This Aquatic Invasive Species Management Plan is part of a multi-stakeholder collaboration with the Nevada Department of Wildlife, and Nevada agencies and organizations and with input from the general public.

This product was prepared by:

Nevada Aquatic Invasive Species Management Plan

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Nevada Aquatic Invasive Species Management Plan

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Nevada Aquatic Invasive Species Management Plan

Acronyms

AIS  Aquatic Invasive Species
ANS  Aquatic Nuisance Species
ANSTF Aquatic Nuisance Species Task Force
APHIS USDA Animal and Plant Health Inspection Service
BIA US Bureau of Indian Affairs
BLM US Bureau of Land Management
BOR US Bureau of Reclamation
DOI US Department of Interior
EDRR Early Detection, Rapid Response
EPI Environmental Improvement Project
EPA US Environmental Protection Agency
FIFRA Federal Insecticide, Fungicide and Rodenticide Act
FWS US Fish and Wildlife Service
ISAC Invasive Species Advisory Committee
HACCP Hazard Analysis and Critical Control Point
LMNRA Lake Mead National Recreation Area
NEPA National Environmental Policy Act
NISA National Invasive Species Act
NISC National Invasive Species Council
NOAA National Oceanic and Atmospheric Administration
NPS National Park Service
NPDES National Pollutant Discharge Elimination System
NRCS National Resource Conservation Service
NBWC Nevada Board of Wildlife Commissioners
NDA Nevada Department of Agriculture
NDOT Nevada Department of Transportation
NDOW Nevada Department of Wildlife
NDEP Nevada Division of Environmental Protection
NDF Nevada Division of Forestry
NDSL Nevada Division of State Lands
NDSP Nevada Division of State Parks
NANPCA Nonindigenous Aquatic Nuisance Prevention and Control Act
PSMFC Pacific States Marine Fisheries Commission
PLPT Pyramid Lake Paiute Tribe
SNWA Southern Nevada Water Authority
TRCD Tahoe Resource Conservation District
TRPA Tahoe Regional Planning Agency
UNR University of Nevada, Reno
UNLV University of Nevada, Las Vegas
USACE US Army Corps of Engineers
USCG US Coast Guard
USDA US Department of Agriculture
USDAFS US Department of Agriculture - Forest Service
USDHS US Department of Homeland Security
USGS US Geological Survey
WGA Western Governors’ Association
WRP Western Regional Panel on Aquatic Nuisance Species
Foreword

To be authored by Tony Wasley, Nevada Department of Wildlife Director.
Executive Summary

The purpose of the plan is to address the management of Aquatic Invasive Species (AIS) of Nevada in a comprehensive realistic approach to minimize AIS impacts regionally. This plan focuses on the species that have significant potential to invade or spread regionally, and create economic, ecological and recreational damage to Nevada’s waters.

The goals of the AIS Management Plan are to:

- Prevent new introductions of AIS to Nevada
- Limit the spread of existing AIS populations in Nevada, and eradicate or control AIS populations when possible
- Minimize harmful ecological, economic, social, and public health impacts that result from AIS

With continued coordination and improved information sharing among state, federal, tribal and other partners, Nevada will address aspects of AIS prevention, monitoring, and control. Further, as the impacts of climate change are realized, this plan acknowledges that management actions currently identified may need to be adjusted or adapted. Proactive measures taken now by partners in Nevada will help ensure that natural resources and recreational amenities are protected for future use.
Introduction

The introduction and spread of aquatic invasive species (AIS) have caused considerable ecological and economic harm globally (Pimentel et al. 2004). While humans have introduced many species intentionally for specific purposes or uses, many species have been introduced unintentionally that affect regional ecosystems and economies. Per Nevada Revised statute (NRS 503.597), AIS are defined as an aquatic species which is exotic or not native to this State and which the Commission has determined to be detrimental to aquatic life, water resources or infrastructure for providing water in this State. Invasive species are defined by the National Invasive Species Council (NISC) as, a non-native species whose introduction does or is likely to cause economic or environmental harm or harm to human, animal or plant health (NISC 2006). Aquatic invasive species can be plants, animals or microbes not native to North America, the western United States, or the State of Nevada.

The discovery of the aquatic invasive quagga mussels (Dreissena rostriformis bugensis) in Lake Mead National Recreation Area (LMNRA) in 2007 was an important point in AIS management in Nevada. Prior to this discovery, the management of AIS was not addressed and a formal Nevada statewide program did not exist. Since 2007, quagga mussels have spread throughout the lower Colorado River Basin. It is estimated that the economic impact from quagga mussels within the lower Colorado River system related to Bureau of Reclamation (BOR) projects is approximately $1 million annually (L. Willett, BOR, personal communication). This economic impact is a reflection of infrastructure management at dam facilities to control quagga mussels. Since 2007, important new partnerships have been initiated to respond to this highly invasive species. Working relationships among Nevada Department of Wildlife (NDOW), the National Park Service’s LMNRA, Pacific States Marine Fisheries Commission (PSMFC), Tahoe Regional Planning Agency (TRPA), the US Fish and Wildlife Service (USFWS), the Western Regional Panel on ANS (WRP) and others have been forged to address the prevention and spread of AIS, including quagga mussels.

Plan Purpose

The purpose of the plan is to address the management of AIS in Nevada in a comprehensive realistic approach to minimize AIS impacts regionally. This plan focuses on the species that have significant potential to invade or spread regionally, and create economic, ecological and recreational damage to Nevada’s waters. With continued coordination and improved information sharing among state, federal, tribal and other partners, Nevada will address aspects of AIS prevention, monitoring, and control. Further, as the impacts of climate change are realized, this plan acknowledges that management actions currently identified may need to be adjusted or adapted. The goals of the plan are to prevent new introductions, limit the spread of existing AIS and eradicate AIS when possible, and minimize harmful ecological, economic, social and public health impacts. Specific objectives and strategies within this plan developed by way of stakeholder consensus will support statewide efforts in Nevada to protect, preserve and manage the unique aquatic resources of the State for the benefit of all.
Prioritizing Management

The approach to manage invasive species combines a focus on individual species and specific pathways of introduction or spread. There are a number of AIS already established within Nevada waters, however dreissenid mussels are the priority species for management. There are significant populations of quagga mussels (*D. rostriformis bugensis*) in the Lower Colorado River, including Lake Mead and Lake Mohave. A wide range of species have been documented in Nevada but not all represent a high management priority. Some of the species of management priority include; zebra mussels (*Dreissena polymorpha*) Eurasian watermilfoil (*Myriophyllum spicatum*), curly leaf pondweed (*Potamogeton crispus*), and northern pike (*Esox lucius*). There are additional AIS that pose a threat to Nevada’s ecosystems and economy, some of which are present and some which have not yet been documented in Nevada (Appendix A and B). Invasive species in neighboring states as well as species suitable for establishment in Nevada are all considerations for management priority.

Examining possibly pathways for species introduction is an important aspect of prevention management. There are a variety of pathways identified as means to protect Nevada from the introduction and spread of AIS. Western regional AIS management programs have focused on recreational boating as a primary pathway and consequently comprehensive boat inspection and decontamination protocols have been developed. NDOW currently implements a boat inspection and decontamination program (Appendix C). Additionally, the TRPA conducts an inspection and decontamination program in the Lake Tahoe Basin. Other pathways of interest for managers in Nevada include aquatic pet release, industrial construction, aquaculture and other sectors of recreation such as hunting, fishing, and scuba diving. Exploration of species and pathways of concern have guided this management plan.
Geographic Scope

This plan is applicable to surface waters of the state. The arid landscape and extreme environmental conditions of Nevada (average annual rainfall of less than 10 inches) foster uniquely adapted species of wildlife and plants. Surprising to many is that Nevada is the most mountainous state in the lower 48. The topography is characterized by high elevation mountain ranges (the highest point being Boundary Peak at 13,140 feet above sea level) that alternate with low elevation basins (the lowest point being the Colorado River at 479 feet above sea level) with significant variation in vegetation among basins. Five basins divide the state; Sierra Nevada Basin, Central Basin, Mojave Basin, Northern Basin, Arizona/New Mexico Plateau (Figure 1). The Sierra Nevada Basin is representative of the Lake Tahoe region on the western border. The Central and Mojave Basins in the south drain into the Colorado River and the Northern Basin drains north into the Snake River.

Nevada lies almost completely within the geographic boundaries of the Great Basin. The Great Basin is a hydrologic designation where precipitation evaporates, sinks underground or flows into lakes. The state is further divided among 14 major hydrographic basins (Figure 2) that include approximately 14,988 miles of freshwater perennial rivers and streams, and 126,257 miles of intermittent/ephemeral streams and channels, 1,782 miles of ditches and canals and 551 border miles of shared rivers (Nevada Division of Environmental Protection [NDEP] 2004). The major rivers of Nevada include the Bruneau, Carson, Colorado, Humboldt, Muddy, Owyhee, Quinn, Truckee, Walker, and Virgin (Figure 3). In addition, Nevada has 1,070 lakes, reservoirs or ponds with an approximate total acreage of 533,239 and approximately 136,650 acres of wetlands (NDEP 2004). There are several relevant waterbodies (natural lakes or reservoirs), including Lahontan Reservoir, Lake Mead, Lake Mohave, Lake Tahoe, Pyramid Lake, Rye Patch Reservoir, Summit Lake, Walker Lake, Weber Reservoir, Wildhorse Reservoir, and Willow Creek Reservoir. Lake Mead, the largest reservoir (28.9 million acre-feet) in the United States, and Lake Mohave create Lake Mead National Recreation Area, which is managed by the National Park Service. Formed when Hoover Dam was built in the Colorado River in 1931, Lake Mead straddles both Nevada’s southeast border and Arizona’s northwest border and serves as the primary drinking water reservoir for more than 25 million people in Nevada, Arizona, California and Mexico (Tietjen and Holdren 2010).
FIGURE 1. NEVADA ECOREGIONS.
FIGURE 2. NEVADA HYDROGRAPHIC BASIN REGIONS
FIGURE 3. MAJOR WATERBODIES OF NEVADA
Climate Change and Invasive Species

Nevada is one of the fastest growing states in the west and is a destination for recreational boating and fishing. With nearly 70% of Nevada’s total water supply being provided by surface water sources (Environmental Protection Agency 2010), the water resources of this arid state are a management consideration of high importance. Taking steps to minimize the introduction and spread of aquatic invasive species will be critical in this water-scarce state.

Understanding the impacts of AIS in tandem with potential changes in regional climate is an area of management interest but also of uncertainty. Research is needed to better understand possible impacts to Nevada waters and their risks from AIS. With changes in climate, there are anticipated changes to aquatic systems which include increases in surface water temperature, altered streamflow, and increased extreme weather events. The White House Committee on Climate Change identified the impacts of climate change in the Southwest region of the United States to be highly relevant (Melillo et al. 2014). For example, observations between 2001 and 2014 indicate streamflow totals ranging between 5% and 37% lower in the Southwest region (including waters of the Colorado River and Great Basin of Nevada) compared to 20th Century average flows (Garfin et al. 2014). How will a warming climate affect the management of AIS?
Existing Authorities and Programs

Understanding the current authorities and programs of Nevada’s management entities helps define an AIS management plan for the future. There are many authorities and programs implemented by state, federal, tribal and other stakeholders that are utilized to prevent the spread and introduction of AIS. However, no single agency or group is responsible for the management of all AIS issues of Nevada. Further, considering 84.9% of Nevada is federally-owned land, the management of waters is heavily focused on federal agencies with resulting federal-state partnerships to implement programs. A summary of relevant state and federal legislation and regulations that currently exist can be found in Appendix D.

STATE

Two state agencies have a primary regulatory role in invasive species management in Nevada; NDOW and Nevada Department of Agriculture (NDA). The pertinent legislation and rules associated with providing these agencies with regulatory authority are in Appendix D. Other state partners play a supporting role in monitoring and research. The following state entities have a role in AIS management.

I. Nevada Department of Wildlife provides management oversight of AIS within the Fisheries Division. This program addresses AIS pathways through monitoring, control, inspection and education (NRS 503). NDOW manages 120,000 acres of Wildlife Management Areas which includes numerous waterbodies. In addition, the NDOW Hatchery Division conducts fish health monitoring for pathogens within the state hatchery program. Under NDOW, the Nevada Board of Wildlife Commissioners, a governor-appointed body, is responsible for establishing broad policy, setting annual and permanent regulations, reviewing budgets, and receiving input on wildlife and boating matters. The Commission is responsible for considering and approving petitions to prohibit or regulate species (SB 245, Restricted Exotic Wildlife).

II. Nevada Department of Agriculture provides oversight on aquatic agriculture (NRS 561.301) and has authority to inspect any conveyance that is injurious to the quality of any water in the State (NRS 555.100).

III. Nevada Department of Conservation and Natural Resources

a. Division of Environmental Protection conducts water quality and bioassessments monitoring within aquatic habitats throughout the state. These efforts target invertebrate sampling, and may include AIS species such as New Zealand mudsnail or dreissenid mussels.

b. Nevada Conservation Districts (NCD) work for the conservation and proper development of the state’s natural resources, including conservation of soil, and water.

c. Nevada Division of State Lands (NSL) provides land and land use planning services to the State, its agencies and its people.

d. Nevada Division of State Parks (NSP) manages, protects and maintains areas across Nevada, which includes many major waterbodies. In several cases, Nevada State Parks works in conjunction with NDOW to implement watercraft inspection stations.
**TABLE 1. SUMMARY OF CURRENT LEGAL AUTHORITIES AFFECTING AIS MANAGEMENT IN NEVADA. GREATER LEGISLATIVE DETAIL CAN BE FOUND IN APPENDIX D.**

<table>
<thead>
<tr>
<th>Legal Authority</th>
<th>Summary</th>
<th>Entity Authorized</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Federal Authority</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Title 16 of the Lacey Act of 1900 (16 U.S.C. §§ 3371-3378)</td>
<td>Provides that it is unlawful for any person to commit or attempt to commit any act described in § 3372(a), including to import, export, transport, sell, receive, acquire, or purchase any fish or wildlife or plant taken, possessed, transported, or sold in violation of any law, treaty, or regulation of the United States or in violation of any Indian tribal law. It is also unlawful for any person to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any fish or wildlife taken, possessed, transported, or sold in violation of any law or regulation of any state or in violation of any foreign law; or to import, export, transport, sell, receive, acquire, or purchase in interstate or foreign commerce any plant taken, possessed, transported, or sold contrary to certain state or foreign laws.</td>
<td>Departments of Interior, Commerce and Agriculture</td>
</tr>
<tr>
<td>Nonindigenous Aquatic Nuisance Species Control and Prevention Act of 1990, (P.L. 101-646, 104 Stats 4761) reauthorized and amended by National Invasive Species Act of 1996 (P.L. 104-332)</td>
<td>The U.S. Fish and Wildlife Service, the U.S. Coast Guard, the Environmental Protection Agency, the Army Corps of Engineers, and the National Oceanic and Atmospheric Administration are assigned responsibilities to develop a program of prevention, monitoring, control, and study to prevent introduction of and to control the spread of introduced aquatic nuisance species and the brown tree snake, including membership on the Aquatic Nuisance Species Task Force (ANSTF). Includes the development of state management plans to address AIS.</td>
<td>Departments of Interior, Commerce and Defense</td>
</tr>
<tr>
<td>Executive Order 13112, issued February 1999</td>
<td>Directs federal agencies to: (1) identify actions that may affect status of an invasive species; (2)(a) prevent introduction of such species; (b) detect and control such species; (c) monitor population of such species; (d) provide for restoration of native species; (e) conduct research on invasive species and develop technologies to prevent introduction of such species; (f) promote public education of such species; and (3) not authorize, fund, or carry out actions likely to cause the introduction or spread of invasive species in the United States or elsewhere unless the benefits of the action clearly outweigh the harm and the agencies take steps to minimize the harm.</td>
<td>Federal Agencies</td>
</tr>
<tr>
<td>Federal Insecticide, Fungicide and Rodenticide Act</td>
<td>The Act provides for federal regulation of pesticide distribution, sale and use. All pesticides distributed or sold in the USA must be registered by the EPA and properly labeled for use.</td>
<td>Environmental Protection Agency</td>
</tr>
</tbody>
</table>
### State Authority

| Title 45 NRS 503.597 | Nevada’s Revised Statue prohibits the importation, transportation or possession of any species of wildlife that the Nevada Department of Wildlife’s Commission deems detrimental to the wildlife or the habitat of the wildlife in the state. The statue further provides a misdemeanor for any person to introduce any aquatic life into the state without the permission of the Board of Wildlife Commissions.  | Nevada Wildlife Commission |
| Assembly Bill 167 | The act relates to aquatic species; prohibiting a person from introducing certain aquatic species into the waters of this State; providing for the inspection of vessels for aquatic invasive species; requiring vessels to be inspected for the presence of aquatic invasive species before being operated on the waters of this State; requiring decontamination of any vessels where an aquatic invasive species is present; authorizing the impoundment or quarantine of certain vessels; requiring an aquatic invasive species fee to be paid by all operators of vessels; providing a civil penalty; and providing penalties. | Nevada Department of Wildlife |
| NRS 488.045 | This regulation requires the owner, operator or person in control of any vessel or conveyance that is transported on public roads or launched on any body of water in this State to drain the water from the vessel or conveyance and any equipment on the vessel or conveyance. This regulation also requires the owner, operator, or person in control of a vessel or conveyance that has been taken out of any body of water in this State to ensure that the drain plugs, drain valves and any other devices used to control the draining of water remain open while transporting the vessel or conveyance on public roads in the State. | Nevada Department of Wildlife |
| NRS 555.100 | Department to conduct inspections; notice to control pest, noxious weed or plant disease. | Nevada Department of Agriculture |

### Regional Authority

| Public Law 96-551 | Tahoe Regional Planning Compact gives TRPA the authority to adopt environmental quality standards, called thresholds, and to enforce ordinances designed to achieve the thresholds. | Tahoe Regional Planning Agency |
| TRPA Code of Ordinances | Chapter 63.4 addresses AIS by prohibiting the introduction of AIS or the launching of watercraft contaminated by invasive species, requirements of inspection and decontamination of watercraft and seaplanes. Chapter 80 addresses prevention and control of AIS. | Tahoe Regional Planning Agency |
TRIBAL

Four primary Native American Tribes including the Washoe, Northern Paiute, Western Shoshone, and Southern Paiute encompass 32 reservations or colonies within Nevada. On a project or program basis, tribes support invasive species management with tribal council resolutions. An example of tribal management of AIS is Pyramid Lake. This basin ecosystem is larger than Lake Tahoe and falls entirely within the Northern Paiute Reservation. The Pyramid Lake Paiute Tribe has developed the Quagga and Zebra Mussel Aquatic Invasive Species Management Plan for the Pyramid Lake Paiute Tribe (2012). The Pyramid Lake Paiute Tribe has authority to regulate activities within the Pyramid Lake Basin and Lake, including boating, angling and other activities. Other significant waterbodies associated with tribal lands that may be impacted by AIS include the Owyhee River (Shoshone-Paiute Duck Valley Reservation), the Walker River (Walker River Paiute Reservation), and Summit Lake (Summit Lake Paiute Reservation).

