Oregon 2023
Aquatic Nuisance Species Management Plan

Prepared by: Robyn Draheim for Portland State University, Center for Lakes and Reservoirs
Photo credit: Vanessa Morgan

Acknowledgements

I'd like to acknowledge the myriad of people involved in invasive species issues in Oregon and the Pacific Northwest for the tireless work they do to prevent and manage invasions as well as thank them for their invaluable assistance in compiling this document. Special thanks go out to all the reviewers who helped edit the many drafts of this plan, especially Marie Hepner at Samara Group, LLC. and Toni Pennington with Environmental Science Associates. Thanks are also due to Don Maclean with the USWFS, for patiently answering questions about state plan revisions years before ever seeing a draft. Lastly, this revision would not have been possible without the leadership of Cat de Rivera at the Center for Lakes and Reservoirs at Portland State University.

Executive Summary

Comprehending the unique threats posed by invasive species to the aquatic resources that are an integral part of the state's identity, Oregon was one of the first western states to develop a state-wide aquatic nuisance species management plan under the guidance of the Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) of 1990. Produced by the Center for Lakes and Reservoirs at Portland State University in 2001, the Oregon Aquatic Nuisance Species Management Plan (referred to herein as the Oregon Plan) set out to address specific invasive species of concern, provide a management framework, and set objectives and actions to prevent and reduce the impact of aquatic nuisance species (more commonly referred to as aquatic invasive species or AIS) in Oregon (Hanson and Sytsma, 2001). With the goal of minimizing the harmful ecological, economic, and social impact of AIS through prevention and management of introduction, population growth, and dispersal of these species, the Oregon Plan placed an emphasis on the development and implementation of new levels of coordination, oversight, and funding for AIS management in the state (Hanson and Sytsma, 2001).

AIS are a significant concern to the state as evidenced by the almost 300 records of nonindigenous aquatic species found in the state (OCS, 2016: Fofonoff et al., 2018; OISC, 2023; USGS, 2022) and over 100 additional nonindigenous aquatic species that have been reported from elsewhere in the Columbia River Basin but have not yet been detected in Oregon (OCS, 2016; USGS, 2022). It is likely that even more nonindigenous species are present that have not been reported or detected and that, even with diligent management, additional nonindigenous species will arrive in Oregon in the future (Tobin, 2018).

Oregon's freshwater, estuarine, and marine waters constitute over 100,000 miles of rivers, 16 major watersheds, more than 6,200 lakes, nine major estuaries, and over 360 miles of coastline (ODEQ, 2000). These waters provide habitat for salmonids and countless other native species and support tribal, commercial, and recreational fishing. They are crucial to providing hydropower, flood control, irrigation, municipal and industrial water supplies, aesthetic enjoyment, and diverse recreational opportunities. Since the implementation of the original Oregon Plan in 2001, AIS management has become a growing component of this broad conservation effort (Mucken and Bateman, 2017).

With a suite of more than 80 recommended actions to protect Oregon's freshwater, estuarine, and marine waters from AIS, the Oregon Plan aimed to create a unified and comprehensive management effort structured for phased implementation of actions, with high priority placed on the establishment of an Invasive Species Council and an ANS coordinator position (Hanson and Sytsma, 2001). While many elements of the 2001 plan have been enacted, including the establishment of the Oregon Invasive Species Council (OISC) and an ANS coordinator position (housed in the Center for Lakes and Reservoirs), it was not possible to implement all the actions in the plan, yet the introduction and spread of AIS continue to be serious concerns to the state.

As the Oregon Plan reached its 20th year of implementation, the Center for Lakes and Reservoirs and other Oregon AIS program managers convened to update the existing plan. While this

comprehensive rewrite puts an emphasis on the broad spectrum of current AIS management strategies, it also reflects the numerous achievements of the 2001 Oregon Plan and ensures that the goals and objectives remain consistent with the original plan. The revised plan continues to recognize the value of Oregon's waters and seeks to minimize the harm posed by current and future AIS threats.

Just as AIS introductions and spread are not limited by geopolitical boundaries, management planning must also consider strategies that are not bound by arbitrary geo-political boundaries. Rather than attempting to create an all-encompassing, stand-alone state AIS management plan, the revised Oregon Plan builds on past and current assessments and planning efforts, as well as a diversity of regional efforts to protect the state from aquatic invaders.

With no one single authority or agency charged with managing AIS statewide, the intent of the revised Oregon Plan is to continue to promote coordination and collaboration on AIS issues between federal, state, tribal, and local entities. Updates contained herein reflect changes in the species of concern to the state and the evolution of education and outreach strategies, new management tools, evolving policies, research priorities, and more. It provides a framework for existing management actions, defines roles and responsibilities for managing AIS, identifies priority actions as well as gaps, and describes opportunities for further collaborative efforts.

The revised 2023 Oregon Plan builds upon the successes of the original plan and is re-organized around the following six objectives, rewritten to reflect those in the Statewide Strategic Plan for Invasive Species (OISC, 2017), as well as the national Aquatic Nuisance Species Task Force Strategic Plan (ANSTF, 2020). Each objective includes a list of supplemental strategies and the specific actions needed to accomplish them.

Prevention

- Support and grow existing AIS prevention programs.
- Address and manage known introduction pathways.
- Research and identify the risk of new and less regulated pathways of introduction.
- Support and grow new AIS programs.
- Identify invasive species of concern.
- Prohibit, control, or permit the importation of non-native aquatic species based upon their invasive potential.
- Increase enforcement and awareness of existing laws.
- Promote regulatory and legislative actions as needed.

Early Detection and Rapid Response

- Develop, fund, and implement a statewide monitoring plan based on waterbody risk.
- Develop a statewide EDRR Network.
- Enhance and expand existing monitoring programs for known AIS populations of concern.
- Support rapid response mechanisms to deal with detected invasive species.

- Enhance rapid response capacity.

Control and Management

- Limit the dispersal of established AIS to new waterbodies or to new areas of a waterbody.
- Control known invasive populations where economically and technically feasible.
- Eradicate pioneering populations of ANS where possible.
- Provide technical guidance and assistance on the control and management of AIS.

Education and Outreach

- Continue current invasive species informational and educational efforts.
- Improve current invasive species outreach and education efforts through strategic assessment and development efforts.
- Inform policymakers on the extent, impact, and potential for harm of ANS.

Coordination and Leadership

- Develop and maintain adequate funding sources for AIS management in Oregon.
- Coordinate AIS management within Oregon.
- Participate in and support regional, national, and international efforts to prevent and control AIS.

Research, Evaluation, and Development

- Identify and support AIS research needs.
- Promote the evaluation of actions to enhance effectiveness and maximize success.
- Address research needs relating to AIS prevention and management that may be affected by climate change.

Actions and strategies included herein reflect priorities identified by the 2022/2023 steering committee (Appendix A2) in addition to recommendations made in the Statewide Strategic Plan for Invasive Species (OISC, 2017), the Statewide Management Assessment of Invasive Species in Oregon (Creative Resource Strategies, 2010), the Noxious Weed Policy and Classification System (ODA, 2020), and ongoing actions from the 2001 Oregon Plan (Hanson and Sytsma, 2001).

The 2023 Oregon Plan uses an approach that is both comprehensive and collaborative to minimize the deleterious impacts of AIS on Oregon's water resources. It provides a framework for existing management actions, defines roles and responsibilities for managing AIS, identifies priority actions as well as gaps, and describes opportunities for further collaborative efforts. In addition, it emphasizes early detection and rapid response planning for species of greatest concern as well as bolstering coordination and cooperation to best respond to novel, unanticipated risks.

Recognizing the challenge in implementing all 113 of the revised Oregon Plan's recommendations within the aspirational five-year span of this plan, the Steering Committee

assigned a rank of high, medium, or low to all the identified actions. Limited resources and capacity for management make prioritizing actions an important but tricky consideration. Numerous actions were rated as a high priority, and many, but not all, of these undertakings have some level of funding allocated.

The greatest (unaddressed) needs for AIS management in Oregon are those actions identified as High Priority but, 1) are without committed funds identified for fiscal years one or two, or 2) with significant funding needs beyond the available funds. Estimated funding shortfalls to fully accomplish all 73 of the High Priority action items total $3,822,000. This sum is approximately two hundred thousand dollars more than is anticipated to be spent in the next year of implementation of this plan. These funding needs fall broadly into three categories:

- Long-term sustainable funding to support and expand prevention, early detection, management, and control efforts,
- Discrete funds necessary to tackle research and development projects as well as monitoring and evaluation, and
- Adequate emergency funds accessible to support rapid response and eradication efforts.

Lastly, this plan is intended to be adaptable to changing circumstances. The activities and priorities of the plan will be under constant review. An annual report will be produced by the OISC and will include recommendations for updating and modifying management activities and priorities. Furthermore, the OISC will convene a review committee every five years to evaluate the plan and its progress and make suggestions for improvement if needed.

Table of Contents

Indigenous Peoples Land Acknowledgement

More than 60 tribes and bands of Indigenous peoples have lived in the northwest for time immemorial. The Oregon Plan respectfully wishes to recognize these Indigenous peoples as the traditional stewards of this region and acknowledge the long-standing relationship that exists between them and their traditional territories. Although only nine tribes were federally recognized in what is now Oregon, these tribes manage natural resources throughout their original territories and ceded lands and actively apply their knowledge, experience, and history of the area. The Oregon Plan acknowledges that aquatic invasive species management is occurring in and adjacent to the ancestral and contemporary waters of these original caretakers and that the actions of colonizers have contributed significantly to the alteration of indigenous environments, including the facilitation of invasive species introductions and establishment.

Acronyms

100YWV	100 Year Water Vision
ABRPI	Aquatic Bioinvasion Research and Policy Institute
AIS	Aquatic Invasive Species
AISPP	Aquatic Invasive Species Prevention Program
ANS	Aquatic Nuisance Species
ANSRP	USACE Aquatic Nuisance Species Research Program
ANSTF	Aquatic Nuisance Species Task Force
APHIS	USDA Animal and Plant Health Inspection Service
AREMP	Aquatic and Riparian Effectiveness Monitoring Program
BAIS	Branch of Aquatic Invasive Species
BIA	Bureau of Indian Affairs
BLM	Bureau of Land Management
BMP	Best Management Practice
CBP	Customs and Border Patrol
CLR	Center for Lakes and Reservoirs
CRB	Columbia River Basin
CRITFC	Columbia River Intertribal Fisheries Commission
CWA	Clean Water Act
DHS	Department of Homeland Security
DOD	Department of Defense
DOI	Department of the Interior
eDNA	Environmental Deoxyribonucleic Acid
EDRR	Early Detection, Rapid Response
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FICMNEW	Federal Interagency Committee for the Management of Noxious and Exotic weeds
FIFRA	Federal Insecticide, Fungicide and Rodenticide Act
HACCP	Hazard Assessment and Critical Control Points Plans
IMO	International Maritime Organization
IPPC	International Plant Protection Convention
ISAC	Invasive Species Advisory Committee
IWRS	Integrated Water Resource Strategy
NANPCA	Nonindigenous Aquatic Nuisance Prevention and Control Act
NAPPO	North American Plant Protection Organization
NAS	Nonindigenous Aquatic Species
NBIC	National Ballast Information Clearinghouse
NEPA	National Environmental Policy Act
NIMS	National Incident Management Systems
NISA	National Invasive Species Act
NISC	National Invasive Species Council
NOAA	National Oceanic and Atmospheric Administration

NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
OCS	Oregon Conservation Strategy
ODA	Oregon Department of Agriculture
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
ODOT	Oregon Department of Transportation
ODSL	Oregon Division of State Lands
OISC	Oregon Invasive Species Council
OPRD	Oregon Parks and Recreation Department
ORS	Oregon Revised Statues
OSG	Oregon Sea Grant
OSMB	Oregon State Marine Board
OSP	Oregon State Police
OSU	Oregon State University
OWEB	Oregon Watershed Enhancement Board
PNWER	Pacific NorthWest Economic Region
PSMFC	Pacific States Marine Fisheries Commission
PSU	Portland State University
SERC	Smithsonian Environmental Research Center
US	United States
USACE	US Army Corps of Engineers
USCG	US Coast Guard
USDA	US Department of Agriculture
USFS	USDA Forest Service
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VIDA	Vessel Incidental Discharge Act
WAFWA	Western Association of Fish and Wildlife Agencies
WISC	Western Invasive Species Council
WISCE	Western Invasive Species Coordinating Effort

Introduction

With annual costs estimated to reach tens of billions of dollars (Diagne et al., 2021) invasive species are a significant cause for concern worldwide. Once introduced, some non-native species disrupt ecosystem services and natural communities, while others damage critical infrastructure or diminish revenues derived from natural resources (Fantle-Lepczyk et al., 2022). Some species even cause harm to human health, while others appear to have little to no discernable impacts. Invasive species, defined in state statute as "those nonnative organisms that cause economic or environmental harm and are capable of spreading to new areas" (ORS 570.755), cost Oregon's taxpayers millions in lost revenue each year and threaten the health and function of the state's natural systems and native wildlife. With annual expenditures in Oregon estimated in the tens of millions of dollars (Creative Resource Strategies 2010), the state's prevention, management, and control of unwanted invasive species is a priority.

Introduced aquatic species are those freshwater, estuarine, and marine species that are transported and released, intentionally or unintentionally, outside their historical range (USFWS 2021). Those species that degrade ecosystem function and benefit or cause direct or indirect economic impacts are referred to collectively as aquatic nuisance species (ANS, an older term) or aquatic invasive species (AIS, the preferred term)[1]. AIS can alter aquatic systems by changing the diversity or abundance of native species, degrading water quality, altering trophic dynamics, and restricting beneficial water resource uses such as commercial, aquacultural, or recreational activities (ANSTF, 2021). Every year, with the steady increase in globalized trade and travel, new AIS arrive in Oregon, bringing with them the potential to threaten the state's natural systems as well as those sectors of Oregon's economy that depend upon aquatic resources.

Once introduced, many AIS cannot be eradicated, and their damage may be irreversible. While tools exist to control and eradicate populations once introduced, they are limited, expensive, and often harmful to native species. Preventing introductions remains the best and most cost-effective way to limit the negative impacts of AIS. Eradication and often control of AIS in open systems has proved nearly impossible, and many AIS management options are simply aimed at lessening the impacts of these species.

In the 1980s, increasing recognition of the threat posed by AIS led the Federal Government to initiate a program of action to address the problem. The Nonindigenous Aquatic Nuisance Prevention and Control Act (NANPCA) was passed on November 29, 1990, and subsequently amended by the National Invasive Species Act of 1996 (NISA). Under section 1204 of NISA, states are authorized to present a comprehensive management plan to the Aquatic Nuisance Species Task Force (ANSTF) for approval.

[1] The term 'nuisance' is no longer used as frequently as 'invasive" as it has differing legal and common vernacular meanings. It is, however, still used when referring to programs that were created by laws, such as the Nonindigenous Aquatic Nuisance Prevention and Control Act (1990) (Public Law 101-636), that use the term 'nuisance species' (Sturtevant, 2019).

Grasping the unique threats posed by AIS, Oregon was one of the first western states to develop a state-wide AIS management plan as called for in NANPCA. With guidance from the ANSTF, the Center for Lakes and Reservoirs (CLR) at Portland State University (PSU) developed a plan to address specific invasive species of concern, provide a management framework, and set objectives and actions to prevent and reduce the impact of aquatic nuisance species in Oregon (Hanson and Sytsma, 2001). The ANSTF formally approved the resulting Oregon ANS Management Plan (Oregon Plan) in 2001.

As the Oregon Plan reached its 20th year of implementation, CLR, in consultation with other Oregon AIS program managers, determined that the existing plan required a significant update. This comprehensive update of the Oregon Plan allows it to maintain its status as a viable, living document reflecting a broad spectrum of current AIS management objectives. As reflected in the plan, AIS management strategies in Oregon emphasize early detection and rapid response planning for species of greatest concern and pathway-based management approaches, as well as bolstering coordination and cooperation to best respond to novel, unanticipated risks.

Purpose

The purpose of the Oregon Plan is to address the prevention and management of AIS using a comprehensive and collaborative approach to minimize the deleterious impacts of AIS on Oregon's water resources. The Oregon Plan focuses on those species that have the potential to invade or spread regionally, as well as those that cause economic, ecological, and recreational harm to Oregon's waters. The Oregon Plan takes a pathway-based approach to AIS prevention and management. It provides a framework for existing management actions, defines roles and responsibilities for managing AIS, identifies priority actions as well as gaps, and describes opportunities for further collaborative efforts. The goals and strategic objectives of the revised plan remain consistent with the original plan. However, updates reflect changes in the species of concern to the state and the evolution of education and outreach strategies, new management tools, evolving policies, research priorities, and more.

Scope

Oregon's water resources are integral to the state's identity. Oregon's freshwater, estuarine, and marine waters constitute over 100,000 miles of rivers, 16 major watersheds, more than 6,200 lakes, nine major estuaries, and over 360 miles of coastline (ODEQ, 2000; Figure 1). These waters provide habitats for salmonids and countless other native species and support tribal and commercial fisheries. They are crucial to providing hydropower, flood control, irrigation, municipal and industrial water supplies, aesthetic enjoyment, and diverse recreational opportunities. To best protect these multiple uses and the communities that depend on them, Oregon's water resources must be managed as interconnected systems while also recognizing that AIS management is an important piece of this holistic approach. With the implementation of the 2001 Oregon Plan, AIS management has become a growing component of this broad conservation effort (Mucken and Bateman, 2017). This plan recognizes the value of Oregon's waters and seeks to protect them from the harm posed by current and future AIS threats. The plan applies to the state's marine, estuarine, and freshwater systems.

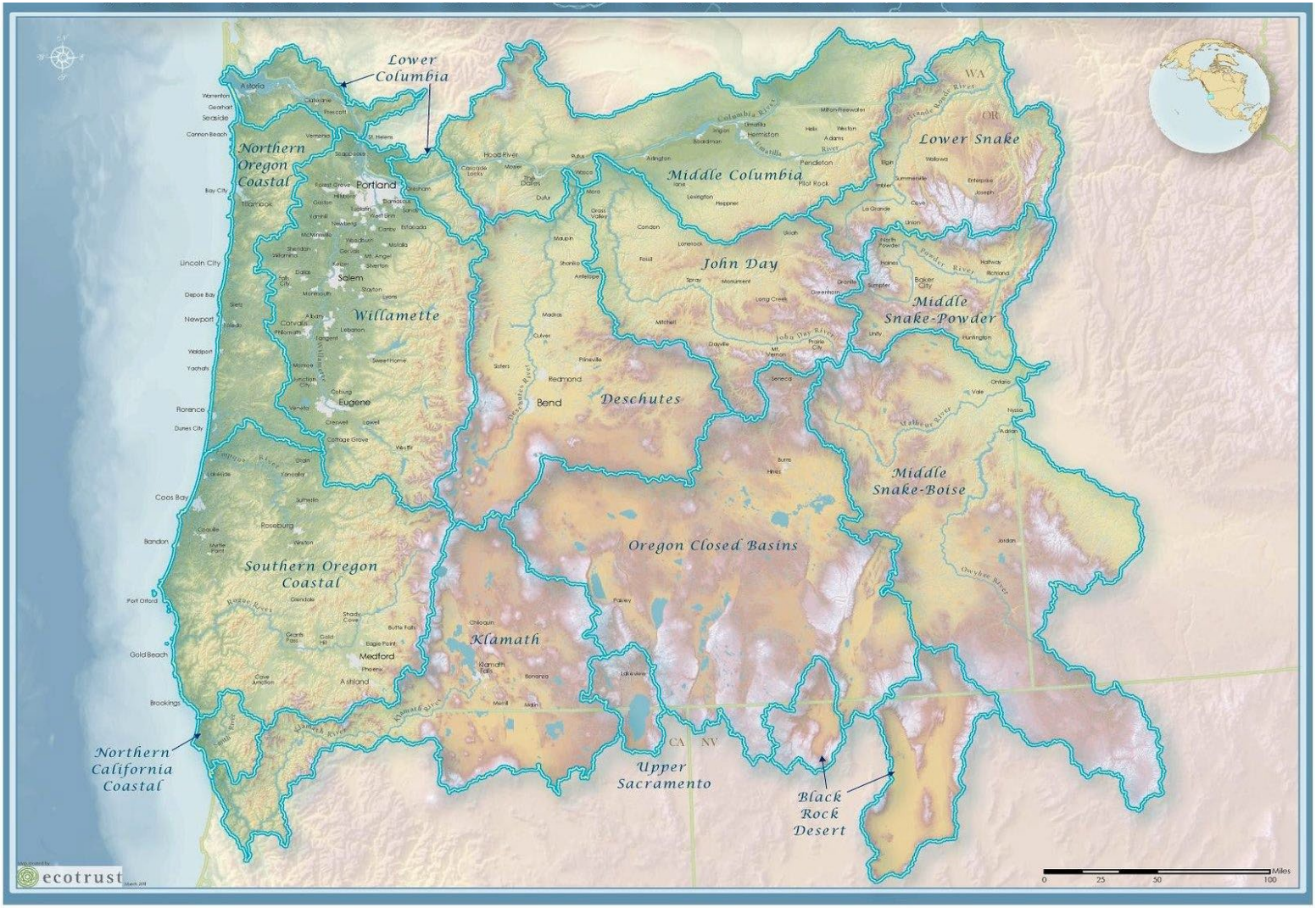


Figure 1 --- Map of major river basins in Oregon. Map created by Ecotrust/Analisa Fenix, used under creative commons license, see https://www.flickr.com/photos/sbeebe/5532945318

Oregon's geographic setting renders it an important location for goods and services entering, exiting, and traveling through the Pacific Northwest. As an essential conduit for trade, Oregon is particularly vulnerable to numerous AIS introductions and pathways. Not only are waters of the state habitable to numerous marine, estuarine, and freshwater invaders, but each of these types of systems has its own suite of corresponding pathways for AIS introduction (marine, estuarine, and freshwater ports, aquaculture, commercial fishing, recreational boating, and fishing, etc.). Oregon is also home to the final stretch of the Columbia River – the largest river in the Pacific Northwest and the second largest in the United States (in terms of volume discharged) - with a drainage basin that encompasses 671,000 km^2 in seven states and one Canadian province (Sytsma et al., 2004). With more than 250 reported nonindigenous[2] organisms in the Columbia River Basin (USGS, 2022), passive and active downstream transportation of potentially invasive species is an ongoing concern to Oregon. Of similar concern are oceanic currents that may transport larval stages of marine and estuarine invaders from areas beyond the Oregon coast (OCS, 2016).

Connectivity

Just as AIS introductions and spread are not limited by geopolitical boundaries, management planning must also consider strategies that are not bound by arbitrary geo-political boundaries. Rather than attempting to create an all-encompassing, stand-alone state AIS management plan, the revised Oregon Plan builds on past and current assessments and planning efforts, as well as a diversity of regional efforts to protect the state from aquatic invaders.

Building upon the foundation established by the original Oregon Plan, the following documents, in conjunction with the existing authorities and programs discussed later in this plan, provided guidance for developing the revised Oregon Plan.

- Integrated Water Resources Strategy (2017[3])
- Oregon Conservation Strategy (2016)
- Oregon Dreissenid Mussel Rapid Response Plan (2013)
- Oregon Invasive Noxious Weed Control Program: 5-year Strategic Plan (2018)
- Oregon Spartina Response Plan (2007)
- Oregon's 100-Year Water Vision (2020)
- Statewide Management Assessment of Invasive Species in Oregon (2010)
- Statewide Strategic Plan for Invasive Species 2017-2027 (2017)

The Oregon Plan purposefully strives to support and expand opportunities for collaboration among agencies including addressing gaps in planning, coordination, and implementation.

The Oregon Plan was written to be both flexible and useful to a wide range of entities. It includes objectives that are relevant to local planners as well as state and regional efforts. Local planners

[2] The terms 'nonindigenous' and 'non-native' are used interchangeably in this document to mean species living outside of their historic native range (i.e., the area where they evolved to into their current form) (Sturtevant, 2019). Following the convention of NANPCA and many researchers in the field of invasive species, this document uses 'nonindigenous' except where state laws and statues use 'non-native.'

[3] A revised Integrated Water Resources Strategy is anticipated in 2024.

include county weed boards, watershed councils, and municipalities. Examples of local invasive species management efforts that were included during the development of this Oregon Plan are:

- Wapato Revival Plan: Collaborative Restoration of the Willamette River's Aquatic Ecosystems (2021)
- Portland at the Crossroads: Invasive Species Strategy 2020-2030 (2019)

Considered together with the Oregon Plan, the following regional and national plans tie Oregon's actions to broader levels of AIS management efforts:

- American Shad in the Columbia River: Past, Present, Future (2021)
- Columbia River Basin Interagency Invasive Species Response Plan: Dreissenid spp. (2018)
- Columbia Basin Flowering Rush Management Plan (2019)
- Management Plan for the European Green Crab (2002)
- National Management and Control Plan for the New Zealand Mudsnail (*Potamopyrgus antipodarum)* (2007)
- Quagga-Zebra Mussel Action Plan for Western U.S. Waters (2010) (updated in 2020)

Process and Participation

The original Oregon Plan (2001) was produced with the support of the Oregon Watershed Enhancement Board and PSU's CLR (Hanson and Sytsma, 2001). CLR drafted the plan with a steering committee composed of members from federal and state agencies, tribes, researchers, and industry representatives (Appendix A1).

The 2001 Oregon Plan was available for public comment for a 60-day period which ended on April 25th, 2001. A press release was issued to all local and regional news sources, followed by an email to all steering committee members requesting them to post information about the public comment period. The press release was posted on the PNW_ANS_Listserv and the Oregon Chapter of the American Fisheries Society website following a presentation at their annual conference. The press release led to a news piece by Oregon Public Broadcasting and an article in the Oregon State Marine Board's "Underway" newsletter that was mailed to 165,000 registered boaters. The public comments that were received are included in Appendix B1. The response to the comments is incorporated with each comment.

At the time the Oregon Plan was being developed, Washington State's ANS Plan had just been approved, and other Columbia River Basin states, such as Idaho and Montana, were developing their own plans with the intent that such efforts would facilitate a coordinated regional approach to AIS management (OR Plan 2001). Signed by Governor John Kitzhaber, the Oregon Plan was formally approved by the ANSTF in 2001.

Unlike other states, Oregon established the state AIS coordinator position not at a state agency (such as a wildlife, parks, or agriculture department) but at PSU's CLR. CLR was established by the Oregon State Legislature a few years prior to address lake management and invasive aquatic

species issues in Oregon. Faculty from PSU and other regional universities, as well as adjunct faculty from federal agencies and other entities (US Fish and Wildlife Service, U.S. Army Corps of Engineers, Smithsonian Institution), collaborate with CLR on research projects, many of which focus on AIS. This unique setup allowed the original Oregon Plan additional opportunities for collaboration and coordination, the latitude to develop far-reaching opportunities for research and training programs, and the ability to coordinate among a wide range of new and non-traditional partnerships.

As per ANSTF guidance, State and Interstate ANS Management Plans were intended to undergo a process of periodic review and evaluation culminating in living, mature plans that ideally spanned five years of management projections with the caveat that emerging issues would require plan amendments on an as-needed basis.

This overhaul of the Oregon Plan bolsters its status as a comprehensive planning document reflecting a broad spectrum of current AIS management objectives. The goals and strategic objectives remain consistent with the original plan. However, updates to the plan reflect changes in the species of concern to the state, as well as the evolution of education and outreach strategies, policy changes, new management tools, research priorities, etc. The revision process was an opportunity to incorporate recommendations from recent regional and national AIS management assessments. These assessments include projects undertaken to evaluate the effectiveness of existing regulations, identify gaps in statutory authority, suggest priority policy issues, assess the success of outreach efforts, and make recommendations for future actions.

The following represent the primary management assessments that informed the current Oregon Plan.

- Building Consensus in the West Workgroup (2019)
- Effects of Climate Change on Aquatic Invasive Species and Implications for Management and Research (2008)
- From Theory to Practice: A Comparison of State Watercraft Inspection and Decontamination Programs to the Model Legal Framework (2018)
- Report on Nutria Management and Research in the Pacific Northwest (2007)
- Summary of Western States' Aquatic Invasive Species Outreach Campaigns: Target Audiences, Messaging, Delivery, and Lessons Learned (2021)

In addition, the updated plan allows AIS managers to continue to coordinate on AIS in other jurisdictions.

Engagement Goals

The Oregon Plan represents a unique partnership between academia, multiple agencies with AIS oversight, and others with AIS management interests. To capture the significant changes in AIS management authorities and increased participation in AIS management by local and regional entities during the revision process, an engagement plan was developed. Drafted and overseen by the environmental consulting firm Samara Group, the engagement plan to update Oregon's Aquatic Nuisance Species Management Plan had three goals:

- Engage with all organizations (or similar organizations when not feasible) that participated in the original plan's development per documentation in the original plan:
    - Steering Committee
    - Implementation Plan
- Enhance governmental collaboration by recruiting four Tribal representatives for the Steering Committee
- Expand engagement to include multiple layers of outreach, engagement, and roles, including:
    - A 2022/2023 Revision Steering Committee (~15 people) (Appendix A2),
    - One request for review of action items and implementation table by the Oregon Invasive Species Council (OISC) (November 2022),
    - An Advisory Network of Reviewers (Appendix A3) was involved at two review points (Draft review: March/April 2023, Draft presentation to OISC: May 2023) during the planning process representing additional interests not represented on the 2022/2023 Revisions Steering Committee (the Advisory Network includes organizational leaders and field staff who have a role in managing aquatic natural resources and aquatic nuisance species),
    - At least one request for review of the 2023 Revised Draft Plan and feedback from members of the OISC (May 2023) (Appendix A4),
    - Three updates at OISC public meetings (June 2022; October 2022; and May 2023), and
    - A two-week public review/comment period (Appendix B2) for the 2023 Revised Draft Plan (May 2023).

The 2023 revised Oregon Plan was available for public comment for a 14-day period which ended on May 25th, 2023. An announcement of the public comment period was issued by the OISC to the OISC Network listserv. Additionally, the OISC network, the OISC, and the steering committee were asked to distribute information about the public comment period to their contacts. The presentation of the Oregon Plan and subsequent public comment period at the May 23, 2023, meeting of the OISC was included in the OISC public meeting notice on the Oregon Transparency website. Public comment is included in Appendix B1.

