°F. The authors may wish to discuss the risk VHS poses to NM waters much as they have with the other Priority 1 species.
4. There has been a change made to applesnail taxonomy (page 19). The snail they are calling the channeled applesnail, P. canaliculata, is more likely the island applesnail P. insularum. Both are phytophagous snails.
5. The silver carp has also been added to the Injurious Species List (page 20).
6. Surprisingly, many of the state plans do not describe state activities associated with current ANSTF supported programs or products. However, on page 29, there is a succinct description of New Mexico's involvement with several ANSTF programs and their recognition and participation is very much appreciated.
7. Strategy 2A, page 33, suggest adding the Generic Nonindigenous Aquatic Organisms Risk Analysis Process as a reference document to 2A3; suggest adding a new strategy that promotes implementation of Habitattitude with the pet owners, distributors, breeders and retailers (also include Habitattitude materials as a component of 6C1); and suggest a new strategy that describes the expanded implementation of the Protect Your Waters program beyond boat ramp posting that they already described as doing.
8. In reference to Strategy 6A, I visited the New Mexico Museum of Natural History and Science in Albuquerque several years ago and was impressed by the quality of its exhibits and information. It would seem that the Museum could be a partner in public education efforts.

Please note that to give the ANSTF members enough time to review the final plan, we must receive a copy of the final plan before September 22. This gives the ANSTF members approximately 30 days before the ANSTF meeting to review the plan - however, the ANSTF is allowed 90 days to approve a plan and if an ANSTF members requests additional time at the meeting then that time would be granted.

Darren Benjamin, Acting Executive Secretary, ANSTF

http://www.fws.gov/fisheries/

Responses to ANSTF comments:

1. Overall, a well-written plan that is nicely organized and focused in its goals and objectives. Of great benefit to Plan readers, especially folks outside of New Mexico, would be to include a New Mexico map and a description of the water resources within the state (i.e., major rivers, lakes, man-made impoundments, etc).

Response: A map showing surface waters and major transportation routes in New Mexico has been added.

2. The authors have offered control methods for most of the aquatic plants identified (Priority 1 species) except hydrilla (page 16). New Mexico uses triploid grass carp in concert with other states (Texas and Louisiana) associated with the Rio

Grande basin as a preferred method to control hydrilla. The several aquatic plants mentioned on page 23 are also consumed by grass carp.

3. VHS virulence is limited to waters between 37 and 54°F. The authors may wish to discuss the risk VHS poses to NM waters much as they have with the other Priority 1 species.
4. There has been a change made to applesnail taxonomy (page 19). The snail they are calling the channeled applesnail, *P. canaliculata*, is more likely the island applesnail *P. insularum*. Both are phytophagous snails.
5. The silver carp has also been added to the Injurious Species List (page 20).

Response: Comments #2 – #5 request specific information for Priority Class species. This information has been added with supplementary detail where appropriate.

6. Surprisingly, many of the state plans do not describe state activities associated with current ANSTF supported programs or products. However, on page 29, there is a succinct description of New Mexico's involvement with several ANSTF programs and their recognition and participation is very much appreciated.

Response: Additional activities have been provided where appropriate to clarify current participation and activities.

7. Strategy 2A, page 33, suggest adding the Generic Nonindigenous Aquatic Organisms Risk Analysis Process as a reference document to 2A3; suggest adding a new strategy that promotes implementation of Habitattitude with the pet owners, distributors, breeders and retailers (also include Habitattitude materials as a component of 6C1); and suggest a new strategy that describes the expanded implementation of the Protect Your Waters program beyond boat ramp posting that they already described as doing.

Response: All suggestions were incorporated into Strategy 2A3 and Strategy 6A10.

8. In reference to Strategy 6A, I visited the New Mexico Museum of Natural History and Science in Albuquerque several years ago and was impressed by the quality of its exhibits and information. It would seem that the Museum could be a partner in public education efforts.

Response: Change here is reflected in Strategy 6A6.

Additional comments from the ANSTF provided in email attachments include:

- "We encourage the Advisory Council to prioritize action items ["*Recommended Strategies and Actions*"], with an emphasis on prevention, coordination, and cooperation."

Response: The New Mexico AISAC acknowledges that prioritization of action items outlined under "*Recommended Strategies and Actions*" of the NMPlan is an important component of adaptive management. As envisaged under the "*Planning and Implementation*" section of the NMPlan, the AISAC recognizes that AIS management strategies and priorities will require constant adjustments in the context of spatial and temporal dynamics of the AIS landscape relative to waters of the State, shared basins of adjacent states, and regional planning strategies. Accordingly, the AISAC preferred not to prioritize action items of the NMPlan.

- "Are there invasive species that are not yet in NM, but for which there are known management techniques? There may or may not, but it does seem to be a category which falls between Priority Class 1 and Priority Class 2. This is not necessarily a problem, but something that seems to be a gap in the classes. Perhaps one of the classes could just be slightly redefined to include species that are not yet in NM, but for which there are known management techniques?"

Response: Priority Class 4 has been redefined to address this recommendation.