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 this issue. Because the land base of Nevada is 84.9% federally owned, federal-state coordination efforts to manage AIS is highly relevant. The following federal entities are pertinent in the consideration of managing AIS in Nevada.

I. US Department of Agriculture
   a. USDA Forest Service (USFS) is guided by an internal management policy on AIS and partners with NDOW to address specific species issues. The USFS uses multiple authorities to conduct activities to prevent, detect, control, mitigate, and research aquatic and terrestrial invasive species across a wide variety of landscapes and agency programs. The USFS invasive species activities are guided by the National Strategic Framework for Invasive Species Management (USDA FS 2013). Additionally, western regions of the USFS have adopted the Interagency Standards for Fire and Fire Aviation Operations protocols to address minimizing the transport of AIS in wildland fire fighting activities (Interagency Standards Group 2016).
   b. USDA Animal and Plant Health Inspection Service (APHIS) implements emergency protocols and partners with affected states to quickly manage or eradicate pest outbreaks, which may include AIS.

II. US Department of Defense
   a. U.S. Army Corps of Engineers (USACE) is tasked with the development, control, maintenance, and conservation of the nation’s water resources in accordance with the laws and policies established by Congress and the Administration. The USACE – Los Angeles Division serves Arizona-Nevada. The USACE Zebra Mussel Research Program (ZMRP) was authorized by the Non-Indigenous Aquatic Nuisance Prevention and Control Act of 1990, Public Law 101-646, and is the only federally authorized research program for the development of technology to control zebra mussels. The USACE AIS programs were integrated into the ANS Task Force to ensure total coordination and leveraging to address all AIS issues.

III. US Department of Commerce
   a. National Oceanic and Atmospheric Administration (NOAA) is tasked with the conservation and management of coastal and marine ecosystems and resources. NOAA
does not have any AIS authorities in Nevada; however, NOAA has a key role in the ANS Task Force.

IV. **US Environmental Protection Agency** (EPA) mission is to protect human health and the environment. EPA conducts bioassessments throughout Nevada that may capture information on AIS. The EPA is also authorized to register pesticides under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) which may affect product use in AIS control projects. The EPA Office of Research and Development/National Exposure Research Laboratory/Environmental Science Library Services is located in Las Vegas, Nevada.

V. **US Department of the Interior** (DOI) is charged with the Nation’s internal affairs and is structured, along with multiple Bureaus and Agencies, to protect and manage natural resources and cultural heritage. DOI provides scientific and other information about these resources and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliate island communities. The DOI is guided on invasive species by a Department Policy (DOI 2017) which defines the federal role in AIS. The following Bureaus and Agencies fall under the Department of Interior.

a. **Bureau of Indian Affairs** (BIA) mission is to enhance the quality of life, to promote economic opportunity, and to carry out the responsibility to protect and improve the trust assets of American Indians, Indian Tribes, and Alaska Natives. BIA’s Division of Natural Resources provides oversight on Invasive Species management issues, participates in monitoring, and supports tribal participation in Early Detection and Rapid Response.

b. **Bureau of Land Management** (BLM) administers 47.5 million acres of public land in Nevada. BLM public lands make up approximately 63 percent of Nevada’s land base. The BLM Nevada Environmental Management System includes invasive species management as a key focus area. The BLM works with state, federal and local partners to reduce the spread of invasive species with an emphasis on early detection and rapid response of new invasions. Currently, AIS management is directed by the BLM Manual, Section 6720 - Fisheries and Aquatic Resources Management (BLM 2017), Aquatic Nuisance Species Task Force (ANSTF) Strategic Plan (ANSTF 2013) and Department of Interior Policy (DOI 2017). The BLM Manual Sec. 6720 clarifies its role for AIS management and highlights the difference in non-native game-fish and other aquatic species. Additionally, the Manual includes the adoption of an internal Clean, Drain, Dry policy (BLM 2017). Also, as part of its implementation of the *Interagency Standards for Fire and Fire Aviation Operations* (Interagency Standards Group 2016), BLM takes actions to address AIS within agency firefighting activities.

c. **Bureau of Reclamation** (BOR) is responsible for thousands of miles of water distribution canals and drains, rights-of-ways, wetlands, wildlife resources, recreational areas, and reservoirs which are at risk from AIS. There are numerous BOR projects in Nevada, including power plants and dams, Boulder Canyon Project (Hoover Dam and Power Plant), Parker-Davis Project (Parker Dam and Power Plant), Davis Dam and Power Plant, Washoe Project (Marble Bluff Dam and Fishway), Humboldt Project (Rye Patch Dam), Newlands Project (Derby Diversion Dam, Lahontan Dam and Power plant and Carson River Diversion Dam). BOR has a role in managing water for multiple uses including recreation in partnership with the natural resource agencies of Nevada. Additionally,
BOR conducts dreissenid mussel monitoring at some of its Nevada facilities. The BOR Mussel Task Force currently works to build consistency in monitoring efforts across the country by internally coordinating the response to quagga and zebra mussel discoveries in western waters. The BOR Technical Services Center actively conducts research on environmental-DNA, early detection, and materials technology associated with a variety of AIS, including dreissenid mussels. The Directives and Standards, and policy of BOR related to invasive species management are as follows: Pest Management/Resource Protection (ENV 01-01; US BOR 1996a), Public Notification and Aerial Pesticide Applications on Lands Managed by BOR (ENV 01-02; US BOR 1998), and Pest Management (ENV P02; US BOR 1996b). These Directives and Standards and the policy focus on integrated pest management and pesticide application on BOR lands. The BOR provides grant funding to cooperating agencies in Nevada.

d. National Park Service (NPS) is tasked with the management of historical, cultural and natural parks. The NPS has several parks, national monuments and trails, and recreation areas within the boundaries of Nevada. Specific NPS managed areas in Nevada include LMNRA, Great Basin National Park, Death Valley National Park, Old Spanish National Historic Trail, Tule Springs Fossil Beds National Monument and the California National Historic Trail. The National Park Service is guided by their Management Policies document (NPS 2006) to identify the responsibility of parks to manage non-native plant and animal species and to cooperate with other agencies having jurisdiction. Additionally, the Quagga/Zebra Mussel Infestation Prevention and Response Planning Guide (US DOI NPS 2007) serves as a resource to NPS managed areas seeking to form a prevention program. Each NPS managed area has differing programs related to AIS that are a reflection of a diverse landscape and current park leadership. For example, LMNRA currently conducts monitoring for AIS, provides financial support to the on-site NDOW watercraft inspection and decontamination program, and conducts extensive public outreach and ongoing dreissenid mussel research. Lake Mead National Recreation Area entered into a cooperative agreement with NDOW in 2014 to collaboratively manage quagga mussel containment efforts.

e. US Fish and Wildlife Service (FWS) addresses aquatic invasive species within the Fisheries and Aquatic Conservation program, Branch of Aquatic Invasive Species. The program seeks to prevent the introduction and spread of AIS, rapidly respond to new invasions, monitor the distribution and control of established invaders, and foster responsible conservation behaviors through its national public awareness campaigns. The AIS program also builds capacity, coordinates, and implements AIS prevention and control activities authorized under the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) and National Invasive Species Act (NISA), including: co-chairing and administering the ANSTF, supporting regional panels of the ANSTF, and implementing a national AIS program. Significant functions of the Aquatic Invasive Species Program include;

- Administration of Aquatic Nuisance Species Task Force.
- Administration of ANSTF-approved state AIS management plans, including the plan development and revision process, and federal cost-share funding for implementation.
• Implementation of national Stop Aquatic Hitchhikers and Habitattitude campaigns.

In Nevada, the FWS works closely with ESA-listed species and collaborates with tribal partners across the state. Lahontan National Fish Hatchery Complex works in partnership with the Pyramid Lake Paiute Tribe to restore Lahontan cutthroat trout. Many FWS National Wildlife Refuges (NWR) manage aquatic habitats in Nevada, including unique areas such as Stillwater NWR, Anaaho Island NWR, Ruby Lake NWR, Ash Meadows NWR and Moapa NWR.

f. US Geological Survey (USGS) monitors, assesses and conducts targeted science research to enhance preparedness, response and resilience. The USGS has developed and maintains the Non-Indigenous Aquatic Species (NAS) Database which is the central repository for accurate and spatially referenced biogeography accounts of nonindigenous aquatic species. At this time the NAS Database includes freshwater aquatic plants, animals, invertebrates, and fishes including a number of records for Nevada. The USGS Nevada Water Science Center provides information about Nevada’s natural resources by collecting data on surface and ground water.

VI. US Department of Homeland Security (USDHS) is tasked with securing the nation from threats, including protecting our borders, and conducting border inspections.

a. US Coast Guard (USCG) receives authority to regulate ballast water and AIS from NANPCA and NISA. NANPCA directed the USCG to issue regulations and guidelines to control the introduction and spread of AIS in the Great Lakes ecosystem. It also requires an assessment of ballast water management practices in all US ports. USCG Auxiliary operates at several Nevada waterbodies, including Lake Tahoe, Lakes Mead and Mohave.

VII. Aquatic Nuisance Species Task Force (ANSTF) is an intergovernmental organization dedicated to preventing and controlling aquatic nuisance species, and implementing the Nonindigenous NANPCA of 1990 and the amended NISA in 1996 (Appendix D). The membership of the ANSTF is comprised of 12 federal agency and 13 ex-officio members. The Task Force coordinates AIS efforts by working with relevant stakeholders in conjunction with six regional panels of the ANSTF. Under NANPCA, state governors are authorized to submit comprehensive management plans to the ANS Task Force for approval. The ANS Task Force will review and approve both draft and final versions of the Nevada Aquatic Invasive Species Management Plan. Grants are authorized to states for implementing approved management plans, under a 75% federal – 25% state cost share agreement.

VIII. National Invasive Species Council (NISC) ensures Federal programs related to invasive species are coordinated, effective and efficient. NISC was established by Executive Order 13112 in 1999 and the amended Executive Order 13751 in 2016. NISC is guided by the National Invasive Species Council Management Plan 2016-2018 (NISC 2016) which provides for direct actions to address invasive species. A recent interagency effort examining federal policy regarding the movement of AIS onto and off of Federal lands was undertaken to better understand the policy role of many federal agencies (Interagency Committee 2015).
a. **Invasive Species Advisory Committee** (ISAC) is a group of non-federal advisors and stakeholders that provide advice to the Council on invasive species issues.

**REGIONAL**

I. **Tahoe Regional Planning Agency** (TRPA) leads a cooperative effort to preserve, restore, and enhance the unique natural and human environment of the Lake Tahoe Basin. TRPA is authorized by a California and Nevada Bi-State Compact to adopt environmental quality standards and to enforce ordinances designed to achieve the standards. Their authorities allow for the creation and enforcement of rules that prevent the spread and introduction of AIS in the Lake Tahoe Basin. TRPA implements their ANSTF-approved *Lake Tahoe Region Aquatic Invasive Species Management Plan, California – Nevada* (TRPA 2014). The implementation of a Nevada ANSTF-approved plan will complement the TRPA Plan.

II. **Tahoe Regional Conservation District** (TRCD) provides leadership and environmental services to stakeholders. TRCD works cooperatively with TRPA to implement a watercraft inspection and decontamination program in the Tahoe Basin.

III. **Carson Water Subconservancy District** (CWSD) is a multi-county, bi-state agency dedicated to establishing a balance between the needs of the communities within the Carson River watershed and the function of the river system. Carson Water Subconservancy District coordinates identification and treatment of Nevada listed noxious weed species on a watershed-wide basis. The District provides funding to the four Coordinated Weed Management Areas throughout the watershed to further their efforts. In addition, CWSD works with NSP and NDOw to strategize solutions on AIS management.

IV. **Truckee – Carson Irrigation District** (TCID) is a political subdivision of the State of Nevada organized for the purpose of representing the water right holders within the boundaries of BOR’s Newlands Project. The District is contracted by BOR to provide care, operation, and maintenance of project facilities and features. Additionally, TCID implements a pest management plan addressing aquatic and terrestrial species (TCID 2016).

V. **Southern Nevada Water Authority** (SNWA), in cooperation with the LMNRA, University of Nevada – Las Vegas, University of Nevada - Reno, and other partners has developed an Interagency Monitoring Action Plan (Wong et al. 2011) to coordinate the collection and sharing of quagga mussel monitoring data and water quality information for both Lake Mead and Lake Mohave. SNWA conducts a variety of studies related to quagga mussels.

VI. The **Western Regional Panel (WRP) on Aquatic Nuisance Species** of the federal Aquatic Nuisance Species Task Force was formed under a provision in NISA. The goal of the WRP is to protect western aquatic resources by preventing the introduction and spread of non-native nuisance species into western marine and freshwater systems through the coordinated management and research activities of state, tribal, federal, commercial, environmental, research entities and other regional panels. The geographic scope of the WRP encompasses 19 US states, and 4 Canadian provinces west of the 100th Meridian. NDOw is an active voting member in the WRP. Other Nevada-based partners, such as LMNRA staff and TRPA, are also active in the WRP.

VII. **100th Meridian Initiative – Columbia River Basin Team** is the most active and organized Basin Team within the 100th Meridian Initiative. Partners share information, research and management strategies associated with the Columbia River Basin. Geographically, northern
Nevada falls within the Columbia River Basin and NDOW is an active participant in the Basin Team.

VIII. **100th Meridian Initiative – Lower Colorado Basin Team** (or the *Colorado River Aquatic Invasive Species Task Force*) works to inform and communicate AIS issues among various partners throughout the Lower Colorado River system. Geographically, the southeastern portion of Nevada falls within the Lower Colorado River Basin. NDOW, as well as various southern Nevada water districts, LMNRA are active participants in the Basin Team.

Additional partners in the region work collaboratively to address invasive species in Nevada, including but not limited to University of Nevada – Reno, the Desert Research Institute, the Nature Conservancy – Nevada, Eastern Nevada Landscape Coalition, Trout Unlimited – Nevada, and others.
Gaps and Challenges

There are many gaps and challenges that exist in the management of AIS. In some cases, there are practical steps that may be taken to address specific issues, but in others there are significant hurdles to overcome in order to address specific issues. The following gaps and challenges to managing AIS in Nevada have been identified. These gaps and challenges are by no means exhaustive and are not presented in any particular order of priority.

I. Climate change has been identified as highly influential to the water resources of Nevada. What is not clear at this time is the potential synergistic effects that can be anticipated with climate change and invasive species impacting Nevada waters. The arid climate and rapidly growing urban areas throughout Nevada and the region will play a role in the impacts of climate change in the future. Working to anticipate possible climate change scenarios and impacts from invasive species will be important for future management of water and invasive species.

II. Pyramid Lake is a significant resource that is under the protection of the Pyramid Lake Paiute Tribe. This waterbody is the largest natural lake within the state offering recreational opportunities and unique biological resources. Increasing AIS prevention efforts of this aquatic resource will require significant partnerships to ensure success. Increased engagement among the Pyramid Lake Paiute Tribe, NDOW and other state and federal entities will be essential for increasing protections against AIS at Pyramid Lake.

III. Illegal fish introductions are a significant source of AIS introductions into Nevada waters. In most cases these introductions include fish that are non-native to the region. With the assistance of partnerships, programs that address the problem of illegal fish introductions could help curb their occurrence.

IV. Fishing tournaments on Nevada waters can be a source of high risk boats and unintentional bait release. The volume of motorized boat traffic drawn to Nevada waters from around the country increases with fishing tournaments. For example, approximately 95 tournaments occur annually within LMNRA which can bring high volumes of boat traffic (>150 boats) for these fishing events. Despite current efforts to minimize the risks of tournament boats spreading invasive species additional prevention strategies, such as mandatory entry inspections, could be used to address this challenge. Additionally, specific measures could be taken to improve proper bait disposal used during tournaments.