Problem Definition

Overview

There are currently 292 records of nonindigenous aquatic species found in Oregon (Appendix C1) (OCS, 2016; Fofonoff et al., 2018; OISC, 2023; USGS, 2022). Nearly half of these are invertebrates, with fishes and plants making up the next two largest categories. Just over a third live in marine or brackish water habitats. More than 250 of the total species are reported as either established or stocked in Oregon, while the remaining species listed are of unknown status,

cryptogenic[4], failed, or in a few instances, considered extirpated or eradicated[5]. Over 100 additional nonindigenous aquatic species have been reported from elsewhere in the Columbia River Basin but have not yet been detected in Oregon (OCS, 2016; USGS, 2022). It is likely that even more nonindigenous species are present that have not been reported or detected and that, even with diligent management, additional nonindigenous species will arrive in Oregon in the future (Tobin, 2018). Left unchecked, many of these species have the potential to threaten Oregon's aquatic resources, transform ecosystems, impact, and even harm human health.

Many of the aquatic species threatening Oregon's waters may be introduced unintentionally, arriving as hitchhikers and stowaways in vehicles, shipping containers, and even in the products being traded themselves. For example, Oregon's rivers and lakes are vulnerable to infestation by the highly invasive zebra and quagga mussels, *Dreissena polymorpha* and *D. rostriformis bugensis*. Also known collectively as dreissenid mussels, the invasion history of these freshwater invaders in North America includes numerous unintentional pathways of introduction and spread. Native to Eastern Europe, these mussels were likely introduced into the Great Lakes as larvae transported in the ballast water of large cargo ships crossing the Atlantic. They have since spread throughout the Mid- and Southwest both as larvae transported passively downstream by currents as well as from water body to water body both as adults attached to boat hulls and in-water equipment and as larvae transported in standing water (Karatayev et al., 2007). More recently, dreissenid mussels were found growing attached to and inside of shipments of moss balls, an imported, decorative, live-aquarium product sold both at pet stores across the United States and online (USGS, 2021).

Other organisms, especially those AIS that have been established in the state for many decades, are the result of intentional introductions, both legally (e.g., for the purpose of fish stocking or wildlife enhancement) as well as illegally. Examples of the latter include the disposal of unwanted aquatic pets such as goldfish, *Carassius auratus*, and red-eared sliders, *Trachemys scripta elegans*, dumped into water bodies by their former owners. Examples of fishery and wildlife enhancement include American bullfrogs, *Lithobates catesbeianus*, a voracious predator of native amphibians brought West and permitted for introduction by the Oregon Fish and Game Commission (Lampman, 1946), and American shad, *Alosa sapidissima*, introduced by state and federal agencies to bolster fishing opportunities (Smith 1896). In addition, numerous invasive aquatic plant species were introduced as ornamental garden plants and spread into natural areas. Examples include yellow flag iris, *Iris pseudacorus*, and purple loosestrife, *Lythrum salicaria*, both of which form detrimental monocultures. Other invasive aquatic plants, once common in the aquarium trade, such as Brazilian elodea, *Egeria densa*, may also have gained a foothold in Oregon's freshwater systems, having been dumped along with other contents of unwanted

[4] As defined by Carlton (1996), cryptogenic species are those species that are neither demonstrably alien nor native, and often appear to be remarkably common in terrestrial, freshwater or marine ecosystems thus making it difficult to determine their status.
[5] This accounting applies to three species which may be better categorized as having failed to establish due, in part, to direct action by a management agency or entity. The original detection of whirling disease *Myxobolus cerebralis* occurred in 1986 followed by a limited number of hatchery detections (ODFW 2023). Subsequent management actions aimed at eliminating the disease from the hatcheries has resulted in no further evidence of the presence of the parasite in those watersheds (ODFW 2023). The two fish species listed as extirpated, *Seriola aureovittata* and *Oplegnathus fasciatus,* were in fact prevented from fully entering Oregon waters. Both species were found living in the center cargo hold of a derelict vessel transported into coastal waters because of the Japanese Earthquake and Tsunami of 2011 (Craig et al., 2018).

aquariums. A survey of the nonindigenous aquatic species in the mid-to-lower Columbia River found that intentional introduction was likely the most common pathway for new species introductions prior to the 1970s (Draheim et al., 2007).

History

Perhaps the best-surveyed watersheds in Oregon for AIS are those of the mid and lower Columbia River (which encompass freshwater, estuarine, and marine habitats). While the introduction of new species into the Columbia is heavily influenced by shipping and fisheries enhancement pathways, many of the species found in the Columbia can also be found throughout the state, and thus the AIS introduction patterns of the Columbia can be considered at least partially representative of those throughout the state.

A survey of the nonindigenous species found in the Oregon portion of the Columbia River basin demonstrates how introduction rates vary over time. From the 1880s to the 1970s, new introduced species were reported from the Oregon portion of the Columbia River approximately every five years (Sytsma et al., 2004). In the 1980s and 1990s, a new invertebrate species was discovered about every five months, and the dramatic change in the rate of discovery can be attributed to both the increasing frequency of introductions (bolstered by an increase in global trade (Ruiz et al., 2000) and an increase in biological surveys (Sytsma et al., 2004). Many of the early reported invertebrate species were valued as food resources in their native range and may have been imported and introduced intentionally (i.e., soft-shelled clam, *Mya arenaria*, corbicula clam, *Corbicula fluminea*, and the mystery snail, *Cipangopaludina chinensis*). In contrast, three of the most recent invertebrate AIS to become established in the Oregon portion of the Columbia River: the New Zealand mudsnail, *Potamopyrgus antipodarum*, a freshwater prawn, *Exopalaemon modestus*, and a calanoid copepod, *Pseudodiaptomus inopinus*, differ from earlier invaders in that they have little or no food or recreational value (Draheim et al., 2007).

In contrast to the rate of invertebrate discovery, nonindigenous fish detections in the Columbia River peaked in the 1950s. The trend is likely due to a decline in intentional fish introductions by both individuals and fish and game agencies undertaken to increase the diversity of food and game fishes (Sytsma et al., 2004; Draheim et al., 2007). By the mid-1950s, intentional sport fish introductions were on the decline, but new fish introductions continue to be reported, many of these representing biological control efforts, e.g., the mosquitofish, *Gambusia affinis*, or illegal aquarium disposal, e.g., the oriental weather loach, *Misgurnus anguillicaudatus* (Sytsma et al., 2004). Today, more than 60 nonindigenous species of fish have been successfully established in Oregon waters (Fofonoff, 2018; OISC, 2023; USGS, 2022).

Unlike fish and invertebrates, of the 15 nonindigenous plants reported from the Columbia River AIS surveys, the majority have no known date of first collection, and the collection records for the remainder range from 1860-1976 (Sytsma et al., 2004; Draheim et al., 2007).

Impacts

The number of established AIS in Oregon likely represents a significant ecological and economic burden to the state, but due to difficulties quantifying many aspects of ecosystem alteration caused by aquatic invaders in particular, the extent of this harm is not easy to calculate (Fantle-Lepczyk et al., 2022). At the state level, quantifying the economic impacts of AIS on ecosystem function and human health has been challenging (Cusack et al., 2009). Although often reported with the caveat that the calculated costs are likely underestimates (Fantle-Lepczyk et al., 2022), the economic impacts of AIS may be easier to quantify than the ecological impacts (Diagne et al., 2021). Often the ecological consequences of introduced species are difficult for humans to perceive or quantify. Long time lags between an introduction and the observation of impact, incremental losses of ecosystem services, and a poor understanding of the natural history characteristics of many aquatic systems contribute to our inability to detect problems early in the invasion when control is most likely to be effective (Diagne et al., 2021). Impacts of introduced species may also be masked by other changes in aquatic systems, such as habitat loss or alteration, climate change, etc. Nonetheless, deleterious impacts currently occur in Oregon and are likely to increase as more nonindigenous species are introduced (OISC, 2017).

The direct economic impacts of AIS in Oregon are reflected both in the lost revenue from fisheries and other aquatic resource-dependent activities (both extractive and recreational) as well as in the direct cost of combating and mitigating the impacts of invasions within the state. For example: sportfishing in Oregon is enjoyed by over 569,600 anglers who spend nearly 8 million angler days afield and, in 2019, generated over $1.5 billion in economic output while fishing in Oregon (American Sportfishing Association, 2021). AIS, which have the potential to depress sportfish populations or otherwise reduce recreational fishing opportunities, can disproportionately damage local economies as well as reduce the overall contribution to the state economy. In addition, the profitability associated with an aquatic resource will be reduced by the costs of AIS management, including prevention, detection, rapid response, long-term control, and eradication (Mack et al., 2000). The direct economic impact of one aquatic weed in Oregon, Brazilian elodea, *Egeria densa*, is estimated to be $3.5 million, according to a recent study completed for the Oregon Department of Agriculture (The Research Group, 2000). The industry impacted by the infestation may pay these costs or be borne by the state agency charged with AIS management. One such potentially costly risk to Oregon and other Pacific Northwest waters is that posed by dreissenid mussels or zebra and quagga mussels. These freshwater mussels attach to hard substrates and clog pipes and have led to substantial costs for maintaining hydropower and municipal water supply systems throughout the Great Lakes, Midwest, and Southwest. The costs associated with an invasion of dreissenids in the Columbia River Basin is estimated to exceed $500,000,000 million annually (PNWER and PSMFC, 2015).

While a comprehensive summary of the existing impacts of AIS in Oregon may be difficult to compile, some impacts are readily observable. For example, multiple, dense infestations of water primrose, *Ludwigia* spp., a perennial marsh plant, now exist in sloughs, ponds, and other waterways in the Willamette Valley, clogging waterways and interfering with water recreation, irrigation, fish passage, and flood control (ODA, 2018). These large mats of water primrose also shade the underlying water giving water primrose a competitive advantage over native aquatic

plants and create low dissolved oxygen concentrations that do not support the survival and growth of native fishes or other aquatic organisms (OISC, 2023). Introduced predatory fish have been implicated in the decline of native species (ODFW, 1999), with bass, walleye, and crappie being the primary consumers of native salmonids in Pacific Northwest reservoirs (Murphy et al., 2021).

Estimates of the impacts of nonindigenous species on threatened and endangered species vary greatly. Pimentel et al., (2005) identified 42% of species listed under the Endangered Species Act as at risk of some impact from invaders while Duenas et al. (2018) reported that only 6.2% of listed species (with nearly half of those species occurring on islands) were at risk due to nonnative species (primarily predators). This supports the notion that additional research is be required to reduce the high degree of uncertainty that surrounds the impacts of invasive species on listed species. However, there may be less disagreement when investigating the impacts of invasives species on recent extinctions. Pimentel et al. (2005) report that, nationwide, nonindigenous species contributed to 68% of fish extinctions in the past 100 years while Blackburn et al. (2019) implicated nonnative species as drivers of extinction in almost a third of worldwide ray-finned fish extinctions in the past 500 years. Nonetheless, identifying and quantifying AIS impacts in Oregon, or elsewhere, is likely to remain a complicated undertaking.

Pathways

A pathway can be defined as the way in which an invasive species enters or moves about Oregon. Pathways that facilitate the introduction and movement of AIS include human-mediated activities that are intentional (e.g., global trade in live organisms and introductions for wildlife enhancement and biological control), unintentional human-mediated transport (e.g., hitchhiking species moved on boats and in packaging materials), and spread through natural dispersal mechanisms (e.g., oceanic currents, downstream riverine transport, etc.). Some pathways and their threats are well-understood - and sometimes well-regulated - while other new pathways or novel events may take the AIS community by surprise.

The pathway-based approach to AIS management promoted herein allows managers to better focus on preventing the introduction of both specific unwanted species and species that may not yet have been identified as a threat or are unknowingly being moved by a particular pathway. This conservative approach is more likely to prevent the need to respond to a new AIS threat after it has been introduced and potentially established - a stage at which it is unlikely to be able to be successfully eradicated or even managed in a cost-effective manner. Addressing pathways, rather than just individual species, allows for a spectrum of agency and stakeholder cooperation beyond the agency with authority for that species or threatened resource. As introduced in the OISC's Statewide Strategic Plan, a Pathways Management Approach includes a call for assessment, evaluation, and collaboration to address threats across complex pathway variables.

The risks that characterize different introduction pathways are constantly shifting. This can be due to changes in management priorities and wildlife policies, alterations in global shipping patterns, changing trends in local import or export pressures, new or renewed interest in exotic

pets, newly discovered pathogens, shifts in recreational opportunities, epidemic-driven related travel restrictions, etc.

To undertake a pathways management approach to AIS, it is helpful to understand how AIS move into and throughout the state. The following is an overview of pathways of concern to Oregon waters, noting that uncovering and responding to new pathways and novel events remains an additional management priority.

Commercial shipping, maritime vessels, and other in-water equipment

In the early 1800s, sizable trans-oceanic sailing ships began arriving in what would become the state of Oregon bearing supplies, colonizers, and immigrant laborers, and leaving with timber, furs, and fish. These ships are believed to have introduced new species in the form of fouling and wood-boring invertebrates and plants. Other organisms were likely introduced from anchor chains, sea chests, solid ballast, and, eventually, ballast water.

With the advent of metal-hulled ships, followed by the introduction of anti-fouling paint and other hull-coating efforts, the scope of the threat from invasive hull-fouling communities has lessened. However, the sporadic movement of (potentially heavily fouled) derelict vessels and in-water work equipment continues to pose a threat.

Nonetheless, ballast water, because of its sheer volume, remains the primary method by which AIS are believed to be transported globally (Carlton, 2001). As ships continue to get bigger and faster, the total volume of ballast transported will continue to increase as travel times decrease, thus increasing the probability that potential invaders will survive their journey. In addition to trans-oceanic ballast transport, the transport of organisms in ballast water from domestic, coastal ports is also a threat.

While the commercial shipping industry is an important component of the Oregon economy, shipping-related pathways, especially ballast water, account for the majority of AIS in the lower Columbia River (Sytsma et al., 2004). In 2001, to protect Oregon water resources from AIS introductions associated with commercial shipping, the legislature established the Oregon Ballast Water Program (Flynn and Sytsma, 2004). Program activities include monitoring vessel arrivals and reporting compliance, providing outreach and technical support, conducting vessel inspections, compliance verification sampling and enforcement actions, and engaging in policy development (Emerson, 2023).

Oregon averages just over 1500 arrivals annually with the lower Columbia River receiving 95% of vessel traffic[6] (Emerson, 2023). Foreign ports make up 55% of the last port of call of these vessels, 25% of vessels arrive from within the Common Waters Zone[7] and an additional 20% from the coastal waters on the Pacific Coast of North America (Emerson, 2023). While total

[6] The Port of Coos Bay, Oregon's largest deep draft coastal harbor moving 2M tons of cargo annually (primarily forest product exports bound for Asia), receives 5% of arrivals (Emerson, 2023).
[7] Per OAR 340-143-0010 vessels arriving from the Common Waters Zone (between 40- and 50-degrees north Latitude) are not subject to ballast water management requirements.

arrivals numbers and last port of call distributions have remained basically unchanged since 2010 there has been a notable change in ballast water management strategies which have shifted from primarily mid-ocean exchange to predominantly ballast water exchange plus ballast water treatment and ballast treatment (Emerson, 2023).

Fishery and wildlife enhancement

Intentional legal and illegal introductions of nonnative species to enhance local fishing opportunities have occurred in Oregon for over 150 years (Sytsma et al., 2004). In addition, several fishery enhancement actions may have led to unintentional species introductions in the region. The late 1800s and early 1900s were characterized by many intentional plantings by the precursor to the USFWS, local fishery managers, and private citizens to improve commercial, recreational, and sustenance fishing in the region (see Lampman 1946). Releases of sport fish into public and private ponds still occur, but state wildlife agencies are becoming more reluctant to stock nonindigenous species in the region.

Mariculture, especially of oysters, is also associated with several historical AIS introductions on the West Coast (Cohen and Carlton, 1995). For example, the soft-shelled clam *Mya arenaria* is believed to have rapidly spread up the West Coast from San Francisco Bay to Puget Sound in the late 1800s. The arrival of *M. arenaria* to the lower Columbia may have been the result of intentional introduction for cultivation, or it may have spread unintentionally in hull fouling communities (Cohen and Carlton, 1995).

Fishing and recreational water use

Recreational anglers, boaters, and other water users may unintentionally transport AIS (primarily aquatic weeds, snails, and other small invertebrate species) as they move from watershed to watershed. Some organisms may move as hitchhikers trapped in damp gear or boat wells; others may be transported as fouling organisms attached to boat hulls or as weeds wrapped around boat propellers. For example, the spread of dreissenid mussels throughout much of the United States has been attributed to movement by recreational boaters, etc. In addition, the practice of dumping left-over live bait has also been implicated in AIS introductions. The bait itself may be the unwanted species, as could be its packing material or other associated hitchhiking organisms. The risk of live bait as an AIS pathway may have decreased with a prohibition on live bait in Oregon decades ago. However, the persistence of exotic bait species available for purchase on the internet, as well as the presence of individuals who may transport live bait harvested in one water body to another (as may have been the case with native chub species appearing in Oregon lakes outside of their native range) continue to be a concern.

Organisms in trade

The commercial transport of live aquatic species (for aquaculture, mariculture, bait, aquaria trade, water gardens, fisheries, scientific supply, educational opportunities, human consumption, etc.) is a vector for both intentional and accidental introductions of aquatic organisms. Organisms in the live aquatics industry are often selected for hardiness and thus have an

enhanced potential to survive transport and be successful at establishing across many different habitats (Chapman et al., 2003).

Intentional introductions into the wild may be the result of releases by individuals to enhance a natural area, to develop a harvestable population for resale, to dispose of species humanely, or to dispose of unwanted organisms. While many species in trade may be unable to overwinter in Oregon's current climate, there are numerous established species that are the result of intentional releases, including popular aquarium and pond species such as oriental weatherfish *Misgurnus anguillacaudatus* and goldfish *Carassius auratus*, aquatic plants like *Cabomba caroliniana* and *Egeria densa*, and the mystery snail *Cipangopaludina chinensis* (USGS, 2022). Plant and animal shipments may include hitchhikers or species accidentally included with the shipment as parasites or pathogens or simply co-occurring in shipping water or other packaging material (Olson and Linen, 1997). These unwanted species may escape through improper disposal of the target species or packing material or be introduced into the wild with the target species. The initial introduction of the New Zealand mudsnail *Potamopyrgus antipodarium* into the western United States is believed to have been via a contaminated shipment of trout intended as hatchery stock.

Biological control

There is little information on early efforts at biological control, but the practice likely originated with the observation that predation by some animals and insects led to reductions of unwanted species. Historical examples of biological control often include spectacular failures (e.g., the promotion of nutria, *Myocastor coypus*, for aquatic plant control throughout Louisiana in the 1940s (Baroch et al., 2002). Today, triploid grass carp, *Ctenopharygodon idella*, and mosquito fish, *Gambusia affinis*, are two nonindigenous aquatic species used as aquatic biological control organisms in Oregon. Purple loosestrife, *Lythrum salicari*, is just one of many invasive plant species in Oregon that are the target of biological control projects using insects. While current biological control projects are well-vetted and highly regulated, there still exists the opportunity for well-intentioned individuals to attempt their own biological control by intentionally (and illegally) releasing AIS.

Novel events

Unique occurrences that may not represent an established pattern of activity can sometimes pose an unusual threat of AIS introduction. Often these events represent an isolated example of a known threat (such as biofouling or the sale of exotic species) that can significantly increase the risk of transportation and subsequent introduction of nonindigenous species. Because of their unusual nature and rare occurrence, they are often unregulated, and in fact, at first, it may be unclear which, if any, state agency has the authority to respond to such an occurrence.

Examples of novel events that took place after the approval of the 2001 Oregon Plan include:

- A proposed shipbreaking facility in Coos Bay. Had it been approved, this project would have entailed importing and anchoring mothballed naval vessels with extensive fouling communities from the highly invaded San Francisco Bay in Yaquina Bay (Oregonian Editorial Board, 2009);

- The arrival of thousands of pieces of heavily fouled tsunami debris for years following a devastating earthquake in Japan in 2011 - including a 60ft long dock that washed up on the Oregon Coast with more than 60 different coastal Japanese species attached (Barnea et al., 2013); and most recently,
- The discovery of live dreissenid mussels imported in decorative moss balls, popular with aquarium and water garden enthusiasts (PSMFC et al., 2021).

AIS of Concern

While the focus of much of the Oregon Plan is driven by prevention objectives and pathway-focused actions, the identification of invasive species of concern (both those present and those whose arrival is concerning) plays a significant role in AIS management. Local or state-wide species inventories, watch lists for surveying and monitoring, prohibited lists that ban the importation or possession of certain species, allowed lists of organisms in trade, regulatory lists that designate management actions, unwanted lists for public outreach and awareness, etc., are just some of the many species lists that may exist in a particular region (Simpson and Eyler, 2018).

Creating a comprehensive list of nonindigenous species for Oregon that is up-to-date, relevant, and provides a source of useful information, as well as one that ranks species by their level of concern, is a task that is both daunting and unrealistic given the constantly shifting nature of invasive species pathways, problems, and concerns, and the level of detail that make certain types of lists relevant to their target users.

With over 250 known nonnative aquatic species present and established in the state (Appendix C1), 100s more in adjacent or connected water bodies (OCS, 2016; USGS, 2022), and still more species of considerable management concern that are absent from the region (Appendix C2), this plan has chosen to direct readers to the OISC's Invasive Species Hub (Hub) instead of attempting to create a stand-alone list of all known and suspected AIS of concern, with static management rankings. Invasive species of concern, including those listed in the Hub, come from various sources. Official lists reflecting state-wide, ongoing invasive species risk assessments that help populate the Hub include the State Noxious Weed List, Prohibited and Controlled Fish and Wildlife Species list, and the Oregon Conservation Strategy's Documented Priority Invasive Species.

Invasive Species Hub[8]

The Hub is a searchable tool that, through a collaborative effort, compiles available information for species of concern: those non-native species (aquatic and terrestrial) that threaten Oregon's environment, economy, or public health. Species profiles include information about the species, species descriptions, introduction pathways, and distribution. As the Hub is an electronic resource, the data housed in this list is far more

[8] https://www.oregoninvasivespeciescouncil.org/infohub

comprehensive than any static list that this plan could reasonably replicate as part of the Oregon Plan update. With more than 30 public-facing published data fields, and numerous additional fields available to the OISC-led team charged with maintaining the data set, the Hub is the most rigorous available resource documenting invasive species of concern in Oregon (see Appendix C2). Furthermore, transparency and collaboration are two key tenants of the Hub efforts, as can be seen in the range of information and opportunities for participation in the review process available to Hub visitors (OISC, 2023).

To be included in Oregon's Invasive Species Hub as a species of concern, a species must be nonindigenous to Oregon, absent from the state or limited to a small, contained range within the state, and deemed a threat to the environment, economy, or human health (OISC, 2023). The OISC, in creating this list, weighs factors such as the risk to human health, the impact of the species in habitats similar to those found in Oregon, the likeliness of the species to cause significant economic loss, the difficulty other regions have had eradicating the invader, and the capacity for the species to spread in Oregon (OISC, 2023). Furthermore, the Hub highlights Alert Species (species of pressing concern because of a recent event, issue, or detection) as well as Early Detection Species in lieu of a high, medium, and low risk-based ranking of all individual species, thus allowing for more flexibility and the ability to upgrade or downgrade species in response to real-time events.

> Alert Species: 'Alert Species' are highlighted species of pressing concern because of an event, issue, or detection. Alerts are posted at the time of the reported issue or event as noted (date of alert) and set to automatically become inactive after 3 months to keep the list timely. At times, there may not be any active alerts[9]. Alerts may be inactivated before or after the 3-month window for multiple reasons including seasonal considerations, the threat status, etc. These species often remain a high priority for prevention, detection, and management (OISC, 2023). Each Alert Species listing includes the following to inform the public and provide resources to partners wishing to create their own internal or external alerts:
>
> - Alert Description
> - Photos
> - Call to Action
> - Why this Alert
> - Primary Web Link
> - News and Press
> - Date of Alert
> - Date to Update

[9] At the time of final review, only one non-native species alert is active in Oregon: Emerald Ash Borer, *Agrilus planipennis*, for which there is an active quarantine, trapping, and mapping effort underway at the state-level. https://www.oregoninvasivespeciescouncil.org/infohub

- Distribution Map
- Species Overview

Early Detection Species: 'Early Detection Species' are species of concern to Oregon that have either not yet been detected, have been eradicated in the past, or have been contained to a limited distribution within the state (OISC, 2023). Early Detection Species listed on the Hub include the full component of informational fields that accompany all published invasive species profiles (see Appendix C2).

With information compiled from regional experts, over 100 species have been published and are currently accessible on the Hub. While it is - at the date of this plan's publication - still a work in progress with additional species profiles and accompanying information being published in a phased approach, the Hub is a fully functional resource for Oregonians. The Oregon Plan believes that the Hub will provide interested parties with a more comprehensive and relevant view of species of concern to the state than the inclusion of a static selection of species profiles.

In addition to the Hub, there are three species lists that have significant relevance to AIS management within the state. They are the State Noxious Weed List, the list of Prohibited and Controlled Fish and Wildlife Species, and the Oregon Conservation Strategy's Documented Priority Invasive Species. The first two are included herein because of the associated management actions and prohibitions that come with these designations. The Conservation Strategy list is included to acknowledge that the management of these species is a key component of the statewide conservation strategy. All three lists are the result of state-wide, ongoing invasive species risk assessments.

Noxious Weed List

The State Noxious Weed List (Appendix C3) prioritizes weed management activities at the state level and provides direction for county-level control programs. The list is part of a Noxious Weed Policy and Classification System and is jointly maintained by the Oregon State Weed Board and the Noxious Weed Control Program (ODA, 2022). The noxious weed quarantine is listed in Oregon Administrative Rule (OAR 603-052-1200) and designates the prohibited acts for these species. State noxious weed quarantines prohibit the import, transport, propagation, or sale of a subset of weeds listed on state and federal noxious weed lists.

The State of Oregon classifies listed species as 'A', 'B,' and 'T,' designated weeds.

- **A Listed Weed:** A weed of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states makes future occurrence in Oregon seem imminent. Recommended action: Infestations are subject to eradication or intensive control when and where found. Biological control agents are not used on "A" listed weeds in Oregon. If this weed is found in the state, it will be targeted for eradication or containment.

- **B Listed Weed:** A weed of economic importance that is regionally abundant, but which may have limited distribution in some counties. Recommended action: Limited to intensive control at the state, county, or regional level as determined on a site-specific, case-by-case basis. Where the implementation of a fully integrated statewide management plan is not feasible, biological control (when available) shall be the primary control method.
- **T-Designated Weed (T):** A designated group of weed species selected from either the A or B list as a focus for prevention and control by the Noxious Weed Control Program. Action against these weeds will receive priority. T-designated noxious weeds are determined by the Oregon State Weed Board, which directs ODA to develop and implement a statewide management plan for each species.

Prohibited and Controlled Wildlife and Fish Species

The Importation, Possession, Confinement, Transportation, and Sale of Nonnative Wildlife (OAR 635-056) sets forth rules regarding activities involving nonnative wildlife (including species in trade as well as interactions with nonnative species in the wild). The rules allow private use or ownership of non-native species "to the extent that they do not pose a significant risk of harm to native species." Species designations are made by the director of Oregon Department of Fish and Wildlife (ODFW), who may choose to appoint a Wildlife Integrity Review Panel to consider listing petitions, etc.

All the non-native wildlife listed are designated as Exempt, Excluded, Prohibited, Controlled, or Non-Controlled species. Most relevant to AIS management in the state are the Prohibited, Controlled, and Non-Controlled categories.

- **Exempt:** Those species not considered "wild," e.g., domesticated animals (i.e., cats, dogs, cattle, sheep, guinea pigs, etc.). The list does not include any aquatic species.
- **Excluded:** Keeping, release, and hunting of certain nonnative animals considered "exotic species" are regulated pursuant to other Oregon Rules. The order Crocodylia encompasses the only aquatic species on this list.
- **Prohibited:** Live wildlife designated as prohibited may not be imported, possessed, sold, purchased, exchanged, or transported in the state of Oregon[10] (Appendix C4).
- **Controlled:** Species listed as controlled must be accompanied by specific information as to how the impacts on native wildlife are to be controlled, for example requiring permits for importation and possession, allowing only certified, non-reproducing individuals, prohibiting the release of wild-captured individuals, etc. (Appendix C4)
- **Non-Controlled:** Upon request, species may be classified as noncontrolled if the petitioner successfully demonstrates that the species presents a low risk of harm to native wildlife.

[10] Exemptions may be made permitting the import and possession of prohibited species to zoos or other accredited facilities.

To avoid the challenges of having species importation lists that are limited to either approved or prohibited species, the State of Oregon chose a different approach to listing species: notably, any nonnative wildlife or fish species not listed under OAR 635-056 may not be possessed, imported, purchased, sold, exchanged, or otherwise traded in Oregon.

Oregon Conservation Strategy

Invasive species are one of seven key conservation issues identified by the state-wide Oregon Conservation Strategy (OCS). As such, a list of priority invasive species was developed by ODFW in consultation with ODA (OCS, 2016). The OCS used a systematic approach to assess the level of ecological threat from invasive species currently present in Oregon or those likely to appear in the near future and listed them by ecoregion (Appendix C5a). The scope was limited to terrestrial and aquatic vertebrates in the original OCS but was expanded to include estuarine and marine fishes, invertebrates, plants, and algae within the nearshore ecoregion in the appended Nearshore Conservation Strategy (Appendix C5b) (OCS, 2016).

Goal

The goal of the Oregon Plan is to minimize the harmful ecological, economic, and social impacts of AIS through prevention and management of introduction, population growth, and dispersal of AIS into, within, and from Oregon. As stewards of over 100,000 miles of rivers, 16 major watersheds, more than 6,200 lakes, nine major estuaries, and over 360 miles of coastline, the partners engaged in implementing the Oregon Plan are faced with a significant challenge when it comes to protecting the economic productivity and ecological integrity of these systems from harm caused by AIS. To accomplish this goal, the unified and comprehensive management effort fostered and facilitated by the original 2001 Oregon Plan will continue to play a vital role.

In the 20 years since the implementation of the original Oregon Plan, recognition of the threat presented by AIS in Oregon has increased significantly. Oregon has made broad advances in coordination and collaboration on AIS issues within the state and regionally. As such, the goals and strategic objectives of the revised Oregon Plan remain consistent with the original.

Furthermore, the revised plan acknowledges the steps taken to facilitate a coordinated response to AIS in Oregon and recommends numerous actions to strengthen and expand this collaborative approach to prevention, education, and response.