V. The jurisdiction or authorities to manage submerged and riparian plants in some cases is not clear. In areas where specific invasive species such as purple loosestrife (Lythrum salicaria) or riparian noxious weeds exist there is conflict in which managing entity is most appropriate for monitoring, control or simply taking management action. Further, multiple agencies may have an overlap in responsibilities for specific species (e.g., Nevada Department of Conservation and Natural Resources and NDA regarding aquatic Salvinia spp).

VI. At this time, monitoring for AIS in Nevada consists largely of dreissenid mussel monitoring, with some ancillary monitoring for aquatic invasive plants, vertebrates and invertebrates done by NDOW and various partners (Appendix E). There is a need for a state-wide strategy encompassing a variety of habitats, species and partners that would assist in protecting habitats and focus on AIS management responses.

VII. At this time, inspection and decontaminations at Lake Mead within LMNRA are primarily done on boats exiting the water. Currently, incoming boats are generally not inspected prior to launch
although these boat operators receive AIS education and outreach. Incoming inspections were halted in 2007 when quagga mussels were detected in Lake Mead. Conducting entrance inspections would protect Lake Mead from other damaging AIS not currently present.
AIS Management Approach

Nevada intends to manage AIS in the following focus areas to protect valuable aquatic resources: Prevention, Early Detection, Rapid Response, Control and Eradication. Nevada acknowledges the ANS Task Force approved interstate AIS management plan completed for Lake Tahoe and intends to seek ways to work together to leverage AIS management efforts reflected in each plan. Furthermore, the State of Nevada intends to work with neighboring western states in order to protect western aquatic resources. The primary approach for this plan has been developed has been to identify the AIS which pose the greatest risk to Nevada. Understanding pathways that are the primary mechanisms for species to be introduced and spread among and within Nevada waters is critical in focusing management efforts with limited funding and resources.

The plan allows for increased coordination with approved state management plans of neighboring California, Utah, Arizona, Oregon and Idaho. This plan will also guide AIS activities in Nevada to allow coordination with and recognition of regional and national initiatives such as the Quagga-Zebra Mussel Action Plan for Western US Waters (WRP 2010), National Management and Control Plan for the New Zealand Mudsnail (Proctor et al. 2007) and Management and Control Plan for Bighead, Black, Grass and Silver Carps in the United States (Conover et al. 2007).

Problem Definition
Recent AIS Problems

Nevada has been affected by a number of highly destructive invasive species. In Nevada’s aquatic and riparian environments, quagga mussels, tamarisk spp. and Eurasian watermilfoil have been most problematic. Other species have been identified with limited geographic distribution. The USGS Non-Indigenous Aquatic Species database manages information nationally on the distribution and occurrence of species. The occurrence of aquatic invasive species particularly non-native fishes, crayfish, other invertebrates suggests a number of discoveries but limited establishments have occurred throughout Nevada (USGS 2017). Further, monitoring of Lahontan and Rye Patch reservoirs suggested the larval-form of dreissenid mussels may have been present during a past sampling period. However, repeat sampling has shown that the dreissenids are not established in either waterbody (Appendix F).

AIS of Concern and Types

As mentioned previously, there are many known invasive species in Nevada including aquatic plants, fish, invertebrates and amphibians. These species have been identified and in some cases are addressed by local management actions such as monitoring, control or outreach. In order to prioritize management and focus of AIS a ranking system of Watch, High, Low, and Unknown have been assigned to specific species (Appendix A). These ranks were assigned based on the following ways, 1) on input from the Nevada AIS Management Plan Working Committee, 2) on existing federally adopted species management plans, 3) and on species that are listed as injurious by the US Fish and Wildlife Service.

- Watch priority rank was assigned to species that have not been established in a waterbody, or have a high potential for introduction to Nevada either by natural range expansion or through unauthorized introductions and can have a high probability of economic and/or ecological impact.
High priority rank was assigned to established species or species for which there is a high probability of economic and/or ecological impact. Low priority rank was assigned to species that are widely established but with minimal impact. A rank of unknown was assigned to species where there is limited information to make a determination of economic or ecological impact to Nevada.

Additionally, to further categorize status has been captured based on establishment and ability to control or eradicate a species. This status is assigned as type 1 to type 5 and is defined in Appendix A.

AIS of focus in Nevada
Historically, invasive species management has been species-specific focused. This approach can be appropriate particularly when there are circumstances for successful eradication of a species identified early in its establishment. However, vector management allows for broader protection of Nevada resources and addresses species that may not yet be identified as a threat. Certainly some known species are of greater threat due to the damage that they may cause to Nevada resources and these species are highlighted. Non-Native Species Management Types and Priority Species of Concern identified in this plan were determined by the Planning team. Further information on individual species are explored in Appendix B.

Animals
Invasive aquatic animals may include fish, bivalves, gastropods, amphibians, mammals and macroinvertebrates. The quagga mussel (Dreissena bugensis) is the top species of priority and attributes to the significant AIS management effort currently underway in Nevada. This species is found in the Colorado Basin only. Other species of priority with isolated distribution are the rusty crayfish (Orconectes rusticus) and the swamp crayfish (Procambarus clarkia). The Asian clam (Corbicula fluminea) represents a highly ubiquitous species found throughout Nevada waters. With the exception of Lake Tahoe’s management efforts, there are no control efforts underway to address Asian clams. Finally, another aquatic animal that is not found in Nevada but is of great priority to Nevada waters is the zebra mussel (Dreissena polymorpha).

Aquatic and Riparian Plants
Aquatic vascular plants include ferns and flowering plants that grow submerged in water, float on the water surface, or have basal portions inundated with foliage and upper parts immersed. Several macrophytes such as Eurasian watermilfoil (Myriophyllum spicatum) and curly-leaf pondweed (Potamogeton crispus) are found within Nevada, but are currently management by NDA. Eurasian watermilfoil is currently on the Nevada Noxious Weed List (NDA 2017). Other species of interest which are not in Nevada but of priority include: hydrilla (Hydrilla verticillata), giant salvinia (Salvinia molesta), elodea (Elodea spp.), and water hyacinth (Eichhormia crassipes). The alga starry stonewort (Nitellopsis obtuse) is also a species of priority. By in large aquatic plants will be addressed by NDA.

Plants that are found in the riparian area are also managed directly by NDA. All species of concern listed below are included on the NDA Noxious Weed List (2017) but because of their link to aquatic habitats they are mentioned here. These species include tamarisk (Tamarisk spp.), purple loosestrife (Lythrum salicaria), crimson fountain grass (Pennisetum setaceum), hoary cress (Cardaria draba), perennial pepperweed (Lepidium latifolium) and Russian olive (Elaeagnus angustifolia).
Pathogens
Pathogens include bacteria, viruses or parasites. They may potentially enter Nevada on plants or animals imported into Nevada or through the water in which plants or animals are transported. Because of the potential negative impact of fish pathogens on Nevada’s wild and cultured fisheries, import and transport of fish are closely regulated. Nevada law prohibits the importation of live fish infected with known bacterial pathogens. US Fish and Wildlife Services’ National Wild Fish Health Survey database indicates limited fish pathogen occurrence in Nevada waters. Examples of pathogens of management priority that threaten Nevada fishes include viral hemorrhagic septicemia (Novirhabdovirus sp.) and largemouth bass virus (family Iridoviridae, Ranavirus).

Pathways of Introduction
Determining high risk pathways for species introductions allows agencies and partners to focus limited resources to be effective in preventing species spread. Some pathways can be identified and targeted with relative straightforwardness, while other pathways prove more challenging to address. The threat that recreational boats pose in transporting and introducing AIS to new waters across the United States is well known (Johnson et al. 2001, Mari et al. 2011, Rothlisberger et al. 2011). Additional pathways such as the aquarium pet trade, private aquaculture and others pose threats as well. In some cases, Nevada has limited tools to address these threats. The use of Hazard Analysis Critical Control Plans (HACCP) then becomes an effective tool to be applied to any number of agency or partner related activities that occur on the landscape. The HACCP process can be used where activities are challenged with a set of considerations in order to identify and block pathways for introduction of invasive species. Basic HACCP guidelines can be applied to activities conducted in Nevada (Appendix G). The following are possible pathways for introduction of AIS.

I. Recreation Activities - There are many recreational activities and equipment that can spread AIS and boats have been identified as a primary pathway. A number of aspects of recreational activities may add an additional source of risk such as:
   a. Watercraft exiting quagga mussel infested waterbodies, such as Lake Mead, are a specific pathway targeted for containment and prevention strategies.
   b. Fishing tournaments result in a high volume of recreational boats entering and exiting waterbodies in a short period of time. These tournaments may be large scale drawing boats from around the country or small scale having only local anglers attend.
   c. Fishing bait release is a pathway where species can be directly released into a waterbody.

II. Aquarium release – Aquarium plants and animals are recognized as an important introduction pathway of invasive species (Padilla and Williams 2004, Rixon et al. 2005, Strecker et al. 2011). Retail markets, such as aquarium and pet stores, nurseries and garden centers, as well as mail order and internet suppliers sell a variety of plants, snails, fish and other aquatic species, many of which are invasive. Additionally, many educational classroom efforts can often be sources of intentional release of species (S Chan, Oregon Sea Grant, personal communication). Educating teachers and students could minimize this risk. Additionally, identifying aquarium species within the Nevada’s Injurious Species List could help limit introductions to the state.
III. Commercial Transportation of Vehicles or Equipment – The commercial transportation or delivery of recreational boats, construction vehicles and other commercial equipment, such as floating docks can introduce AIS into new waters. Careful monitoring of such transport of equipment and proactive coordination with the transportation industry within Nevada is an important aspect of protecting waters by limiting the treat of this pathway.

IV. Retail Markets and Private Industries – There are many retail markets within Nevada that may be a potential source of invasive species. Retail industries such as nursery and garden centers, mail order and internet suppliers, private fish hatcheries and products from the exotic food industry can be a pathway to introduction.

V. Field Activities – Many entities conduct field activities on Nevada’s waterways for a variety of reasons including school groups, researchers, agency and tribal monitoring and educational events. There are many state and federal agencies that conduct work on different waterbodies to collect information on water quality, habitat and species. Any of these activities are a potential source for moving invasive species among water bodies. Providing general outreach and agency-internal education about best practices for field equipment cleaning, and promoting the use of the HACCP process can address the risk potential of this pathway.
   a. Wildland Fire fighting Activities – The nature of fighting fire involves water and equipment that moves and carries water. Open water sources are often used to control a fire. Firefighting teams work across the west and are moved frequently as the fire incidents evolve. Encouraging the adoption of Interagency Management Fire Team protocols to reduce the risk of spreading AIS via equipment is recommended.

VI. Industrial or Land Use Development Activities – The construction of new roads, placement of culverts or bridges and other movement where industrial vehicles are entering water or transporting water to do work are potential pathways for spreading AIS. Many construction vehicles and equipment move among watersheds or between states. Ensuring that pathways of introduction can be minimized by different industries is a challenge.

VII. Wildlife – The potential for a variety of wildlife species such as fish, or waterfowl have been suggested to play a role in the spread of AIS. The introduction and spread of AIS by wildlife may be unlikely, but options to prevent or control the spread of AIS by wildlife are equally improbable.

VIII. Natural Disasters – There are events that occur naturally that could introduce or spread an invasive species. These include wind events, earthquakes, floods or other emergency events that may bring high traffic into the state which can promote the spread of invasive species. Many of these events cannot be prevented or controlled as a means to introduce species.

IX. Free-flowing Water - The natural flow of water serves as a means for AIS to spread to new areas. AIS infested waters which are connected to other waters can provide a source of AIS. This natural aspect of species spread is largely out of the control of managers but is recognized as a means for species spread.
Plan Development

The development of an AIS Management Plan requires the input and expertise of a variety of state, federal, non-governmental entities and other stakeholder. The perspective from multiple entities ensures that a full suite of issues can be observed and a variety of strategies can be considered in their management. The Nevada AIS Management Plan was developed by a consensus built stakeholder team including the following entities:

- Carson Water Subconservancy District
- National Park Service, Lake Mead National Recreation Area
- Nevada Department of Agriculture
- Nevada Division of State Lands
- Nevada Division of State Parks
- Nevada Department of Wildlife
- Nevada Division of Environmental Protection
- Nevada Natural Heritage Program
- Pyramid Lake Paiute Tribe
- Southern Nevada Water Authority
- Tahoe Regional Planning Agency
- US Forest Service, Humboldt-Toiyabe Forest
- US Fish and Wildlife Service, Region 8 Pacific Southwest
- US Environmental Protection Agency
- University of Nevada- Reno

With contributions via face to face meetings, conference calls and other correspondence from these stakeholders, a plan was created that reflects the needs of Nevada. The additional feedback received via a 60-day Public Comment process as well as review by the Nevada Wildlife Commission who informed and improved the plan.
Management Plan Goals and Objectives

The goals of the AIS Management Plan are to:

- Prevent new introductions of AIS to Nevada
- Limit the spread of existing AIS populations in Nevada, and eradicate or control novel AIS populations when possible
- Minimize harmful ecological, economic, social, and public health impacts that result from AIS

These goals will be accomplished by six objectives detailed below and summarized in the Implementation Table. Specific strategies and actions have been outlined to meet objectives. The Nevada State Aquatic Invasive Species Management Plan Objectives meet the Plan’s goals to limit AIS introductions, spread, and reduce their impacts. Strategies and actions used to meet these objectives have been identified.

OBJECTIVE A: OVERSIGHT AND COORDINATION

A state management plan requires strong oversight and coordination to ensure Plan objectives and action items continue to meet the goals of the Plan within the existing regulatory framework of the state. This requires identifying lead entities to support Plan development, oversight, coordination, implementation, and adaptive review. The success of the Plan is reflected in robust coordination efforts at state, regional and national level.

OBJECTIVE B: PREVENTION

Preventing the introduction of AIS to new waters within Nevada as well as preventing further spread of existing AIS to other Nevada waters or beyond the region requires adequate inspection and decontamination procedures coupled with effective and consistent education and outreach. Additionally, targeting prevention efforts to high risk pathways will maximize limited resources.

OBJECTIVE C: OUTREACH AND EDUCATION

Thoughtful targeted outreach and education can apply to all aspects of AIS management. Appropriate outreach can improve coordination effectiveness, increase public participation, and programmatic expand support.

OBJECTIVE D: MONITORING, EARLY DETECTION, AND RESPONSE

Early detection, containment, and control/eradication of new AIS introductions are important measures to reduce the impacts from AIS. Early detection is accomplished through comprehensive monitoring which is followed by the ability to respond appropriately and efficiently should a detection be made. Response is recognized as a collaborative effort among numerous agencies, non-governmental organizations, researchers, and other stakeholders.

OBJECTIVE E: LONG-TERM CONTROL

The ability to control AIS implies that populations can be managed to prevent further expansion of that population; whereas eradication suggests an option to completely remove the AIS population. In some cases, control or eradication measures will require collaborative effort among various agencies, non-governmental organizations, researchers, and other stakeholders.
OBJECTIVE F: AIS LAWS AND REGULATIONS
The management of AIS is complex and requires a variety of legislative provisions to protect Nevada waters. The authority to adequately manage AIS in Nevada requires appropriate legislation and regulation.

Strategies and Actions for Implementation
The strategies to implement the Nevada AIS Management Plan provide a framework for activities that will take place. With very few exceptions, strategies contain a component of evaluation in their implementation. When needed, further explanation on evaluation is stated explicitly. Otherwise, evaluation or in some cases quality assurance and quality control can be assumed to play a role in the implementation of each strategy. The following strategies have been identified to address the objectives of the plan. They are intended to be addressed within a 5-year implementation timeline. Strategies of the Nevada AIS Management Plan are considered to be dynamic and achievable. Action items are provided under a majority of the strategies to provide additional clarification on the direction of the objectives and strategies.

OBJECTIVE A: DEVELOP AND MAINTAIN OVERSIGHT AND COORDINATION

Strategy A.1
Maintain a statewide Aquatic Invasive Species Coordinator.
A.1.1 Action
Promote Nevada’s AIS Program to ensure adequate funding is available, including promotion of Nevada’s Watercraft AIS decal requirement; and assess potential funding opportunities to support the position.

Strategy A.2
Implement the Nevada AIS Management Plan including but not limited to internal agency coordination.
A.2.1 Action
Review action items annually for completion and assessment.

Strategy A.3
Review and adopt the Nevada AIS Management Plan as needed including potential needs associated with climate change adaptation.
A.3.1 Action
Evaluate AIS Plan strategies and actions on an annually basis to determine if AIS introductions and/or spread are influenced by changes in climate.

Strategy A.4
Submit annual progress reports and five-year program report to the US Fish and Wildlife Service as directed based on funding agreement. Other reports will be provided to other partners based on funding sources.
A.4.1 Action
Evaluate and track objectives, strategies and actions of the AIS Plan and report to US Fish and Wildlife Service and other interested parties.

A.4.2 Action
Review and update the AIS Management Plan every five years or as deemed necessary.

Strategy A.5
Coordinate and collaborate with local, state, federal, tribal governments, AIS stakeholders and legislators.

A.5.1 Action
Continue annual coordination meetings and/or conference calls with the AIS Management Plan Working Group.

A.5.2 Action
Evaluate and contact new potential statewide and out of state new members to the AIS Management Plan Working Group.

A.5.3 Action
Develop and provide biennium AIS program reports to be submitted and/or available on-line to the Nevada State and federal Legislators, federal/state and tribal partners and stakeholders.

Strategy A.6
Participate in regional AIS management efforts, including but not limited to the ANS Task Force’s Western Regional Panel on ANS, 100th Meridian Columbia River Basin Team, Colorado River Basin Team, Lake Tahoe AIS Coordinating Committee, and Southern Nevada Interagency AIS Quagga Meetings.

A.6.1 Action
Provide program presentations and participate in committee’s and working groups that further the advancement of AIS prevention, detection and control methodologies that impact Nevada.

Strategy A.7
Identify areas where more information is needed on oversight and coordination that may be affected by climate change.

A.7.1 Action
Review and incorporate, where appropriate, up to date scientific research related to climate change and AIS into the management plan including prevention, detection, early response and control programs.

A.7.2 Action
Evaluate economic vs ecological harm program considerations.

A.7.3 Action
Coordinate with tribal/local/federal/state and academic entities to remain vigilant to current climate change research.

OBJECTIVE B: PREVENT NEW AIS INTRODUCTIONS

Strategy B.1
Identify and categorize potential new pathways and risk of AIS introductions and hold stakeholder meetings when appropriate to minimize or eliminate introductions.
B.1.1 Action
Coordinate with neighboring state, federal, and local agencies, and academia and field biologists to identify risks and pathways of new species introductions.

B.1.2 Action
Participate in conferences and workshops that assist in establishing risk assessments of new invasive species introductions.

B.1.3 Action
Review and update the Management Plan species list as necessary regarding concerns and AIS types as defined in Appendix A.

B.1.4 Action
Generate species specific actions for prevention and/or control for species with high risk levels of introduction.

B.1.5 Action
Develop and disseminate educational and outreach materials to targeted audiences regarding pathways, new introductions and/or threats. Coordinate with stakeholders and inform the general public on potentially new high risk introductions.

B.1.6 Action
Develop and implement an outreach and educational campaign targeting the aquarium and pet store industry to help prevent AIS introductions.

B.1.7 Action
Evaluate existing laws and regulations to determine their adequacy for preventing potential introductions or the spread of AIS.

B.1.8 Action
Develop new regulations as appropriate to protect Nevada from new AIS introductions and/or to reduce threats.

Strategy B.2
Continue the implementation of a watercraft inspection and decontamination program.

B.2.1 Action
Annually evaluate the effectiveness of the watercraft inspection and decontamination station locations, interceptions, prevention efforts and associated expenses utilizing reporting structures and the Western State’s Interactive mapping database.

B.2.2 Action
Provide AIS field staff with most current acceptable watercraft inspection and decontamination protocols and training on an annual basis.

B.2.3 Action
Provide AIS field staff with job site safety instructions and training; including monthly safety checks and/or training.

B.2.4 Action
Participate, as deemed appropriate, in the Western State’s Watercraft Database Program and the Pacific States Marine Fisheries Watercraft Interception Mapping Program.

B.2.5 Action
Ensure funding opportunities are evaluated and proposals submitted in a timely fashion to establish effective and stable watercraft inspection and decontamination program elements.

**B.2.6 Action**

Ensure adequate support staff and equipment is available to implement the necessary watercraft inspection and decontamination training and provide oversight for the stations.

**Strategy B.3**

Coordinate, as feasible, with tribal government engagement in AIS management, including but not limited to Pyramid Lake Paiute Tribe in their development of prevention methods to protect Pyramid Lake, Wildhorse Reservoir, and the Shoshone-Paiute Tribes of the Duck Valley Reservation.

**B.3.1 Action**

Extend AIS training and coordinate outreach efforts with Nevada’s tribal nations.

**B.3.2 Action**

Extend invitations to Nevada’s tribal nations to participate in the Western Regional Panel and committees and other western regional groups as appropriate.

**Strategy B.4**

Work collaboratively with state, local and federal enforcement personnel to educate staff on AIS regulations to increase engagement with enforcement actions.

**B.4.1 Action**

Develop a plan to engage with various law enforcement entities.

**B.4.2 Action**

Coordinate and train NDOW game wardens and other law enforcement officials in AIS prevention and regulatory compliance.

**Strategy B.5**

Implement Hazard Analysis and Critical Control Point (HACCP) training and plans for appropriate personnel within agencies, and among stakeholders.

**B.5.1 Action**

Conduct interagency and stakeholder HACCP trainings as needed.

**B.5.2 Action**

Develop plans incorporating HACCP recommendations and actions into AIS prevention efforts.

**Strategy B.6**

Identify information needs on AIS prevention that may be affected by climate change.

**B.6.1 Action**

Evaluate current climate change research and coordinate with climate researchers and other states to evaluate the potential risk, prevention, pathways and introductions due to changes in climatic variables.

**OBJECTIVE C: DEVELOP OUTREACH AND EDUCATION TOOLS**

**Strategy C.1**
Develop and implement outreach and education strategies that target major pathways of introduction and reflect regional themes.

**C.1.1 Action**
Collaborate with stakeholders, western states and other local entities to define major pathways and develop consistent regional outreach and education efforts as appropriate.

**C.1.2 Action**
Develop outreach and educational outreach information that targets the specific user of the resource; include multi languages where appropriate.

**C.1.3 Action**
Provide necessary training and outreach materials to AIS personnel and other staff for distribution to the public.

**Strategy C.2**
Develop outreach strategies to target legislative body.

**C.2.1 Action**
Collaborate with western states and local entities to define necessary requests and potential actions.

**C.2.2 Action**
Develop AIS Program reports to be distributed on-line and to impacted legislative bodies.

**Strategy C.3**
Develop communication strategies to stakeholders to encourage collaboration and response.

**C.3.1 Action**
Participate in regional, interagency and local working groups and educational events to promote the prevention and spread of AIS.

**C.3.2 Action**
Work with conservation education experts and non-profit organizations to develop targeted objectives and actions.

**Strategy C.4**
Develop outreach strategies that highlight efforts of programmatic implementation successes and failures.

**C.4.1 Action**
Work with conservation education experts and advertising organizations to develop and provide outreach and educational guidance.

**Strategy C.5**
Develop outreach strategies to improve internal agency understanding and support.

**C.5.1 Action**
Provide periodic program progress reports to agency management.

**C.5.2 Action**
Incorporate agency management into program needs and developments.

**C.5.3 Action**
Collaborate with agency Law Enforcement, Boater Safety Program, Fisheries, Wildlife Diversity, and Conservation Education Divisions of NDOW.
Strategy C.6
With current public outreach efforts consider how information about climate change – invasive species interactions could be shared.

C.6.1 Action
Collaborate with experts from both the outreach community and climate change to develop and implement appropriate outreach tools.

OBJECTIVE D: DEVELOPMONITORING, EARLY DETECTION, AND RESPONSE PLANS

Strategy D.1
Create a comprehensive early detection and monitoring program for species that have a high risk of introduction on waters of the state in collaboration with stakeholders as appropriate. Program evaluation and adaptive management, and climate change impacts are strong components of this effort.

D.1.1 Action
Review and recommend use of appropriate risk assessment when a new AIS species is detected in the State.

D.1.2 Action
Develop a reporting platform for potential AIS sighting by public citizens through hot line reports and on-line reports.

D.1.3 Action
Identify stakeholder agencies or organizations that can verify public sightings.

D.1.4 Action
Facilitate the use of consistent and effective monitoring, sampling protocols and laboratory analysis methods among stakeholders.

D.1.5 Action
Encourage and establish monitoring networks or include other interested parties to work in cooperation with agencies on monitoring.

D.1.6 Action
Coordinate with other agencies to establish monitoring locations and methodologies.

D.1.7 Action
Establish a communication group to discuss and report monitoring results.

D.1.8 Action
Support scientific research efforts, as appropriate, to assist with the identification of vector pathways, early detection, control points, and control options.

D.1.9 Action
Evaluate the role that climatic change may have on new introductions, monitoring, early detection and rapid response.

Strategy D.2
Develop a rapid response framework that defines roles, responsibilities of potential participants, identifies potential funding sources for response actions and identifies potential methods for control for newly introduced species.

D.2.1 Action
Establish elements of the Incident Command System structure to identify roles and responsibilities for new introduced species.

D.2.2 Action
Identify potential funding sources for supporting rapid response activities.

D.2.3 Action
Provide training to appropriate Incident Command Team members for a rapid response.

D.2.4 Action
Retain and update the Incident Command Team frame work and member contact information.

D.2.5 Action
Participate in regional rapid response events, when possible including Lake Tahoe and Columbia River Basin’s Rapid Response Planning Teams.

D.2.6 Action
Evaluate and update available AIS databases to identify AIS establishments and identify problem species, regions, and high risk introductions.

D.2.7 Action
Develop monitoring protocols and identify responsibilities to identify and respond to potential high risk AIS introductions.

OBJECTIVE E: EVALUATE AND DEVELOP LONG-TERM CONTROL MECHANISMS

Strategy E.1
Coordinate with partners on response efforts to control detected AIS, when possible.

E.1.1 Action
Prepare resources and gain authorizations to utilize control measures, as needed.

E.1.2 Action
Identify and encourage research to inform long-term control options and consider areas of climate change-AIS interactions.

E.1.3 Action
Identify areas where more information, including economic and ecological impacts, are needed on long-term control that may be affected by climate change.

OBJECTIVE F: EVALUATE AND DEVELOP AIS LAWS AND REGULATIONS

Strategy F.1
Conduct periodic reviews of current AIS laws and regulations to determine effectiveness, and seek areas of improvement for protections to Nevada waters that reflect regional consistency as appropriate. Review current AIS laws and regulations, and seek areas of improvement for protections to Nevada waters.

F.1.1 Action
Evaluate and adopt, where appropriate, recommendations on regulation modifications from Building Consensus in the West (Showalter Otts and Nanjappa 2014 and 2016)

F.1.2 Action
Coordinate with law enforcement and the attorneys general’s office to incorporate regulations and/or changes to laws.

**F.1.3 Action**

Participate in the development of Tahoe Regional Planning Agency’s regulatory process.
Implementation Table
The implementation table of the Nevada AIS Management plan identifies the funding needed as well as the appropriate agency that will implement portions of the plan. This table is a reflection of the outlined objectives and strategies that have been identified. Refer to Appendix for the completed implementation table.
Implementation Table

**Total Estimated Expenses for Implementation Table (5 year): $4.728m**

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>ACTION</th>
<th>LEAD ORGANIZATION</th>
<th>COOPERATING ORGANIZATION</th>
<th>FUNDING SOURCE</th>
<th>5-YEAR ANTICIPATED FUNDING NEED</th>
<th>PRIORITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1</td>
<td>Maintain a Statewide AIS Coordinator</td>
<td>A.1.1 Promote Nevada’s AIS Program to ensure adequate funding is available, including promotion of Nevada’s Watercraft AIS decal requirement; and evaluation of potential funding opportunities to support the position.</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee &amp; Available Federal Grants</td>
<td>1 FTE 475k</td>
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<tr>
<td>A.2</td>
<td>Implement the Nevada AIS Management Plan including but not limited to internal agency coordination.</td>
<td>A.2.1 Review action items annually for completion and assessment.</td>
<td>NDOW</td>
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<tr>
<td>A.3</td>
<td>Review and adapt the Nevada AIS Management Plan as needed including potential needs associated with climate change adaptation.</td>
<td>A.3.1 Evaluate AIS Plan strategies and actions on an annually basis to determine if AIS introductions and/or spread are influenced by changes in climate.</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
<tr>
<td>A.4</td>
<td>Submit annual progress reports and five-year program report to the US FWS as directed based on funding agreement. Other reports will be provided to other partners based on funding sources and agreements.</td>
<td>A.4.1 Review and update the AIS Management Plan every five years or as deemed necessary.</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee &amp; Available Grants</td>
<td>40k</td>
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<tr>
<td>A.5</td>
<td>Coordinate and collaborate with local, state, federal, tribal</td>
<td>A.5.1 Continue annual coordination meetings and/or conference calls with the AIS</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>10k</td>
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<tr>
<td>STRATEGY</td>
<td>ACTION</td>
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<td>FUNDING SOURCE</td>
<td>5-YEAR ANTICIPATED FUNDING NEED</td>
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<td></td>
<td>A.5.2 Evaluate and contact new potential statewide and out of state new members to the AIS Management Plan Working Group.</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
<td>Med</td>
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<tr>
<td></td>
<td>A.5.3 Develop and provide biennium AIS program reports to be submitted and/or available on-line to the Nevada State and federal Legislators, federal/state and tribal partners and stakeholders.</td>
<td>NDOW</td>
<td>---</td>
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<td>Med</td>
</tr>
<tr>
<td>A.6 Participate in regional AIS management efforts, including but not limited to the ANS Task Force’s Western Regional Panel on ANS, 100th Meridian Columbia River Basin Team, Colorado River Basin Team, Lake Tahoe AIS Coordinating Committee, and Southern Nevada Interagency AIS Quagga Meetings.</td>
<td>A.6.1 Provide program presentations and participate in committee’s and working groups that further the advancement of AIS prevention, detection and control methodologies that impact Nevada.</td>
<td>NDOW</td>
<td>---</td>
<td>---</td>
<td>5k</td>
<td>High</td>
</tr>
<tr>
<td>A.7 Identify areas where more information is needed on oversight and coordination that may be affected by climate change.</td>
<td>A.7.1 Review and incorporate, where appropriate, up to date scientific research related to climate change and AIS into the management plan including prevention, detection, early response and control</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers, Stakeholders &amp; Academia</td>
<td>Available Grants</td>
<td>25k</td>
<td>High</td>
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</table>
## Nevada Aquatic Invasive Species Management Plan

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<tr>
<th>STRATEGY</th>
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<th>LEAD ORGANIZATION</th>
<th>COOPERATING ORGANIZATION</th>
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<th>5-YEAR ANTICIPATED FUNDING NEED</th>
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<td>programs.</td>
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<td>A.7.2</td>
<td>Evaluate economic vs ecological harm program considerations.</td>
<td>NDOW</td>
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<td>-0-</td>
<td>High</td>
</tr>
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<td>A.7.3</td>
<td>Coordinate with tribal/local/federal/state and academic entities to remain vigilant to current climate change research.</td>
<td>NDOW</td>
<td>Academia &amp; Resource Managers</td>
<td>Available Grants</td>
<td>-0-</td>
<td>High</td>
</tr>
</tbody>
</table>

### OBJECTIVE B: PREVENT NEW AIS INTRODUCTIONS

| B.1 Identify and categorize potential new pathways and risk of AIS introductions and hold stakeholder meetings when appropriate to minimize or eliminate introductions. | B.1.1 Coordinate with neighboring state, federal, and local agencies, and academia and field biologists to identify risks and pathways of new species introductions. | NDOW | Academia, Stakeholders & Resource Managers | -- | -0- | High |
|                                                                 | B.1.2 Participate in conferences and workshops that assist in establishing risk assessments of new invasive species introductions. | NDOW | Academia, Stakeholders & Resource Managers | Available Grants | 5k |         |
|                                                                 | B.1.3 Review and update the Management Plan species list as necessary regarding concerns and AIS types as defined in Appendix A. | NDOW | USFWS, & Resource Managers & Stakeholders | Available Grants | 10k | Med     |
|                                                                 | B.1.4 Generate species specific actions for prevention and/or control for species with high risk levels of introduction. | NDOW | USFWS, & Resource Managers & Stakeholders | Available Grants | 10k | High    |
|                                                                 | B.1.5 Develop and disseminate educational resources. | NDOW | USFWS, & AIS Decal | 75k |         |         |
### Nevada Aquatic Invasive Species Management Plan