Objectives

Participants in AIS management throughout the state will address key AIS issues by focusing efforts and resources on the six overriding objectives of the Oregon Plan:

- Prevention: halting introductions before they occur

- Early Detection and Rapid Response: enhancing Oregon's capacity to detect, identify, report, and effectively respond to newly discovered AIS of all taxa,
- Control and Management: minimizing the harmful impacts of established AIS populations,
- Education and Outreach: maximizing understanding of AIS issues,
- Coordination and Leadership: promoting collaboration on AIS efforts, and
- Research, Evaluation, and Development: improving the effectiveness of prevention and management efforts through research and assessment.

Crosscutting Principles

Running through the strategies and actions intended to accomplish the above objectives are a series of themes. These repeated concepts or crosscutting principles (DOI, 2020a) include collaboration, pathway-based management, adaptive management, cost-effectiveness, and accountability.

Existing Authorities and Programs

In Oregon, numerous authorities, programs, and partnerships play a role in the successful prevention and management of AIS. They span international shipping conventions, bi-national Columbia Basin working groups, state agency directives, and local planning - each playing a different role in informing, guiding, enforcing, or coordinating efforts. Effectively making use of this patchwork of authorities, plans, and responsibilities requires a high level of coordination and cooperation. Included in this list of authorities are those programs where information is shared between managers, researchers, and other entities with overlapping interests and jurisdictions to better plan for and implement the necessary actions for the prevention and control of AIS in Oregon.

International Authorities

International Maritime Organization

The International Maritime Organization (IMO) has been involved in the effort to prevent the transfer of harmful organisms by ships since 1991. In 1997, the IMO adopted ballast water guidelines to minimize the risk of introducing harmful aquatic organisms and pathogens transported in the ballast tanks of large ships (IMO, 2022b). The International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM Convention), adopted in 2004, established standards and procedures for the management and control of ships' ballast water and sediments. As of February 2022, 89 countries (>90% of the global merchant fleet) have signed on to this maritime treaty (IMO, 2022a). Guidelines for the Control and Management of Ships' Biofouling to Minimize the Transfer of Invasive Aquatic Species (Biofouling Guidelines) (resolution MEPC.207(62)) were adopted in 2011 (IMO, 2022b). While these guidelines are not binding on member nations, the United States is implementing many of the provisions through the USEPA (in-water cleaning is regulated under the National Pollutant

Discharge Elimination System (NPDES) section of the Clean Water Act (33 U.S.C. 1342)) and the U.S. Coast Guard (under the authority of the 2018 Vessel Incidental Discharge Act (VIDA, 33 U.S.C. 1322)) (Tamburri et al., 2021). For a comprehensive timeline of the history of major ballast water and biofouling policy advances in the US, please see Scianni et al. (2021).

International Plant Protection Convention

The United States is a member of the North American Plant Protection Organization (NAPPO). The NAPPO has adopted standards to prevent and control the introduction of pests under the guidance of the International Plant Protection Convention (IPPC), an intergovernmental treaty signed by over 180 countries that protects global plant resources from the spread and introduction of invasive pests and promotes phytosanitary trade practices (IPPC, 2022) The United States became a party to the Convention in 1972. The Convention applies to specific quarantined pests in international trade. Participating entities agree to establish a national plant protection organization responsible for phytosanitary certifications, inspections of plants and plant products in trade, disinfection, risk analysis, etc. (IPPC 2022). Within the US, the IPPO guidance is implemented by the U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine (APHIS-PPQ) program. APHIS-PPQ is an active participant in the IPPC Community.

Federal Authorities and Programs

No single federal agency has complete authority over all aspects of AIS management, but many federal agencies have programs and stewardship responsibilities that relate to or include AIS management. As Oregon is comprised of 52.95% federally owned land (making it the state with the fifth largest percentage of federally owned land), federal-state coordination efforts to manage AIS are relevant to the larger management overview of AIS in the state.

At the National level, federal activities on AIS management are coordinated through the ANSTF. In February 1999, President Clinton signed Executive Order (EO) 13112, which requires all federal agencies to collaborate to develop a national invasive species management plan that includes terrestrial and aquatic species. The EO was amended in 2016 by President Obama and extended the scope of the initial EO. Included below are brief descriptions of the many federal authorities and programs with relevance to Oregon. A more comprehensive list of Federal Authorities can be found in Appendix D.

Lacey Act

The Lacey Act of 1900 (18 U.S.C. 42; 16 U.S.C. 3371-3378) (as amended) is the oldest national invasive species law in the United States. Title 16 (16 U.S. Code § 3372) prohibits the importation, exportation, transportation, sale, or purchase of fish and wildlife taken or possessed in violation of State, Federal, Indian Tribal, and foreign laws. Title 18 (18 U.S.C. 42) prohibits the importation of species that have been designated as “injurious to human beings, to the interests of agriculture, horticulture, forestry, or to wildlife or the wildlife resources of the United States” by the Secretary of the Interior. AIS species listed as injurious that are of particular concern to Oregon include the mitten crabs *Eriocheir* spp., the zebra and quagga mussels

Dreissena polymorpha, and *Dreissena rostriformis bugensis*; Snakehead fishes (Family Channidae); numerous invasive carp species (bighead, black, silver); etc. For a comprehensive history of the Lacey Act, please see Jewell (2020).

Executive Order 13112

President Clinton signed Executive Order 13112 on Invasive Species (64 FR 6183), on February 3, 1999. The Executive Order seeks to prevent the introduction of invasive species, provide for their control, and minimize their impacts through better coordination of federal agency efforts under a National Invasive Species Management Plan to be developed by an interagency Invasive Species Council. The Order directs all federal agencies to address invasive species concerns as well as refrain from actions likely to increase invasive species problems.

Executive Order 13751

Signed on December 5, 2016, by President Obama, EO13751 - Safeguarding the Nation from the Impacts of Invasive Species (2016) (81 FR 88609) - amended EO13112 above. This new EO established the continuing need for coordinated Federal prevention and control efforts related to invasive species, including AIS. It perpetuated the National Invasive Species Council (NISC) and the Invasive Species Advisory Committee (ISAC) while expanding membership and redefining roles and responsibilities. EO13751 also incorporated human and environmental health considerations, climate change, technological innovation, and other emerging priorities into Federal efforts to address invasive species (NISIC 2022). Note: After being active for nearly two decades, ISAC was disbanded in 2019 by the Trump administration. President Biden reestablished the Committee on September 30, 2021, with EO14048 (86 FR 55465).

Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990

(NANPCA; Title I of P. No.101-646, 16 U.S.C. 4701 et seq.)
This Act established a federal program to prevent the introduction of and control the spread of introduced aquatic nuisance species and the brown tree snake. 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 share responsibilities for implementing this effort. They act cooperatively as members of an Aquatic Nuisance Species Task Force to develop programs for protection, monitoring, control, and research. The Task Force conducts studies and reports to Congress. The Act also authorized the development of an AIS program housed within the USFWS and established the State\Interstate ANS Management Plan Grant Program, which is managed by the USFWS. Under NANPCA, state governors are authorized to submit comprehensive management plans to the Task Force for approval that identify areas or activities for which technical and financial assistance is needed. The Oregon Plan, after formal approval from the ANSTF, qualifies the state of Oregon, through the AIS coordinator, to seek such grants.

National Invasive Species Act of 1996

(NISA; P. No.104-332)

In 1996, NISA amended NANPCA to mandate regulations to prevent the introduction and spread of aquatic nuisance species into the Great Lakes through ballast water and other vessel operations. This Act required a U.S. Coast Guard (USCG) study and report to Congress on the effectiveness of existing shoreside ballast water facilities used by crude oil tankers in the coastwise trade along Alaska as well as studies of Lake Champlain, the Chesapeake Bay, San Francisco Bay, Honolulu Harbor, the Columbia River system, other estuaries of national significance, and other waters. In addition, NISA amended NANPCA, specifying the need for a ballast water management program to demonstrate technologies and practices to prevent AIS from being introduced into and spread through ballast water in U.S. waters.

Identified as a priority research area under NISA, the lower and middle reaches of the Columbia River were the subject of two AIS surveys between 2001 and 2005 funded by the USCG, the U.S. Fish and Wildlife Service (USFWS), and the Pacific States Marine Fisheries Commission (PSMFC). These surveys increased awareness and understanding of Oregon's marine, estuarine, and freshwater AIS. They provided a new baseline of information identifying 96 nonindigenous aquatic species in the Columbia River.

Aquatic Nuisance Species Task Force (ANSTF)

Established in 1991 by NANPCA (as amended), the ANSTF, co-chaired by the USFWS and the National Oceanic and Atmospheric Administration (NOAA), provides a national forum to coordinate efforts among federal and state agencies as well as efforts of the private sector and other interest groups. Made up of 13 Federal agency representatives and 15 ex-officio members, the ANSTF oversees the formation and activities of regional AIS panels and committees and other responsibilities as outlined in NANPCA. These members work with six regional panels and issue-specific committees to meet the AIS management challenges identified in the ANSTF Strategic Plan. Of the nine national ANS management plans currently approved by the ANSTF the following are most relevant to Oregon:

- Green crab, *Carcinus maenas*, approved November 2002. [Under revision]
- Mitten crabs, Genus *Eriocheir*, approved November 2003.
- Caulerpa species (invasive algae), approved October 2005.
- New Zealand mudsnail, *Potamopyrgus antipodarum,* approved May 2007. [Under revision]

State Authorities and Programs

Although many state agencies in Oregon have authority over the management of aquatic resources, no one central agency has responsibility for managing AIS, and each Oregon agency with an AIS program has a separate statutory role or mission. As awareness of the role that invasive species issues play in natural resource management grows, so too does the number of agencies in Oregon that have incorporated AIS goals into their conservation and management objectives.

While the primary regulatory roles in invasive species management in Oregon are divided up among a few agencies with differing statutory responsibilities, numerous other partners play important roles in the process of managing invasive species activities within the state. This requires increased levels of coordination and a centralized management structure to facilitate effective partnerships. This falls to the Oregon Invasive Species Council (OISC) whose role is to convene and coordinate a network of entities engaged in invasive species issues in Oregon, both terrestrial and aquatic. The statutory responsibility of the OISC as a state agency is to engage in a comprehensive planning effort that focuses on a coordinated, statewide perspective, and this focus on statewide strategic planning distinguishes the Council's role from the roles of other agencies (OISC, 2017).

The following section describes the existing authorities related to AIS that the primary state agencies have for managing AIS, as well as the coordination roles played by the OISC, other agencies, and programs. A more comprehensive list of legislation, agencies, and programs with regulatory authority over AIS in Oregon can be found in Appendix E.

Oregon Invasive Species Council (OISC)

In 2001, the Oregon Legislature established the OISC (HB 2181) to conduct a comprehensive and coordinated effort to prevent, detect, control, and eliminate invasive species harming the region's economy, health, and natural resources. The OISC comprises 18 ex officio members representing various state and federal agencies with invasive species responsibilities, ten appointed members representing local, tribal, and private entities, and a council coordinator. Unlike state invasive species councils that are composed solely of agency appointees, the OISC's governing statute (ORS 570.750) specifically acknowledges the important role played by the robust and diverse network of stakeholders that informs the work of the group: The Invasive Species Council has a strong network of local, state, federal, tribal and private entities that actively and cooperatively combat the threat posed by harmful invasive species (ORS 570.750).

The responsibilities of the OISC set forth in statute include:

- Maintaining an invasive species reporting hotline,
- Educating the public about invasive species,
- Developing a statewide plan for invasive species, and
- Providing a grant or loan program for the eradication of invasive species.

Addressing both terrestrial and aquatic species, the OISC serves to coordinate and foster cooperation between existing programs dealing with invasive species and to help fill the gaps between programs. The statutory responsibility of the OISC - to engage in a comprehensive planning effort that focuses on a coordinated, statewide perspective - allows for a focus on statewide strategic planning and distinguishes the OISC's role from those of other agencies. The 2017-2027 Statewide Strategic Plan for Invasive Species outlined a 10-year plan for cohesive objectives, strategies, and coordinated actions to synergize invasive species programs throughout Oregon. It includes a list of recommended actions from the Oregon Invasive Species Council.

The Statewide Strategic Plan played a pivotal role in the update of the Oregon Plan (OISC, 2017).

A complete list of current OISC members, including ex-officio voting members, non-voting ex-officio members, and current appointed voting representatives, can be found in Appendix A4.

Oregon Aquatic Invasive Species Prevention Program (AISPP)

In 2009, the Oregon Legislature passed House Bill 2220 to create the Aquatic Invasive Species Prevention Program (AISPP) and established a new user fee for boaters called the Aquatic Invasive Species Prevention Permit. This program was established to help keep Oregon's lakes, rivers, and streams free of AIS, including dreissenid mussels (ORS 830.565). The purchase, by Oregon boaters, of Waterway Access or Aquatic Invasive Species Permits helps fund this program. The Oregon Department of Fish and Wildlife (ODFW) and the Oregon State Marine Board (OSMB) manage the AISPP jointly. OSMB distributes the permit program funds to ODFW, law enforcement agencies, and other partners via intergovernmental agreements and contracts to support watercraft inspection and decontamination activities. ODFW manages the watercraft inspection staff and AIS monitoring activities. Administration of the AIS Prevention Permit and law enforcement coordination are the purview of OSMB (Boatner et al., 2022).

Oregon Department of Agriculture (ODA)

The Oregon Department of Agriculture (ODA) Noxious Weed Control Program provides statewide leadership for the coordination and management of state-listed noxious weeds (including listed marine, estuarine, and freshwater plants) (ORS 569, 570; OAR 603-052-1200). State noxious weed quarantines prohibit the import, transport, propagation, or sale of a subset of weeds listed on both state and federal noxious weed lists. The state program focuses on the following noxious weed control efforts: early detection and rapid response projects for new invasive noxious weeds, biological control, statewide inventory and surveys, noxious weed education, priority-listed noxious weed data, and maps (Weed Mapper) integrated weed management projects. The Noxious Weed Control Program also supports the Oregon State Weed Board (OSWB) with the administration of the OSWB Grant Program, developing statewide management objectives, developing weed risk assessments, and maintaining the state noxious weed list (ORS 569). AIS currently addressed by ODA are detailed in Appendix C3.

Oregon Department of Environmental Quality (ODEQ)

The mission of ODEQ's Water Quality Program is to protect and improve Oregon's rivers, lakes, streams, and groundwater quality to keep these waters safe for a multitude of beneficial uses (OAR 340-041). Since 2002, ODEQ has the authority, granted by the Oregon Legislature, to implement and enforce ballast water management regulations to reduce the risk of introducing AIS (OAR 340-143).

Oregon Department of Fish and Wildlife (ODFW)

ODFW has the broadest agency responsibility for the management of aquatic invasive animals in Oregon. Under the Importation, Possession, Confinement, Transportation and Sale of Nonnative Wildlife (OAR 635-056), the agency has jurisdiction over the importation, possession, confinement, transportation, and sale of nonnative wildlife. The purpose of these rules is to regulate non-native species to protect native wildlife while allowing flexibility for private ownership of non-native species that have no potential to be harmful to native species. Under these rules, nonnative wildlife species are classified into one of three primary groups: Prohibited, Controlled, or Noncontrolled, depending on their potential to harm native wildlife. Aquatic species addressed by OAR 635-056 are detailed in Appendix C4. The rules also allow the Director to appoint a Wildlife Integrity Review Panel to assist the Department in the species classification process.

Invasive Species are also a key conservation issue in the Oregon Conservation Strategy (OCS, 2016). Under the OCS, the OISC is listed as the lead agency on invasive species issues. The OCS uses a systematic approach to assess the level of ecological threat from those invasive terrestrial and aquatic vertebrates currently present in Oregon or likely to appear in the near future. These species are included in Appendices C5a, b.

The ODFW AIS coordinator participates in education and outreach activities and is also involved with statewide projects to manage species of concern and implement strategies that address the eradication, control, or containment of AIS. The ODFW Invasive Species Coordinator jointly manages the Aquatic Invasive Species Prevention Program (AISPP,) along with the Oregon Marine Board.

Oregon State Marine Board (OSMB)

The OSMB is the state agency responsible for managing recreational boating and has the lead role in implementing the AISPP. This permit program is an important funding mechanism for boat inspection teams, public education and outreach efforts, and other related AIS awareness and prevention activities. The AIS coordinator for the OSMB is engaged in public education and outreach activities about AIS topics. The coordinator develops and distributes printed material (brochures, posters, signs, etc.) to statewide partners, including recreational water sports businesses. The OSMB jointly manages the Oregon Aquatic Invasive Species Prevention Program (AISPP, see above) with ODFW. The program manages AIS permit funding, provides education and outreach materials and signage at the boat ramps, and oversees enforcement contracts for the program, and ODFW runs the inspection stations. The OSMB has also led efforts to address gaps in AIS management through public awareness campaigns, pathway-specific legislation, and sponsored research.

Oregon Sea Grant (OSG)

OSG works with collaborators and partners to provide education and outreach about AIS to diverse audiences, including students, recreational boaters, and government entities. OSG achieved college status in 1971 and is based at Oregon State University. They serve Oregon's

coastal communities through an integrated program of research, outreach, and education to provide the public with information based on sound research and innovative science.

Oregon's 100-Year Water Vision and Oregon's Integrated Water Resource Strategy

The Oregon 100-Year Water Vision (100YWV) document was published in 2020 by the Governor's Natural Resource Office to help strategically plan for, prioritize, and invest in the state's natural and built water infrastructure. The intent of the 100YWV is built on Oregon's Integrated Water Resources Strategy (IWRS, 2017) [11] to provide "high-level goals and operating principles" that will help guide the future of Oregon water. While the IWRS addresses AIS in Recommended Action 11.C: Prevent and Eradicate Invasive Species, the 100YWV includes only one indirect mention of invasive species. However, invasive species concerns are raised numerous times in both written comments and notes from small group surveys and a website survey (Oregon, 2020). Nonetheless, the goals of the 100YWV include numerous areas of overlap for AIS management considerations:

- **Health:** Clean water for all who live in Oregon. Water should be fishable, swimmable, and drinkable. *Aquatic weeds and invasive fishes are known to impair swimming and other recreational water uses.*[12]
- **Economy:** Sustainable and clean water to support local economic vitality. Diverse and resilient agricultural, timber, fishing, hi-tech, energy, and recreation economies require a reliable and clean water supply. *Built water supply infrastructure, in particular dams, irrigation pipes, etc., are vulnerable to clogging by dreissenid infestations and aquatic weeds.*
- **Environment:** Adequate cool, clean water to sustain Oregon's ecosystems for healthy fish and wildlife. *In addition to posing a direct threat to native fish and wildlife, AIS can disrupt the natural processes that maintain and enhance water quality.*
- **Safety:** Resilient water supplies and flood protection systems for Oregon's communities. *The resiliency of aquatic habitats and their ability to provide critical ecosystem services, such as flood control, can be significantly impacted by AIS.*

Portland State University - Center for Lakes and Reservoirs

The Center for Lakes and Reservoirs (CLR) at Portland State University (PSU) was established in 2001 by the Oregon State Legislature to address lake management and invasive aquatic species issues in Oregon. HB2198 called for the creation of the CLR to "assist state and federal agencies in researching and mitigating nonindigenous, invasive aquatic species in this state and to work with communities in developing effective management of lakes and reservoirs." CLR is housed in the Environmental Science and Management Department at PSU, which has a major focus on watershed and aquatic ecosystem management. CLR works with universities, agencies, and citizens to study, monitor, and protect freshwater resources. CLR created and coordinated the original Oregon Aquatic Nuisance Species Management Plan.

[11] Oregon's Integrated Water Resources Strategy is being updated in 2023 and a revised version should be released in 2024.
[12] Emphasis from original source document

Also located at PSU is the Aquatic Bioinvasion Research and Policy Institute (ABRPI). Established in 2004, the ABRPI is a joint initiative between PSU/CLR and the Smithsonian Environmental Research Center (SERC) that focuses on marine research, including marine invasive species. The goals of the ABRPI collaborative are to understand key biological, social, and cultural factors that affect invasion outcomes and to subsequently inform management and policy decisions. The ABRPI incorporates the founding partners' expertise in both freshwater and marine invasions and utilizes PSU/SERC connections on the Pacific and Atlantic coasts for comparative, large-scale investigations. Collaborative projects have included modeling the potential for high-latitude marine invasions off the coast of Alaska (de Rivera et al., 2011), contributions to a regional biosecurity plan for Micronesia and Hawaii (Ruiz and Zabin, 2014), and maintenance of the National Exotic Marine and Estuarine Species Information System (Fofonoff et al., 2018).

Tribal Programs

Awareness of the responsibility to include tribal perspectives, expand consultation, and create opportunities for mutual engagement in natural resource management, including invasive species, has been on the rise in Oregon in the past two decades. For example, the Confederated Tribes of the Warm Springs Reservation are recognized as vital collaborators in aquatic plant management and control in Lake Billy Chinook (Bill Reynolds, personal communication August 15, 2023). Collaborative management entities such as the Oregon Invasive Species Council (OISC) and the Western Regional Panel (WRP) have designated voting member seats for tribal representatives, and tribal associations (such as CRITFC, below) are active regional partners in AIS management in the Columbia River Basin. However, many more opportunities to listen to and incorporate indigenous ecological knowledge and management goals remain to be realized.

Columbia River Intertribal Fish Commission (CRITFC)

In 1977, the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe formed CRITFC. Charged with the mission of "ensuring a unified voice in the overall management of the fishery resources," CRITFC staff work on behalf of native fish and native people in the Columbia River Basin. CRITFC's Aquatic Invasive Species Coordinator monitors the Columbia River Basin system for AIS, which can impact the health of the water systems and the native aquatic species that live there (CRITFC 2022).

Regional Programs

Regional-scale coordination efforts are crucial to address the prevention and management of AIS successfully. Collaboration among and between federal and state agencies, local governments, tribal entities, industry, non-governmental organizations, and other entities impacted by aquatic nuisance species is facilitated at multiple levels, including nationally (ANSTF) and at the state level (OISC). The following examples highlight some of the regional-scale efforts on AIS.

Aquatic Invasive Species Prevention Program[13]

In 1999, in response to the significant environmental threats posed by AIS, the Pacific States Marine Fisheries Commission (PSMFC) established the AIS Prevention Program. The goal of the program is to prevent and minimize the impacts of AIS, particularly those species that affect fisheries and the habitat upon which those fisheries depend. The program elements include prevention, research, monitoring, education and outreach, and inter-jurisdictional planning and coordination.

Columbia River Basin 100th Meridian Team

The 100th Meridian Initiative is a cooperative effort between local, state, provincial, regional, tribal, and federal agencies to prevent the westward spread of zebra/quagga mussels and other aquatic nuisance species in North America. The Columbia River Basin Team comprises 100th Meridian Initiative partners primarily located in Washington, Oregon, Montana, Idaho, Montana, Wyoming, and British Columbia. The group meets twice a year and provides a forum for state and provincial AIS managers, federal agency representatives, tribal natural resources staff, and academics to share information and updates on AIS efforts within the basin.

Pacific Ballast Water Group

Administered and chaired by PSMFC, The Pacific Ballast Water Group (PBWG) was formed in 1998 following a series of informal meetings of West Coast state/provincial and federal agencies and shipping industry representatives from the United States and Canada concerned about the introduction of aquatic nuisance species through ballast water discharge (PBWG, 2022). The mission of the PBWG is to promote the development and implementation of safe, economical, and effective management of aquatic nuisance species associated with West Coast shipping. The PBWG serves as a coordinating body to share information and formulate consensus solutions on ballast water management and research issues of common concern to regulators, managers, scientists, and the shipping industry on the West Coast (Canada, California, Oregon, Washington, and Alaska) (PBWG, 2022).

Pacific NorthWest Economic Region (PNWER)

PNWER is a "statutory public/private non-profit created in 1991 by the states of Alaska, Idaho, Oregon, Montana, Washington, and the Canadian provinces of British Columbia, Alberta, Saskatchewan, and the Yukon and Northwest Territories" (PNWER, 2023). Its mission, to increase the regional economic well-being and quality of life, while maintaining and enhancing the natural environment, is overseen by a governing body that includes members of state and provincial legislatures as well as private sector representatives. In past years, PNWER has been active in advocating for funding to support and expand efforts to keep dreissenid mussels out of the Columbia River Basin (PNWER, 2023).

[13] Although they have the same name, this should not be mistaken for the Oregon AIS Prevention Program (AISPP).

Western Governors Association (WGA)

The WGA was established in 1984 for bipartisan policy development, information exchange, and collective action on issues important to the Western US. Representing the governors of the nineteen Western states (and three Pacific territories), the WGA launched the Western Governors' Biosecurity and Invasive Species Initiative in 2018 (WGA, 2022). This initiative seeks to address the impacts that nuisance species, pests, and pathogens have on ecosystems, forests, rangelands, watersheds, and infrastructure in the West and examines the role that biosecurity plays in addressing invasive species risks (WGA, 2022).

Western Invasive Species Coordinating Effort (WISCE)

Collectively formed in 2011, WISCE provides an avenue for western state agency AIS program managers to discuss and coordinate AIS management, particularly on zebra and quagga mussel management (CPW, 2020).

Western Regional Panel on Aquatic Nuisance Species (WRP)

The WRP was formed under a provision in NISA (P.L. 101-636). The initial organizational meeting of the WRP was held at Portland State University in Oregon in 1997. Created to help coordinate AIS management activities in 19 western states (including Oregon) and 4 Canadian provinces, the panel includes representatives from federal, state, and local agencies as well as from universities, tribes, private industry, and non-governmental organizations. The WRP serves as one of 6 regional panels that advise the ANSTF and identifies regional priorities for responding to AIS; making recommendations regarding AIS outreach, education, prevention, research, and control; coordinating AIS program activities; and developing an emergency response strategy for responding to new AIS invasions (WRP 2022). The following are examples of projects and programs helmed by the WRP of significance to Oregon AIS efforts.

Quagga-Zebra Mussel Action Plan for Western Waters (QZAP)

Produced by the WRP in 2010 and updated in 2020, QZAP was created to inform ongoing partnership efforts to minimize the spread and impacts of zebra and quagga mussels in the Western United States (WRP, 2020). QZAP action items have collectively guided prevention, containment, management, and outreach efforts in the West since 2010 (WRP, 2020). QZAP also provides a template for funding priorities and research guidance.

Building Consensus in the West

In 2012, the WRP established a Building Consensus in the West Workgroup, which provided a forum for facilitated dialogue between state and federal jurisdictions conducting watercraft inspection and decontamination programs. Facilitated dialogue between state's attorneys general, law enforcement, and AIS managers resulting in the creation of science-based standards for preventing and containing the spread of mussels by trailered recreational watercraft, in addition to the development of a model legal framework for state watercraft inspection and decontamination programs (WRP, 2019).

Rapid Response

It is widely acknowledged that, after prevention, early detection and rapid response strategies are the most cost-effective means to manage potential invasions (de Groot et al., 2020). Although eradication should always be the foremost goal of any rapid response plan, it may not always be feasible, especially in open-water aquatic systems where removal or treatment can be challenging, if not impossible (Draheim et al., 2013). In these cases, responders must adapt and determine which goals are attainable and cost-effective. Given the limited window of opportunity to respond once an introduction is suspected or a population is identified, it is imperative that Oregon have guidance that outlines tasks, actions, and responsibilities to increase response effectiveness.

While rapid response tools have evolved significantly over the past two decades, finding an effective balance between a single, robust, state-wide AIS rapid response plan and the highly specific details of single-species action plans remains challenging. Generic rapid response plans are often too broad to provide significant utility in guiding actual response scenarios. In contrast, species-specific contingency plans can be the opposite - so attuned to the details of a particular species and the type or location of the introduction as to provide limited utility to other rapid response efforts (deGroot et al., 2020). In addition, the time and resources necessary to develop and update numerous species-specific response plans can be cost-prohibitive.

The following steps are frequently recommended for the development and implementation of a successful, adaptive Rapid Response Plan (Adapted from Smits and Moser, 2009 and WISC, 2019).

- Determine Need for Response Plan
- Build a Response Framework
    - Delineate Geographic Scope/Extent of the Incident
    - Develop Communication
    - Identify Lead Action Entity
    - Build a Team/Task Force
    - Establish a Scientific Review Panel
    - Engage AIS Partners
    - Determine Response
    - Secure Emergency Declaration
    - Enter into Cooperative Agreements
    - Secure Funding
    - Secure Permits
    - Finalize the Rapid Response Plan
    - Activate Initial Response (Eradication, Control or Management)
    - Mitigate Impacts/Prevent Spread
- Evaluate Response Action
- Develop New Rapid Response Actions as Needed
- Revise Rapid Response Plan

The best time to develop a response plan is before a problem exists; however, many traditional response actions (such as signing cooperative agreements, securing funding, developing location-specific plans, applying for permits, etc., see above) may only be successful when entities are reacting to an invasion. This lack of an emergency may confound such proactive rapid response planning. For this reason, the Oregon Plan takes a more holistic approach to readiness and response planning, one that is less sequential but provides entities with guidance on evaluating readiness, addressing gaps in response capabilities, and developing rapid response capacity and tools as resources allow. Such plans, playbooks, or toolkits should be considered "working" documents and updated or revised to reflect new information and emerging technologies.

Two strategies (2.4., 2.5.), encompassing a total of twelve actions, are proposed in the revised Oregon Plan that will enhance the effectiveness and capacity of the state to conduct rapid response actions (See Implementation Table). In addition, three strategies address growing the state's capacity for early detection in recognition that early detection itself is a critical component of rapid response.

The Oregon Plan steering committee has chosen to move away from both all-encompassing rapid response planning and the idea that every AIS of concern must have its own fully developed rapid response plan. This approach is reflected in the action items outlined in the Objectives and Strategies. Some species (such as dreissenid mussels) may pose such a dramatic risk that they continue to warrant significant and specific rapid response planning. This strategy complements the dreissenid rapid response planning already in existence in the region (e.g., Columbia River Basin Dreissenid Incident Response Toolkit: A resource to facilitate a response to an introduction of dreissenids in the Columbia River Basin). New rapid response management tools being developed reflect the uncertainty of predicting the next invader and instead offer a suite of tools and mix-n-match "playbook" type guidance for management actions, including readiness and rapid response planning for priority taxa (WISC, 2019).

The following are examples of Readiness and Response Planning actions that may be undertaken for either single or multiple taxa, and on a state, ecoregion, or watershed level as appropriate (adapted from WISC, 2019)

- Evaluate Existing Management Structures and Identifying Roles
- Review Existing AIS Regulations, Plans, and Policies
- Identify Priority AIS Species/Taxa
- Assess Invasion Pathways and Vectors
- Identify and Evaluate Available Resources
- AIS Inventory and Mapping
- Perform Risk Analyses
- Understand the Legal/Policy/Permit Environment
- Build Stakeholder Coalitions
- Audience Outreach and Messaging
- Cultivate Proactive Support from Decision Makers and Leadership
- Address Gaps in Management Capacity, Plans, and Policies
- Implement Robust Prevention Efforts

- Enhance Early Detection
- Establish Conservation Goals
- Build Resilience
- Determine Future AIS Management Strategies
- Develop Capacity for NICS driven Rapid Response
- Plan for Monitoring, Maintenance, and Recovery of Habitat

Funding Strategies

In addition to needing the authority, planning, and capacity for rapid response, states need readily accessible funds that can be used to assess new species introductions and provide, at minimum, seed money to support response actions to contain or eradicate species quickly.

Oregon Invasive Species Emergency Control Account

Established in 2010, the Oregon Invasive Species Control Account (Emergency Control Account) is administered by the OISC for the purpose of eradicating or controlling new or expanding infestations of invasive species that threaten the health and integrity of Oregon's native flora and fauna (ORS 570.810). The OISC may be petitioned and asked to declare an Invasive Species Emergency and release funds for a rapid response. Eligible recipients may be a person, state or local government, a unit of state or local government, a tribe, or a unit of the federal government. In order to receive funds, a written request for the Council to declare an Invasive Species Emergency must be submitted. Past response actions funded by the Emergency Control Account include a Marine Tunicate Response (2014), Sudden Oak Death Response (2012 and 2017), and Japanese Beetle Eradication. The fund is currently valued at $79,163 (January 2023), and, as it is considered inadequate to implement a large-scale rapid response, action item 2.4.3 recommends a minimum one-time replenishment of at least $300k.

Existing Plans

The following plans currently inform and guide AIS rapid response and management in Oregon.

Oregon Spartina Response Plan

The Oregon Spartina Response Plan (Pfauth et al., 2007) reviews the biology and historical and current information of Spartina species on the west coast and outlines a strategy to prevent, detect, identify, and eradicate these invasive saltwater cordgrasses in Oregon. The goal of Spartina management in Oregon is to prevent the establishment and spread of any Spartina species in Oregon estuaries and coastal wetlands. It identifies the Oregon Department of Agriculture as the lead agency in this effort but describes a coordinated approach that requires the cooperation of preserve and refuge managers, mariculturists, state and federal agencies, and those who use Oregon's estuaries to protect them from Spartina damage (Pfauth et al., 2007). Oregon has two known infestations of Spartina (ODA, 2011). One, a *S. alterniflora* patch near Warrenton, Oregon, was eradicated by the ODA in 2010. The other, *S. patens* on Cox Island near Florence, is currently being treated by the landowner (ODA, 2011).

Oregon Dreissenid Mussel Rapid Response Plan

The Oregon Dreissenid Mussel Rapid Response Plan was developed in response to the increasing likelihood of the successful transport and introduction of these species into the State of Oregon and the Pacific Northwest (Draheim et al., 2013). At the time of its writing (and subsequent update in 2013), the plan was intended to complement the 2008 Columbia River Basin Interagency Invasive Species Response Plan: Zebra Mussels and Other Dreissena Species drafted by the Columbia River Basin 100th Meridian Team as well as provide stand-alone guidance should mussels be found in Oregon but outside of the Columbia River Basin. Since then, Columbia River Basin management efforts have focused on the development of an online Dreissenid Response Toolkit (see below).

Agencies and entities authorized to respond to a discovery of dreissenid mussels (or other non-plant AIS) will largely depend on the location of the initial discovery. The entities with primary responsibility for dreissenid mussel management and response in Oregon are the Oregon Department of Fish and Wildlife (ODFW) – the designated lead agency – Oregon State Marine Board (OSMB) and Portland State University (PSU); each has an AIS or invasive species coordinator tasked with varied responsibilities relating to AIS, and all three entities are ex-officio members of the Oregon Invasive Species Council (OISC). For the purposes of this response plan, these three entities comprise the initial AIS coordination team (Draheim et al., 2013).

The Oregon Dreissenid Mussel Rapid Response Plan outlines the following guidance in case of a zebra or quagga mussel introduction (Draheim et al., 2013):

- Pre-Planning
    - Funding and Resources
    - Quarantine Establishment and Enforcement
    - Environmental Regulatory Compliance
- Early Detection and Rapid Response
    - Early Detection Efforts
    - Identification of High-Risk Water Bodies
    - Verification and Initial Response to Dreissenids and Other AIS Reports
        - Reported Introduction
        - Status Levels and Corresponding Actions
- Initial Response
    - Reporting and Notification
    - Notification
        - Oregon AIS Incident System (OAISIS)
        - Oregon Multi-Agency Coordination Group (OR MAC)
    - Defining the Extent of Colonization
        - Preventing Further Spread
        - Initiating Available/relevant Control Actions
- Extended Response
    - Long-term Monitoring

While this plan is specific to dreissenids, elements of the plan may be useful for responding to other freshwater invasive invertebrates. This rapid response plan may be less useful for addressing taxa that inhabit other habitats or whose life history traits differ significantly from these freshwater mussels. For example, freshwater plants fall under the purview of the Oregon Department of Agriculture and are governed by different rules and regulations regarding response. Likewise, marine plants and animals will require unique considerations not included in this plan. Action item 2.4.2 addresses a needed update of this response plan.

Response Protocols for Biofouled Debris and Invasive Species Generated by the 2011 Japan Tsunami

On June 5, 2012, a large, heavily biofouled, floating dock, confirmed to have been lost from Honshu Island, Japan, during the 2011 Tōhoku earthquake and tsunami, washed ashore on Agate Beach in Newport, Oregon. Faced with this novel pathway, a workshop to address the need for a regionally coordinated tsunami debris response was proposed and rapidly planned. The workshop included more than 100 participants from Federal agencies (US and Canada), Tribes, states (HI, AK, OR, WA and CA), NGOs, and the international research community. The tsunami debris response protocols were developed over the course of this workshop with the goal of reducing the risk of introduction of AIS from the biofouling community associated with marine tsunami debris through a coordinated regional response. The Response Protocols for Biofouled Debris and Invasive Species Generated by the 2011 Japan Tsunami includes guidelines for the communication of risk (Level 1), a framework for incident reporting (Level 2), science-based protocols for risk assessment (Level 3), and management options to effectively and consistently respond to potential AIS associated with tsunami-generated marine debris on shore and at sea (Level 4) (NOAA et al., 2012).

Columbia River Basin Interagency Invasive Species Response Plan: Dreissenid spp. (2018)

This toolkit provides a more flexible and robust suite of tools and information to assist resource managers faced with implementing a response to a dreissenid introduction than the previous 2008 Columbia River Basin Interagency Invasive Species Response Plan: Zebra Mussels and Other Dreissena Species. The toolkit includes information on Columbia River Basin geography; entities; dreissenid biology and distribution; environmental, economic, and cultural effects of dreissenids; use of the Incident Management System; response resources; and environmental compliance, including Endangered Species Act (ESA) consultation steps (PSMFC, 2023).

Columbia Basin Flowering Rush Management Plan (2019)

The state of Oregon considers flowering rush, *Butomus umbellatus*, an A-rated noxious weed (Appendix C2). As such, the recommended response is to treat infestations with the intent of eradication or intensive control when and where found. Control of A-rated weeds is mandatory under state law. The Oregon Department of Agriculture, which has authority over noxious weeds, is just one of several active Oregon partners in the Columbia Basin Cooperative Weed Management Area which was formed to bring together agencies, stakeholders, tribes, and other entities throughout the Columbia River Basin to develop an integrated weed management plan

for controlling flowering rush (CBCWMA 2019). The plan outlines a basin-wide effort to share information and best management practices, as well as a process to identify the strategic short- and long-term actions needed to address the challenges of managing flowering rush effectively and efficiently. The plan was also developed to help guide future research, policy changes, management activities, and collaboration on flowering rush (CBCWMA, 2019).

Strategic Management Goals for T-Designated Weeds

T-designated weeds are a designated group of invasive species selected from Oregon's Noxious Weed List (either A- or B-listed species) that are the focus of prevention and control by the Noxious Weed Control Program (Appendix C3). T-designated noxious weeds are determined by the Oregon State Weed Board and direct ODA to develop and implement strategic, statewide management plan goals. Each T-designated species has a management document that acts as a response guide. Response plans actions may guide coordinated management responses (e.g., flowering rush, *Butomus umbellatus*), specify long-term management goals (e.g., gain programmatic experience on the efficacy of water primrose, *Ludwigia* spp. treatments), or simply direct ODA to locate and eradicate all known populations of a species (e.g., dense-flowered cord grass, *Spartina densiflora*).

Objectives, Strategies, Actions and Cost Estimates

The goal of the Oregon Aquatic Nuisance Species Management plan is:

> *To minimize the harmful ecological, economic, and social impacts of AIS through prevention and management of introduction, population growth, and dispersal of AIS into, within, and from Oregon.*

The 2001 Oregon Plan was developed with an emphasis on the development and implementation of new levels of coordination, oversight, and funding for AIS management in the state (Hanson and Sytsma, 2001). With no one single authority or agency charged with managing AIS statewide, the intent of the revised Oregon Plan is to continue to promote coordination and collaboration on AIS issues between federal, state, tribal, and local entities.

The revised Oregon Plan builds upon these successes and is re-organized around the following six objectives, rewritten to reflect those in the Statewide Strategic Plan for Invasive Species (OISC, 2017), as well as the national Aquatic Nuisance Species Task Force 2020-2025 Strategic Plan (ANSTF, 2021).

- Prevention
- Early Detection and Rapid Response
- Control and Management
- Education and Outreach
- Coordination and Leadership
- Research, Evaluation, and Development

Each objective includes a list of supplemental strategies and the specific actions needed to accomplish them. Actions and strategies included herein reflect priorities identified by the 2022/2023 steering committee (Appendix A2) in addition to recommendations made in the Statewide Strategic Plan for Invasive Species (OISC, 2017), the Statewide Management Assessment of Invasive Species in Oregon (2010), the Noxious Weed Policy and Classification System (2020), and ongoing actions from the 2001 Oregon Plan.

As stated in the OISC's Statewide Strategic Plan for Invasive Species (2017-2027), it is recommended that Oregon implement a pathways management approach to invasive species that includes assessment, evaluation, and collaboration to address threats across complex pathway variables (OISC, 2017). The revised Oregon Plan endorses this pathways management approach to prevent new introductions of nonnative aquatic species as well as contain further spread of AIS present in the state in limited or isolated populations.

The Oregon Plan uses an approach that is both comprehensive and collaborative to minimize the deleterious impacts of AIS on Oregon's water resources. It provides a framework for existing management actions, defines roles and responsibilities for managing AIS, identifies priority actions as well as gaps, and describes opportunities for further collaborative efforts. In addition, it emphasizes early detection and rapid response planning for species of greatest concern as well as bolstering coordination and cooperation to best respond to novel, unanticipated risks.

As a result of the significant collaborative efforts and contributions by the state agencies with management oversight of AIS, the following can be considered a robust list of ANS management actions. However, it is not possible to address, in one plan, all potential invaders, their impacts, and the constraints and contingencies that may develop. Consequently, this plan is intended to be adaptable to changing circumstances. The activities and priorities of the plan will be under constant review. An annual report will be produced by the Oregon Invasive Species Council (OISC), which will include recommendations for updating and modifying management activities and priorities. The OISC will convene a review committee every five years to evaluate the plan and its progress and make suggestions for improvement if needed.

Objective 1. Prevention

Preventing introductions before they occur is the most cost-effective means of avoiding the harm caused by AIS. Suppressing new species introductions will result in an overall reduction in the number and rate at which new species are introduced, become established, and cause harm in turn reducing the overall impact on the environment, economy, and health of Oregon's aquatic resources. The intentions of this objective are to:

- To the extent possible, limit the introduction and establishment of nonnative aquatic species,
- Refine risk-assessment tools for identifying regional threats (pathways and species),
- Maintain the exclusion of harmful aquatic species, and

- Expand the implementation of regulatory and non-regulatory approaches to limiting the spread of AIS into, within, and from Oregon.

Strategy 1.1. Support and grow existing AIS prevention programs.

1.1.1. Support and grow the Oregon Ballast Water Program.
1.1.2. Reconvene OR Ballast Water Committee to evaluate future program needs and develop guidance for periodic or triggered risk assessments and enhanced surveillance of AIS threats.
1.1.3. Create and implement Biofouling Management Program aligned with other Pacific states and federal implementation regulations.
1.1.4. Identify and secure adequate and reliable funding for the Aquatic Invasive Species Prevention Program (AISPP) and expand the program to provide sufficient, year-round watercraft inspection and decontamination stations (including law enforcement).
1.1.5. Employ a statewide watercraft inspection station supervisor.
1.1.6. Create dedicated law enforcement positions for watercraft inspection stations.
1.1.7 Increase the capacity of the Noxious Weed Control Program to address aquatic plant introduction pathways, provide technical expertise on management and survey and detection work, control projects as needed, including creating and funding an aquatic invasive plant specialist position in ODA (see also 5.1.10).
1.1.8 Partner with other Western States to communicate need for growing existing prevention programs based on regional risks.

Strategy 1.2. Address and manage known introduction pathways.

1.2.1. Engage in cooperative partnerships at the local, national, and regional levels to aid in effective pathway-based prevention and communication.
1.2.2. Develop a suite of risk management tools and evaluate effective pathway management approaches.
1.2.3 Convey the results of pathway-based risk assessments to the public and other stakeholders to inform decisions about behaviors contributing to AIS introduction risks.
1.2.4. Evaluate and review the need for HACCP training, BMPs and other guidance in agencies and among stakeholders to ensure AIS not transferred by work tasks.
1.2.5. Conduct HACCP and other training on as needed basis.

Strategy 1.3. Research and identify the risk of new and less regulated pathways of introduction.

1.3.1. Identify and assess the risk of new and novel pathways that may be of concern to Oregon.
1.3.2. Coordinate with stakeholders, neighboring states, federal and local agencies, academia, and field biologists to communicate the risk of new pathways.
1.3.3. Participate in the USGS and USFWS national horizon scan for organisms in trade.

Strategy 1.4. Support and grow new AIS programs.

1.4.1. Develop a Marine Aquatic Invasive Algae Plan.
1.4.2. Develop an Oregon-specific Green Crab Management Plan.

Strategy 1.5 Identify invasive species of concern.

1.5.1. Perform new (and update existing) aquatic plant risk assessments.
1.5.2. Generate species-specific actions for prevention of species with high-risk levels of introduction.
1.5.3. Populate and support the maintenance of the AIS information in the OISC's Invasive Species HUB, an online information clearinghouse for invasive species.
1.5.4. Network with other Western states to coordinate AIS watch lists where appropriate.

Strategy 1.6. Prohibit, control, or permit the importation of non-native aquatic species based upon their invasive potential.

1.6.1. Recommend known AIS be added to exclusion lists (Oregon State Weed Board, Oregon Wildlife Integrity Rules).
1.6.2. Research invasiveness of imported aquatic plants and other aquatic species currently in trade.
1.6.3. Support efforts to list high-risk AIS at the national level (Lacey Act, Federal Interagency Committee for the Management of Noxious and Exotic weeds (FICMNEW), Federal Noxious Weed List, etc.).

Strategy 1.7. Increase enforcement and awareness of existing laws.

1.7.1. Train state police and sheriff's marine patrols on AIS identification and regulations specific to watercraft.
1.7.2. Work collaboratively with state, local, and federal enforcement personnel to educate staff on AIS regulations and increase

engagement with enforcement actions (not watercraft related) (i.e., Wildlife Integrity Rules).

1.7.3. Create and distribute information on identifying AIS, the laws regulating them, and their effects in natural systems (including to businesses that import or sell aquatic organisms).

Strategy 1.8. Promote regulatory and legislative actions as needed.

1.8.1. Clarify agency roles and responsibilities related to the sale of nonnative aquatic species in Oregon, identify where gaps exist, and pursue statutory authority, if needed, to fill gaps and increase violations for the sale of invasive organisms in trade.

1.8.2. Promote legislation and regulatory rules that establish or increase the state's authority to control the introduction of new species.

1.8.3. Evaluate changes needed to incorporate pathway approaches into existing legal authorities.

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

Objective 2: Early Detection and Rapid Response

The intent of this objective is to develop, strengthen, and expand Oregon's capacity to detect, identify, report, and effectively respond to newly discovered AIS of all taxa. By creating opportunities for monitoring and detection efforts, the state will be better able to discover and manage pioneering infestations at the point when success is more likely. Usually, it is too late or too expensive to eradicate a species once it has reached nuisance levels, and when management is conducted after a population is well-established. By encouraging early detection and rapid response (EDRR), the state will be able to discover and manage pioneering infestations at a point when the species can be eradicated in a cost-effective manner. This will require evaluating existing monitoring programs, facilitating opportunistic AIS sampling during routine aquatic resource monitoring, prioritizing at-risk water bodies, and building the capacity to respond rapidly to newly detected species. Promoting an approach that is inclusive of pathways (rather than just single-, high-risk species) to better capture newly discovered AIS during detection and monitoring efforts is a priority.

The intentions of this objective are to:

- Enhance existing AIS monitoring using ranked, risk-based waterbody assessments,
- Expand the capacity for early detection using a multi-pronged approach that includes developing a robust EDRR network, harnessing citizen scientists, and increasing opportunistic AIS sampling, and
- Bolster rapid response capacity of AIS managers and partners.

Strategy 2.1. Develop, fund, and implement a statewide monitoring plan based on waterbody risk.

2.1.1. Develop a waterbody risk analysis model based on multiple variables, including introduction pathways, at-risk species, habitat suitability, water chemistry, invasion vulnerability, etc. that can be used for multiple high-priority invasive taxa.
2.1.2. Develop a funding plan for annual, comprehensive, statewide waterbody surveys based on examples of neighboring Columbia River Basin States.
2.1.3. Conduct targeted AIS surveys of waterbodies based on the above risk analysis model, including water chemistry analyses to support risk model (2.1.1.).
2.1.4. Explore opportunities to increase use of eDNA in statewide monitoring and other early detection efforts.

Strategy 2.2 Develop a statewide EDRR Network.

2.2.1. Provide AIS identification training for agency personnel, tribes and stakeholders.
2.2.2. Continue to work with federal, state, and local natural resource entities to ensure AIS are included in ongoing monitoring programs.
2.2.3. Develop AIS monitoring protocols for watershed councils, lake associations and other local government or coordinating bodies.
2.2.4. Create and train a citizen-monitoring network to work in cooperation with state agencies.
2.2.5. Distribute dreissenid mussel colonization substrates for individuals to deploy and monitor.
2.2.6. Develop a comprehensive reporting app or enhance use of existing app-based reporting platforms for AIS sighting by public citizens.
2.2.7. Support staff time to respond to species identification queries.

Strategy 2.3 Enhance and expand existing monitoring programs for known AIS populations of concern.

2.3.1. Conduct periodic coastal/estuarine overflights to detect colonies of Spartina.
2.3.2. Continue and expand green crab monitoring efforts.
2.3.3. Continue to coordinate regional efforts to detect and eradicate flowering rush.
2.3.4. Coordinate surveillance and monitoring for new species of concern, such as flowering rush, with ongoing targeted aquatic invasive species monitoring, e.g., quagga and zebra mussel surveys.

Strategy 2.4. Support rapid response mechanisms to deal with detected invasive species.

2.4.1. Update and maintain Statewide Management Plans for T-Designated Aquatic Noxious Weeds.
2.4.2. Facilitate the development of comprehensive multi-taxa rapid response plans, including readiness, playbook style tools.
2.4.3. Create risk assessments and management plans for new threats as well as other high-risk invaders in need of assessments or plans.
2.4.4. Update the Oregon Dreissenid Rapid Response Plan.
2.4.5. Fund and manage the Emergency Response Fund.

Strategy 2.5. Enhance rapid response capacity.

2.5.1. Increase capacity for rapid response through formal National Incident Management Systems (NIMS) training courses and informal workshops.
2.5.2. Participate in and host regional rapid response training exercises.
2.5.3. Develop general permits to control certain invasive species based on rapid response plans (See 2.4.).
2.5.4. Support after-action evaluation of all rapid response undertakings including training exercises.
2.5.5. Identify legal, regulatory, and institutional barriers that could impede a rapid response to an AIS introduction.
2.5.6. Develop specific regulations to enable rapid response actions (i.e., declaration of AIS emergency, quarantine authority).
2.5.7. Identify a state agency to be assigned clear jurisdiction over macroinvertebrates and microorganisms for rapid response purposes.

Objective 3: Control and Management

Long-established nonindigenous species often create the most visible impacts (e.g., English ivy), yet they are often far beyond the threshold where widespread eradication or control is feasible. Management activities are most effective when they are directed at limiting the impacts of a recent population or stopping that population from spreading to new waterbodies. Once established, new species can even become a basis for new economic activity or a replacement for activities based on native species, such as fishing for bass, walleye, or other warm water game fish, which makes them more challenging to remove later. Minimizing the harmful impacts of established AIS populations, when possible, should be achieved through containment, population reduction, etc. These management activities, however, are best undertaken on populations of established species where there is a clear and significant impact on native species or ecosystem health and where the control or eradication of specific populations is feasible both economically

and technically. In addition, habitat restoration and monitoring play an important component in guarding against future invasions and minimizing harm from AIS control activities.

The intentions of this objective are to:

- Support the control and management of existing AIS in the state, identifying opportunities where eradication or control are feasible, and
- Provide technical guidance and assistance to partners to enhance the control and management of AIS statewide.

Strategy 3.1. Limit the dispersal of established AIS to new waterbodies or to new areas of a waterbody.

3.1.1. Control or limit the spread of established AIS by focusing on pathways into and out of affected areas.
3.1.2. Evaluate and identify gaps in authorities to limit activities that may spread AIS within and between water bodies in the state.

Strategy 3.2. Control known AIS populations where economically and technically feasible.

3.2.1. Identify and secure sufficient funding for effective invasive species control.
3.2.2. Develop partnerships with private industry groups to fund prevention and eradication efforts.
3.2.3. Identity opportunities for agencies to share responsibilities for invasive species control.
3.2.4. Work to contain, reduce and if possible, eradicate AIS in high quality or otherwise strategic habitats.
3.2.5. Continue to pursue targeted AIS population reduction with low-cost tools such as adjusted catch limits.
3.2.6. Support use of aquatic plant biocontrol agents for target aquatic species (e.g., the success of purple loosestrife biocontrol).

Strategy 3.3. Eradicate pioneering populations of AIS where possible.

3.3.1. Continue to support the eradication of pioneering AIS populations such as spartina and flowering rush (outside of EDRR response window).

Strategy 3.4 Provide technical guidance and assistance on the control and management of AIS.

3.4.1. Provide ongoing technical assistance to watershed councils, irrigation districts and other local boards for development of localized control and management plans.
3.4.2. Ensure habitat restoration and ecosystem recovery processes are an essential component of control and management treatments to restore resilience in the system and reduce need for on-going management (e.g., nutria).
3.4.3. Adapt and improve field sampling and monitoring protocols and procedures as science evolves and effective new tools, such as eDNA, are made available.

Objective 4: Education and Outreach

While awareness of the risks of nonnative species has been on the rise in recent years, the lack of understanding of the threats AIS and their pathways pose continues to pose a challenge to successful AIS prevention and management. Educating the public about AIS threats and the value of individual actions to prevent introduction and spread, encouraging and incentivizing behavior change, and removing barriers to action will all support the goal of the Oregon Plan. In addition to educating the public, outreach efforts must also target legislators and other policymakers. It is crucial that we ensure all Oregonians understand the impacts of invasive species and what role they can play in preventing and controlling invasive species. In addition, better coordination amongst natural resource agencies at multiple jurisdictional levels will help to create a better-informed public as well as leverage limited outreach resources.

The intentions of this objective are to:

- Effectively disseminate targeted AIS information to resource users and the general public through coordinated education and outreach efforts, and
- Inform policymakers about key AIS issues and efforts.

Strategy 4.1. Continue current invasive species informational and educational efforts.

4.1.1. Continue to participate in ongoing western AIS campaigns (e.g., Clean, Drain, Dry; Play, Clean, Go; Don’t Let it Loose; Don’t Pack a Pest).
4.1.2. Create and distribute information on AIS at various conferences, shows, tournaments, and public gatherings.
4.1.3. Coordinate with stakeholders and inform the public regarding potential new high-risk AIS introductions.

Strategy 4.2 Improve current invasive species outreach and education efforts through strategic assessment and development efforts.

4.2.1. Evaluate and improve upon the delivery of current regional invasive species outreach campaigns to effectively reach the public with messaging that resonates with Oregonians (this may include increasing public awareness of the undesirable effects of existing and new AIS, the importance of healthy aquatic ecosystems, and instilling a sense of personal responsibility and need to protect Oregon's water resources).

4.2.2. Develop and promote focused, inclusive outreach and engagement to build public support and involvement among under-represented audiences.

4.2.3. Support dedicated AIS outreach staff to increase the efficacy of outreach campaigns and other communication strategies.

Strategy 4.3. Inform policymakers on the extent, impact, and potential for harm of AIS.

4.3.1. Keep policymakers informed about the risks, impacts, costs, and status of AIS issues in Oregon and regionally.

4.3.2. Conduct field trips for policymakers to demonstrate AIS impacts and management efforts.

Objective 5: Coordination and Leadership

With no single authority or agency charged with managing AIS statewide, the role of the revised Oregon Plan is to continue to promote coordination and collaboration on AIS issues between federal, state, tribal, and local entities spanning both geographic and jurisdictional boundaries and maximizing the effectiveness of AIS management.

The intentions of this objective are to:

- Expand the capacity for AIS management, emphasizing the need for robust and stable funding,
- Enhance ongoing efforts at coordinated AIS management, and
- Maintain regional and national coordination efforts.

Strategy 5.1. Develop and maintain adequate funding sources for AIS management in Oregon.

5.1.1. Leverage existing funding opportunities.
5.1.2. Ensure adequate funding is available to effectively prevent, control, and manage the introduction and spread of AIS.
5.1.3. Maintain support for the Oregon Invasive Species Council.
5.1.4. Maintain an AIS coordinator position with oversight for the Oregon ANS Management Plan.
5.1.5. Increase state capacity for AIS management by supporting/adding full-time permanent staff to address gaps and inefficiencies related to aquatic invasive plant management, illicit fish stocking, etc.
5.1.6. Create new, stable funding sources for AIS management in Oregon, looking particularly at industries and users who contribute to the introduction and spread of ANS and/or will benefit from their control or eradication.
5.1.7. Continue to cultivate existing partnerships with federal agencies as funding sources.

Strategy 5.2. Coordinate AIS management within Oregon.

5.2.1. Increase coordination and consultation with tribal governments regarding AIS management.
5.2.2. Increase participation/representation by state agencies with heretofore limited active participation in AIS management.
5.2.3. Provide staff time to participate in statewide aquatic resource planning efforts to ensure that these strategic efforts plan for, prioritize, and invest in AIS management.
5.2.4. Coordinate invasive species issues among state agencies with guidance from the Governor's Natural Resource Office.
5.2.5. Advocate for the creation of a Natural Resources Caucus within the OR Legislature.
5.2.6. Engage stakeholders in developing proposals to advance further the objectives of the Oregon ANS Management Plan.
5.2.7. Create opportunities for mutual engagement to develop research and management agendas that reflect and promote tribal priorities.
5.2.8. Develop the capacity of the CLR to be a clearinghouse for all dressenid mussel sampling in the state.

Strategy 5.3. Participate in and support regional, national, and international efforts to prevent and control AIS.

5.3.1. Participate in regional AIS management efforts, including but not limited to the Western Regional Panel, 100th Meridian Columbia River Basin Team, Pacific Ballast Water Group, Pacific Northwest Economic Region, Western Invasive Species Coordinating Effort, etc.
5.3.2. Contribute to coordinating events, provide presentations, and participate in committees and working groups that further advance AIS prevention, detection, and control methodologies that impact Oregon and the Pacific Northwest.
5.3.3. Develop and implement regular communication, coordination with neighboring states' Invasive Species Councils and the Western Invasive Species Council.

Objective 6: Research, Evaluation, and Development

Scientific data, assessments of actions, new tools, etc., are examples of the types of information and research that support and enhance the strategies proposed in the Oregon Plan. Collecting and analyzing information is crucial to evaluating and improving the effectiveness of prevention and management efforts. More information and research are needed to quantify and clarify the effects that nonindigenous aquatic species have on Oregon's native species and habitat. Research can provide much-needed details about the mechanisms by which AIS harm native species as well as how they are introduced. To ensure that AIS research addresses critical needs, the strategies and actions listed here focus on developing performance measures and effectiveness monitoring, as well as promoting the identification of areas where basic research and the development of new tools can increase the effectiveness of current and future management strategies.

The intentions of this objective are to:

- Identify and address gaps in knowledge and tools to support AIS management,
- Share information and promote research priorities, and
- Track the success of AIS management of AIS in the state, including the actions listed in the Oregon Plan.

Strategy 6.1. Identify and support AIS research needs.

6.1.1. Conduct a biennial symposium focused on AIS research and management in Oregon.
6.1.2. Collaborate with academia, agency research staff, and other organizations to study biology, impacts, and control methods of high-risk AIS.
6.1.3. Develop a better understanding of basic biology and impacts of introduced aquatic plants and animals.
6.1.4. Research the potential for aquarium and live food fish to serve as vectors of disease.

6.1.5. Research invasiveness of aquatic plant species currently imported.
6.1.6. Support scientific research efforts to assist with the identification of pathways, early detection, and response options.
6.1.7. Research the impacts of AIS and AIS control on First Foods.
6.1.8. Promote research on the advantages of a pathways management approach.
6.1.9. Develop partnerships with stakeholders, universities, other agencies to develop control methods based on sound science.

Strategy 6.2. Promote the evaluation of actions to enhance effectiveness and maximize success.

6.2.1. Produce an annual review of Oregon Plan actions and other AIS activities.
6.2.2. Identify opportunities for and create proposals to support actions that advance the plan's objectives.
6.2.3. Review and update the Oregon Plan every five years or as deemed necessary.
6.2.4. Develop measurable invasive species performance measures to assess the state's success in adequately protecting Oregon, where appropriate, evaluate the cost-benefits to Oregon's expenditures on invasive species.
6.2.5. Evaluate existing control methods, prioritize efforts, and identify new and novel techniques for greater control and efficacy of management of priority AIS and emerging invasives.
6.2.6. Survey boaters, anglers, campers, and other recreational user groups to determine the awareness and voluntary compliance with state regulations and other guidance (once every 4 years).