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<th>5-YEAR ANTICIPATED FUNDING NEED</th>
<th>PRIORITY</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>and outreach materials to targeted audiences regarding pathways, new introductions and/or threats. Coordinate with stakeholders and inform the general public on potentially new high risk introductions.</td>
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<td></td>
<td>B.1.6 Develop and implement an outreach and educational campaign targeting the aquarium and pet store industry to help prevent AIS introductions.</td>
<td>NDOW</td>
<td>USFWS, &amp; AIS Decal Fee and available Grants</td>
<td>50k</td>
<td>High</td>
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<td></td>
<td>B.1.7 Evaluate existing laws and regulations to determine their adequacy for preventing potential introductions or the spread of AIS.</td>
<td>NDOW</td>
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<td></td>
<td>B.1.8 Develop new regulations as appropriate to protect Nevada from new AIS introductions and/or to reduce threats.</td>
<td>NDOW</td>
<td>---</td>
<td>-0-</td>
<td>Med</td>
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<td></td>
<td>B.2 Continue the implementation of a watercraft inspection and decontamination program.</td>
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<td></td>
<td>B.2.1 Annually evaluate the effectiveness of the watercraft inspection and decontamination station locations, interceptions, prevention efforts and associated expenses utilizing reporting structures and the Western State’s Interactive mapping database.</td>
<td>NDOW</td>
<td>USFWS, NPS, USBOR, NSP</td>
<td>3.5m</td>
<td>High</td>
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<tr>
<td></td>
<td>B.2.2 Provide AIS field staff with most current acceptable watercraft inspection and decontamination protocols and training on an annual basis.</td>
<td>NDOW</td>
<td>Western Regional Panel</td>
<td>-0-</td>
<td>High</td>
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<th>STRATEGY</th>
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<th>5-YEAR ANTICIPATED FUNDING NEED</th>
<th>PRIORITY</th>
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<tr>
<td></td>
<td><strong>B.2.3</strong> Provide AIS field staff with job site safety instructions and training; including monthly safety checks and/or training.</td>
<td>NDOW</td>
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<td>-0-</td>
<td>High</td>
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<td></td>
<td><strong>B.2.4</strong> Participate, as deemed appropriate, in the Western State’s Watercraft Database Program and the Pacific States Marine Fisheries Watercraft Interception Mapping Program.</td>
<td>NDOW</td>
<td>Western Regional Panel &amp; Pacific States Marine Fisheries Commission</td>
<td>AIS Decal Fee &amp; Available Grants</td>
<td>100k</td>
<td>Med</td>
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<td></td>
<td><strong>B.2.5</strong> Ensure funding opportunities are evaluated and proposals submitted in a timely fashion to establish effective and stable watercraft inspection and decontamination program elements.</td>
<td>NDOW</td>
<td>---</td>
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<td>-0-</td>
<td>High</td>
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<td></td>
<td><strong>B.2.6</strong> Ensure adequate support staff and equipment is available to implement the necessary watercraft inspection and decontamination training and provide oversight for the stations.</td>
<td>NDOW</td>
<td>NPS, NSP &amp; other Resource Managers</td>
<td>---</td>
<td>-0-</td>
<td>High</td>
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<tr>
<td></td>
<td><strong>B.3</strong> Coordinate, as feasible, with tribal government engagement in AIS management, including but not limited to Pyramid Lake Paiute Tribe in their development of prevention methods to protect Pyramid Lake, Wildhorse Reservoir, and the Shoshone-</td>
<td>NDOW</td>
<td>USFWS, PLPT, &amp; other NV Tribal Partners</td>
<td>Available Grants</td>
<td>8k</td>
<td>High</td>
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<td></td>
<td><strong>B.3.1</strong> Extend AIS training and coordinate outreach efforts with Nevada’s tribal nations.</td>
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<td></td>
<td><strong>B.3.2</strong> Extend invitations to Nevada’s tribal nations to participate in the Western Regional Panel and committees and other western regional groups as appropriate.</td>
<td>Western Regional Panel</td>
<td>Western Regional Panel, PLPT, &amp; other NV Tribal Partners and</td>
<td>---</td>
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<td>Med</td>
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<td>STRATEGY</td>
<td>ACTION</td>
<td>LEAD ORGANIZATION</td>
<td>COOPERATING ORGANIZATION</td>
<td>FUNDING SOURCE</td>
<td>5-YEAR ANTICIPATED FUNDING NEED</td>
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<td>Paiute Tribes of the Duck Valley Reservation.</td>
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<td>Resource Managers</td>
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<tr>
<td><strong>B.4</strong> Work collaboratively with state, local and federal enforcement personnel to educate staff on AIS regulations to increase engagement with enforcement actions.</td>
<td><strong>B.4.1</strong> Develop a plan to engage with various law enforcement entities.</td>
<td>NDOW</td>
<td>NPS, County Sheriff Dept., NV Highway Patrol, Tribal Police</td>
<td>---</td>
<td>5k</td>
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<td></td>
<td><strong>B.4.2</strong> Coordinate and train NDOW game wardens and other law enforcement officials in AIS prevention and regulatory compliance.</td>
<td>NDOW</td>
<td>NPS, County Sheriff Dept. NV Highway Patrol, Tribal Police</td>
<td>---</td>
<td>-0-</td>
<td>Med</td>
</tr>
<tr>
<td><strong>B.5</strong> Implement Hazard Analysis and Critical Control Point (HACCP) training and plans for appropriate personnel within agencies, and among stakeholders.</td>
<td><strong>B.5.1</strong> Conduct interagency and stakeholder HACCP trainings as needed.</td>
<td>NDOW &amp; USFWS</td>
<td>All partners</td>
<td>USFWS &amp; Available Grants</td>
<td>10k</td>
<td>High</td>
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<tr>
<td></td>
<td><strong>B.5.2</strong> Develop plans incorporating HACCP recommendations and actions into AIS prevention efforts.</td>
<td>NDOW &amp; USFWS</td>
<td>All Partners</td>
<td>USFWS &amp; Available Grants</td>
<td>-0-</td>
<td>Med</td>
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<tr>
<td><strong>B.6</strong> Identify information needs on AIS prevention that may be affected by climate change.</td>
<td><strong>B.6.1</strong> Evaluate current climate change research and coordinate with climate researchers and other states to evaluate the potential risk, prevention, pathways and introductions due to changes in climatic variables.</td>
<td>NDOW, USFWS, Academia</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee &amp; Available Federal Grants</td>
<td>20k</td>
<td>Med</td>
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</tbody>
</table>

**OBJECTIVE C: DEVELOP OUTREACH AND EDUCATION TOOLS**

<p>| C.1 Develop and implement outreach and education strategies that target major | C.1.1 Collaborate with stakeholders, western states and other local entities to define major pathways and develop consistent regional | NDOW | Western Regional Panel | AIS Decal Fee &amp; Available | -0- | Med |</p>
<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>ACTION</th>
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<th>COOPERATING ORGANIZATION</th>
<th>FUNDING SOURCE</th>
<th>5-YEAR ANTICIPATED FUNDING NEED</th>
<th>PRIORITY</th>
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<tr>
<td>pathways of introduction and reflect regional themes.</td>
<td>outreach and education efforts as appropriate.</td>
<td></td>
<td></td>
<td>Federal Grants</td>
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<tr>
<td>C.1.2 Develop outreach and educational outreach information that targets</td>
<td>NDOW</td>
<td>Western Regional Panel</td>
<td>AIS Decal Fee &amp; Available Federal Grants</td>
<td>275k</td>
<td>High</td>
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<td>the specific user of the resource; Include multi languages where</td>
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<td>appropriate.</td>
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<td>C.1.3 Provide necessary training and outreach materials to AIS personnel</td>
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<td>and other staff for distribution to the public.</td>
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<tr>
<td>C.2 Develop outreach strategies to target legislative body.</td>
<td>C.2.1 Collaborate with western states and local entities to define</td>
<td>NDOW</td>
<td>Western Regional Panel</td>
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<td>necessary requests and potential actions.</td>
<td>necessary requests and potential actions.</td>
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<td>C.2.2 Develop AIS Program reports to be distributed on-line and to</td>
<td>NDOW</td>
<td>Western Regional Panel</td>
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<td>impact legislative bodies.</td>
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<td>C.3 Develop communication strategies to stakeholders to encourage</td>
<td>C.3.1 Participate in regional, interagency and local working groups</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
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<td>collaboration and response.</td>
<td>and educational events to promote the prevention and spread of AIS.</td>
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<td>C.3.2 Work with conservation education experts and non-profit</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
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<td>organizations to develop targeted objectives and actions.</td>
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<td>C.4 Develop outreach strategies that highlight efforts of</td>
<td>C.4.1 Work with conservation education experts and advertising</td>
<td>NDOW</td>
<td>USFWS, &amp; AIS Decal Fee and</td>
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<td>organizations to protect the state.</td>
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### Nevada Aquatic Invasive Species Management Plan

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<tbody>
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<td></td>
<td>develop and provide outreach and educational guidance.</td>
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<td>Managers &amp; Stakeholders</td>
<td>Available Grants</td>
<td>-0-</td>
<td>High</td>
</tr>
<tr>
<td>C.5 Develop outreach strategies to improve internal agency understanding and support.</td>
<td>C.5.1 Provide periodic program progress reports to agency management.</td>
<td>NDOW</td>
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<td>-0-</td>
<td>High</td>
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<td>C.5.2 Incorporate agency management into program needs and developments.</td>
<td>NDOW</td>
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<td>-0-</td>
<td>High</td>
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<tr>
<td></td>
<td>C.5.3 Collaborate with agency Law Enforcement, Boater Safety Program, Fisheries, Wildlife Diversity, and Conservation Education Divisions of NDOW.</td>
<td>NDOW</td>
<td>---</td>
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<td>-0-</td>
<td>High</td>
</tr>
<tr>
<td>C.6 With current public outreach efforts consider how information about climate change – invasive species interactions could be shared.</td>
<td>C.6.1 Collaborate with experts from both the outreach community and climate change to develop and implement appropriate outreach tools.</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
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<td>-0-</td>
<td>Med</td>
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### OBJECTIVE D: DEVELOP MONITORING, EARLY DETECTION AND, RESPONSE PLANS

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<th>5-YEAR ANTICIPATED FUNDING NEED</th>
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<tbody>
<tr>
<td>D.1 Create a comprehensive early detection and monitoring program for species that have a high risk of introduction on waters of the state in collaboration with stakeholders as appropriate. Program evaluation and adaptive management, and climate change impacts are strong components of this effort.</td>
<td>D.1.1 Review and recommend use of appropriate risk assessment when a new AIS species is detected in the State.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
<tr>
<td></td>
<td>D.1.2 Develop a reporting platform for potential AIS sighting by public citizens through hot line reports and on-line reports.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee and Available Grants</td>
<td>25k</td>
</tr>
<tr>
<td></td>
<td>D.1.3 Identify stakeholder agencies or organizations that can verify public sightings.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
<tr>
<td>STRATEGY</td>
<td>ACTION</td>
<td>LEAD ORGANIZATION</td>
<td>COOPERATING ORGANIZATION</td>
<td>FUNDING SOURCE</td>
<td>5-YEAR ANTICIPATED FUNDING NEED</td>
</tr>
<tr>
<td>----------</td>
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<td>--------------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>D.1.4</td>
<td>Facilitate the use of consistent and effective monitoring, sampling protocols and laboratory analysis methods among stakeholders.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
<tr>
<td>D.1.5</td>
<td>Encourage and establish monitoring networks or include other interested parties to work in cooperation with agencies on monitoring.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee and Available Grants</td>
<td>50k</td>
</tr>
<tr>
<td>D.1.6</td>
<td>Coordinate with other agencies to establish monitoring locations and methodologies.</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
<tr>
<td>D.1.7</td>
<td>Establish a communication group to discuss and report monitoring results.</td>
<td>NDOW &amp; Resource Managers</td>
<td></td>
<td>---</td>
<td>-0-</td>
</tr>
<tr>
<td>D.1.8</td>
<td>Support scientific research efforts, as appropriate, to assist with the identification of vector pathways, early detection, control points, and control options.</td>
<td>NDOW, Resource Managers and Academia</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee and Available Grants</td>
<td>50k</td>
</tr>
<tr>
<td>D.1.9</td>
<td>Evaluate the role that climatic change may have on new introductions, monitoring, early detection and rapid response.</td>
<td>NDOW, Resource Managers and Academia</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee and Available Grants</td>
<td>25k</td>
</tr>
<tr>
<td>D.2</td>
<td>Develop a rapid response framework that defines roles, responsibilities of potential</td>
<td>D.2.1 Establish elements of the Incident Command System structure to identify roles and responsibilities for new introduced</td>
<td>NDOW, USFWS, Resource Managers,</td>
<td>USFWS, &amp; Resource Managers &amp;</td>
<td>AIS Decal Fee and Available</td>
</tr>
<tr>
<td>STRATEGY</td>
<td>ACTION</td>
<td>LEAD ORGANIZATION</td>
<td>COOPERATING ORGANIZATION</td>
<td>FUNDING SOURCE</td>
<td>5-YEAR ANTICIPATED FUNDING NEED</td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>------------------</td>
<td>------------------------</td>
<td>----------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>participants, identifies potential funding sources for response actions and identifies potential methods for control for newly introduced species.</td>
<td>species.</td>
<td>Stakeholders</td>
<td>Stakeholders</td>
<td>Grants</td>
<td></td>
</tr>
<tr>
<td>D.2.2 Identify potential funding sources for supporting rapid response activities.</td>
<td>NDOW, USFWS, Resource Managers, Stakeholders</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
<td>High</td>
</tr>
<tr>
<td>D.2.3 Provide training to appropriate Incident Command Team members for a rapid response.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee and Available Grants</td>
<td>10k</td>
<td>High</td>
</tr>
<tr>
<td>D.2.4 Retain and update the Incident Command Team frame work and member contact</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
<td>High</td>
</tr>
<tr>
<td>D.2.5 Participate in regional rapid response events, when possible including Lake Tahoe and Columbia River Basin’s Rapid Response Planning Teams.</td>
<td>NDOW</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee and Available Grants</td>
<td>2.5k</td>
<td>High</td>
</tr>
<tr>
<td>D.2.6 Evaluate and update available AIS databases to identify AIS establishments and identify problem species, regions, and high risk introductions.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
<td>High</td>
</tr>
<tr>
<td>D.2.7 Develop monitoring protocols and identify responsibilities to identify and respond to potential high risk AIS introductions.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>Undefined without known organism</td>
<td>High</td>
</tr>
</tbody>
</table>

**OBJECTIVE E: EVALUATE AND DEVELOP LONG-TERM CONTROL MECHANISMS**
### STRATEGY

<table>
<thead>
<tr>
<th>ACTION</th>
<th>LEAD ORGANIZATION</th>
<th>COOPERATING ORGANIZATION</th>
<th>FUNDING SOURCE</th>
<th>5-YEAR ANTICIPATED FUNDING NEED</th>
<th>PRIORITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.1 Coordinate with partners on response efforts to control detected AIS, when possible.</td>
<td>E.1.1 Prepare resources and gain authorizations to utilize control measures, as needed.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
<tr>
<td></td>
<td>E.1.2 Identify and encourage research to inform long-term control options and consider areas of climate change-AIS interactions.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>AIS Decal Fee and Available Grants</td>
<td>50k</td>
</tr>
<tr>
<td></td>
<td>E.1.3 Identify areas where more information, including economic and ecological impacts, are needed on long-term control that may be affected by climate change.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
</tbody>
</table>

### OBJECTIVE F: EVALUATE AND DEVELOP AIS LAWS AND REGULATIONS

<table>
<thead>
<tr>
<th>ACTION</th>
<th>LEAD ORGANIZATION</th>
<th>COOPERATING ORGANIZATION</th>
<th>FUNDING SOURCE</th>
<th>5-YEAR ANTICIPATED FUNDING NEED</th>
<th>PRIORITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.1 Conduct periodic reviews of current AIS laws and regulations to determine effectiveness, and seek areas of improvement for protections to Nevada waters that reflect regional consistency as appropriate. Review current AIS laws and regulations, and seek areas of improvement for protections to Nevada waters.</td>
<td>F.1.1 Evaluate and adopt, where appropriate, recommendations on regulation modifications from WRP’s Building Consensus in the West</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
<tr>
<td></td>
<td>F.1.2 Coordinate with law enforcement and the attorneys general’s office to incorporate regulations and/or changes to laws.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
<tr>
<td></td>
<td>F.1.3 Participate in the development of Tahoe Regional Planning Agency’s regulatory process.</td>
<td>NDOW &amp; Resource Managers</td>
<td>USFWS, &amp; Resource Managers &amp; Stakeholders</td>
<td>---</td>
<td>-0-</td>
</tr>
</tbody>
</table>
Climate Change and Invasive Species in Nevada

Understanding the impacts of AIS in tandem with potential changes to regional climate is an area of management interest but also of uncertainty. Research is needed to better understand possible impacts to Nevada waters and their risks from AIS. The synergistic effects of climate change and invasive species upon the ecosystems of Nevada are uncertain and stress a need to develop adaptive management strategies (Figure 4).

Guidance documents on adaptation considerations can assist managers in how best to integrate climate change into AIS management (e.g. US EPA 2008, Hellmann et al. 2008, and Pyke et al. 2008).

A variety of scenarios may be possible and understanding the response of invasive species to changes in water temperatures as well as habitat connectivity affecting invasion success will be relevant factors to consider. The trend in warmer temperatures may affect control programs. Earlier warm temperatures in the spring and later warm temperatures in the fall create a longer growing period. These changes could result in control actions being applied at a more frequent rate (Rahel and Olden 2008). For example, effort to address quagga mussels throughout the Colorado River system may be faced with increased control efforts due to extended periods of warmer temperatures. Additionally, reservoirs can facilitate the spread of invasive species compared to natural lake systems (Havel et al. 2005). Reservoirs in arid climates with less abundant surface water will be of particular interest. The synergistic effects of climate change and invasive species upon the ecosystems of Nevada are uncertain and emphasize a need to develop adaptive management strategies.

Finally, according to the National Census (US Census Bureau 2010) in the last decade, Nevada is among the states with the highest population growth in the nation. Nevada is in close proximity to major
population centers such as Los Angeles, Phoenix, Sacramento, and San Francisco and popular destinations, such as Lake Tahoe and Lake Mead, have noted annual increases in general visitation and park visitation numbers over the last 5 years (Nevada Division of Tourism 2016). Rapidly growing Nevada could face some significant impacts to water resources in the future when combined with climate change. Climate-influenced streamflow could strain ecosystems already affected by invasive species. The following AIS objectives were explored as a means to consider anticipating the impacts of climate change.

### Table 2. Climate Change Considerations for AIS Management Objectives.

<table>
<thead>
<tr>
<th>AIS Management Objective</th>
<th>Climate Change Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention</td>
<td>• The completion of HACCP efforts highlight areas of introduction and spread of AIS. Plans that have already been completed may be re-examined and revised periodically whether climate impacts are realized or not.</td>
</tr>
<tr>
<td></td>
<td>• A changing climate may create the opportunity for previous unidentified pathways of introduction or spread. Therefore a re-evaluation of vectors under new climate scenarios will allow managers to better identify resources at risk.</td>
</tr>
<tr>
<td>Outreach and Education</td>
<td>• Outreach and education on AIS is currently underway. As new materials are developed consideration of integrating information about climate change and how it may affect AIS management will help inform the public on anticipated impacts.</td>
</tr>
<tr>
<td>Early Detection, Monitoring and Rapid Response</td>
<td>• Monitoring efforts will be a critical aspect that may aid in detecting changes to ecosystems under the influences of a changing climate. Consider that there may be a need to examine a variation in monitoring protocol under different spatial and temporal situations as well as in sampling techniques (Hellmann et al. 2008).</td>
</tr>
<tr>
<td>Control and Eradication</td>
<td>• When there are changes to habitats or even in success of particular invasive species that are currently in a control</td>
</tr>
</tbody>
</table>
management situation, a re-evaluation of current control strategies may be required as conditions change (US EPA 2008).

| Laws and Regulations | There are climate change policy considerations that may be reflected in AIS policy. Pyke et al. (2008) suggest that several aspects of policy should define the following; a) characterize interactions between invasive species and climate change; b) identify areas where climate change policies could negatively affect invasive species management, and c) identify areas where policies could benefit from the synergies between climate change and invasive species management. |
Rapid Response Strategy

Preparation in advance of the discovery of AIS is an important management aspect which is often overlooked. Several preparation aspects are helpful to determine prior to a discovery, including understanding authorities to respond, sources of funding that may be utilized, tools that may be needed or acquired to respond, and the command system that will be used to react to a discovery.

Often when faced with the need to respond to a new discovery, agency leadership can find there are gaps in legal authorities to act or there are unclear lines of leadership to take control of the situation. Spending time in advance of a discovery helps agency partners’ work though any potential hurdles prior to being under the duress of high-pressure decision making. Similarly, prior to a discovery, it is important to determine what, if any funding would be available to address specific response actions. This may include understanding the availability of emergency funding or setting up a mechanism to make funds available quickly. Anticipating what tools might be needed for response is also a valuable step in preparation. In some cases, securing materials that can be stored for future needs may be an option.

The use of the Incident Command System (ICS) is the preferred method to structure a response. The ICS is utilized by and a product of the Federal Emergency Management Agency’s National Incident Management System program. The ICS provides clear structure for leadership and common language that all participants can use.

Below is a basic flow of events when faced with an AIS discovery to initiate a rapid response.

I. Verify – This step is used to confirm the identification of the suspected population of AIS.

II. Initial Notifications – This step is to communicate with all affected parties with jurisdiction who will be engaged in response decisions. The identification of appropriate tiers of agencies and entities is an important step to streamlining communications.

III. Activate appropriate elements of a response plan – This step engages a response team in addressing the issue in context.

IV. Define the extent of the infestation – This step helps to confirm the scope of the discovered population, which in turn helps to guide further actions and those with jurisdiction.

V. Initiate external communications – This step creates a communication line to stakeholders, the media and members of the public.

VI. Prevent further spread – This step identifies and implements actions to prevent spread from the identified area.

VII. Initiate available and appropriate control measures – This step identifies and implements actions to eradicate or contain the discovered population.

VIII. Conduct after-action and debrief – This step allows all parties engaged in the rapid response event to improve and learn from actions taken.

A number of existing tools can help inform the future development of specific planning tools for Nevada. The Columbia River Basin Interagency Invasive Species Response Plan (100th Meridian Initiative 2014) as well as other neighboring states have developed guidelines should management agencies be faced with the discovery of dreissenid mussels or other AIS that require a timely coordinated response.
Plan Review

The Nevada State AIS Management Plan is a document that shall be reviewed on a periodic basis to reflect regional changes both in threats posed to Nevada resources as well as management strategies meant to improve response and prevention measures for Nevada. NDOW will conduct an annual review of programs and collaborations and provide this information to FWS at their direction. Minor revisions may be considered for incorporation into the Nevada AIS Management Plan as appropriate. The structure of the current plan allows for minor adjustments to be made to the document that will not require approval from the federal ANS Task Force. The easily updated plan structure places dynamic information in Appendices and static concepts in the body of the Plan. The types of dynamic information that may be subject to minor changes include, but are not limited to; strategies to implement objectives, and updates to Nevada legislation or regulation. Finally, there may be a need to modify strategies in the future if new information on climate or AIS becomes available.
Conclusion
Addressing AIS continues to be an evolving area of management as our scientific understanding improves, political climate varies and management tools grow. An AIS Management Plan for Nevada will help provide specific guidance to elevate AIS management issues in the state. As with any complex natural resource management issue, the support and expansion of collaborative efforts will only work to protect Nevada’s unique resources into the future.
Literature Cited


Nevada Aquatic Invasive Species Management Plan


Showalter Otts S and P Nanjappa, eds. 2014. Preventing the Spread of Aquatic Invasive Species by Recreational Boats: Model Legislative Provisions and Guidance to Promote Reciprocity State Watercraft Inspection and Decontamination Programs. National Sea Grant Law Center, University, MS. Pp44.
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Showalter Otts S and P Nanjappa, eds. 2016. Model Regulation for State Watercraft Inspection and Decontamination Programs. National Sea Grant Law Center, University, MS. Pp 42.


Tietjen TE, and GC Holdren. 2010. Lake Mead Limnology and Ecosystem Management: Lake and Reservoir Management 26:229.


White House Committee on Climate Change. 2014. National Climate Assessment, pp. 841.

Glossary

**Aquatic invasive species** – as per Executive Order 13112, an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

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

**Containment** – to stop or attempt to stop AIS from spreading.

**Control** – 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; to mitigate against the effect of AIS through reductions in the species population size.

**Decontamination** – a treatment with the intent to kill, destroy, and remove AIS to the extent technically and measurably possible.

**Dreissenid mussel** – freshwater, bivalve mollusks that typically have a dark and white striped pattern on their shell. Dreissenid mussels of interest are *Dreissena polymorpha* and *Dreissena rostiformis bugensis* which are non-native.

**Eradicate** – managing invasive species with a goal to completely eliminate the invasive species population from a specified waterbody or habitat.

**Hazard Analysis Critical Control Points** – a management tool that provides a structured method to identify risks and focus procedures that is being successfully used in natural resource pathway activities.

**Incident Command System** – a standardized on-scene incident management concept designed to allow responders to adopt in integrated organizational structure equal to the complexity and demands of any single incident or multiple incidents without being hindered by jurisdictional boundaries. ICS is commonly used in emergency situations.

**Infested waterbody** – a waterbody that has an established (recruiting or reproducing) population of AIS.

**Inspection** – Process to determine whether a conveyance presents and AIS risk.

**Introduction** – intentional or unintentional escape, release, dissemination, or placement of a species into an ecosystem as a result of human activity.

**Invasive Species** - as per Executive Order 13112, an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.

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

**Nuisance Species** – this term is often synonymous with invasive species, and for the purposes of this plan all references to nuisance species will agree with invasive species.

**Pathogen** – a biological agent that causes disease or illness to its host.

**Pathway** – refers to the mode by which an invasive species can be transported or introduced into a novel environment; see vector.
Nevada Aquatic Invasive Species Management Plan

**Prevention** – to stop or attempt to stop the introduction of AIS.

**Vector** – refers to the mode by which an invasive species can be transported or introduced into a novel environment; see pathway.

**Veliger** – planktonic larvae of many bivalve mollusks, including quagga and zebra mussels.
Appendices
Appendix A: Ranking Aquatic Invasive Species for Management Priority

Non-native species that have been detected in Nevada as well as those that pose a threat to Nevada ecosystems and economies have been identified here. USGS NAS Database houses all records of non-indigenous species and has informed the following information as well as expert consultation. The AIS Management Plan Team has built this list through scientific understanding and discussion. This is an incomplete list that will be reviewed and updated as additional information becomes available. Categorizing species for management allows agencies and stakeholders to prioritize efforts and funding.

The status of a species defines the current knowledge of its presence in Nevada as well as management considerations. The status types are defined as follows:

**Type 1:** A species which has not yet been detected in Nevada with a possible risk potential for introduction and establishment;

**Type 2:** A species which is limited in its geographic distribution in Nevada and control options may be available;

**Type 3:** A species established in Nevada and control options may be available;

**Type 4:** A species established in Nevada and no control options are available; and

**Type 5:** A species that poses an unknown risk potential for establishment in Nevada.

The rank delineation supplies management information for level of management concern and action with the rank type of greatest to least concern, respectively:

**Watch (WATCH):** species that are not established, have a high potential for introduction to Nevada either by natural range expansion or unauthorized introductions and have a high probability of economic and/or ecological impact,

**High (HIGH):** established species or species for which there is a high probability of economic and/or ecological impact,

**Low (LOW):** species that are widely established but with minimal impact, and

**Unknown (UNK):** species where there is limited information to make a determination of economic or ecological impact to Nevada.
## Ranking Aquatic Invasive Species for Management Priority

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Status</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mollusks</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Corbicula fluminea</em></td>
<td>Asian clam(^1)</td>
<td>Type 3</td>
<td>LOW</td>
</tr>
<tr>
<td><em>Dreissena bugensis</em></td>
<td>quagga mussel</td>
<td>Type 4</td>
<td>HIGH</td>
</tr>
<tr>
<td><em>Dreissena polymorpha</em></td>
<td>zebra mussel</td>
<td>Type 1</td>
<td>WATCH</td>
</tr>
<tr>
<td><em>Limnoperna fortunei</em></td>
<td>golden mussel</td>
<td>Type 1</td>
<td>WATCH</td>
</tr>
<tr>
<td><em>Pomocea spp.</em></td>
<td>apple snail</td>
<td>Type 1</td>
<td>UNK</td>
</tr>
<tr>
<td><em>Potamopyrgus antipodarium</em></td>
<td>New Zealand mudsnail</td>
<td>Type 4</td>
<td>LOW</td>
</tr>
<tr>
<td><strong>Crustaceans</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Cherax quadricarinatus</em></td>
<td>Australian red claw crayfish</td>
<td>Type 2</td>
<td>HIGH</td>
</tr>
<tr>
<td><em>Orconectes rusticus</em></td>
<td>rusty crayfish</td>
<td>Type 1</td>
<td>WATCH</td>
</tr>
<tr>
<td><em>Pacifastacus leniusculus</em></td>
<td>signal crayfish</td>
<td>Type 2</td>
<td>HIGH</td>
</tr>
<tr>
<td><em>Procambarus clarkia</em></td>
<td>swamp crayfish</td>
<td>Type 3</td>
<td>HIGH</td>
</tr>
<tr>
<td><strong>Reptiles and Amphibians</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Apalone spinifera</em></td>
<td>spiny softshell turtle</td>
<td>Type 2</td>
<td>HIGH</td>
</tr>
<tr>
<td><em>Trachemys scripta elegans</em></td>
<td>red-eared slider</td>
<td>Type 2</td>
<td>WATCH</td>
</tr>
<tr>
<td><em>Lithobates catesbeianus</em></td>
<td>American bullfrog</td>
<td>Type 2</td>
<td>WATCH</td>
</tr>
<tr>
<td><em>Nerodia fasciata fasciata</em></td>
<td>Southern watersnake</td>
<td>Type 1</td>
<td>WATCH</td>
</tr>
<tr>
<td><em>Xenopus spp.</em></td>
<td>African clawed frog</td>
<td>Type 1</td>
<td>UNK</td>
</tr>
<tr>
<td><strong>Fishes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Archocentrus nigrofasciatus</em></td>
<td>convict cichlid</td>
<td>Type 3</td>
<td>HIGH</td>
</tr>
<tr>
<td><em>Cetopsidae and Trichomycteridae</em></td>
<td>South American parasitic catfish</td>
<td>Type 1</td>
<td>UNK</td>
</tr>
<tr>
<td><em>Channa argus</em></td>
<td>snakehead</td>
<td>Type 1</td>
<td>HIGH</td>
</tr>
<tr>
<td><em>Cyprinella lutrensis</em></td>
<td>red shiner</td>
<td>Type 3</td>
<td>HIGH</td>
</tr>
<tr>
<td><em>Cyprinus carpio</em></td>
<td>common carp</td>
<td>Type 4</td>
<td>LOW</td>
</tr>
<tr>
<td><em>Esox lucius</em></td>
<td>northern pike</td>
<td>Type 3</td>
<td>HIGH</td>
</tr>
<tr>
<td><em>Gambusia affinis</em></td>
<td>western mosquitofish</td>
<td>Type 3</td>
<td>HIGH</td>
</tr>
<tr>
<td><em>Lepisosteidae spp.</em></td>
<td>gar</td>
<td>Type 1</td>
<td>UNK</td>
</tr>
<tr>
<td><em>Lates and Luciolates spp.</em></td>
<td>Nile perch</td>
<td>Type 1</td>
<td>UNK</td>
</tr>
<tr>
<td><em>Hoplias malabrais</em></td>
<td>tiger fish</td>
<td>Type 1</td>
<td>UNK</td>
</tr>
</tbody>
</table>

\(^1\) Due to the status of Lake Tahoe as an “Outstanding Natural Resource Water” under the Clean Water Act, Tahoe Regional Planning Agency AIS Management Plan may have assigned a different management priority to this species.
### Scientific Name | Common Name | Status | Rank
--- | --- | --- | ---
*Hypophthalmichthys molitrix* | silver carp | Type 1 | WATCH
*Hypophthalmichthys nobilis* | bighead carp | Type 2 | WATCH
*Hypostomus plecostomus* | sailfin catfish species | Type 1 | HIGH
*Monopterus spp.* | Asian swamp eel | Type 1 | UNK
*Neogobius melanostomus* | round goby | Type 1 | UNK
*Pirania spp.* | Piranha | Type 1 | UNK
*Poecilia latipinna x velifera* | black molly | Type 3 | HIGH
*Poecilia reticulate* | guppy | Type 3 | HIGH
*Pterygoplichthys spp.* | sailfin catfish | Type 1 | HIGH
*Pylodictis olivaris* | flathead catfish | Type 1 | HIGH
*Tilapia and Sarotherodon* | tilapia | Type 3 | HIGH

### Aquatic and Riparian Plants

| Scientific Name | Common Name | Status | Rank |
--- | --- | --- | ---
*Myriophyllum spicatum* | Eurasian watermilfoil | Type 3 | HIGH
*Potamogeton crispus* | Curly-leaf pondweed | Type 3 | HIGH
*Hydrilla verticillata* | Hydrilla | Type 1 | HIGH
*Salvinia molesta* | giant salvinia | Type 1 | HIGH
*Elodea spp.* | Elodea | Type 1 | HIGH
*Eichhornia crassipes* | water hyacinth | Type 1 | HIGH
*Nitellopsis obtusa* | starry stonewort | Type 1 | HIGH
*Tamarix spp.* | tamarisk | Type 3 | HIGH
*Lepidium latifolium* | whitetop | Type 3 | HIGH

### Pathogens

| Scientific Name | Common Name | Status | Rank |
--- | --- | --- | ---
*Bothriocephalus acheilognathi* | Asian tapeworm | Type 3 | HIGH
*Myxobolus cerebralis* | whirling disease parasite | Type 4 | LOW
*Novirhabdovirus* | viral hemorrhagic septicemia | Type 1 | HIGH
*Ranavirus* | largemouth bass virus | Type 1 | HIGH
*Spring viraemia of carp virus* | carp virus | Type 1 | HIGH
Appendix B: Description of Priority Species for Management

Species listed here include ones that have been detected in Nevada and those not yet detected but of management concern due to potential economic or ecological impacts. For each species information has been provided on the known distribution if present in Nevada, pathways of introduction and spread and management considerations. General information on each species was generated from the NAS USGS Database. More information can be learned on each species including distribution maps and collection information at this site.

Mollusks, Crustaceans, and Fish

Invasive aquatic animals may include fish, bivalves, gastropods, amphibians, mammals and macroinvertebrates.

A. Present in Nevada

1. Quagga mussel (*Dreissena bugensis*) are native to Eurasia and first detected in Nevada in 2007. In Nevada, this species is found in the Colorado Basin only.
   - Pathways for introduction and spread include movement of fouled watercraft, natural flow of water from infested waterbodies and any other fouled equipment moved from infested waters.
   - Management considerations for quagga mussels are a primary driver for current programmatic efforts in Nevada. Preventing their spread to other Nevada waterbodies include rigorous watercraft inspection. Control or eradication are not possible with the current population. If *D. bugensis* were to be found in a new waterbody, possible chemical (e.g. potash) or physical (waterbody draw down) eradication techniques would be considered.

2. Crayfishes. There are three non-native crayfish to Nevada including rusty crayfish (*Orconectes rusticus*) which is native to the Ohio River Basin, swamp crayfish (*Procambarus clarkia*) native to the Gulf coastal plain and the southern Mississippi River Basin and signal crayfish (*Pacifastacus leniusculus*) are native to the Pacific Northwest of the United States. Rusty crayfish are found in Spring Mountain Ranch State Park (Clark County). Swamp crayfish are found in Lake Mead and many waters within Nye County. Signal crayfish have been found in Lake Tahoe, Lahontan Reservoir and many waterbodies in western Nevada.
   - Pathways for introduction include bait transfer and aquarium trade.
   - Management considerations for invasive crayfish include an examination of bait rules. In locations where invasive crayfish threaten native species an exploration of eradication efforts may be appropriate.

3. Asian clam (*Corbicula fluminea*) is native to Asia, the Mediterranean and Africa. This species is highly ubiquitous throughout Nevada waters.
   - Pathways for introduction and spread of this species are not well understood. However it is assumed that fouled watercraft and other contaminated equipment can spread this species.
   - Management considerations for Asian clams in Nevada fall into two areas: Lake Tahoe management efforts implemented by the Tahoe Regional Planning Agency which
include a full suite of control techniques to eradicate the species from the Lake. However, elsewhere in Nevada there are no control efforts implemented to address Asian clams.