Strategy 6.3. Address research needs relating to AIS prevention and management that may be affected by climate change.

6.3.1. Research the implications of climate change projections for Oregon with an emphasis on nonnative organisms in trade (e.g., aquatic plants and animals not listed because of currently/formerly incompatible thermal tolerances).
6.3.2. Review and incorporate, where appropriate, up-to-date scientific research related to climate change and AIS into the management plan including outreach, prevention, detection, early response, and control programs.

Implementation Table

The implementation table of the Oregon AIS Management Plan identifies the estimated funding needed as well as the appropriate agency and cooperating entities that will implement the actions listed in the plan. This table reflects the outlined objectives, strategies, and actions that have been identified above during the revision process and through the engagement of multiple agencies, stakeholders, and other interest groups. The funding identified is considered for a 2-year period of implementation corresponding to biennial funding mechanisms in Oregon. These numbers reflect funds that have been or are in the process of being allocated to action items.

In addition, a series of columns for identifying projected investment needs were added to the Implementation Table as a resource for partners looking to identify opportunities for investment and priority actions to drive funding requests. The revised Oregon Plan and budget recommendations are submitted as an integral part of a comprehensive approach to managing AIS in Oregon.

Table 1. Implementation costs of objectives, strategies, and actions.

This table describes by whom and when specific actions are planned to be implemented. Full-time-equivalent staff (FTE) as well as state and federal funds (in thousands of dollars) are estimated for the first two years of the life of this plan. Projected costs and rough FTE estimates are also included representing future needs. Each action item also includes a priority level (high, medium, low) assigned by the 2023 Oregon Plan Steering Committee. Total *FTE is likely exaggerated as FTE estimates were rounded to the nearest 100th of an FTE (~20 hours/year) or 10th of an FTE (~208 hours).*

Actions	**Lead**	**FTE FY1**	**State $ FY1**	**Federal $ FY1**	**FTE FY2**	**State $ FY2**	**Federal $ FY2**	**Pro-jected FTE**	**Pro-jected $**	**Priority**
1. PREVENTION										
1.1. Support and grow existing AIS prevention programs.										
1.1.1. Support and grow the Oregon Ballast Water Program.	ODEQ	1.5	320		1.5	452		0.5	100	High
1.1.2. Reconvene OR Ballast Water Committee to evaluate future program needs and develop guidance for periodic or triggered risk assessments and enhanced surveillance of AIS threats.	LEG, ODEQ	0.01	6		0.01	6				High
1.1.3. Create and implement Biofouling Management Program aligned with other Pacific states and federal implementation regulations.	ODEQ							1.5	452	High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
1.1.4. Identify and secure adequate and reliable funding for the Aquatic Invasive Species Prevention Program (AISPP) and expand the program to provide sufficient, year-round watercraft inspection and decontamination stations (including law enforcement).	ODFW, OSMB		670	570		670	570	6	600	High
1.1.5. Employ a statewide watercraft inspection station supervisor.	ODFW	0.5	45	45	0.5	45	45	0.3	30	Med
1.1.6. Create dedicated law enforcement positions for watercraft inspection stations.	OSP							6	2,000	Med
1.1.7. Increase the capacity of the Noxious Weed Control Program to address aquatic plant introduction pathways, provide technical expertise on management and survey and detection work, control projects as needed, including creating and funding an aquatic invasive plant specialist position in ODA (see also 5.1.10.).	ODA	1	375	150	1	375	150	1	375	High
1.1.8. Partner with other Western States to communicate need for growing existing prevention programs based on regional risks.	ODA, ODFW, OSMB, ODEQ							0.01	6	High
1.2. Address and manage known introduction pathways.										

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
1.2.1. Engage in cooperative partnerships at the local, national, and regional levels to aid in effective pathway-based prevention and communication.	CLR, ALL	0.1	5	15	0.1	5	15			High
1.2.2. Develop a suite of risk management tools and evaluate effective pathway management approaches.	CLR, OSG	0.4	30	45	0.4	30	15			Med
1.2.3. Convey the results of pathway-based risk assessments to the public and other stakeholders to inform decisions about behaviors contributing to AIS introduction risks.	CLR, OISC, OSG	0.1	10		0.1	10				High
1.2.4. Evaluate and review need for HACCP training, BMPs and other guidance in agencies and among stakeholders to ensure AIS not transferred by work tasks.	CLR	0.02		1	0.02		1			High
1.2.5. Conduct HACCP and other trainings on as needed basis.	OISC	0.01	2		0.01	2				High
1.3. Research and identify the risk of new and less regulated pathways of introduction.										
1.3.1. Identify and assess the risk of new and novel pathways that may be of concern to Oregon.	OISC, CLR, OSG, ODFW	0.2	10	25	0.2	10	25			Med

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
1.3.2. Coordinate with stakeholders, neighboring states, federal, and local agencies, academia, and field biologists to communicate risk of new pathways.	CLR, OISC, ODA	0.1		15	0.5		10	0.1	15	High
1.3.3. Participate in the USGS and USFWS national horizon scan for organisms in trade.	ODA, ODFW, OISC, CLR, OSG	0.01		0.5	0.01		0.5			Med
1.4. Support and grow new AIS programs.										
1.4.1. Develop a Marine Aquatic Invasive Algae Plan.	CLR	0.5		5	0	0	0			Med
1.4.2. Develop and Oregon-specific Green Crab Management Plan.	CLR	0.5	6	6	0	0	0			High
1.5. Identify invasive species of concern.										
1.5.1. Perform new (and update existing) aquatic plant risk assessments.	ODA, CLR	0.1	10		0.1	10			25	High
1.5.2. Generate species specific actions for prevention of species with high risk levels of introduction.	ODA, ODFW	0.2	20		0.2	20			20	High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
1.5.3. Populate and support the maintenance of the AIS information in the OISC's Invasive Species HUB, an online information clearinghouse for invasive species.	CLR, OISC	0.3	29.8	2.5	0.3		2.5		30	High
1.5.4. Network with other Western states to coordinate AIS watch lists where appropriate.	ODA, ODFW							0.02	1	Med
1.6. Prohibit, control, or permit the importation of non-native aquatic species based upon their invasive potential.										
1.6.1. Recommend known AIS be added to exclusion lists (Oregon State Weed Board, Oregon Wildlife Integrity Rules).	ODA, ODFW	0.02	5		0.01	5				High
1.6.2. Research invasiveness of imported aquatic plants and other aquatic species currently in trade.	CLR, OISC, ODA	0.11	2	5	0.11	2	5			High
1.6.3. Support efforts to list high risk AIS at the national level (Lacey Act, FICMNEW, Federal Noxious Weed List, etc.).	OISC	0.01	2		0.01	2				Med
1.7. Increase enforcement and awareness of existing laws.										

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
1.7.1. Train state police and sheriff's marine patrols on AIS identification and regulations specific to watercraft.	OSMB	0.01		0.5	0.01		0.5			High
1.7.2. Work collaboratively with state, local, and federal enforcement personnel to educate staff on AIS regulations and increase engagement with enforcement actions (not watercraft related) (i.e., Wildlife Integrity Rules).	ODA, ODFW	0.11	8	6	0.11	8	6			Med
1.7.3. Create and distribute information on identifying AIS, the laws regulating them, and their effects in natural systems (including to businesses that import or sell aquatic organisms).	ALL	0.3	20		0.3	20		0.2	100	High
1.8. Promote regulatory and legislative actions as needed.										
1.8.1. Clarify agency roles and responsibilities related to the sale of nonnative aquatic species in Oregon, identify where gaps exist and pursue statutory authority, if needed, to fill gaps and increase violations for the sale of invasive organisms in trade.	OISC							0.75	30	High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
1.8.2. Promote legislation and regulatory rules that establish or increase the state's authority to control the introduction of new species.	ALL	0.1	5		0.1	5				High
1.8.3. Evaluate changes needed to incorporate pathway approach into existing legal authorities.	OISC							0.5	20	Med
1.8.4. Evaluate existing laws and regulations to determine their adequacy for preventing potential introductions or the spread of AIS.	OSG	0.75		30	0.25		10			Med
2. EARLY DETECTION AND RAPID RESPONSE										
2.1. Develop, fund, and implement a statewide monitoring plan based on waterbody risk.										
2.1.1. Develop a waterbody risk analysis model based on multiple variables, including introduction pathways, at-risk species, habitat suitability, water chemistry, invasion vulnerability, etc., that can be used for multiple high-priority invasive taxa.	CLR	0.25	35		0.1	15				High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
2.1.2. Develop a funding plan for annual, comprehensive, statewide waterbody surveys based on examples of neighboring Columbia River Basin States.	CLR, ODA, ODFW, OSMB	0.05	2							High
2.1.3. Conduct targeted AIS surveys of waterbodies based on the above risk analysis model, including water chemistry analyses to support risk model (2.1.1.).	ODA, ODFW, CLR, OSMB	0.5	75	75	0.5	75	75			High
2.1.4. Explore opportunities to increase use of eDNA in statewide monitoring and other early detection efforts.	CLR							0.5	50	Med
2.2. Develop a statewide EDRR Network.										
2.2.1. Provide AIS identification training for agency personnel, tribes, and stakeholders.	CLR, ODA, ODFW, OSG	0.2	6	6	0.2	6	6		10	High
2.2.2. Continue to work with federal, state, and local natural resource entities to ensure AIS are included in ongoing monitoring programs.	OSG	0.15		8	0.15		8			High
2.2.3. Develop AIS monitoring protocols for watershed councils, lake associations and other local government or coordinating bodies.	CLR, OSG	0.1		5	0.1		5			High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
2.2.4. Create and train a citizen-monitoring network to work in cooperation with state agencies.	CLR, OLA	0.1		5	0.1		5			High
2.2.5. Distribute dreissenid mussel colonization substrates for individuals to deploy and monitor.	CLR	0.1		5	0.1		5			High
2.2.6. Develop comprehensive reporting app or enhance use of existing app-based reporting platforms for AIS sighting by public citizens.	OISC								150	High
2.2.7. Support staff time to respond to species identification queries.	CLR, ODA, ODFW	0.01	5	5	0.01	5	5			High
2.3. Enhance and expand existing monitoring programs for known AIS populations of concern.										
2.3.1. Conduct periodic coastal/estuarine overflights to detect colonies of Spartina.	ODA, CLR							0.01	10	High
2.3.2. Continue and expand green crab monitoring efforts.	ODFW, OSG, OSU, CLR, DSL	0.5	30	30	0.5	30	30	0.5	100	High
2.3.3. Continue to coordinate regional efforts to detect and eradicate flowering rush.	ODA	0.01	5		0.01	5				High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
2.3.4. Coordinate surveillance and monitoring for new species of concern, such as flowering rush, with ongoing targeted AIS monitoring, e.g., quagga and zebra mussel surveys.	CLR, ODA	0.01	10		0.02	10				High
2.4. Support rapid response mechanisms to deal with detected invasive species.										
2.4.1. Update and maintain Statewide Management Plans for T-Designated Aquatic Noxious Weeds.	ODA	0.01	10		0.01	10				High
2.4.2. Facilitate development of comprehensive multi-taxa rapid response plans, including readiness, playbook style tools.	OISC, CLR							0.5	60	High
2.4.3. Create risk assessments and management plans for new threats as well as other high-risk invaders in need of assessments or plans.	CLR, ODA	0.01	10		0.01	10				High
2.4.3. Update the Oregon Dreissenid Rapid Response Plan.	ODFW, OSMB, CLR	0.2		20	0.2		20			Med
2.4.4. Fund and manage the Emergency Response Fund.	LEG, GOV, OISC	0.01	0.5		0.01	0.5			300	Med
2.5. Enhance rapid response capacity.										

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
2.5.1. Increase capacity for rapid response through formal National Incident Management Systems (NIMS) training courses and informal workshops.	ODA, ODFW								15	High
2.5.2. Participate in and host regional rapid response training exercises.	CLR, ODFW, OSMB	0.01	0.5		0.01	0.5			25-150	Med
2.5.3. Develop general permits to control certain invasive species based on rapid response plans (See 2.4.).	ODA, ODFW	0.01	2		0.01	2				Low
2.5.4. Support after action evaluation of all rapid response undertakings including training exercises.	OISC							0.01	5	Med
2.5.5. Identify legal, regulatory, and institutional barriers that could impede a rapid response to an AIS introduction.	OISC							0.75	30	High
2.5.6. Develop specific regulations to enable rapid response actions (i.e., declaration of AIS emergency, quarantine authority).	LEG									Med
2.5.7. Identify a state agency to be assigned clear jurisdiction over macroinvertebrates and microorganisms for rapid response purposes.	LEG, GOV									High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
3. CONTROL AND MANAGEMENT										
3.1. Limit the dispersal of established AIS to new waterbodies or to new areas of a waterbody.										
3.1.1. Control or limit the spread of established AIS by focusing on pathways into and out of affected areas.	ODA, ODFW	0.31	38		0.31	38				High
3.1.2. Evaluate and identify gaps in authorities to limit activities that may spread AIS within and between water bodies in the state.	OISC							0.75	30	Med
3.2. Control known AIS populations where economically and technically feasible.										
3.2.1. Identify and secure sufficient funding for effective invasive species control.	OISC, ODA, ODFW, LEG, GOV	0.05	1		0.05	1				High
3.2.2. Develop partnerships with private industry groups to fund prevention and eradication efforts.	OISC, ODA, CLR, ODFW							0.1	12	High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
3.2.3. Identify opportunities for agencies to share responsibilities for invasive species control.	OISC	0.01	1		0.01	1				Low
3.2.4. Work to contain, reduce and if possible, eradicate AIS in high quality or otherwise strategic habitats.	ODA, ODFW, CLR	0.2	10	5	0.2	10	5	1	200	High
3.2.5. Continue to pursue targeted AIS population reduction with low-cost tools such as adjusted catch limits.	ODFW, CLR	0.1		5	0.1		5			High
3.2.6. Support use of aquatic plant biocontrol agents for target aquatic species (e.g., success of purple loosestrife bio control).	ODA							0.5	150	High
3.3. Eradicate pioneering populations of ANS where possible.										
3.3.1. Continue to support the eradication of pioneering AIS populations such as spartina and flowering rush (outside of EDRR response window).	ODA, ODFW	0.2	120	5	0.2	120	5	1	200	High
3.4. Provide technical guidance and assistance on the control and management of AIS.										

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
3.4.1. Provide ongoing technical assistance to watershed councils, irrigation districts and other local boards for development of localized control and management plans.	CLR, ODA	0.2		10	0.2		10			Med
3.4.2. Ensure habitat restoration and ecosystem recovery processes are an essential component of control and management treatments to restore resilience in the system and reduce need for on-going management (e.g., nutria).	ODFW, ODA							0.5	100	Med
3.4.3. Adapt and improve field sampling and monitoring protocols and procedures as science evolves and effective new tools, such as eDNA, are made available.	CLR, OSG, ODA, ODFW	0.3		30	0.3		30			Med
4. EDUCATION AND OUTREACH										
4.1. Continue current invasive species informational and educational efforts.										
4.1.1. Continue to participate in ongoing western AIS campaigns (e.g., Clean, Drain, Dry; Play, Clean, Go; Don't Let it Loose; Don't Pack a Pest).	ALL	0.1	5	5	0.1	5	5	0.5	100	High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
4.1.2. Create and distribute information on AIS at various conferences, shows, tournaments, and public gatherings.	ALL	0.06	40	10	0.6	40	10	0.5	100	High
4.1.3. Coordinate with stakeholders and inform the public regarding potential new high risk AIS introductions.	OISC	0.1	10	10	0.1	10	10			High
4.2. Improve current invasive species outreach and education efforts through strategic assessment and development efforts.										
4.2.1. Evaluate and improve upon the delivery of current regional invasive species outreach campaigns to effectively reach the public with messaging that resonates with Oregonians (this may include increasing public awareness of the undesirable effects of existing and new AIS, the importance of healthy aquatic ecosystems, and instilling a sense of personal responsibility and need to protect Oregon's water resources).	ALL	0.35	29	12	0.35	29	12	0.5	80	High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
4.2.2. Develop and promote focused, inclusive outreach and engagement to build public support and involvement among under-represented audiences.	OISC, OSG, ALL							0.1	20	High
4.2.3. Support dedicated AIS outreach staff to increase efficacy of outreach campaigns and other communication strategies.	CLR, OSG	0.2		10	0.2		10			Med
4.3. Inform policymakers on the extent, impact, and potential for harm of AIS.										
4.3.1. Keep policymakers informed about the risks, impacts, costs, and status of AIS issues in Oregon and regionally.	OISC	0.05	5		0.05	5				High
4.3.2. Conduct field trips for policymakers to demonstrate AIS impacts and management efforts.	OISC							0.01	10	High
5. COORDINATION AND LEADERSHIP										
5.1. Develop and maintain adequate funding sources for AIS management in Oregon.										
5.1.1. Leverage existing funding opportunities.	OISC, OWEB, ALL	0.01	1		0.01	1				High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
5.1.2. Ensure adequate funding is available to effectively prevent, control, and manage the introduction and spread of AIS.	LEG, GOV									Med
5.1.3. Maintain support for the Oregon Invasive Species Council.	LEG, GOV, ALL	0.6	60	15	0.6	60	15	1.5	200	High
5.1.4. Maintain an AIS coordinator position with oversight for the Oregon ANS Management Plan.	CLR	0.2		10	0.2		10	0.8	100	High
5.1.5. Increase state capacity for AIS management by supporting/adding full-time permanent staff to address gaps and inefficiencies related to aquatic invasive plant management, illicit fish stocking, etc.	LEG, GOV, ODA, ODFW							3	440	High
5.1.6. Create new, stable funding sources for AIS management in Oregon, looking particularly at industries and users who contribute to the introduction and spread of AIS and/or will benefit from their control or eradication.	LEG, GOV, OISC, OWEB							0.5	60	High
5.1.7. Continue to cultivate existing partnerships with federal agencies as funding sources.	ALL	0.01	1		0.01	1				
5.2. Coordinate AIS management within Oregon.										

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
5.2.1 Increase coordination and consultation with tribal governments regarding AIS management.	OISC, ODA, CLR, ODFW	0.02	3		0.02	3		0.5		High
5.2.2. Increase participation/representation by state agencies with heretofore limited active participation in AIS management.	ODOT, ODS, OPRD, OWEB, DSL							0.1	10	Med
5.2.3. Provide staff time to participate in statewide aquatic resource planning efforts to ensure that these strategic efforts plan for, prioritize, and invest in AIS management.	OISC, ALL							0.1	10	Med
5.2.4. Coordinate invasive species issues among state agencies with guidance from the Governor's Natural Resource Office.	OISC	0.01	2		0.01	2		0.02	4	Med
5.2.5. Advocate for the creation of a Natural Resources Caucus within the OR Legislature.	OISC	0.01	2		0.01	2		0.02	4	Med
5.2.6. Engage stakeholders in developing proposals to advance further the objectives of the Oregon ANS Management Plan.	OISC, CLR							0.01	2	Med

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
5.2.7. Create opportunities for mutual engagement to develop research and management agendas that reflect and promote tribal priorities.	OISC, CLR							0.01	2	High
5.2.8. Develop the capacity of the CLR to be a clearing house for all dressenid mussel sampling in the state.	CLR	0.01	0.5		0.01	0.5		0.01		High
5.3. Participate in and support regional, national, and international efforts to prevent and control AIS.										
5.3.1. Participate in regional AIS management efforts, including but not limited to the Western Regional Panel, 100th Meridian Columbia River Basin Team, Pacific Ballast Water Group, Pacific Northwest Economic Region, Western Invasive Species Coordinating Effort, etc.	CLR, ALL	0.1	6	6	0.1	6	6			High
5.3.2. Contribute to coordinating events, provide presentations, and participate in committees and working groups that further advance AIS prevention, detection, and control methodologies that impact Oregon and the Pacific Northwest.	CLR, ALL	0.1	6	6	0.1	6	6			High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
5.3.3. Develop and implement regular communication, coordination with neighboring states' Invasive Species Councils and the Western Invasive Species Council.	OISC	0.01	2		0.01	2				High
6. RESEARCH, EVALUATION, AND DEVELOPMENT										
6.1. Identify and support AIS research needs.										
6.1.1. Conduct a biennial symposium focused on AIS research and management in Oregon.	CLR	0.01		0.5			0.5		20	High
6.1.2. Collaborate with academia, agency research staff, and other organizations to study biology, impacts, and control methods of high-risk AIS.	CLR, OSU, OSG	0.5		50		0.5	50			High
6.1.3. Develop a better understanding of basic biology and impacts of introduced aquatic plants and animals.	CLR, OSU	0.01		0.5			0.5			High
6.1.4. Research the potential for aquarium and live food fish to serve as vectors of disease.	OSU, ODFW	0.5	50	50	0.5	50	50	0.5	50	Med
6.1.5. Research invasiveness of aquatic plant species currently imported.	CLR, ODA	0.01		0.5			0.5			Med

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
6.1.6. Support scientific research efforts to assist with the identification of pathways, early detection, and response options.	CLR, OSG, OSU	0.01		0.5			0.5			High
6.1.7. Research the impacts of AIS and AIS control on First Foods.	CLR, OSG, OSU	0.01		0.5			0.5	0.5	50	High
6.1.8. Promote research on the advantages of a pathways management approach.	CLR, OSG	0.1		5	0.1		5			Med
6.1.9 Develop partnerships with stakeholders, universities, other agencies to develop control methods based on sound science.	CLR, OSG	0.1		5	0.1		5	0.5	50	Med
6.2. Promote the evaluation of actions to enhance effectiveness and maximize success.										
6.2.1. Produce an annual review of Oregon Plan actions and other AIS activities.	CLR, OISC	0.01		0.5	0.01		0.5			Med
6.2.2. Identify opportunities for and create proposals to support actions that advance the plan's objectives.	ALL	0.1		5	0.1		5			High
6.2.3 Review and update the Oregon ANS Management Plan every five years or as deemed necessary.	CLR, OISC	0.25		20						High

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
6.2.4. Develop measurable invasive species performance measures to assess the state's success in adequately protecting Oregon, where appropriate, evaluate the cost-benefits to Oregon's expenditures on invasive species.	CLR, OISC, ODA	0.01		0.5			0.5			Med
6.2.5. Evaluate existing control methods, prioritize efforts, and identify new and novel techniques for greater control and efficacy of management of priority AIS and emerging invasives.	CLR, ODA, ALL	0.2		20	0.2		20			Med
6.2.6. Survey boaters, anglers, campers, and other recreational user groups to determine the awareness and voluntary compliance with state regulations and other guidance (once every 4 years).	OSMB							0.2	15	Low
6.3. Address research needs relating to AIS prevention and management that may be affected by climate change.										

Actions	Lead	FTE FY1	State $ FY1	Federal $ FY1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
6.3.1. Research the implications of climate change projections for Oregon with an emphasis on nonnative organisms in trade (e.g., aquatic plants and animals not listed because of currently/formerly incompatible thermal tolerances).	CLR, OSG, ODA, ODFW, OISC	1.7		120	1.7		120	1	50	Med
6.3.2. Review and incorporate, where appropriate, up-to-date scientific research related to climate change and AIS into the management plan including outreach, prevention, detection, early response and control programs.	CLR, OISC, ODA, ALL	0.01		0.5	0.01		0.5	0.5	120	Med

		Actions	Lead	FTE FY1	State $ FY1	Federal $ fy1	FTE FY2	State $ FY2	Federal $ FY2	Pro-jected FTE	Pro-jected $	Priority
Objective 1: Prevention												
	Strategy 1.1 Support and grow existing AIS prevention programs											
		1.1.1 Support and grow the Oregon Ballast Water Program	ODEQ	1	120		1	120		0.5	60	High

		1.1.2 Reconvene OR Ballast Water Committee to evaluate future program needs and develop guidance for periodic or triggered risk assessments and enhanced surveillance of AIS threats	LEG, ODEQ	0.01	6		0.01	6				High
		1.1.3 Create Biofouling Management Program aligned with other Pacific states and federal implementation regulations	ODEQ							1	120	High
		1.1.4 Identify and secure adequate and reliable funding for the Aquatic Invasive Species Prevention Program (AISPP) and expand the program to provide sufficient, year-round watercraft inspection and decontamination stations (including law enforcement)	ODFW, OSMB		670	570		670	570	6	600	High

		1.1.5 Employ a statewide watercraft inspection station supervisor	ODFW	0.5	45	45	0.5	45	45	0.3	30	Med
		1.1.6 Create dedicated law enforcement positions for watercraft inspection stations	OSP,							6	2000	Med
		1.1.7 Increase the capacity of the Noxious Weed Control Program to address aquatic plant introduction pathways, provide technical expertise on management and survey and detection work, control projects as needed, including creating and funding an aquatic invasive plant specialist position in ODA (see also 5.1.10)	ODA	1	375	150	1	375	150	1	375	High
		1.1.8 Partner with other Western States to communicate need for growing existing programs based on regional risks.	ODA, ODFW, OSMB, ODEQ							0.01	6	High
	Strategy 1.2 Address and manage known introduction pathways											

		1.2.1 Engage in cooperative partnerships at the local, national, and regional levels to aid in effective pathway-based prevention and communication	CLR, ALL	0.1	5k	15	0.1	5	15			High
		1.2.2 Develop a suite of risk management tools and evaluate effective pathway management approaches	CLR, OSG	0.4	30	45	0.4	30	15			Med
		1.2.3 Convey the results of risk assessments to the public and other stakeholders to inform decisions about their behaviors	CLR, OISC, OSG	0.1	10		0.1	10				High
		1.2.4 Evaluate and review need for HACCP training, BMPs and other guidance in agencies and among stakeholders to ensure AIS not transferred by work tasks	CLR	0.02		1	0.02		1			High
		1.2.5 Conduct HACCP and other trainings on as needed basis	OISC	0.01	2		0.01	2				High

	Strategy 1.3 Research and identify risk of new and less regulated pathways of introduction										
	1.3.1 Identify and assess the risk of new and novel pathways that may be of concern to Oregon	OISC, CLR, OSG, ODFW	0.2	10	25	0.2	10	25			Med
	1.3.2 Coordinate with stakeholders, neighboring states, federal, and local agencies, academia, and field biologists to communicate risk of new pathways	CLR, OISC, ODA	0.1		15	0.5		10	0.1	15	High
	1.3.3 Participate in the USGS and USFWS national horizon scan for organisms in trade	ODA, ODFW, OISC, CLR, OSG	0.01		0.5	0.01		0.5			Med
	Strategy 1.4 Support and grow new AIS programs										
	1.4.1 Develop a Marine Aquatic Invasive Algae Plan	CLR	0.5		5	0	0	0			Med
	Strategy 1.5 Identify species of concern										
	1.5.1 Perform new (and update existing) aquatic plant risk assessments	ODA, CLR	0.1	10		0.1	10			25	High

		1.5.2 Generate species specific actions for prevention of species with high risk levels of introduction	ODA, ODFW	0.2	20		0.2	20			20	High
		1.5.3 Populate and support the maintenance of the AIS information in the OISC's Invasive Species HUB, an online information clearinghouse for invasive species	CLR, OISC	0.3	29.8	2.5	0.3		2.5		30	High
		1.5.4 Network with other Western states to coordinate AIS watch lists where appropriate	ODA, ODFW							0.02	1	Med
	Strategy 1.6 Prohibit, control, or permit the importation of noni-native aquatic species based upon their invasive potential											
		1.6.1 Recommend known AIS be added to exclusion lists (Oregon State Weed Board, Oregon Wildlife Integrity Rules)	ODA, ODFW	0.02	5		0.01	5				High
		1.6.2 Research invasiveness of imported aquatic plants and other aquatic species currently in trade	CLR, OISC, ODA	0.11	2	5	0.11	2	5			High

		1.6.3 Support efforts to list high risk AIS at the national level (Lacey Act, FICMNEW, Federal Noxious Weed List, etc.)	OISC	0.01	2		0.01	2				Med
	Strategy 1.7 Increase enforcement and awareness of existing laws											
		1.7.1 Train state police and sheriff's marine patrols on AIS identification and regulations specific to watercraft.	OSMB	0.01		0.5	0.01		0.5			High
		1.7.2 Work collaboratively with state, local, and federal enforcement personnel to educate staff on AIS regulations and increase engagement with enforcement actions (not watercraft related) (i.e., Wildlife Integrity Rules)	ODA, ODFW	0.11	8	6	0.11	8	6			Med
		1.7.3 Create and distribute information on identifying AIS, the laws regulating them, and their effects in natural systems (including to businesses that import or sell aquatic organisms)	ALL	0.3	20		0.3	20		0.2	100	High

	Strategy 1.8 Promote regulatory and legislative actions as needed										
		1.8.1 Clarify agency roles and responsibilities related to the sale of nonnative aquatic species in Oregon, identify where gaps exist and pursue statutory authority, if needed, to fill gaps and increase violations for the sale of invasive organisms in trade	OISC							0.75	30	High
		1.8.2 Promote legislation and regulatory rules that establish or increase the state's authority to control the introduction of new species	ALL	0.1	5		0.1	5				High
		1.8.3 Evaluate changes needed to incorporate pathway approach into existing legal authorities	OISC							0.5	20	Med

		1.8.4 Evaluate existing laws and regulations to determine their adequacy for preventing potential introductions or the spread of AIS	OSG	0.75		30	0.25		10			Med
Objective 2: Early Detection & Rapid Response												
	Strategy 2.1 Develop, fund and implement a statewide monitoring plan based on waterbody risk											
		2.1.1 Develop a waterbody risk analysis model based on multiple variables including introduction pathways, priority species, habitat suitability, water chemistry, invasion vulnerability, etc that can be used for multiple taxa	CLR	0.25	35		0.1	15				High
		2.1.2 Develop a funding plan for annual, comprehensive, statewide waterbody surveys based on examples of neighboring Columbia River Basin States	CLR, ODA, ODFW, OSMB	0.05	2		NA	NA	NA			High

		2.1.3 Conduct targeted AIS surveys of waterbodies based on the above risk analysis model, including water chemistry analyses to support risk model (2.1.1)	ODA, ODFW, CLR, OSMB	0.5	75	75	0.5	75	75			High
		2.1.4 Explore opportunities to increase use of eDNA in statewide monitoring and other early detection efforts	CLR							0.5	50	Med
	Strategy 2.2 Develop a statewide EDRR Network											
		2.2.1 Provide AIS identification training for agency personnel, tribes and stakeholders	CLR, ODA, ODFW, OSG	0.2	6	6	0.2	6	6		10	High
		2.2.2 Continue to work with federal, state, and local natural resource entities to ensure AIS are included in ongoing monitoring programs	OSG	0.15		8	0.15		8			High