4. Northern Pike (*Esox lucius*) are native to Arctic, Great Lakes and Mississippi River Basin. This species has been found in multiple waters across the state including the Truckee River, Lahontan Reservoir, Humboldt River, and numerous smaller waters.
   - Pathways for introduction of pike are typically illegal introduction or agency stocking programs.
   - Management considerations for pike include education and outreach on illegal fish planting, examination of current fines associated with illegal introductions, and possible fish removal efforts.

5. Red-eared slider (*Trachemys scropta elegans*) indigenous range broadly covers the Midwestern United States with the closest introduced populations in California, and Lake Mead, Lake Mohave and the lower Colorado River.
   - Pathways for introduction most likely are pet release and escape.
   - Management considerations for this turtle species include increased outreach and education to pet owners, pet industry, classrooms and other partners, consideration to include as state prohibited wildlife, and consideration to legally prohibit their sale in the state.

**Not reported in Nevada but of priority**

1. Zebra mussel (*Dreissena polymorpha*) are native to East Asia and China. Introduced populations of *D. polymorpha* have occurred across Eastern United States, and in locations in California.
   - Pathways for introduction are similar to *D. bugensis* with fouled watercraft, and contaminated equipment.
   - Management considerations for *D. polymorpha* are addressed in the current management approach with watercraft inspection and decontamination. If *D. polymorpha* were to be found in a new waterbody, possible chemical (e.g. potash) or physical (waterbody draw down) eradication techniques would be considered.

2. Asian tapeworm (*Bothriocephalus acheilognathus*) is a freshwater fish parasite that is native to Eurasia. The primary host is grass carp, however it has been found in the fish families of Cyprinidae, Poeciliidae and Cichlidae and Centrarchidae. Asian tapeworm has historically been present in Nevada within the Muddy River corridor but is currently unconfirmed.
   - Pathways for introduction for Asian tapeworm are likely accidently introduced with grass carp and subsequent spread through baitfish transfer.
   - Management considerations include examination of baitfish rules and aquaculture protocols as needed.

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**Aquatic and Riparian Plants**

Aquatic vascular plants include ferns and flowering plants that grow submersed in water, float on the water surface, or have basal portions inundated with foliage and upper parts immersed. Plants that are found in the riparian area are also managed directly by NDA. The species of concern listed here are included on the Nevada Noxious Weed List (2017) and include: tamarisk (*Tamarix* spp.), purple
loosestrife \((Lythrum salicaria)\), crimson fountain grass \((Pennisetum setaceum)\), hoary cress \((Cardaria draba)\), perennial pepperweed \((Lepidium latifolium)\) and Russian olive \((Elaeagnus angustifolia)\). Information concerning their management can be found within the Nevada Noxious Weed Management Plan.

**Present in Nevada**

1. **Eurasian watermilfoil** \((Myriophyllum spicatum)\) is a common aquarium plant native to Europe, Asia and northern Africa. Introduced populations are found in the Lake Tahoe area with additional regional populations across California, Oregon and Idaho.
   - Pathways for introduction include fragmentations which can be moved with water-based equipment and watercraft, and the aquarium trade.
   - Management considerations for milfoil are addressed in the current watercraft inspection program. In some cases, control options may be examined for small novel populations.

2. **Curly-leaf pondweed** \((Potamogeton crispus)\) is a submersed aquatic plant that is native to Eurasia, Africa and Australia. Introduced populations are found in the Truckee River and Lake Tahoe with additional regional populations across California and Arizona.
   - Pathways for introduction include plant fragments which can be moved with water-based equipment and watercraft and waterfowl.
   - Management considerations for pondweed are addressed in the current watercraft inspection program. In some cases, control options may be examined for small novel populations.

**Not reported in Nevada but of priority**

1. **Hydrilla** \((Hydrilla verticillata)\) is a submersed perennial herb that is native to the Indian subcontinent. Regionally, introduced populations are in California, Idaho and Arizona.
   - Pathways of introduction include the aquarium pet trade, water garden industry and fragments on watercraft.
   - Management considerations for hydrilla may be addressed in the current watercraft inspection program. In some cases, control options may be examined for small novel populations.

2. **Giant salvinia** \((Salvinia molesta)\) is a free-floating aquatic fern that is native to southeast Brazil. Regionally, populations are found in Southern California and Arizona.
   - Pathways of introduction include transport on water-based equipment and watercraft, waterfowl, as well as the aquarium and water garden industry.
   - Management considerations for salvinia may be addressed in the current watercraft inspection program. In some cases, control options may be examined for small novel populations. Emerging research suggested salvinia might be susceptible to endocide treatments \((Li et al. 2016)\).

3. **Elodea** \((Elodea spp.)\) is a submersed perennial native to South America. Regionally, populations are found primarily in California, Oregon, and Washington.
   - Pathways of introduction include the aquarium trade as well as fragments on watercraft and natural movement by downstream dispersal.
Pathogens

The following pathogens are of consideration for their impact on the fishery of Nevada.

**Present in Nevada**

1. *Myxobolus cerebralis*, the parasite that causes whirling disease in wild and hatchery salmonids, has been found in few locations across Nevada, including the Truckee River.
   - Pathways of introduction include infected decomposed wild fish, infected wild obligate host *Tubifex tubifex*, recreational equipment that has been exposed to the parasite and natural dispersal by flow of water.
   - Management considerations in natural systems are very limited and are focused on encouraging proper cleaning of equipment to prevent further spread. However, in hatchery situations the parasite can be addressed with upgrading fish runways to concrete, and disposal of infected fish.

**Not reported in Nevada but of priority**

1. Viral hemorrhagic septicemia (*Novirhabdovirus* sp; VHS) is a virus that affects a wide variety of fish species. The virus is indigenous to eastern and western Europe, Japan and the Pacific and Atlantic coasts of North America. Outbreaks in North America have been limited to the Great Lakes area to date.
   - Pathways of introduction include the transfer of bait fish among waterbodies or ballast of watercraft or equipment.
   - Management considerations include an examination of bait regulations as well as continued rigorous watercraft inspection and decontamination programs.
2. Largemouth bass virus (Ranavirus) is a virus that primarily affects largemouth bass. Outbreaks in North America have been limited to central and eastern United States. Bonytail chub are an impacted species of interest to Nevada.
Pathways of introduction include water containing the virus, which could include watercraft and equipment, as well as transfer of live fish for aquaculture.

Management considerations include an examination of possible aquaculture procedures.

3. Spring viraemia of carp virus is a virus that largely affects carp species. The virus likely originated in Europe, and was recently discovered in central and southeast United States after several outbreaks.

Pathways of introduction include infected fish, however it has been suggested that the movement of baitfish may also be possible pathway for the virus.

Management considerations include an examination of aquaculture procedures to minimize potential to transfer the virus as well as bait regulations.
Appendix C: Watercraft Inspection and Decontamination Implementation

With the successful passage of Nevada’s Aquatic Invasive Species Bill (AB167) in mid-2011 and the threat of quagga mussel-contaminated watercraft heading northbound from Lake Mead NRA, NDOW applied for grant funding to establish seasonal watercraft inspection stations at high priority waters at risk of becoming established with quagga/zebra mussels. AB167 established an annual Aquatic Invasive Species Decal for motorized and non-motorized watercraft; however, the revenue generated from the decal has not been sufficient to provide for a statewide watercraft inspection program. After a successful grant application through USFWS, the first inspection stations opened in late 2012 and were operated by Nevada State Parks through a contract with NDOW. The stations were located within Nevada State Recreational areas and included stations at Wild Horse Reservoir, Lahontan Reservoir and Rye Patch Reservoir.

Wild Horse Reservoir, located in northeastern Nevada, was identified as a high priority water by NDOW due to its inclusion in the Snake River Basin and eventually in the Columbia River Drainage. Although located in a remote section of Nevada, the reservoir is a prime fishing location and receives numerous fishing and recreational boats during the summer months. The seasonal station was operated by State Parks until 2015, when it was moved to a roadside station north of Elko under operation by NDOW. The roadside inspection station expands to address watercraft headed northbound towards other Nevada lakes including Wild Horse Reservoir and protects other waters within the Snake River Basin.

In 2015, NDOW also assumed responsibility for the operation of the Lahontan and Rye Patch Reservoir stations. Three seasonal stations were in operation at Lahontan Reservoir and one station at Rye Patch Reservoir. Lahontan Reservoir is a high use recreational and fishing location due to its close proximity to the Reno/Sparks area. Although more remote than Lahontan Reservoir, Rye Patch Reservoir, receives both recreation and fishing watercraft and is located adjacent to Interstate 80. The four stations are located at or near entrances to the State Recreation Areas.

The period between 2012 and 2015, watercraft were inspected prior to entrance and when exiting both Lahontan and Rye Patch Reservoirs. Watercraft were inspected in both directions due to positive quagga mussel monitoring results that occurred in both waters during the spring of 2011. Since the initial quagga positive results, NDOW has not recorded any quagga positive results at either reservoir utilizing the laboratory analysis of microscopy and polymerase chain reaction (PCR). In 2016, after five years of negative results, both reservoirs were delisted from the quagga suspect/positive list to non-detected based on the Waterbody Quagga/Zebra Listing and Delisting Classification developed by the Western Regional Panel on ANS, Building Consensus Committee (Appendix F).

Since the discovery of quagga mussels in Lake Mead NRA in 2007, the threat of quagga contaminated watercraft exiting Lake Mead NRA (LMNRA) with destinations to other waters in Nevada and other western states continued to be an issue with land and water resource managers. In 2013, in coordination with the NPS at LMNRA and the USFWS, NDOW proposed to provide year-round free-of-charge inspection and decontamination staff at three existing stationary decontamination stations at Lake Mead. The operation continues and has expanded to four stations with funding opportunities awarded to NDOW through USFWS and the NPS. The primary focus has been on the decontamination of
long-term moored watercraft that are exiting the recreation area. However, boat ramp exit and entry inspections are also implemented in the program. In addition, AIS staff also provides AIS outreach to the boating public.

The inspection/decontamination program is voluntary at the LMNRA due to the 24 hour a day watercraft launching and exiting availability. However, watercraft users are informed that it is a violation of Nevada State Law to transport AIS. Overall, the inspection program at the LMNRA has been successful and is documented by a significant decrease in quagga contaminated watercraft entering other states (California Department of Fish and Wildlife 2017). In addition, the Colorado River in Nevada remains the only quagga positive water within the state. The number of watercraft inspected and decontaminated has continued to increase every year at LMNRA. In 2016, over 10,000 watercraft were inspected and over 650 watercraft decontaminated (NDOW 2016).

NDOW also operates several seasonal inspection and decontamination stations throughout the state including traveling rover stations and stations at other high priority waters. Staff are trained utilizing protocols developed by the Western Regional Panel on ANS Building Consensus Committee (Brown 2016) and are provided with training to ensure on-site safety (Appendix H). In addition, the Tahoe Regional Planning Agency (TRPA) operates a Lake Tahoe inspection station that is located in Nevada. The current NDOW program has a total of three seasonal rover stations that visit six waterbodies; two seasonal roadside stations, and nine boat ramp stations. Overall, twenty watercraft inspection and decontamination stations are operated within the state with four of those stations opened year round at Lake Mead NRA (Figure 5).

With the exception of LMNRA and the TRPA stations, funding for the operation of the stations has been through USFWS Boater Access grants with match provided by NDOW’s AIS Decal fee. In addition, in 2017, NDOW anticipates receiving a small grant from the US Bureau of Reclamation to assist with the Lahontan Reservoir stations.
FIGURE 5. NEVADA WATERCRAFT INSPECTION STATIONS 2017
Appendix D: Authorities and Program Support Materials

Existing Legal Authorities

Nevada Department of Wildlife

Title 45 Nevada Revised Statute - Wildlife NRS 503.597 Nevada’s Revised Statue prohibits the importation, transportation or possession of any species of wildlife that the Nevada Department of Wildlife’s Commission deems detrimental to the wildlife or the habitat of the wildlife in the state. The statute further provides a misdemeanor for any person to introduce any aquatic life into the state without the permission of the Board of Wildlife Commissioners.

NRS Title 45 – Wildlife NRS 503.597 - Chapter 503 – Hunting, Fishing and Trapping, Miscellaneous Protective Measures  Introduction or removal of aquatic life or wildlife: Approval required; investigation; regulations; penalties.

1. Except as otherwise provided in this section, it is unlawful, except by the written consent and approval of the Department, for any person at any time to receive, bring or have brought or shipped into this State, or remove from one stream or body of water in this State to any other, or from one portion of the State to any other, or to any other state, any aquatic life or wildlife, or any spawn, eggs or young of any of them.

2. The Department shall require an applicant to conduct an investigation to confirm that such an introduction or removal will not be detrimental to the wildlife or the habitat of wildlife in this State. Written consent and approval of the Department may be given only if the results of the investigation prove that the introduction, removal or importation will not be detrimental to existing aquatic life or wildlife, or any spawn, eggs or young of any of them.

3. The Commission may through appropriate regulation provide for the inspection of such introduced or removed creatures and the inspection fees therefor.

4. The Commission may adopt regulations to prohibit the importation, transportation or possession of any species of wildlife which the Commission deems to be detrimental to the wildlife or the habitat of the wildlife in this State.

5. A person who knowingly or intentionally introduces, causes to be introduced or attempts to introduce an aquatic invasive species or injurious aquatic species into any waters of this State is guilty of:

   (a) For a first offense, a misdemeanor; and

   (b) For any subsequent offense, a category E felony and shall be punished as provided in NRS 193.130.

6. A court before whom a defendant is convicted of a violation of subsection 5 shall, for each violation, order the defendant to pay a civil penalty of at least $25,000 but not more than $250,000. The money must be deposited into the Wildlife Account in the State General Fund and used to:

   (a) Remove the aquatic invasive species or injurious aquatic species;

   (b) Reintroduce any game fish or other aquatic wildlife destroyed by the aquatic invasive species or injurious aquatic species;
(c) Restore any habitat destroyed by the aquatic invasive species or injurious aquatic species;

(d) Repair any other damage done to the waters of this State by the introduction of the aquatic invasive species or injurious aquatic species; and

(e) Defray any other costs incurred by the Department because of the introduction of the aquatic invasive species or injurious aquatic species.

7. The provisions of this section do not apply to:

(a) Alternative livestock and products made therefrom; or

(b) The introduction of any species by the Department for sport fishing or other wildlife management programs.

8. As used in this section:

(a) “Aquatic invasive species” means an aquatic species which is exotic or not native to this State and which the Commission has determined to be detrimental to aquatic life, water resources or infrastructure for providing water in this State.

(b) “Injurious aquatic species” means an aquatic species which the Commission has determined to be a threat to sensitive, threatened or endangered aquatic species or game fish or to the habitat of sensitive, threatened or endangered aquatic species or game fish by any means, including, without limitation:

(1) Predation;

(2) Parasitism;

(3) Interbreeding; or

(4) The transmission of disease.


**AB167 Aquatic Invasive Species Act (2011)** passed by the Nevada State Legislature and the Governor of Nevada, enacted provisions for the protection of the waters of the State from aquatic invasive species. The bill prohibits a person from introducing certain aquatic species into the waters of the State and provides for the inspection of vessels for aquatic invasive species. It also requires watercraft to be inspected for the presence of aquatic invasive species before being operated on the waters of the State and requires decontamination of any vessels where an aquatic invasive species is present. In addition, the law authorizes the impoundment or quarantine of certain vessels and requires an aquatic invasive species fee to be paid by all operators of watercraft in the state.

AB167 also provided civil penalties for individuals who knowingly introduce AIS into the States waters. Section 2 of the bill made it a misdemeanor for a first offense and a category E felony for any subsequent offense for knowingly or intentionally introducing any aquatic species which may be detrimental to the aquatic resources, aquatic species or water resources of the State. Section 2 also provided for an additional civil penalty of not less than $25,000 and not more than $250,000 for anyone convicted of such introductions.
Section 4 of the bill authorized NDOW to set up inspection stations for vessels operating on the waters of the State, to inspect such vessels for AIS, and to prohibit any person from operating a vessel without first complying with the inspection program. Section 4 also prohibits any person operating a vessel from leaving an impaired body of water and entering another body of water in the State without first having the vessel decontaminated. In addition, Section 4 allows a peace officer to inspect a vessel at any point if the peace officer has a reasonable belief based on articulable facts that an aquatic invasive species may be present on the vessel. Finally, if a person refuses to comply with a peace officer or the requirements of an inspection station, section 4 allows the person’s vessel to be impounded or quarantined. Section 5 of the bill authorizes a peace officer to keep a vessel impounded or quarantined until it has been decontaminated and shown to be in compliance with the requirements of NDOW.

Other provisions of AB167 requires the Wildlife Commission to establish an annual aquatic invasive species fee which must not exceed $10 for a motorboat owned or operated by a resident of the State and $5 for any other vessel owned or operated by a resident of the State. The fee for a nonresident motorboat owner must be $20 and $10 for any other non-motorized vessels owned or operated by nonresidents of the State. Section 6 also required the Department to issue an aquatic invasive species decal as evidence of payment of the AIS fee. Section 6 prohibits any person from operating a vessel on the waters of the State without first paying the fee and attaching the decal to his or her vessel as proof of payment.