		2.2.3 Develop AIS monitoring protocols for watershed councils, lake associations and other local government or coordinating bodies	CLR, OSG	0.1		5	0.1		5			High
		2.2.4 Create and train a citizen-monitoring network to work in cooperation with state agencies	CLR, OLA	0.1		5	0.1		5			High
		2.2.5 Distribute dreissenid mussel colonization substrates for individuals to deploy and monitor	CLR	0.1		5	0.1		5			High
		2.2.6 Enhance use of existing app-based reporting platforms for AIS sighting by public citizens	OISC								50	High
		2.2.7 Support staff time to respond to species identification queries	CLR, ODA, ODFW	0.01	5	5	0.01	5	5			High
	Strategy 2.3 Enhance and expand existing monitoring programs for known AIS populations of concern											
		2.3.1 Conduct periodic coastal/estuarine overflights to detect colonies of Spartina	ODA, CLR							0.01	10	High

		2.3.2 Continue and expand green crab monitoring efforts	ODFW, OSG, OSU, CLR, DSL	0.5	30	30	0.5	30	30	0.5	100	High
		2.3.3 Continue to coordinate regional efforts to detect and eradicate flowering rush	ODA	0.01	5		0.01	5				High
		2.3.4 Coordinate surveillance and monitoring for new species of concern, such as flowering rush, with ongoing targeted AIS monitoring, e.g quagga and zebra mussel surveys	CLR, ODA	0.01	10		0.02	10				High
	Strategy 2.4 Support rapid response mechanisms to deal with detected invasive species											
		2.4.1 Update and maintain Statewide T-Designated Management Plans for Aquatic Noxious Weed	ODA	0.01	10		0.01	10				High
		2.4.2 Facilitate development of comprehensive multi-taxa rapid response plans, including readiness, playbook style tools	OISC, CLR							0.5	60	High

		2.4.3 Create risk assessments and management plans for new threats as well as other high-risk invaders in need of assessments or plans	CLR, ODA	0.01	10		0.01	10				High
		2.4.3 Update the Oregon Dreissenid Rapid Response Plan	ODFW, OSMB, CLR	0.2		20	0.2		20			Med
		2.4.4 Fund and manage the Emergency Response Fund	LEG, GOV, OISC	0.01	0.5		0.01	0.5			300	Med
	Strategy 2.5 Enhance rapid response capacity											
		2.5.1 Increase capacity for rapid response through formal National Incident Management Systems (NIMS) training courses and informal workshops	ODA, ODFW								15	High
		2.5.2 Participate in and host regional rapid response training exercises	CLR, ODFW, OSMB	0.01	0.5		0.01	0.5			25-150	Med

		2.5.3 Develop general permits to control certain invasive species based on rapid response plans (See 2.4)	ODA, ODFW	0.01	2		0.01	2				Low
		2.5.4 Support after action evaluation of all rapid response undertakings including training exercises	OISC							0.01	5	Med
		2.5.5 Identify legal, regulatory, and institutional barriers that could impede a rapid response to an AIS introduction	OISC							0.75	30	High
		2.5.6 Develop specific regulations to enable rapid response actions (i.e., declaration of AIS emergency, quarantine authority)	LEG									Med

		2.5.7 Identify a state agency to be assigned clear jurisdiction over macroinvertebrates and microorganisms for rapid response purposes	LEG, GOV									High
Objective 3: Control, Management, and Eradication												
	Strategy 3.1 Limit the dispersal of established AIS to new waterbodies or to new areas of a waterbody											
		3.1.1 Control or limit the spread of established AIS by focusing on pathways into and out of affected areas.	ODA, ODFW	0.31	38		0.31	38				High
		3.1.2 Evaluate and identify gaps in authorities to limit activities that may spread AIS within and between water bodies in the state	OISC							0.75	30	Med
	Strategy 3.2 Control known nuisance populations where economically and technically feasible											
		3.2.1 Identify and secure sufficient funding for effective invasive species control	OISC, ODA, ODFW, LEG, GOV	0.05	1		0.05	1				High

		3.2.2 Develop partnerships with private industry groups to fund prevention and eradication efforts.	OISC, ODA, CLR, ODFW						0.1	12	High
		3.2.3 Identify opportunities for agencies to share responsibilities for invasive species control	OISC	0.01	1		0.01	1			Low
		3.2.4 Work to contain, reduce and if possible, eradicate AIS in high quality or otherwise strategic habitats	ODA, ODFW, CLR	0.2	10	5	0.2	10	5	1	200	High
		3.2.5 Continue to pursue targeted AIS population reduction with low-cost tools such as adjusted catch limits	ODFW, CLR	0.1		5	0.1		5			High
		3.2.6 Support use of aquatic plant biocontrol agents for target aquatic species (e.g. success of purple loosestrife bio control)	ODA							0.5	150	High
	Strategy 3.3 Eradicate pioneering populations of ANS where possible											

		3.3.1 Continue to support the eradication of pioneering AIS populations such as spartina and flowering rush (outside of EDRR response window)	ODA, ODFW	0.2	120	5	0.2	120	5	1	200	High
	Strategy 3.4 Provide technical guidance and assistance on the control and management of AIS											
		3.4.1 Provide ongoing technical assistance to watershed councils, irrigation districts and other local boards for development of localized management plans	CLR, ODA	0.2		10	0.2		10			Med
		3.4.2 Ensure habitat restoration and ecosystem recovery processes are an essential component of control and management treatments to restore resilience in the system and reduce need for on-going management (e.g., nutria)	ODFW, ODA							0.5	100	Med

		3.4.3 Adapt and improve field sampling and monitoring protocols and procedures as science evolves and effective new tools, such as eDNA, are made available	CLR, OSG, ODA, ODFW	0.3		30	0.3		30			Med
Objective 4: Education & Outreach												
	Strategy 4.1 Continue current invasive species informational and educational efforts											
		4.1.1 Participate in ongoing western AIS campaigns	ALL	0.1	5	5	0.1	5	5	0.5	100	High
		4.1.2 Create and distribute information on AIS at various conferences, shows, tournaments, and public gatherings	ALL	0.6	80	20	0.6	80	20	0.5	100	High
		4.1.3 Coordinate with stakeholders and inform the public regarding potential new high risk AIS introductions	OISC	0.1	10	10	0.1	10	10			High
	Strategy 4.2 Improve AIS outreach and education efforts through strategic assessment and development efforts											

		4.2.1 Evaluate and improve upon the delivery of current regional invasive species outreach campaigns to effectively reach the public with messaging that resonates with Oregonians (this may include increasing public awareness of the undesirable effects of existing and new AIS, the importance of healthy aquatic ecosystems, and instilling a sense of personal responsibility and need to protect Oregon's water resources).	ALL	0.35	29	12	0.35	29	12	0.5	80	High
		4.2.2 Develop and promote focused, inclusive outreach and engagement to build public support and involvement among under-represented audiences	OISC, OSG, ALL							0.1	20	High

		4.2.3 Support dedicated AIS outreach staff to increase efficacy of outreach campaigns and other communication strategies	CLR, OSG	0.2		10	0.2		10			Med
	Strategy 4.3 Inform policy makers on the extent, impact, and potential for harm of ANS.											
		4.3.1 Keep policymakers informed about the risks, impacts, costs, and status of AIS issues in Oregon and regionally	OISC	0.05	5		0.05	5				High
		4.3.2 Conduct field trips for policymakers to demonstrate AIS impacts and management efforts	OISC							0.01	10	High
Objective 5: Coordination & Leadership												
	Strategy 5.1 Develop and maintain adequate funding sources for AIS management in Oregon											
		5.1.1 Leverage existing funding opportunities	OISC, OWEB, ALL	0.01	1		0.01	1				High
		5.1.2 Ensure adequate funding is available to effectively prevent, control, and manage the introduction and spread of AIS	LEG, GOV									Med

		5.1.3 Maintain support for the Oregon Invasive Species Council	LEG, GOV, ALL	0.6	60	15	0.6	60	15	1.5	200	High
		5.1.4 Maintain an AIS coordinator position with oversight for the Oregon ANS Management Plan	CLR	0.2		10	0.2		10	0.8	100	High
		5.1.5 Increase state capacity for AIS management by supporting/adding full-time permanent staff to address gaps and inefficiencies related to aquatic invasive plant management, illicit fish stocking, etc.	LEG, GOV, ODA, ODFW							3	440	High
		5.1.6 Create new, stable funding sources for AIS management in Oregon, looking particularly at industries and users who contribute to the introduction and spread of ANS and/or will benefit from their control or eradication	LEG, GOV, OISC, OWEB							0.5	60	High

		5.1.7 Continue to cultivate existing partnerships with federal agencies as funding sources	ALL	0.01	1		0.01	1				
	Strategy 5.2 Coordinate AIS management within Oregon											
		5.2.1 Increase coordination and consultation with tribal governments regarding AIS management	OISC, ODA, CLR, ODFW	0.02	3		0.02	3		0.5		High
		5.2.2 Increase participation/representation by state agencies with heretofore limited active participation in AIS management	ODOT, ODS, OPRD, OWEB, DSL							0.1	10	Med
		5.2.3 Provide staff time to participate in statewide aquatic resource planning efforts to ensure that these strategic efforts plan for, prioritize, and invest in AIS management	OISC, ALL							0.1	10	Med

		5.2.4 Coordinate invasive species issues among state agencies with guidance from the Governor's Natural Resource Office	OISC	0.01	2		0.01	2		0.02	4	Med
		5.2.5 Advocate for the creation of a Natural Resources Caucus within the OR Legislature	OISC	0.01	2		0.01	2		0.02	4	Med
		5.2.6 Engage stakeholders in developing proposals to advance further the objectives of the Oregon ANS Management Plan's	OISC, CLR							0.01	2	Med
		5.2.7 Create opportunities for mutual engagement to develop research and management agendas that reflect and promote tribal priorities	OISC, CLR							0.01	2	High
	Strategy 5.3 Participate in and support regional, national and international efforts to prevent and control AIS											

		5.3.1 Participate in regional AIS management efforts, including but not limited to the Western Regional Panel, 100th Meridian Columbia River Basin Team, Pacific Ballast Water Group, Pacific Northwest Economic Region, Western Invasive Species Coordinating Effort, etc.	CLR, ALL	0.1	6	6	0.1	6	6			High
		5.3.2 Contribute to coordinating events, provide presentations, and participate in committees and working groups that further advance AIS prevention, detection, and control methodologies that impact Oregon and the Pacific Northwest	CLR, ALL	0.1	6	6	0.1	6	6			High

		5.3.3 Develop and implement regular communication, coordination with neighboring states' Invasive Species Councils and the Western Invasive Species Council (WISC)	OISC	0.01	2		0.01	2				High
Objective 6: Research, Evaluation, and Development												
	Strategy 6.1 Identify and support AIS research needs											
		6.1.1 Conduct a biennial symposium focused on AIS research and management in Oregon	CLR	0.01		0.5			0.5		20	High
		6.1.2 Collaborate with academia, agency research staff, and other organizations to study biology, impacts, and control methods of high-risk AIS	CLR, OSU, OSG	0.5		50		0.5	50			High
		6.1.3 Develop a better understanding of basic biology and impacts of introduced aquatic plants and animals	CLR, OSU	0.01		0.5			0.5			High

		6.1.4 Research the potential for aquarium and live food fish to serve as vectors of disease	OSU, ODFW	0.5	50	50	0.5	50	50	0.5	50	Med
		6.1.5 Research invasiveness of aquatic plant species currently imported	CLR, ODA	0.01		0.5			0.5			Med
		6.1.6 Support scientific research efforts to assist with the identification of pathways, early detection, and response options	CLR, OSG, OSU	0.01		0.5			0.5			High
		6.1.7 Research the impacts of AIS and AIS control on First Foods	CLR, OSG, OSU	0.01		0.5			0.5	0.5	50	High
		6.1.8 Promote research on the advantages of a pathways management approach	CLR, OSG	0.1		5	0.1		5			Med
		6.1.9 Develop partnerships with stakeholders, universities, other agencies to develop control methods based on sound science	CLR, OSG	0.1		5	0.1		5	0.5	50	Med
	Strategy 6.2 Promote the evaluation of actions to enhance effectiveness and maximize success											

		6.2.1 Produce an annual review of Oregon Plan actions and other AIS activities	CLR, OISC	0.01		0.5	0.01		0.5			Med
		6.2.2 Identify opportunities for and create proposals to support actions that advance the plan's objectives	ALL	0.1		5	0.1		5			
		6.2.3 Review and update the ANS Management Plan every five years or as deemed necessary	CLR, OISC	0.25		20	NA	NA	NA			High
		6.2.4 Develop measurable invasive species performance measures to assess the state’s success in adequately protecting Oregon, where appropriate, evaluate the cost-benefits to Oregon’s expenditures on invasive species	CLR, OISC, ODA	0.01		0.5			0.5			Med

		6.2.5 Evaluate existing control methods, prioritize efforts, and identify new and novel techniques for greater control and efficacy of management of priority AIS and emerging invasives	CLR, ODA, ALL	0.2		20	0.2		20			Med
		6.2.6 Survey boaters, anglers, campers, and other recreational user groups to determine the awareness and voluntary compliance with state regulations and other guidance (once every 4 years)	OSMB							0.2	15	Low
	Strategy 6.3 Address research needs related to AIS prevention and management that may be affected by climate change											

		6.3.1 Research the implications of climate change projections for Oregon with an emphasis on nonnative organisms in trade (e.g., aquatic plants and animals not listed because of currently/formerly incompatible thermal tolerances)	CLR, OSG, ODA, ODFW, OISC	1.7		120	1.7		120	1	50	Med
		6.3.2 Review and incorporate, where appropriate, up-to-date scientific research related to climate change and AIS into the management plan including outreach, prevention, detection, early response and control programs	CLR, OISC, ODA, ALL	0.01		0.5	0.01		0.5	0.5	120	Med

Priorities for Action

All action items listed in the revised Oregon Plan were assigned a rank of high, medium, or low by members of the 2022/2003 Revision Steering Committee. Limited resources and capacity for management make prioritizing actions an important consideration. Numerous actions were rated as a high priority, and many, but not all, of these undertakings have some level of funding allocated.

Actions identified as High Priority but without funds identified for fiscal years one or two or with significant funding needs identified as an additional projected investment should be viewed as the greatest (unaddressed) needs for AIS management in Oregon.

Examples include:

Actions that require program expansion or increased staffing

- 1.1.3 Create Biofouling Management Program aligned with other Pacific states and federal implementation regulations within ODEQ.
- 1.1.7 Increase the capacity of the Noxious Weed Control Program to address aquatic plant introduction pathways, provide technical expertise on management and survey and detection work, and control projects as needed, including creating and funding an aquatic invasive plant specialist position in ODA.
- 5.1.5 Increase state capacity for AIS management by supporting/adding full-time permanent staff to address gaps and inefficiencies related to aquatic invasive plant management, illicit fish stocking, etc.
- 5.2.8 Develop the capacity of the CLR to be a clearinghouse for all dressenid mussel sampling in the state.

Actions that reflect the need for funds to match AIS management efforts by other states in the region:

- 1.4.2 Develop an Oregon-specific Green Crab Management Plan.
- 2.2.6 Develop a comprehensive reporting app or enhance use of existing app-based reporting platforms for AIS sighting by public citizens.
- 2.5.1 Increase capacity for rapid response through formal National Incident Management Systems (NIMS) training courses and informal workshops.
- 4.1.1 Participate in ongoing western AIS awareness campaigns.

Actions that require the establishment of stable, long-term funding sources for success

- 3.2.4 Work to contain, reduce and, if possible, eradicate AIS in high-quality or otherwise strategic habitats.
- 5.1.3 Maintain support for the Oregon Invasive Species Council.

Actions that demonstrate the need for funding to support programmatic research and evaluation of AIS management capabilities:

1.8.1 Clarify agency roles and responsibilities related to the sale of nonnative aquatic species in Oregon, identify where gaps exist, and pursue statutory authority, if needed, to fill gaps and increase violations for the sale of invasive organisms in trade.

2.5.5 Identify legal, regulatory, and institutional barriers that could impede a rapid response to an AIS introduction.

3.2.2 Develop partnerships with private industry groups to fund prevention and eradication efforts.

4.2.1 Evaluate and improve upon the delivery of current regional invasive species outreach campaigns to effectively reach the public with messaging that resonates with Oregonians.

6.1.7 Research the impacts of AIS and AIS control on First Foods.

Program Monitoring and Evaluation

The success of the six objectives listed in the Oregon Plan will require a long-term, ongoing commitment to AIS management in Oregon. Action items were deliberately composed for ease of annual performance evaluation based on whether actions were undertaken and completed (where appropriate). In addition, *Strategy 6.2, Promote the evaluation of actions to enhance effectiveness and maximize success,* lists six action items designed to either enhance or create new opportunities for evaluating the success of current and future AIS management actions, including an annual review of Oregon Plan action items, and a 5-year update of the Oregon Plan itself.

Gaps and Challenges

There are numerous gaps and challenges to the successful prevention and management of AIS in Oregon. Some of these are discrete and may be addressed by the successful implementation of the actions recommended above, while other issues require a significant investment or long-term shift in management priorities.

The biggest challenge to effective AIS management in Oregon is funding:

- Long-term sustainable funding to support and expand prevention, early detection, management, and control efforts,
- Discrete funds necessary to tackle research and development projects as well as monitoring and evaluation, and
- Adequate emergency funds accessible to support rapid response and eradication efforts.

Table 2 identifies the estimated AIS spending for fiscal years 1 (FY1) and 2 (FY2) as well as the estimated funding required to support all the action items identified in the revised Oregon Plan. Estimated funding to accomplish all 113 listed action items falls short of FY1 projected spending

by $6,723,000[14]. This funding shortfall is reduced to $3,822,000 when only high priority actions are considered. This sum is more than the estimated AIS spending for FY1 of the revised plan (FY2024) of $3,662,800, an estimate based on funds that have been or are in the process of being allocated.

Table 2: Estimated costs and FTE for actions identified in the implementation plan in (in thousands of dollars). Total FTE numbers are likely exaggerated as minimum FTE was rounded to the nearest 100th of an FTE (~20 hours/year) or nearest 10th of an FTE (~208 hours)

ACTION RANK	FTE FY1	STATE $ FY1	FEDERAL $ FY1	FTE FY2	STATE $ FY2	FEDERAL $ FY2	PRO-JECTED FTE	PRO-JECTED $
LOW	0.02	3	0	0.02	3	0	0.2	15
MEDIUM	6.06	150	428.5	5.04	150	373.5	11.33	2836
HIGH	9.94	2010.3	1070	9.39	2085	1039	22.85	3872
TOTAL	**16.03**	**2164.3**	**1498.5**	**14.46**	**2239**	**1412.5**	**34.38**	**6723**

Other challenges to AIS management in Oregon include ensuring that objectives are aligned and that opportunities are leveraged across the many plans and programs that have jurisdiction over AIS management as well as those that guide strategic investment in natural resource management. Support for and participation on the OISC remains crucial to these formal and informal coordination efforts. The OISC can also play a pivotal role in identifying gaps in AIS management, advocating for solutions, and identifying strategic opportunities. For example, Oregon's 100-Year Water Vision (2020) - drafted to guide the conversation around future conservation of and investment in the state's natural and built water infrastructure - includes only limited recognition that invasive species can impair the health of natural water systems with no mention of how to include invasive species in the strategic planning process (Oregon, 2020). Going forward, as the state works to revise the Integrated Water Resource Strategy (the blueprint for water resource actions), state AIS managers and the OISC should be involved in advocating for the inclusion of AIS actions that align with the Oregon Plan and support the 100-Year Water Vision.

In addition, managers have long failed to work with tribes to incorporate tribal priorities and tribal ecological knowledge into decision-making processes regarding AIS management, nor have they recognized that, depending on the resources impacted, some tribes' priorities may not align with conventional (non-tribal) AIS management goals. While several action items seek to begin addressing these gaps, there is considerable room for improvement.

While Oregon is exemplary in many aspects of invasive species coordination and cooperation regionally, there is more to be accomplished in this area. Regional ANS coordination and communication (driven in part by dreissenid mussel monitoring and prevention) has been less inclusive of aquatic weed practitioners. As such, opportunities for strengthening partnerships with other Western states and federal agencies doing aquatic weed work may have been underutilized. In addition, particular concerns to the state that require enhanced coordination

[14] Action 1.1.6. Create dedicated law enforcement positions for watercraft inspection stations (medium priority) accounts for $2,000,000 of this projected funding need.

include the encroaching spread of high-priority species, including the downstream movement of AIS in shared watersheds such as the Columbia River.

There is no single, complete repository for AIS information in Oregon. As evidenced in the review of species lists for this plan, there are a considerable number of locations where information about AIS present in or of concern to Oregon may be housed. When these lists and fact sheets do not reflect the most up-to-date information or contradict each other, how can a layperson be expected to navigate these resources to guide their actions and consumer choices? The development of the OISC Hub is a first step to consolidating invasive species information in Oregon, but much work remains to be done.

Other conspicuous gaps in AIS management in Oregon, aside from funding, capacity, and coordination considerations, include management planning for marine species, forecasting future AIS concerns, and the role of climate change in shifting AIS priorities and risks. Climate change impacts on Oregon's water resources are numerous and have already been identified as highly impactful to the future of water resources in the state. What remains unclear is the additional effect that climate change will have on those ANS already harming Oregon, as well as the potential to alter how we predict AIS threats.

The Oregon Plan acknowledges these challenges and has included specific action items to tackle these gaps.

Literature Cited

American Sportfishing Association. 2021. Economic Contributions of Recreational Fishing — Oregon. https://asafishing.org/wp-content/uploads/2021/01/Oregon-2021.pdf Accessed October 10, 2022.

Aquatic Nuisance Species Task Force (ANSTF). 2021. https://www.fws.gov/program/aquatic-nuisance-species-task-force Accessed March 4, 2022.

Barnea, N., L. Antrim, D. Lott, G. Galasso, T. Suess, and S. Fradkin. 2013. The response to the Misawa dock on the Washington coast: Summary report and lessons learned. National Oceanic and Atmospheric Administration. Marine Debris Program. 25pp. https://repository.library.noaa.gov/view/noaa/2686

Baroch, J., M. Hafner, T. Brown, J. Mach, and R. Poché. 2002. Nutria (Myocaster coypus) in Louisiana. Other Publications in Wildlife Management. 46. https://digitalcommons.unl.edu/icwdmother/46

Blackburn, T.M., C. Bellard, and A. Ricciardi. 2019. Alien versus native species as drivers of recent extinctions. Frontiers in Ecology and the Environment, 17 (4) pp. 203-207. https://doi.org/10.1002/fee.2020

Boatner, R., G. Dolphin, and M. Reesman. 2022. Oregon's Aquatic Invasive Species Prevention Program: 2021 Legislative Report. 10pp.

Carlton, J. (1996), Biological Invasions and Cryptogenic Species. Ecology, 77: 1653-1655. https://doi.org/10.2307/2265767

Chapman, J., T. Miller, and E. Coan. 2003. Live seafood species as recipes for invasion. Conservation Biology 17:1386-1395.

Cimino, S. and A. Strecker. 2014. Oregon State Marine Board Final Report: Task 6. Tenmile Lake Boat Wash Effectiveness Monitoring. Center for Lakes and Reservoirs Publications and Presentations. 36. https://pdxscholar.library.pdx.edu/centerforlakes_pub/36

Cohen, A., and J. Carlton. 1995. Nonindigenous Aquatic Species in a United States Estuary: A Case Study of the Biological Invasions of the San Francisco Bay and Delta. United States Fish and Wildlife Service. 246pp.

Colorado Parks and Wildlife (CPW) 2020 State of Colorado Aquatic Nuisance Species Management Plan. 108pp. https://cpw.state.co.us/Documents/ANS/CO-ANS-Management-Plan.pdf

Columbia Basin Cooperative Weed Management Area (CBCWMA). 2019. Columbia Basin Flowering Rush Management Plan: A regional strategy to address *Butomus umbellatus* throughout the Columbia Basin. 67pp. https://columbiabasincwma.org/wp-

content/uploads/2017/12/2019-ISAN_Flowering-Rush_Report-FINAL-Low-Res-080519_Revised2020.pdf

Columbia River Intertribal Fisheries Commission (CRITFC). 2022. Invasive Species. https://critfc.org/invasive/ Accessed April 22, 2022.

Craig, M., J. Burke, K. Clifford, E. Mochon-Collura, J. Chapman, and J. Hyde. 2018. Trans-Pacific rafting in tsunami associated debris by the Japanese yellowtail jack, *Seriola aureovittata* Temminck & Schlegel, 1845 (Pisces, Carangidae). Aquatic Invasions (2018) Volume 13, Issue 1: 173–177 https://doi.org/10.3391/ai.2018.13.1.13

Creative Resource Strategies LLC. 2010. A Statewide Management Assessment of Invasive Species in Oregon. Prepared for the Oregon Invasive Species Council. 158pp.

Cusack, C., M. Harte, and S. Chan. 2009. The Economics of Invasive Species Prepared for the Oregon Invasive Species Council. 11pp. https://seagrant.oregonstate.edu/sites/seagrant.oregonstate.edu/files/sgpubs/onlinepubs/g09001.pdf

de Groot M, R. O'Hanlon, E. Bullas- Appleton, G. Csóka, A. Csiszár, M. Faccoli, E. Gervasini, N. Kirichenko, M. Korda, A. Marinšek, N. Robinson, C. Shuttleworth, J. Sweeney, E. Tricarico, L. Verbrugge, D. Williams, S. Zidar, J. Kus Veenvliet. 2020. Challenges and solutions in early detection, rapid response and communication about potential invasive alien species in forests. Management of Biological Invasions 11(4): 637–660, https://doi.org/10.3391/mbi.2020.11.4.02

de Rivera, C.E, Steves, B.P., Fofonoff, P.W., Hines, A.H. and Ruiz, G.M. 2011. Potential for high-latitude marine invasions along western North America. Diversity and Distributions, 17: 1198-1209. https://doi.org/10.1111/j.1472-4642.2011.00790.x
Department of the Interior (DOI). 2008. Department of the Interior Departmental Manual - Adaptive Management Implementation Policy. Series: Environmental Quality Programs Part 522: Adaptive Management. https://www.doi.gov/sites/doi.gov/files/elips/documents/522-dm-1.pdf

Department of the Interior (DOI). 2020a. Department of the Interior Departmental Manual Series: Environmental Quality Programs Part 524: Invasive Species Management. https://www.doi.gov/sites/doi.gov/files/elips/documents/524-dm-1-508.pdf

Department of the Interior (DOI). 2020b. Safeguarding the West from Invasive Species; Actions to Strengthen Federal, State, and Tribal Coordination to Address Invasive Mussels Final Report. 18pp. https://www.doi.gov/sites/doi.gov/files/safeguarding-the-west-final-report-2020-508.pdf

Diagne, C., B., Leroy, and A. Vaissière. 2021. High and rising economic costs of biological invasions worldwide. Nature 592, 571–576. 2021. https://doi.org/10.1038/s41586-021-03405-6

Draheim, R. M.D., Sytsma, R. Miller, and J. Cordell. 2007. Middle Columbia River Aquatic Nuisance Species Survey. Center for Lakes and Reservoirs Publications and Presentations. 6. https://pdxscholar.library.pdx.edu/centerforlakes_pub/6

Draheim, R, R. Boatner, G. Dolphin, and L. DeBruyckere. 2013. Oregon Dreissenid Mussel Rapid Response Plan. 60pp. https://pdxscholar.library.pdx.edu/centerforlakes_pub/40/

Duenas, M, H. Ruffhead, N. Wakefield, H. Nicola, P. Roberts, D. Hemming, H. Diaz-Soltero. 2018. The role played by invasive species in interactions with endangered and threatened species in the United States: a systematic review. Biodiversity and Conservation, 27 (12). 3171-3183. https://doi.org/10.1007/s10531-018-1595-x

Emerson, J. 2023. Ballast Water Program Update: Oregon Department of Environmental Quality. Presentation to the Pacific Ballast Water Group March 28, 2023. https://www.westernais.org/_files/ugd/0e48c2_80cc29e1f65842c781dee6a934183c94.pdf

Environmental Protection Agency, (EPA). 2008. Effects of Climate Change on Aquatic Invasive Species and Implications for Management and Research (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/014, 2008. https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=188305

Fantle-Lepczyk, J., P. Haubrock, A. Kramer, R. Cuthbert, A. Turbelin, R. Crystal-Ornelas, C. Diagne, and F. Courchamp. 2022. Economic costs of biological invasions in the United States. Science of The Total Environment. Volume 806, Part 3, 2022. 151318. https://doi.org/10.1016/j.scitotenv.2021.151318

Flynn, K., and M. Systma. 2004. Report on the Oregon Ballast Water Management Program in 2004. Produced for the Oregon State Legislature by the Oregon Ballast Water Task Force. 92pp. https://pdxscholar.library.pdx.edu/cgi/viewcontent.cgi?article=1002&context=centerforlakes_pub

Fofonoff, P., G. Ruiz, B. Steves, C. Simkanin, and J. Carlton. 2018. National Exotic Marine and Estuarine Species Information System. http://invasions.si.edu/nemesis. Access Date: 5/26/2022

Hanson, Erik, and Mark Sytsma. 2001. Oregon Aquatic Nuisance Species Management Plan. Center for Lakes and Reservoirs Publications and Presentations. 21. http://archives.pdx.edu/ds/psu/4782

Independent Science Advisory Board (ISAB). 2021. American Shad in the Columbia River: Past, Present, Future. ISAB2021-4. 89pp.

International Maritime Organization (IMO) 2022a. Status of IMO Treaties: Comprehensive information on the status of multilateral Conventions and instruments in respect of which the International Maritime Organization or its Secretary-General performs depositary or other functions. 567 pp

https://wwwcdn.imo.org/localresources/en/About/Conventions/StatusOfConventions/Status%20-%202022.pdf

International Maritime Organization (IMO). 2022b. Ballast Water Management Conventions and Guidance. Access Date: 4/6/2022 https://www.imo.org/en/OurWork/Environment/Pages/BWMConventionandGuidelines.aspx

International Plant Protection Convention (IPPC). 2022. What is the International Plant Protection Convention (IPPC). https://www.ippc.int/en/about/overview/ Access Date: April 6, 2022.

Jewell, S. 2020. A century of injurious wildlife listing under the Lacey Act: a history. Management of Biological Invasions 11(3): 356–371, https://doi.org/10.3391/mbi.2020.11.3.01

Miller, R., V. Morgan, and M. Sytsma. 2013. Aquatic Invasive Plant Surveys in the BLM Medford District During 2012. Center for Lakes and Reservoirs Publications and Presentations. 45. http://archives.pdx.edu/ds/psu/16276

Karatayev, A., D. Padilla, D. Minchin, D. Boltovskoy, and L. Burlakova. 2007. Changes in global economies and trade: the potential spread of exotic freshwater bivalves. Biological Invasions. 9:161-180.

Lampman, B. 1946. The Coming of the Pond Fishes. Binfords and Mort, Portland, Oregon.

Mack, R., D. Simberloff, M. Lonsdale, H. Evans, M. Clout, and F. Bazzaz. 2000. Biotic Invasions: Causes, Epidemiology, global consequences, and control. Ecological Applications, 10: 689-710. https://doi.org/10.1890/1051-0761(2000)010[0689:BICEGC]2.0.CO;2

Mucken, A., and B. Bateman (Eds.). 2017. Oregon's 2017 Integrated Water Resources Strategy. Oregon Water Resources Department. Salem, OR https://www.oregon.gov/owrd/wrdpublications1/2017_IWRS_Final.pdf

Murphy, C., J. Romer, K. Stertz, I. Arismendi, R. Emig, F. Monzyk, and S. Johnson. 2021. Damming salmon fry: evidence for predation by non-native warmwater fishes in reservoirs. e03757 Ecosphere vol 12(9). 2021 https://esajournals.onlinelibrary.wiley.com/toc/21508925/2021/12/9

NISIC 2022 National Invasive Species Information Center: https://www.invasivespeciesinfo.gov/executive-order-13751 Access Date: April 10, 2022.

National Oceanographic and Atmospheric Administration (NOAA) et al. (2012) Response protocols for biofouled debris and invasive species generated by the 2011 Japan tsunami: outcome of the Regional Preparedness and Response Workshop to Address Biofouling and Aquatic Invasive Species on Japan Tsunami Marine Debris. 31 July–1 August 2012, Portland, OR https://www.blm.gov/sites/blm.gov/files/uploads/IM2013-028_att1.pdf

National Park Service (NPS). 2006. Management Policies 2006. 169pp. https://www.nps.gov/subjects/policy/upload/MP_2006.pdf

National Park Service (NPS). 2007. Quagga/Zebra Mussel Infestation Prevention and Response Planning Guide. 42pp + appendices https://invasivemusselcollaborative.net/wp-content/uploads/2018/11/QuaggaPlanningGuide_ext.pdf

Olson, A., and E. Linen. 1997. Exotic Species and the Live Aquatics Trade. Proceedings of Marketing and Shipping Live Aquatics '96: Conference and Exhibition, Seattle, Washington, October 1996. School of Marine Affairs, University of Washington, Working Paper No. 6.

Oregon Conservation Strategy (OCS). 2016. Oregon Department of Fish and Wildlife, Salem, Oregon. 10-year revision, approved by the U.S. Fish and Wildlife Service in August 2016. Accessed January 22, 2023. https://www.dfw.state.or.us/conservationstrategy/

Oregon Department of Agriculture (ODA). 2011. Oregon Department of Agriculture Plant Pest Risk Assessment for Spartina, Spartina ssp. 30pp. https://www.oregon.gov/oda/shared/Documents/Publications/Weeds/PlantPestRiskAssessmentCordgrass.pdf

Oregon Department of Agriculture (ODA) 2022 Oregon Noxious Weed Profiles https://www.oregon.gov/oda/programs/Weeds/OregonNoxiousWeeds/Pages/AboutOregonWeeds.aspx

Oregon Department of Environmental Quality (ODEQ). 2000. Oregon's 2000 Water Quality Status Assessment Report Section 305(b) Report. Portland, OR.

Oregon Department of Environmental Quality (ODEQ). 2019. Oregon Ballast Water Management Factsheet. https://www.oregon.gov/deq/FilterDocs/bwpFSballastmanage.pdf

Oregon Department of Fish and Wildlife (ODFW) 2023. Whirling Disease and Oregon's Trout and Salmon. https://www.dfw.state.or.us/fish/diseases/whirling.asp Accessed August 20, 2023

Oregon Invasive Species Council (OISC). 2017. Oregon Statewide Strategic Plan for Invasive Species 2017-2027. Prepared by the Statewide Strategic Plan Working Group of the Oregon Invasive Species Council. 38pp. https://www.oregoninvasivespeciescouncil.org/statewide-plans

Oregon Invasive Species Council (OISC). 2023. Oregon's Invasive Species Information Hub. https://www.oregoninvasivespeciescouncil.org/infohub Accessed May 24, 2023.

Oregon Governor's Natural Resource Office (Oregon) 2020. Oregon's 100-Year Water Vision: Full Summary. 443 pp. https://www.oregon.gov/oweb/Documents/OWV-Full-Report.pdf

Oregonian Editorial Board. 2009. A proper disposal plan for the 'ghost fleet' October 25, 2009 https://www.oregonlive.com/opinion/2009/10/a_proper_disposal_plan_for_the.html

Pfauth, M., M. Sytsma, and D. Isaacson, Dennis, "Oregon Spartina Response Plan" (2007). Center for Lakes and Reservoirs Publications and Presentations. Paper 18. 70pp. http://pdxscholar.library.pdx.edu/centerforlakes_pub/18

Pimentel, D., Zuniga, R., and D. Morrison. 2005. Update on the environmental and economic cost associated with alien-invasive species in the United States. Ecological Economics 52. pp 273-288.

Pacific Ballast Water Group (PBWG). 2022. Pacific Ballast Water Group website. https://www.westernais.org/ballast-water Accessed March 16, 2022

Pacific NorthWest Economic Region and Pacific States Marine Fisheries Commission (PNWER and PSMFC). 2015. Advancing a regional defense against dreissenids in the Pacific Northwest. 21pp. https://ec8c3022-1480-4580-96c0-98958d49781f.filesusr.com/ugd/0e48c2_0acc131c2647407ab2376406ac711fde.pdf

Pacific NorthWest Economic Region (PNWER). 2023. About PNWER website. https://www.pnwer.org/about-us.html Accessed May 23, 2023.

Pacific States Marine Fisheries Commission (PSMFC), Invasive Species Action Network and the U.S. Fish and Wildlife Service. 2021. Columbia River Basin AIS Team: Moss Ball Incident Action Report, Recommendations and Key Findings. 22 pp. https://www.westernais.org/_files/ugd/bb76e5_1e97fad4c4634e8cab68805e86c38ff7.pdf

Pacific States Marine Fisheries Commission (PSMFC). 2023. Columbia River Basin Dreissenid Incident Response Toolkit. http://www.crbdirt.com Accessed January 16, 2023.

Ruiz, G., P. Fofonoff, J. Carlton, M. Wonham, and A. Hines. 2000. Invasion of coastal marine communities in North America: apparent patterns, processes and biases. Annual Review of Ecology and Systematics 31:481-531.

Ruiz, G. and C. Zabin. 2014. Marine Invasive Species Risk Assessment for the Commonwealth of the Northern Mariana Islands, Guam, Hawai'I, Palau, the Federated States of Micronesia, and the Republic of the Marshall Islands. Submitted to the University of Guam and the Secretariat of the Pacific Community. https://www.doi.gov/sites/doi.gov/files/uploads/pac_regional_biosecurity_plan_for_micronesia_and_hawaii_volume_iii.pdf

Scianni C, K. Lubarsky, L. Ceballos-Osuna, and T. Bates. 2021. Yes, we CANZ: initial compliance and lessons learned from regulating vessel biofouling management in California and New Zealand. Management of Biological Invasions 12(3): 727–746, https://doi.org/10.3391/mbi.2021.12.3.14

Simpson, A., and M. Eyler. 2018. First comprehensive list of non-native species established in three major regions of the United States: U.S. Geological Survey Open-File Report 2018-1156, 15 p., https://doi.org/10.3133/ofr20181156

Smith, H. 1896. A Review of the History and Results of the Attempts to Acclimatize Fish and Other Water Animals in the Pacific States. Bull. of the U.S. Fish Comm. 15: 379-472

Smits, J. and F. Moser, eds. 2009. Rapid Response Planning for Aquatic Invasive Species- A Maryland Example. Prepared for the Mid-Atlantic Panel on Aquatic Invasive Species by the Maryland Sea Grant College University System of Maryland. 43pp. http://www.midatlanticpanel.org//wp-content/uploads/2016/04/RapidResponse_MarylandPlanExample.pdf

Sturtevant, R. 2019. Alien language: Understanding terminology about nonindigenous species. Michigan Sea Grant, Michigan State University Extension. February 24, 2019.

Sytsma, M., J. Cordell, J. Chapman, and R. Draheim. 2004. Lower Columbia River Aquatic Nonindigenous Species Survey 2001-2004Center for Lakes and Reservoirs Publications and Presentations. 23. http://archives.pdx.edu/ds/psu/4793

Tamburri. M, E. Georgiades, C. Scianni, R. Matthew, G. Ruiz, and C. Junemann. 2021. Technical Considerations for Development of Policy and Approvals for In-Water Cleaning of Ship Biofouling. Frontiers in Marine Science 8(21). https://www.frontiersin.org/article/10.3389/fmars.2021.804766

Tobin P. 2018. Managing invasive species. F1000Research, 7, F1000 Faculty Rev-1686. https://doi.org/10.12688/f1000research.15414.1

U.S. Fish and Wildlife Service (USFWS). 2021. What is an aquatic invasive species? (USFW story published October 3, 2021) https://www.fws.gov/story/what-aquatic-invasive-species

U.S. Geological Survey (USGS). 2021. Invasive Zebra Mussels Found in Pet Stores in 21 States (USGS Press Release, Mar 8, 2021) https://www.usgs.gov/news/featured-story/invasive-zebra-mussels-found-pet-stores-21-states

U.S. Geological Survey (USGS). 2022. Nonindigenous Aquatic Species Database, Gainesville, FL. http://nas.er.usgs.gov Accessed March 30, 2022.

Washington Invasive Species Council (WISC). 2019. The State of Washington Urban Forest Pest Readiness Playbook. Prepared for the Washington Department of Natural Resources. 85pp. https://invasivespecies.wa.gov/wp-content/uploads/2020/01/UrbanForestPestReadinessPlaybook.pdf

Western Regional Panel (WRP). 2019 Building Consensus in the West Workgroup Final Activity Report 2011–2019. 28pp. https://westernregionalpanel.org/wp-content/uploads/2019/11/WRP-BC-Activity-Report-FINAL.pdf

Western Regional Panel (WRP). 2020. Updated Recommendations for the Quagga and Zebra Mussel Action Plan for Western U.S. Waters. 32pp https://westernregionalpanel.org/wp-content/uploads/2020/12/QZAP-2.0-Final.pdf

Western Regional Panel (WRP). 2021. Summary of Western States' Aquatic Invasive Species Outreach Campaigns: Target Audiences, Messaging, Delivery, and Lessons Learned. 9pp. https://westernregionalpanel.org/wp-content/uploads/2021/04/WesternStatesANSOutreachCampaignsSurvey_WRP-EOC_Report_Apr2021.pdf

Western Regional Panel (WRP). 2022. About. https://westernregionalpanel.org/ Accessed March 30, 2022

Appendices

Appendix A: Participants

Appendix A1: 2001 Plan Development Steering Committee

Lindsay Ball, Oregon State Police
Larry Cooper, Oregon Department of Fish and Wildlife
Jason Daughn, Senator Wyden's Office
Sebastian Degens, Port of Portland
Russell Harding, Oregon Department of Environmental Quality
Jesse Hayes, Hayes Oysters
Paul Heimowitz, Oregon State University Sea Grant
Dan Hilburn, Oregon Department of Agriculture
Jeff Kroft, Oregon Division of State Lands
Charles Lang, Oregon B.A.S.S.
Denny Lassuy, U.S. Fish and Wildlife Service
Jan Lee, Oregon Water Resources Congress
Jim Myron, Oregon Trout
Blaine Parker, Columbia River Intertribal Fisheries Commission
Stephen Phillips, Pacific States Marine Fisheries Commission
Mark Sytsma, Portland State University Center for Lakes and Reservoirs*
Eric Hansen, Portland State University Center for Lakes and Reservoirs*
Ray Rainbolt, Oregon Department of Fish and Wildlife
Wayne Shuyler, Oregon State Marine Board
Vivienne Torgeson, Oregon Watershed Enhancement Board
James Townely, Columbia River Steamship Operators
Sylvia Yamada, Oregon State University, Zoology Department

*Plan Authors

Appendix A2: 2022/2023 Plan Development Steering Committee

Arick Rouhe, Portland State University
Blaine Parker, Columbia River Intertribal Fish Commission
Carri Pirosko, Oregon Department of Agriculture
Cat deRivera, Portland State University
Glenn Dolphin, Oregon State Marine Board
Josh Emerson, Oregon Department of Environmental Quality
Mark Sytsma, Portland State University
Richard Dickinson, Willamette Riverkeeper
Rick Boatner, Oregon Department of Fish and Wildlife
Sam Chan, Oregon Sea Grant
Theresa Thom, U.S. Fish and Wildlife Service
Tim Butler, Oregon Department of Agriculture
Troy Abercrombie, Oregon Department of Agriculture

Appendix A3: 2022/2023 Plan Development - Advisory Network Reviewers

Owen Cass, Oregon Department of Fish and Wildlife
John Chapman, Dept. Fisheries, Wildlife and Conservation, Oregon State University
Brien Flanagan, Columbia River Steamship Operators' Association, Inc.
Rebecca Fritz, Burns Paiute Tribe
Thomas Fourney, Oregon Department of Agriculture
Audrey Hatch, Oregon Watershed Enhancement Board
Paul Heimowitz, U.S. Geological Survey
Ryan Howell, Oregon State Police
Kate Mickelson, Columbia River Steamship Operators' Association, Inc.
Stephen Phillips, Pacific States Marine Fisheries Commission
Matt Paroulek, Port of Portland
Toni Pennington, Environmental Science Associates
Tyler Pedersen, Tualatin Soil and Water Conservation District
Steve Rumrill, Oregon Department of Fish and Wildlife
Lindsey Wise, Institute for Natural Resources

Appendix A4: 2022/2023 Plan Development - Oregon Invasive Species Council

The most current list of the OISC membership can be accessed at https://www.oregoninvasivespeciescouncil.org

OISC (2022)

Ex Officio

Noel Bacheller	Oregon Parks and Recreation Department
Rick Boatner	Oregon Department of Fish and Wildlife
Chris Benemann	Oregon Department of Agriculture
Sam Chan	Oregon Sea Grant
Glenn Dolphin	Oregon State Marine Board
Josh Emerson	Oregon Department of Environmental Quality
Catherine de Rivera	Portland State University
Wyatt Williams	Oregon Department of Forestry

Ex Officio Non-voting

David Brock Smith	Representative
Lew Frederick	Senator
Morgan Gratz-Weiser	Governor's Office
Stacy Johnson	Bureau of Land Management
Heidi McMaster	Bureau of Reclamation
Sean McMillen	USDA APHIS
Kathy Pendergrass	USDA - Natural Resources Conservation Service
Karen Ripley	USDA Forest Service
Nicole Brooks	Customs and Border Protection
Brendan White	U.S. Fish and Wildlife Service

Appointed - Voting

Brian Clapp	Union County Weed Control
Chuck Fisk	F5 Wildlife Control
Peter Kenagy	Oregon Farm Bureau
Katie Murra	Oregonians for Food and Shelter
Christine Moffitt	Friends of South Slough
Tim Newton	Malheur SWCD
Blaine Parker	Columbia River Inter-Tribal Fish Commission
Cheryl Shippentower	Confederated Tribes of the Umatilla Indian Reservation
Alex Staunch	Mosaic Ecology
Eugene Wier	Freshwater Trust

Ex Officio

Noel Bacheller	Oregon Parks and Recreation Department
Rick Boatner	Oregon Department of Fish and Wildlife
Chris Benemann	Oregon Department of Agriculture
Sam Chan	Oregon Sea Grant
Glenn Dolphin	Oregon State Marine Board
Josh Emerson	Oregon Department of Environmental Quality
Catherine de Rivera	Portland State University
Wyatt Williams	Oregon Department of Forestry

Ex Officio Non-voting

David Brock Smith	Senator
Lew Frederick	Senator
Stacy Johnson	Bureau of Land Management
Heidi McMaster	Bureau of Reclamation
Sean McMillen	USDA APHIS
Kathy Pendergrass	USDA - Natural Resources Conservation Service
Karen Ripley	USDA Forest Service
Nicole Brooks	Customs and Border Protection
Brendan White	U.S. Fish and Wildlife Service

Appointed - Voting

Brian Clapp	Union County Weed Control
Chuck Fisk	F5 Wildlife Control
Nathan Gehres	Applegate Partnership and Watershed Council
Peter Kenagy	Oregon Farm Bureau
Katie Murray	Oregonians for Food and Shelter
Tim Newton	Malheur SWCD
Shon Schooler	Department of State Lands, South Slough Estuarine Research Reserve
Cheryl Shippentower	Confederated Tribes of the Umatilla Indian Reservation
Alex Staunch	Mosaic Ecology

Appendix B: Public Comment

Appendix B1: 2001

Email received from Kevin Aitkin (USFWS) on 4/30/2001.

Erik
Thank you for the opportunity to review the "Oregon Aquatic Nuisance Species Management Plan." The plan is well organized and very informative. Your development of an ANS Management Classification scheme to address the prioritization of exotic species impacts is a good alternative to a priority species list. I also found Appendix D: Federal Laws Addressing Aquatic Nuisance Species to be very informative and a much needed addition to all state plans, a similar table addressing state laws would also be useful. Below are additional comments on the plan.

- Page 14 (Federal and Regional Authorities and Activities) and page 66 (Appendix D)- You may want to add Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds (66 FR 3853, January 17, 2001) which was signed by President Clinton on January 10, 2001. Section 3 (e) states: Pursuant to its MOU, each agency shall, to the extent permitted by law and subject to the availability of appropriations and with Administration budgetary limits, and in harmony with agency missions: (10) within the scope of its statutorily-designated authorities, control the import, export, and establishment in the wild of live exotic animals and plants that may be harmful to migratory bird resources." A copy of the executive order can be found at (http://www.nara.gov/fedreg/eo2001c.html).
- Page 18 (U.S. Fish and Wildlife Service) – Add the following: The U.S. Fish and Wildlife Service also provides Federal funding for implementation of state and regional ANS management plans which have been approved by the ANS Task Force.
- Page 43 (Implementation Table) – U.S. Fish and Wildlife Service (USFWS) needs to be added to the "Agency Abbreviations" section of the table.
- Page 49 (Glossary) – You may want to consider some of the bioinvasion terms in Shafland and Lewis (1984) when completing the glossary. (Shafland, P.L., and W.M. Lewis. 1984. Terminology associated with introduced organisms. Fisheries 9 (4): 17-18.)
- Page 53 (appendix A1, A2, and B) – I would suggest listing animals and plants in taxonomic order rather than alphabetic order in all tables. Nonnative and nonindigenous are spelled two different ways (one word or hyphenated) throughout the draft plan. I believe that the accepted spelling of those terms is as one word and the following references should support this. "Nonindigenous" is spelled as one word in the title and glossary of the Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990. It continues to be spelled as one word in the glossary of the National Invasive Species Act of 1996. The one-word spelling of both terms is also used in Nonindigenous Fishes Introduced into Inland Waters of the United States by Fuller, Nico, and Williams (1999). Both terms are spelled as one word in the 2001 version of the Merriam-Webster's Collegiate Dictionary found as (http://www.mw.com/home.htm). The ninth edition of The Gregg Reference Manual (2001), a writing and editing manual, states "In general, do

not use a hyphen to set off a prefix at the beginning of a word or a suffix at the end of a word."

Response to Kevin Aitkin's comments:
The corrections and additions suggested were incorporated into the plan, except for the addition of more bioinvasion terms and the listing of species taxanomically. No new bioinvasion terms were added to the glossary due to inconsistency on how these terms are used and applied. Instead, a task was added to the plan that will have the Invasive Species Council develop a list of terms and definitions that can be used consistently in Oregon. The species lists were left in alphabetical order to faciliate their use by the general public. While it would be proper to list species taxonomically, the plan was developed for a larger audience then the scientific community, and they are likely to find an alphabetical list, by common name, easier to use.

Email received from Anne Jennings on 4/24/2001.

Erik Hanson and Mark Sytsma;
I had an opportunity to look over the ANS Management Plan as I am quite interested in the topic after working on an estuary management contract with the PNCERS program offices (and delving into invasive species in PNW estuaries).
I've attached a document with suggestions for a slightly different ANS management classification system (table) than what appears in the final draft. It would allow species classification by: (1) whether or not it is established in Oregon, (2) whether or not there are significant known impacts (ecological or economic) and (3) whether or not control/eradication methods are known. The definitions are clear and flexible - as the 'status' or classification changes so does the action.
Good luck.
Sincerely, Anne Jennings
North Coast Consultants

Management Classification	Description	Management Action
1	ANS: Established, known significant impact/potential for impact	Priority
1A	Management/control/eradication methods known	Control/eradication
1B	Management/control/eradication methods not known or not proven	Intensive control/eradication research
2	ANS: Not established, known significant impact/potential for impact	Priority
2A	Management/control/eradication methods known	Prevention, Intensive monitoring, eradication of pioneer populations
2B	Management/control/eradication methods not known or not proven	Intensive monitoring, Control/eradication research
3	ANS: Established, no significant impacts/potential for impact known	-
3A	Management/control/eradication methods known	Population control, Monitoring, Dispersal prevention
3B	Management/control/eradication methods not known or not proven	Monitoring, research
4	ANS: Not established or reported in Oregon, no significant impacts/potential for impact known	-
4A	Management/control/eradication methods known	Monitoring
4B	Management/control/eradication methods not known or not proven	Monitoring

Response to Anne Jenning's comments:
The proposed classification system led to the splitting of Management Class 3 into two classes. To be consistent with the Washington State ANS Plan classification system subdivision of management classes was not included. The management actions described are included in the description of the four management classes. A more detailed assessment of management actions for subclasses could be included when Task 1A12 is implemented.

Email received from Bill Wallace on 4/23/2001.

Erik
A few observations on your draft ANS management plan:

- I like the way the mission statement recognizes the importance of not "exporting" ANS from Oregon.
- In the management classification system, Class 3 includes species at opposite ends of the spectrum: those that are in OR, but which you can't do much about (at least so far); and those not in OR, but of uncertain or little threat. The need for and objectives of further research would seem to be different for these types. Should there be a Class 4?
- Appendix D lists a number of USDA-APHIS authorities, several of which have been superseded by the Plant Protection Act, which is also listed.

If you e-mail me your fax number, I'll fax you a marked up copy of the list.
Bill Wallace, ANS Task Force

Response to Bill Wallace's comments:
Corrections were made to Appendix D and Management Class 3 was split into two classes.

Appendix B2: 2023

Email received from Vanessa Youngblood (Willamette Riverkeeper) on 5/24/2023.

Hello Robyn,

My name is Vanessa Youngblood and I am the new Restoration Manager for Willamette Riverkeeper. Richard probably shared with you that as of January I moved into this role within our organization after being our Restoration Associate before then. I have been working very hard to ensure our restoration program will continue the great work both Richard and Marci have accomplished over the years.

I was reviewing the ANS Management Plan, since it is now open for comments, and I wanted to ask about one particular species listed, *Lysimachia vulgaris* (garden yellow loosestrife, GYL). Last year I spent a large part of my summer both surveying and project managing treatments of several populations of *Lysimachia vulgaris* under our OSWB grants, in partner with Yamhill Soil and Water Conservation District. After our summer field work in 2022, I created a document that outlined each specific patch we found of GYL along the Willamette River, as a timeline of sorts for each population. This document includes river miles, GPS coordinates, patch size, photos and treatment history.

I'm writing to you because on page 135 it is listed in the "Appendix C2: List of Aquatic Nonindigenous Species of Concern not yet in Oregon" and wanted to share that it is indeed present in Oregon and in 2022 had spread to 25 patches ranging in size across 20.5 miles of the Willamette River. I realize I do not know all of your criteria or rating for this management plan, but I thought I would share this information with you since it is definitely present and a large concern in Oregon in my opinion.

I really appreciate all the hard work you and the steering committee have undergone to complete such a thorough management plan and I just wanted to make sure you have all this information before the final version is released.

Please let me know if you have any questions.

Thank you for your time and energy!
Vanessa

Response to Vanessa Youngblood's comments:
In response to this and a similar comment made by Steering Committee member Richard Dickinson, the author of the Oregon Plan reached out to the OISC Hub manager and provided them with the above information on the status and distribution of garden yellow loosestrife, *Lysimachia vulgaris*, in the state. As a result, the Hub entry for *Lysimachia vulgaris* was revised, and subsequently, the list of species in Appendix C2 was updated to reflect this change. This remains a useful example of an issue highlighted in the Gaps and Challenges section of the document, where multiple species lists can be confusing, especially when different lists report different invasion status or other contradictory information. Although the Hub was in error in

this example, the speed and ease at which it was able to be revised further support the value of having a comprehensive, dynamic clearinghouse for invasive species information.

Appendix C: Aquatic Nonindigenous Species

Appendix C1: Aquatic Nonindigenous Species in Oregon

Table C1a. Nonnative Plants and Algae Reported from Oregon (Fofonoff et al. 2018, USGS 2022, OISC 2022). Status Key: C= cryptogenic, E= established, F= failed, M= under management for eradication, U= unknown, X= extirpated/eradicated. Status marked with an * indicates species that are native to Oregon but have been introduced in the state outside of their native range.

Taxa	Scientific Name	Common name	Habitat	Status
Algae	*Attheya armata*		Marine	E
Algae	*Ceramium kondoi*		Marine	E
Algae	*Ceramium sungminbooi*		Marine	E
Algae	*Didymosphenia geminata*	didymo	Freshwater	C
Algae	*Gracilaria vermiculophylla*		Marine	E
Algae	*Polysiphonia brodiei*		Marine	E
Algae	*Sargassum muticum*	wireweed	Marine	E
Algae	*Ulva australis*	lacy sea lettuce	Marine	E
Plants	*Agrostis gigantea*	water bent grass	Brackish	E
Plants	*Alisma lanceolatum*	lanceleaf water plantain	Freshwater	U
Plants	*Alopecurus geniculatus*	water foxtail	Freshwater	E
Plants	*Aponogeton distachyos*	cape pondweed	Freshwater	U
Plants	*Arundo donax*	giant reed	Freshwater	E

Taxa	Scientific Name	Common name	Habitat	Status
Plants	*Bidens beckii*	Beck's water-marigold	Freshwater	U
Plants	*Butomus umbellatus*	flowering rush	Freshwater	E
Plants	*Cabomba caroliniana*	Carolina fanwort	Freshwater	E
Plants	*Cakile edentula*	American sea rocket	Brackish	U
Plants	*Cakile maritime*	European sea rocket	Brackish	U
Plants	*Callitriche stagnalis*	pond water-starwort	Freshwater	E
Plants	*Cotula coronopifolia*	common brassbuttons	Freshwater	E
Plants	*Cyperus esculentus*	yellow nutsedge	Freshwater	E
Plants	*Egeria densa*	Braziian waterweed	Freshwater	E
Plants	*Eichhornia crassipes*	common water-hyacinth	Freshwater	U
Plants	*Fallopia japonica*	Japanese knotweed	Freshwater	E
Plants	*Fallopia sachalinenis*	giant knotweed	Freshwater	E
Plants	*Fallopia x Bohemica*	bohemian knotweed	Freshwater	E
Plants	*Impatiens glandulifera*	policeman's helmet	Freshwater	E
Plants	*Iris pseudacorus*	yellow iris	Freshwater	E
Plants	*Juncus effusus solutus*	lamp rush	Freshwater	E
Plants	*Juncus gerardii*	saltmeadow rush	Freshwater	E
Plants	*Landoltia punctata*	dotted duckweed	Freshwater	E
Plants	*Ludwigia grandiflora*	large-flower primrose-willow	Freshwater	U

Taxa	Scientific Name	Common name	Habitat	Status
Plants	*Ludwigia hexapetala*	six petal water primrose	Freshwater	E
Plants	*Ludwigia peploides*	floating primrose-willow	Freshwater	E
Plants	*Ludwigia peploides montevidensis*	floating primrose-willow	Freshwater	E
Plants	*Lysimachia punctata*	large yellow loosestrife	Freshwater	U
Plants	*Lysimachia vulgaris*	garden yellow loosestrife	Freshwater	E
Plants	*Lythrum hyssopifolia*	hyssop loosestrife	Freshwater	E
Plants	*Lythrum portula*	spatulaleaf loosestrife	Freshwater	E
Plants	*Lythrum salicaria*	purple loosestrife	Freshwater	E
Plants	*Lythrum tribracteatum*	threebract loosestrife	Freshwater	E
Plants	*Marsilea mutica*	Australian water-clover	Freshwater	U
Plants	*Mentha aquatica*	water mint	Freshwater	E
Plants	*Murdannia keisak*	marsh dewflower	Freshwater	U
Plants	*Myosotis scorpioides*	forget-me-not	Freshwater	E
Plants	*Myriophyllum aquaticum*	parrot feather	Freshwater	E
Plants	*Myriophyllum heterophyllum*	variable-leaf watermilfoil	Freshwater	E
Plants	*Myriophyllum spicatum*	Eurasian watermilfoil	Brackish	E
Plants	*Myriophyllum x spicatum*	hybrid watermilfoil	Freshwater	U
Plants	*Nasturtium microphyllum*	onerow yellowcress	Freshwater	U
Plants	*Nasturtium officinale*	watercress	Freshwater	E

Taxa	Scientific Name	Common name	Habitat	Status
Plants	*Nymphaea odorata*	American white waterlily	Freshwater	E
Plants	*Nymphoides peltata*	yellow floating-heart	Freshwater	E
Plants	*Parapholis incurva*	curved sicklegrass	Brackish	U
Plants	*Phalaris arundinacea*	reed carygrass	Freshwater	E
Plants	*Phalaris arundinacea var. Picta*	Ribbongrass	Freshwater	E
Plants	*Phragmites australis australis*	common reed	Freshwater	E
Plants	*Polygonum polystachyum*	Himalayan knotweed	Freshwater	E
Plants	*Pontederia cordata*	pickerelweed	Freshwater	E
Plants	*Potamogeton crispus*	curly-leaf pondweed	Freshwater	E
Plants	*Rorippa sylvestris*	keek	Freshwater	E
Plants	*Sagittaria platyphyla*	Delta arrowhead	Freshwater	E
Plants	*Sporobolus alterniflorus, Spartina alterniflora*	smooth cordgrass	Brackish	E
Plants	*Sporobolus densiflora, Spartina densiflora*	dense-flowered cordgrass	Brackish	E
Plants	*Sporobolus pumilus, Spartina patens*	saltmeadow cordgrass	Brackish	M
Plants	*Typha angustifolia*	arrow-leaved cattail	Freshwater	U
Plants	*Typha domingensis*	southern cattail	Freshwater	E
Plants	*Vallisneria americana*	wild celery	Freshwater	E
Plants	*Veronica anagallis-aquatica*	water speedwell	Freshwater	U
Plants	*Zantedeschia aethiopica*	calla lily	Freshwater	U

Taxa	Scientific Name	Common name	Habitat	Status
Plants	*Zostera japonica*	Japanese eelgrass	Marine	E

Table C1b. Nonnative Fishes Reported from Oregon (Fofonoff et al. 2018, USGS 2022, OISC 2022). Status Key: C= cryptogenic, E= established, F= failed, M= under management for eradication, U= unknown, X= extirpated/eradicated. Status marked with an * indicates species that are native to Oregon but have been introduced in the state outside of their native range.