**NRS 488.045 (2016)** This regulation requires the owner, operator or person in control of any vessel or conveyance that is transported on public roads or launched on any body of water in this State to drain the water from the vessel or conveyance and any equipment on the vessel or conveyance. This regulation also requires the owner, operator, or person in control of a vessel or conveyance that has been taken out of any body of water in this State to ensure that the drain plugs, drain valves and any other devices used to control the draining of water remain open while transporting the vessel or conveyance on public roads in the State.

**Nevada Administrative Code**

**Nevada Administrative Code Title 503 – Hunting, Fishing and Trapping, Miscellaneous Protective Measures NAC 503.072** Injurious aquatic species: Fish; mollusks; amphibians; crustaceans. (NRS 501.105, 501.181, 503.597) For the purposes of NRS 503.597, the following species are classified as injurious aquatic species:

<table>
<thead>
<tr>
<th><strong>Common Name</strong></th>
<th><strong>Scientific Classification</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FISH</strong></td>
<td></td>
</tr>
<tr>
<td>Asian swamp eel</td>
<td>All species in the genus <em>Monopterus</em></td>
</tr>
<tr>
<td>Bighead carp</td>
<td><em>Hypophthalmichthys nobilis</em></td>
</tr>
<tr>
<td>Flathead catfish</td>
<td><em>Pylodictus olivaris</em></td>
</tr>
<tr>
<td>Gar</td>
<td>All species in the family Lepisosteidae</td>
</tr>
<tr>
<td>Nile perch</td>
<td>All species in the genera <em>Lates</em> and <em>Lucioliates</em>, except for <em>Lates calcarifer</em></td>
</tr>
<tr>
<td>Northern pike</td>
<td><em>Esox lucius</em></td>
</tr>
<tr>
<td>Piranha</td>
<td>All species in the genera <em>Serrasalmus</em>, <em>Serrasalmo</em>, <em>Pygocentrus</em>, <em>Pristobrycon</em>, <em>Hydrolucus</em>, <em>Rooseveltiella</em> and <em>Pygopristis</em></td>
</tr>
</tbody>
</table>
Nevada Aquatic Invasive Species Management Plan

Round goby  Neogobius melanostomus
Silver carp  Hypophthalmichthys molitrix
Snakeheads  All species in the genera Ophicephalus, Channa and Parachanna
South American parasitic catfish  All species in the families Cetopsidae and Trichomycteridae
Tiger fish  Hoplias malabaricus

Mollusks
Apple snails  All species in the genus Pomocea

Amphibians
African clawed frogs  All species in the genus Xenopus

Crustaceans
Rusty crayfish  Orconectes rusticus
Australian red claw crayfish  Cherax quadricarinatus

Title 503 Nevada Administrative Code– Hunting, Fishing and Trapping, Miscellaneous Protective Measures NAC 503.074 Aquatic invasive species: Mollusks. (NRS 501.105, 501.181, 503.597) For the purposes of NRS 503.597, the following species are classified as aquatic invasive species:

Common Name  Scientific Classification
Golden mussels  Limnoperna fortunei
New Zealand mud snails  Potamopyrgus antipodarum, P. jenkinsi
Quagga and zebra mussels  All species in the genus Dreissena

State Programs
Department of Agriculture

CHAPTER 555 Nevada Revised Statue - CONTROL OF INSECTS, PESTS AND NOXIOUS WEEDS

NRS 555.010 Director: Authorization to investigate and control pests, plant diseases and disorders, and noxious weeds; establishment of program to certify agricultural products as being free from noxious weeds.

Within the limits of any appropriation made by law:

1. The Director may:

(a) Investigate the prevalence of; and
(b) Take the necessary action to control, vertebrate and invertebrate pests of plants and animals, plant diseases, physiological plant disorders and noxious weeds for the protection of the crops, livestock, public health, wildlife, water quality and beneficial uses of land in the State of Nevada.

2. The Director may, by regulation, establish and administer a program to certify agricultural products as being free from noxious weeds to support the control and prevention of the spread of noxious weeds in this State and to allow businesses in this State to market those products in compliance with any applicable federal law or regulation or any other requirement specified by the Director.


NRS 555.021 Director: Cooperation for suppression of vertebrate pests.

The Director may cooperate, financially or otherwise, with any federal agency or Department, any other state agency or department, any county, city, public district or political subdivision of this State, any public or private corporation, and any natural person or group of natural persons in suppressing vertebrate pests injurious to the state agricultural interests and in suppressing vertebrate pest vectors of diseases transmissible and injurious to humans.

(Added to NRS by 1975, 555; A 1993, 1710; 1999, 3640)

NRS 555.035 Account for the Control of Weeds; creation; use of money in Account; acceptance of gifts and grants.

1. There is hereby created in the State General Fund the Account for the Control of Weeds to be administered by the Director. Money in the Account must be used for the abatement of weeds. The Director may adopt regulations for the administration of the Account.

2. The Account is a continuing account without reversion to the State General Fund. The money in the Account must be invested as the money in other state funds or accounts is invested. The interest and income earned on the money in the Account, after deducting any appropriate charges, must be credited to the Account. All claims against the Account must be paid as other claims against the State are paid.

3. The Director may accept gifts, grants and donations from any source for deposit in the Account.

(Added to NRS by 2005, 2452)
NRS 555.100 Department to conduct inspections; notice to control pest, noxious weed or plant disease.

1. The Department shall, if necessary or if a complaint is made to the Department, cause an inspection to be conducted of any premises, land, means of conveyance or article of any person in this State if it is found to be infested with any pest, noxious weed or plant disease that is injurious to:

   (a) The public health or quality of any water in this State; or

   (b) Any wildlife, beneficial use of land or agriculture in this State.

2. The Department may provide a written notice of its findings to the owner or occupant of the premises, land, means of conveyance or article and require the owner or occupant to control the pest, noxious weed or plant disease in the manner and within the period specified in the notice.

3. A notice issued pursuant to the provisions of subsection 2:

   (a) May be served upon the owner or occupant by an officer or employee of the Department; and

   (b) Must be served in writing, by certified mail or personally, with receipt given therefor.


NRS 555.110 Premises infested with pest, noxious weed or plant disease declared to be public nuisance; abatement by Department.

1. Any premises found to be infested with any pest, noxious weed or plant disease is hereby adjudged and declared to be a public nuisance. If such a nuisance exists at any place within the jurisdiction of the Department and the owner or occupant of the premises, after notification, refuses or neglects to abate the nuisance within the period specified, the Department shall cause the nuisance to be abated at once by controlling pests, noxious weeds or plant diseases in a manner to be determined by the Department.

2. The expense thereof must be paid from any money made available to the Department by direct legislative appropriation or otherwise.


NRS 561.301 Aquatic agriculture: Promotion, protection and regulation. Aquatic agriculture, which includes the propagation, cultivation and harvesting of plants or animals indigenous to water in a man-made, controlled or selected aquatic environment for the commercial production of food, is one of the agricultural enterprises conducted in this state. The Department shall promote, protect and regulate aquatic
agriculture to the extent that the Department is authorized to regulate other forms of agriculture and other agricultural products. The Department shall confer with the Department of Wildlife regarding aquatic agriculture to prevent any adverse effects on existing aquatic animals.

(Added to NRS by 1985, 624; A 1993, 1727; 1999, 3662; 2003, 1582; 2015, 3608)

NRS 555.005 Definitions. As used in this chapter, unless the context requires otherwise:

1. “Department” means the State Department of Agriculture.
2. “Director” means the Director of the Department.
3. “Noxious weed” means any species of plant which is, or is likely to be, a public nuisance, detrimental and destructive and difficult to control.
4. “Pest” means any form of animal or vegetable life detrimental to the crops, horticulture, livestock, public health, wildlife, quality of water and beneficial uses of land in this State, including, without limitation, any insect, snail, nematode, fungus, virus, bacterium, microorganism, mycoplasma, weed, parasitic plant or any other plant that is normally considered to be a pest of cultivated plants, uncultivated plants, agricultural commodities, horticultural products or nursery stock, or that the Director declares to be a pest.

Regional Programs

The Tahoe Regional Planning Compact

Public Law 96-551
To grant the consent of the Congress to the Tahoe Regional Planning Compact, and to authorize the Secretary of Agriculture and others to cooperate with the planning agency thereby created.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That in order to encourage the wise use and conservation of the waters of Lake Tahoe and of the resources of the area around said lake, the consent of the Congress is hereby given to the Tahoe Regional Planning Compact heretofore adopted by the States of California and Nevada, which compact reads as follows:

Tahoe Regional Planning Compact

Article I – Findings and Declarations of Policy

It is found and declared that:

1. The waters of Lake Tahoe and other resources of the region are threatened with deterioration or degeneration, which endangers the natural beauty and economic productivity of the region.
2. The public and private interests and investments in the region are substantial
3. The region exhibits unique environmental and ecological values which are irreplaceable.
4. By virtue of the special conditions and circumstance of the region’s natural ecology, developmental pattern, population distributions and human needs, the region is experiencing problems of resource use and deficiencies of environmental control.

5. Increasing urbanization is threatening the ecological values of the region and threatening the public opportunities for use of the public lands.

6. Maintenance of the social and economic health of the region depends on maintaining the significant scenic, recreational, educational, scientific, natural public health values provided by the Lake Tahoe Basin.

7. There is a public interest in protecting, preserving and enhancing these values for the residents of the region and for visitors to the region.

8. Responsibilities for providing recreational and scientific opportunities, preserving scenic and natural areas, and safeguarding the public who live, work and play in or visit the region are divided among local governments, regional agencies, the States of California and Nevada, and the Federal Government.

9. In recognition of the public investment and multi-state and national significance of the recreational values, the Federal Government has an interest in the acquisition of recreational property and the management of resources in the region to preserve environmental and recreational values, and the Federal Government should assist the States in fulfilling their responsibilities.

10. In order to preserve the scenic beauty and outdoor recreational opportunities of the region, there is a need to insure an equilibrium between the region’s natural endowment and its manmade environment.

In order to enhance the efficiency and governmental effectiveness of the region, it is imperative that there be established a Tahoe Regional Planning Agency with the powers conferred by this compact including the power to establish environmental threshold carrying capacities and to adopt and enforce a regional plan and implementing ordinances which will achieve and maintain such capacities while providing opportunities for orderly growth and development consistent with such capacities.

The Tahoe Regional Planning Agency shall interpret and administer its plans, ordinances, rules and regulations in accordance with the provision of this compact.

The complete Compact is housed at www.trpa.org.
Appendix E: Monitoring Implementation Plan

Input: a strategy to implement rather than an implementation plan itself. Provide current efforts and acknowledge that the plan is to address comprehensive/collaborative effort.

Various entities routinely monitor Nevada’s aquatic environment for water quality parameters, habitat, and the presence of native or intentionally introduced species. Aquatic invasive species are often encountered through routine monitoring or may be reported by the general public. General statewide monitoring strategies typically do not target invasive species due to financial constraints. However, a majority of AIS that have been identified in Nevada, excluding reports by the public, have been during general and routine monitoring such as aquatic bioassessments, fish population assessments and stream/lake habitat quality monitoring. If an invasive species has been confirmed in a specific area, and is of management priority, then targeted monitoring may be implemented. An exception to statewide monitoring for a particular invasive species has been the development of quagga and zebra mussel monitoring.

Following the discovery of quagga mussels at Lake Mead in 2007, NDOW began routinely monitoring for quagga and zebra mussels at state lakes and reservoirs with high risk for establishment or introduction. Quagga and zebra mussel monitoring is performed during the warm weather months at over twelve popular watercraft reservoirs and lakes. The collection of samples generally includes three plankton tow samples per station and three distinct sample locations within a waterbody. The laboratory analysis of the samples includes a minimum of microscopy in addition to in vivo amplification of specific gene fragments utilizing polymerase chain reaction (PCR). PCR analysis is performed at a minimum of one complete set of samples per waterbody per year. At lakes and reservoirs considered high risk due to high boater traffic and the potential introduction of mussels, PCR is routinely performed several times per season. For confirmation purposes of any potential laboratory positive result, NDOW’s monitoring protocol calls for an immediate increase in both the frequency and location of samples collected at a waterbody to confirm the result. All samples collected would be analyzed utilizing both microscopy and PCR.

In addition to NDOW’s waterbody sampling for dreissenid species, other organizations also routinely monitor for the mussels in uninfested waterbodies. The Bureau of Reclamation routinely monitors for quagga and zebra mussels at four of Nevada’s uninfested reservoirs and lakes including Rye Patch and Lahontan Reservoirs, and Pyramid Lake. The Tahoe Basin is also routinely monitored by the Tahoe Regional Planning Agency. Currently, no other waterbodies in Nevada outside of the Colorado River system have been found to contain either quagga or zebra mussels.

A completed Nevada AIS Management Plan will assist Nevada partners in strategizing a comprehensive and collaborative effort for AIS monitoring across the state. Future efforts should include but are not limited to better documentation, adoption of best practices among monitoring entities and collaborative planning of monitoring efforts.
Appendix F: Waterbody Classification Based on AIS Monitoring

Classifying waterbodies based on the current monitoring efforts in Nevada. By utilizing a protocol to determine waterbody status, this allows Nevada water managers to have a system to categorize waters. The waterbody classification system is adopted from the Western Regional Panel on Aquatic Nuisance Species, Building Consensus Committee (Building Consensus in the West 2013).

**Waterbody definitions:**
- **Status Unknown** – Waters that have not been monitored.
- **Undetected/Negative** - sampling/testing is ongoing and nothing has been detected, or nothing has been detected within the time frames for de-listing.
- **Inconclusive** (temporary status) - Water body has not met the minimum criteria for detection.
- **Suspect** – Water body that has met the minimum criteria for detection.
- **Positive** – Multiple (2 or more) subsequent sampling events that meet the minimum criteria for detection.
- **Infested** – A water body that has an established (recruiting or reproducing) population of AIS.

**De-listing a Water Body for Zebra and Quagga Mussels:**
- **Inconclusive** – 1 year of negative testing including at least one sample taken in the same month of subsequent year as the positive sample (accounting for seasonal environment variability) to get to undetected/negative.
- **Suspect** – 3 years of negative testing to get to undetected/negative.
- **Positive** – 5 years of negative testing to get to undetected/negative.
- **Infested** – Following a successful eradication or extirpation event including a minimum of 5 years’ post-event testing/monitoring with negative results.
Appendix G: Hazard Analysis and Critical Control Point Framework

Hazard Analysis and Critical Control Point (HACCP) planning is a management tool that provides a structured method to identify risks and focus procedures in natural resource pathway activities. Understanding pathways and developing plans to reduce non-target species and prevent biological contamination are necessary to avoid unintended spread of species.

Five Steps to HACCP Planning

1. Describing the activity: The activity description includes specific information such as who, what, when, where, how, and why of the project. The description offers a historical, working reference to facilitate plan review and communication with the facility staff and other resource management agency personnel.

2. Charting the flow of tasks for the activity: This step provides an important visual tool that the HACCP team can use to complete the remaining steps of the plan. Here, a clear and concise, yet complete description of the tasks necessary to complete the overall activity is diagramed in a linear fashion.

3. Identifying potential non-targets: Any species that has a reasonable potential to be moved or introduced to new habitats should be identified in order to implement appropriate control measures to prevent an unintended invasion. These may include vertebrates, invertebrates, plants, or other organisms (e.g., diseases, pathogens, and parasites).

4. Analyzing non-targets: It is crucial to identify significant non-targets with respect to each required task within a larger activity so that effective measures to control them may be employed. During the analysis, the significance of each potential non-target is assessed by considering risk.

5. Completing the action plan: The action plan addresses specific methods to control risks of non-target species. It lists specific information about controls, monitoring procedures, methods for evaluation, and corrective actions.

Additional web resources on HACCP planning and forms can be found here:

www.haccp
Appendix H: NDOW AIS Program Health and Safety Policy and Implementation Plan

In 2016, NDOW developed the Aquatic Invasive Species Program Health and Safety Policy to ensure a safe work place for all employees involved in AIS management and implementation of the watercraft inspection and decontamination program. The complete document is housed at www.ndow.org

Nevada Department of Wildlife (NDOW) Aquatic Invasive Species (AIS) Program Health and Safety Policy

Developed per NRS 618.383 and NAC 618.540

Every staff member of the Nevada Department of Wildlife’s Aquatic Invasive Species Program is expected to make every effort to integrate safety and health considerations into all parts of their daily activities. Safety program effectiveness is a shared responsibility. Each staff member must contribute their fair share in order for NDOW to remain a successful and viable government agency. We are committed to provide a safe work place for all employees and encourage all employees to be involved.

The objective of our safety and health program is to reduce or eliminate the potential for on-the-job injuries and illnesses. The AIS Program is charged with the responsibility for assuring that each staff member is provided with the tools and resources necessary to accomplish their job tasks in a safe manner consistent with established procedures, safety and health rules and criteria. Violations of safety and health policy and procedures will not be tolerated by NDOW management or staff and is subject to progressive discipline. The AIS Safety Policy is in addition and meant to supplement NDOW’s General Safety Policy.

The AIS Program Safety Policy is intended to be a “living document”, thus hazard identifications and control methods can easily be adopted into the policy through the use of appendices and tables provided at the end of this document.

Every staff member is encouraged to identify unsafe conditions and be assured that immediate action for viable safety concerns will follow to permanently solve the concern. Each staff member can also feel confident that identifying unsafe conditions will not result in any type of reprisal to them. The prevention of accidents and mishaps is crucial to the success of the safety program. If every employee does their part, we will all have a safe place to work.
Appendix I: Summary of Public Comments
This will be populated following the public review to be conducted June 2017.