Taxa	Scientific Name	Common name	Habitat	Status
Fishes	*Acipenser transmontanus*	white sturgeon	Freshwater	E
Fishes	*Alosa sapidissima*	American shad	Freshwater-Marine	E
Fishes	*Ambloplites rupestris*	rock bass	Freshwater	E
Fishes	*Ameiurus catus*	white catfish	Freshwater	E
Fishes	*Ameiurus melas*	black bullhead	Freshwater	E
Fishes	*Ameiurus natalis*	yellow bullhead	Freshwater	E
Fishes	*Ameiurus nebulosus*	brown bullhead	Freshwater	E
Fishes	*Anguilla sp.*	unidentified eel	Freshwater-Marine	F
Fishes	*Archoplites interruptus*	Sacramento perch	Freshwater	E
Fishes	*Carassius auratus*	goldfish	Freshwater	E
Fishes	*Catostomus commersonii*	white sucker	Freshwater	U
Fishes	*Chasmistes brevirostris*	shortnose sucker	Freshwater	E
Fishes	*Coregonus clupeaformis*	lake whitefish	Freshwater	F
Fishes	*Ctenopharyngodon idella*	grass carp (triploid)	Freshwater	S
Fishes	*Ctenopharyngodon idella*	grass carp	Freshwater	U

Taxa	Scientific Name	Common name	Habitat	Status
Fishes	*Cyprinella lutrensis*	red shiner	Freshwater	E
Fishes	*Cyprinus carpio*	common carp	Freshwater	E
Fishes	*Cyprinus rubrofuscus*	koi	Freshwater	U
Fishes	*Dorosoma petenense*	threadfin shad	Freshwater-Marine	E
Fishes	*Esox americanus vermiculatus*	grass pickerel	Freshwater	E
Fishes	*Esox lucius x masquinongy*	tiger muskellunge	Freshwater	S
Fishes	*Fundulus diaphanus*	banded killifish	Freshwater	E
Fishes	*Gambusia affinis*	western mosquitofish	Freshwater	E
Fishes	*Gasterosteus aculeatus*	threespine stickleback	Marine	E
Fishes	*Gila atraria*	Utah chub	Freshwater	E
Fishes	*Gila coerulea*	blue chub	Freshwater	U
Fishes	*Hesperoleucus symmetricus*	California roach	Freshwater	E
Fishes	*Ictalurus furcatus*	blue catfish	Freshwater	F
Fishes	*Ictalurus punctatus*	channel catfish	Freshwater	E
Fishes	*Lepisosteus platyrhincus*	Florida gar	Freshwater	F
Fishes	*Lepomis cyanellus*	green sunfish	Freshwater	E
Fishes	*Lepomis gibbosus*	pumpkinseed	Freshwater	E
Fishes	*Lepomis gulosus*	warmouth	Freshwater	E
Fishes	*Lepomis macrochirus*	bluegill	Freshwater	E
Fishes	*Lepomis microlophus*	redear sunfish	Freshwater	E
Fishes	*Lepomis sp.*	sunfish	Freshwater	E

Taxa	Scientific Name	Common name	Habitat	Status
Fishes	*Lucania parva*	rainwater killifish	Freshwater	E
Fishes	*Micropterus dolomieu*	smallmouth bass	Freshwater	E
Fishes	*Micropterus punctulatus*	spotted bass	Freshwater	E
Fishes	*Micropterus salmoides*	largemouth bass	Freshwater	E
Fishes	*Misgurnus anguillicaudatus*	pond loach	Freshwater	E
Fishes	*Misgurnus mizolepis*	Chinese fine-scaled loach	Freshwater	F
Fishes	*Morone americana x saxatilis*	white perch x striped bass	Freshwater	S
Fishes	*Morone chrysops x mississippiensis*	white bass x yellow bass	Freshwater	E
Fishes	*Morone chrysops x saxatilis*	wiper	Freshwater-Marine	U
Fishes	*Morone saxatilis*	striped bass	Freshwater-Marine	E
Fishes	*Notemigonus crysoleucas*	golden shiner	Freshwater	E
Fishes	*Noturus gyrinus*	tadpole madtom	Freshwater	E
Fishes	*Oncorhynchus aguabonita*	golden trout	Freshwater	U
Fishes	*Oncorhynchus clarkii*	cutthroat trout	Freshwater	E
Fishes	*Oncorhynchus clarkii henshawi*	Lahontan cutthroat trout	Freshwater	E
Fishes	*Oncorhynchus clarkii lewisi*	westslope cutthroat trout	Freshwater	E
Fishes	*Oncorhynchus clarkii x mykiss*	cutbow trout	Freshwater	E
Fishes	*Oncorhynchus kisutch*	coho salmon	Freshwater-Marine	S

Taxa	Scientific Name	Common name	Habitat	Status
Fishes	*Oncorhynchus mykiss*	rainbow trout	Freshwater-Marine	S
Fishes	*Oncorhynchus mykiss kamloops strain*	Kamloops trout	Freshwater-Marine	U
Fishes	*Oncorhynchus nerka*	sockeye salmon	Freshwater-Marine	E
Fishes	*Oplegnathus fasciatus*	barred knifejaw	Marine	F
Fishes	*Oreochromis*	tilapia sp.	Freshwater	F
Fishes	*Perca flavescens*	yellow perch	Freshwater	E
Fishes	*Piaractus brachypomus*	pirapitinga, red-bellied pacu	Freshwater	F
Fishes	*Piaractus mesopotamicus*	small-scaled pacu	Freshwater	F
Fishes	*Pimephales promelas*	fathead minnow	Freshwater	E
Fishes	*Pomoxis annularis*	white crappie	Freshwater	E
Fishes	*Pomoxis nigromaculatus*	black crappie	Freshwater	E
Fishes	*Ptychocheilus umpquae*	Umpqua pikeminnow	Freshwater	E
Fishes	*Pylodictis olivaris*	flathead catfish	Freshwater	E
Fishes	*Rhinichthys osculus klamathensis*	Klamath speckled dace	Freshwater	E
Fishes	*Rhinogobius brunneus*	amur goby	Freshwater	E
Fishes	*Salmo salar*	Atlantic salmon	Freshwater-Marine	S
Fishes	*Salmo trutta*	brown trout	Freshwater	E
Fishes	*Salmo trutta x Salvelinus fontinalis*	tiger trout	Freshwater	S
Fishes	*Salvelinus fontinalis*	brook trout	Freshwater	E

Taxa	Scientific Name	Common name	Habitat	Status
Fishes	*Salvelinus fontinalis x confluentus*	brook trout x bull trout	Freshwater	X/U
Fishes	*Salvelinus malma*	dolly varden	Freshwater-Marine	U
Fishes	*Salvelinus namaycush*	lake trout	Freshwater	E
Fishes	*Sander vitreus*	walleye	Freshwater	E
Fishes	*Seriola aureovittata*	Japanese yellowtail jack	Marine	F
Fishes	*Siphateles bicolor*	tui chub	Freshwater	U
Fishes	*Thymallus arcticus*	Arctic grayling	Freshwater	U
Fishes	*Tinca tinca*	tench	Freshwater	U

Table C1c. Nonnative Invertebrates Reported from Oregon (Fofonoff et al. 2018, USGS 2022, OISC 2022). Status Key: C= cryptogenic, E= established, F= failed, M= under management for eradication, U= unknown, X= extirpated/eradicated. Status marked with an * indicates species that are native to Oregon but have been introduced in the state outside of their native range.

Taxa	Scientific Name	Common name	Habitat	Status
Annelids-Oligochaetes	*Tubificoides brownae*		Marine	E
Annelids-Oligochaetes	*Tubificoides diazi*		Marine	E
Annelids-Polychaetes	*Alitta succinea*	pile worm	Marine	E
Annelids-Polychaetes	*Boccardia claparedei*		Marine	E
Annelids-Polychaetes	*Capitella teleta*		Marine	E
Annelids-Polychaetes	*Dipolydora quadrilobata*		Marine	E

Taxa	Scientific Name	Common name	Habitat	Status
Annelids-Polychaetes	*Hediste diadroma*		Marine	E
Annelids-Polychaetes	*Heteromastus filiformis species complex*		Marine	E
Annelids-Polychaetes	*Hobsonia florida*		Marine	E
Annelids-Polychaetes	*Manayunkia aestuarina*		Marine	E
Annelids-Polychaetes	*Marenzelleria neglecta*	red-gilled mudworm	Marine	E
Annelids-Polychaetes	*Polydora cornuta*		Marine	E
Annelids-Polychaetes	*Polydora limicola*		Marine	E
Annelids-Polychaetes	*Polydora neocaeca*		Marine	E
Annelids-Polychaetes	*Proceraea okadai*		Marine	E
Annelids-Polychaetes	*Pseudopolydora bassarginensis*		Marine	E
Annelids-Polychaetes	*Pseudopolydora cf. kempi*	spionid worm	Marine	E
Annelids-Polychaetes	*Pseudopolydora paucibranchiata*	spionid worm	Marine	E
Annelids-Polychaetes	*Rhynchospio foliosa*		Marine	E
Annelids-Polychaetes	*Streblospio benedicti*	bar-gilled mud worm	Marine	E
Annelids-Polychaetes	*Syllis cornuta*		Brackish	E
Bryozoans	*Bowerbankia "gracilis"*		Marine-Brackish	E
Bryozoans	*Bugula neritina*		Marine	E
Bryozoans	*Conopeum chesapeakensis*		Marine	E

Taxa	Scientific Name	Common name	Habitat	Status
Bryozoans	*Conopeum tenuissimum*		Marine	E
Bryozoans	*Cryptosula pallasiana*		Marine	E
Bryozoans	*Fredericella indica*	freshwater bryozoan	Freshwater	E
Bryozoans	*Lophopodella carteri*	freshwater bryozoan	Freshwater	U
Bryozoans	*Pectinatella magnifica*	magnificent bryozoan	Freshwater	E
Bryozoans	*Schizoporella japonica*		Marine	E
Bryozoans	*Stephanella hina*		Freshwater	E
Bryozoans	*Watersipora subtorquata*		Marine	E
Cnidarians-Anthozoans	*Diadumene leucolena*	ghost anemone, white anemone	Marine	E
Cnidarians-Anthozoans	*Diadumene lineata*	orange-striped anemone	Marine	E
Cnidarians-Anthozoans	*Nematostella vectensis*	starlet sea anemone	Marine	E
Cnidarians-Hydrozoans	*Blackfordia virginica*	Black Sea jellyfish	Marine	E
Cnidarians-Hydrozoans	*Calyptospadix cerulea*	rope grass hydroid	Marine	E
Cnidarians-Hydrozoans	*Clava multicornis*	club hydroid	Marine	E
Cnidarians-Hydrozoans	*Climacocodon ikarii*		Marine	E
Cnidarians-Hydrozoans	*Cordylophora caspia*	freshwater hydroid	Marine	E

Taxa	Scientific Name	Common name	Habitat	Status
Cnidarians-Hydrozoans	*Craspedacusta sowerbyi*	freshwater jellyfish	Freshwater	U
Cnidarians-Hydrozoans	*Ectopleura crocea*	pink-hearted hydroid, pink-mouthed hydroid	Marine	E
Cnidarians-Hydrozoans	*Gonothyraea loveni*		Marine	U
Crustaceans-Amphipods	*Ampithoe lacertosa*		Marine-Brackish	E
Crustaceans-Amphipods	*Ampithoe valida*		Marine	E
Crustaceans-Amphipods	*Aoroides secunda*		Marine	E
Crustaceans-Amphipods	*Caprella drepanochir*		Marine	E
Crustaceans-Amphipods	*Caprella mutica*	skeleton shrimp	Marine	E
Crustaceans-Amphipods	*Crangonyx pseudogracilis*	northern river crangonyctid	Freshwater	E
Crustaceans-Amphipods	*Eobrolgus spinosus*		Marine	E
Crustaceans-Amphipods	*Ericthonius brasiliensis*		Marine	E
Crustaceans-Amphipods	*Grandidierella japonica*		Marine	E
Crustaceans-Amphipods	*Incisocalliope derzhavini*		Marine	E

Taxa	Scientific Name	Common name	Habitat	Status
Crustaceans-Amphipods	*Jassa marmorata*		Marine	E
Crustaceans-Amphipods	*Melita nitida*		Marine	E
Crustaceans-Amphipods	*Monocorophium acherusicum*		Marine	E
Crustaceans-Amphipods	*Monocorophium insidiosum*		Marine	E
Crustaceans-Amphipods	*Parapleustes derzhavini*		Marine	E
Crustaceans-Amphipods	*Ptilohyale littoralis*		Marine	E
Crustaceans-Barnacles	*Amphibalanus improvisus*	bay barnacle	Marine	E
Crustaceans-Cladocerans	*Bosmina coregoni*	a water flea	Freshwater	E
Crustaceans-Copepods	*Corycaeus anglicus*		Marine	E
Crustaceans-Copepods	*Coullana canadensis*		Marine	E
Crustaceans-Copepods	*Eurytemora affinis*	a calanoid copepod	Freshwater-Marine	E
Crustaceans-Copepods	*Lernaea cyprinacea*	anchor worm	Freshwater	U
Crustaceans-Copepods	*Limnoithona sinensis*	a copepod	Freshwater-Marine	E
Crustaceans-Copepods	*Limnoithona tetraspina*	a copepod	Freshwater-Marine	E
Crustaceans-Copepods	*Mytilicola orientalis*		Marine	E

Taxa	Scientific Name	Common name	Habitat	Status
Crustaceans-Copepods	*Oithona davisae*		Marine	E
Crustaceans-Copepods	*Oithona similis*		Marine	E
Crustaceans-Copepods	*Pseudodiaptomus forbesi*	a calanoid copepod	Freshwater-Marine	E
Crustaceans-Copepods	*Pseudodiaptomus inopinus*		Marine	E
Crustaceans-Copepods	*Sinocalanus doerri*	calanoid copepod	Freshwater-Marine	E
Crustaceans-Copepods	*Tachidius triangularis*	a copepod	Brackish	E
Crustaceans-Crabs	*Carcinus maenas*	green crab	Marine	E
Crustaceans-Crabs	*Eriocheir sinensis*	mitten crab	Marine-Freshwater	F
Crustaceans-Crabs	*Rhithropanopeus harrisii*	Harris mud crab	Marine	E
Crustaceans-Crayfish	*Faxonius neglectus, Orconectes neglectus*	ringed crayfish	Freshwater	E
Crustaceans-Crayfish	*Faxonius rusticus, Orconectes rusticus*	rusty crayfish	Freshwater	E
Crustaceans-Crayfish	*Faxonius virilis*	northern crayfish, virile crayfish	Freshwater	U
Crustaceans-Crayfish	*Pacifastacus leniusculus*	signal crayfish	Freshwater	E*
Crustaceans-Crayfish	*Procambarus clarkii*	red swamp crayfish	Freshwater	E
Crustaceans-Crayfish	*Procambarus sp.*		Freshwater	U
Crustaceans-Cumaceans	*Nippoleucon hinumensis*	cumacean	Marine	E

Taxa	Scientific Name	Common name	Habitat	Status
Crustaceans-Isopods	*Caecidotea racovitzai*	asellid isopod	Freshwater	E
Crustaceans-Isopods	*Iais californica*		Marine	E
Crustaceans-Isopods	*Limnoria tripunctata*	gribble	Marine	E
Crustaceans-Isopods	*Orthione griffenis*	Griffen's isopod	Marine	E
Crustaceans-Isopods	*Pseudosphaeroma sp. A*		Marine	E
Crustaceans-Isopods	*Sphaeroma quoianum*		Marine	E
Crustaceans-Shrimp	*Exopalaemon modestus*	Siberian prawn	Freshwater	E
Crustaceans-Shrimp	*Palaemon macrodactylus*	oriental shrimp	Marine	E
Crustaceans-Tanaids	*Sinelobus cf. stanfordi*		Marine	E
Entoprocts	*Barentsia benedeni*		Marine	E
Mollusks-Bivalves	*Corbicula fluminea*	corbicula clam	Freshwater	E
Mollusks-Bivalves	*Crassostrea gigas*	Pacific giant oyster	Marine	E
Mollusks-Bivalves	*Laternula gracilis*		Marine	U
Mollusks-Bivalves	*Mya arenaria*	gaper, longneck, softshell clam	Marine	E
Mollusks-Bivalves	*Mytilus galloprovincialis*	Mediterranean mussel	Marine	E
Mollusks-Bivalves	*Nuttallia obscurata*	varnish clam, purple varnish clam	Marine	E
Mollusks-Bivalves	*Ruditapes philippinarum*	Japanese littleneck, Manila clam	Marine	F
Mollusks-Bivalves	*Teredo navalis*	naval shipworm	Brackish	E

Taxa	Scientific Name	Common name	Habitat	Status
Mollusks-Gastropods	*Assiminea parasitologica*	Asian marsh snail	Marine	E
Mollusks-Gastropods	*Catriona rickettsi*	Rickett's aeolis	Marine	E
Mollusks-Gastropods	*Cipangopaludina chinensis*	Chinese mystery snail	Freshwater	E
Mollusks-Gastropods	*Cumanotus sp.*		Marine	E
Mollusks-Gastropods	*Helisoma sp.*	unidentified rams-horn	Freshwater	E
Mollusks-Gastropods	*Melanoides tuberculata*	red-rim melania	Freshwater	E
Mollusks-Gastropods	*Myosotella myosotis*	mouse-ear snail	Marine	E
Mollusks-Gastropods	*Ocinebrellus inornatus*	Japanese oyster-drill	Marine	E
Mollusks-Gastropods	*Philine auriformis*	tortellini snail	Marine	E
Mollusks-Gastropods	*Potamopyrgus antipodarum*	New Zealand mudsnail	Freshwater	E
Mollusks-Gastropods	*Radix auricularia*	European ear snail	Freshwater	E
Mollusks-Gastropods	*Sabia conica*	bonnet limpet	Marine	E
Mollusks-Gastropods	*Tenellia adspersa*	miniature aeolis	Marine	E
Sponges	*Chalinula loosanoffi*	Loosanoff's haliclo	Marine	E
Sponges	*Cliona sp.*	boring sponge	Marine	U
Sponges	*Halichondria bowerbanki*		Marine	E
Tunicates	*Botrylloides violaceus*		Marine	E
Tunicates	*Botryllus schlosseri*	golden star tunicate, harbor star	Marine	E

Taxa	Scientific Name	Common name	Habitat	Status
Tunicates	*Ciona savignyi*		Marine	U
Tunicates	*Corella inflata*		Marine	E
Tunicates	*Didemnum vexillum*	carpet sea squirt	Marine	E
Tunicates	*Diplosoma listerianum*		Marine	E
Tunicates	*Molgula citrina*		Marine	E
Tunicates	*Molgula manhattensis*	sea grapes	Marine	E
Tunicates	*Styela clava*	club sea squirt	Marine	E

Table C1d. Non-Fish Vertebrates Reported from Oregon (Fofonoff et al. 2018 USGS 2022, OISC 2022). Status Key: C= cryptogenic, E= established, F= failed, M= under management for eradication, U= unknown, X= extirpated/eradicated. Status marked with an * indicates species that are native to Oregon but have been introduced in the state outside of their native range.

Taxa	Scientific Name	Common name	Habitat	Status
Amphibians	*Lithobates catesbeianus*	American bullfrog	Freshwater	E
Reptiles	*Alligator mississippiensis*	American alligator	Freshwater	F
Reptiles	*Apalone spinifera*	spiny softshell	Freshwater	E
Reptiles	*Chelydra serpentina*	snapping turtle	Freshwater	E
Reptiles	*Chrysemys picta dorsalis*	southern painted turtle	Freshwater	U
Reptiles	*Chrysemys picta marginata*	midland painted turtle	Freshwater	U
Reptiles	*Kinosternon subrubrum*	eastern mud turtle	Freshwater	F

Reptiles	*Macrochelys temminckii*	alligator snapping turtle	Freshwater	F
Reptiles	*Sternotherus odoratus*	eastern musk turtle	Freshwater	F
Reptiles	*Trachemys scripta elegans*	red-eared slider	Freshwater	E
Mammals	*Myocastor coypus*	nutria	Freshwater	E

Table C1e. Aquatic Microorganisms, Fungi, and Diseases reported from Oregon (OISC 2022, USGS 2022) (Status marked with an * indices species that are native to Oregon but have been introduced in the state outside of their native range).

Taxa	**Scientific Name**	**Common name**	**Habitat**	**Status**
Myxosporea	*Myxobolus cerebralis*	whirling disease	Freshwater	X
Diatoms	*Attheya armatum*	surf diatom	Marine	U

Appendix C2: Aquatic Nonindigenous Species of Concern not yet in Oregon

Please refer to Oregon's Invasive Species Hub <https://www.oregoninvasivespeciescouncil.org/infohub> hosted by the Oregon Invasive Species Council for the most up-to-date listing of species of concern to Oregon including, but not limited to, species present in the state. Regardless of their status, all species profiles include information about the species, species description, introduction pathways, and distributions. The extensive list of public-facing data fields is customizable to allow the generation of species cards as well as being available as a searchable, multi-media dataset.

Public-facing published data fields:

- Common Name
- Species Name
- Species Description

- Early Detection List
- Date Last Modified
- Hub Status
- Photos and Attachments
- Suitable Habitat (natural and non-natural)
- Pathways of Concern
- Taxa Category
- Taxa Sub Category
- Aquatic v. Terrestrial
- EcoRegion Suitability
- Causes Disease
- Human Health Impacts
- Economic Impacts
- Ecological Impacts
- State Regulating Program
- Native Range Information
- Statewide Establishment Level
- Current Infestations
- Associated Resources
- Reporting
- Life History Notes
- Best Season(s) to look for this species
- Look-alikes
- Look-alike Notes
- Active Alert
- Impacts Notes
- Past and Present Alerts
- iMap Invasives Distribution
- Distribution Map
- URL
- Attachments (from Associated Resources)

Example Species Card generated by the Hub for a species of concern *not present* in the state:

Species Common and Scientific Name: Zebra mussel*, *Dreissena polymorpha*
Species Name: *Dreissena polymorpha*
Common Name(s): Zebra mussel
Species Description: Zebra mussels are aggressive freshwater invaders with a striped, D-shaped shell composed of two hinged valves joined by a ligament. The shells are typically one-quarter inch to one and one-half inches long, depending on age, with alternating yellow and brownish colored stripes. Adults are typically fingernail-sized. Zebra mussels attach to hard surfaces underwater. Populations can grow rapidly and the total biomass of a population can exceed all other native invertebrates. Once zebra mussels become established in a waterbody, there is currently nothing that can be done to eradicate or control the population.
Photos and Attachments

Photo Credit: Amy Benson, U.S. Geological Survey, Bugwood.org

Last Modified: 11/15/2021
Taxa Category: Invertebrates
Taxa Sub Category: Mollusks
Aquatic v. Terrestrial: Freshwater Aquatic
Pathways of Concern: Recreational Watercraft, Movement of Water, Maritime Transport. Aquaculture
State Regulating Program: Oregon Fish and Wildlife, Oregon Aquatic Invasive Species Prevention Program
Causes Disease: No
Human Health Impacts:
Economic Impacts:
EcoRegion Suitability:

- Basin and Range
- Blue Mountains
- Coast Range
- Columbia Plateau
- East Cascades
- West Cascades
- Klamath Mountains
- Willamette Valley

Ecological Impacts:
Native Range Information: It is a native of Caspian Sea region of Asia and was first detected in Lake St. Clair, Michigan in 1988.
Current Infestations: No records
Statewide Establishment Level: Not detected (active monitoring in place)
Suitable Habitat (natural and non-natural):

- Natural Lakes
- Flowing Water and Riparian Habitats
- Non-natural water bodies (reservoirs, ponds, etc.)

Reporting: If you believe that have found zebra mussels in a waterbody please call ODFW (503) 947-6000 to report sighting or to inquire about a watercraft inspection.
If you are concerned that your pet/aquarium store is selling infested moss balls or that your aquarium is contaminated with zebra mussels, please report it to the Oregon Invasive Species Hotline and share or follow the decontamination/disposal methods noted.
Please also submit a report to the USGS Nonindigenous Aquatic Species database: https://nas.er.usgs.gov/SightingReport.aspx
Look-alikes:

zebraandquagga2.gif photo credit USGS

Look-alike Notes: Zebra mussels are most likely to colonize hard surfaces like docks, rocks, concrete, metal, and boats, while quagga mussels (*Dreissena rostriformis)* can colonize soft substrates such as silty or sandy benthic layers.
Impacts Notes:

- In spite of their small size (often no bigger than a penny) zebra mussels cause far-reaching damage to water structures and native ecosystems.
- Health impacts: mussel-infested waters can become toxic with Cyanobacteria due to more blue-green algae blooms. This is problematic for drinking water and recreation. Zebra mussel fecal material may contribute to taste and odor problems in drinking water sources.
- Economic impacts: Called the "most troublesome freshwater biofouling organism in North America" by U.S. Army Corp of Engineers, they attach to manmade structures, particularly pipelines, impeding water movement through hydroelectric turbines and intake structures for drinking water and irrigation systems.
- Due to the ability to quickly populate, they will clog any water delivery systems infrastructure. Zebra mussels cause upwards of several millions of dollars to maintain equipment and infrastructure. As well as reduction of recreational and tourism to a given area or region. In the Midwest they have destroyed boat engines, fouled beaches, and caused damage to boat ramps and docks.
- Ecological impacts: Zebra mussel are filter feeders and disrupt the food web by removing the foundational microorganism and altering the water chemistry with their fecal deposits. In huge numbers, they out-compete other filter feeders, starving them. They adhere to all hard surfaces, including the shells of native mussels, turtles, and crustaceans.

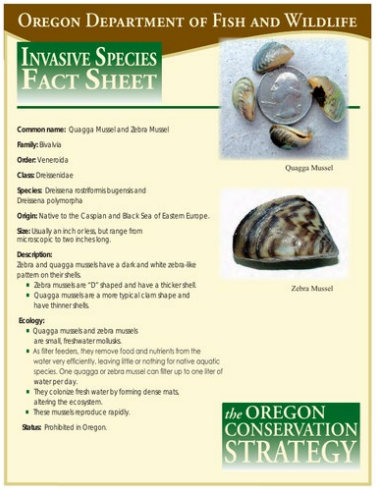
Distribution Map: https://nas.er.usgs.gov/viewer/omap.aspx?SpeciesID=5

iMap Invasives Distribution: https://imapinvasives.natureserve.org/imap/services/page/map.html?x=-119.3767&y=44.0340&z=7&fspec=340&fstyp=n
Life History Notes: Zebra mussels have three life stages – larval, juvenile, and adult. In the larval stage, the mussels live freely in the water column, allowing them to be easily transported to new ecosystems via currents or ballast water. Adult zebra mussels can stay alive for several days outside of water and may also colonize new regions by clinging to the underside of boats that are trailered to new locations -Invasive Mussel Collaborative
Best season(s) to look for this species:

- Spring
- Summer
- Fall
- Winter

Attachments (from Associated Resources)

AISPP2021AnnualRept.pdf



QuaggaMusselZebraMusseFactSheet.pdf
Document Link (URL) (from Associated Resources)
https://www.oregon.gov/osmb/boater-info/Documents/AIS/AISPP2021AnnualRept.pdf,
https://pdxscholar.library.pdx.edu/centerforlakes_pub/40/

Example Species Card generated by the hub for a species of concern *present* in the state:

Species Common and Scientific Name: Water primroses, *Ludwigia peploides, L. hexapetala*
Species Name: *Ludwigia peploides, L. hexapetala*
Common Name(s): Water primroses
Species Description
General Description

- A perennial occurring in marshes, swamps, ditches, ponds, and around lake margins, where they form dense floating or rooted mats in depths of up to 6 feet. They can grow up to 3 ft above the water surface. The stems root freely at the nodes either in the water or in damp soil and mud flats. Reproduction occurs sexually through seed, and vegetatively through fragmentation.
- Flower Description
    - Showy yellow flowers approximately 1-1.5 inches in diameter with 5-6 petals. Flowers can be terminal, but also present where the leaves attach to the stem. Blooms mid-July through August. Bright green sepals may remain after petals fall off after fertilization.
- Leaf Description
    - Leaves can vary based on growing conditions and age of the plant. They are alternately arranged on the stem, round early in the growing season and changing to lanceolate or willow-like as the growing season progresses. They are bright green, glossy, and can reach 3.5 inches in length.
- Stem Description
    - Stems tend to float along the water's surface or grow upright in dense patches and on mudflats. Stems can be fleshy and green when young, turning red as the plant ages or is under stress.
- Fruit/Seed Description
    - Fruits are formed as slender, green capsules up to 4 cm long. Many small seeds are produced and are imbedded in the capsule wall. The sepals usually remain as the fruit forms and even into maturity.
- Roots
    - *Ludwigia peploides* has two types of roots. One type roots in the soils, are fibrous and can be white or a dark gray. Adventitious roots are attached to the stem, float in the water column and conduct gas exchange. These roots are bright white, soft, and have a puffy appearance.

Photos and Attachments

Photo Credit: Shaun Winterton, Aquarium and Pond Plants of the World, Edition 3, USDA APHIS PPQ, Bugwood.org

Photo Credit: Shaun Winterton, Aquarium and Pond Plants of the World, Edition 3, USDA APHIS PPQ, Bugwood.org

Last Modified: 11/9/2021
Taxa Category: Plants
Taxa SubCategory: Forbs and Herbs
Aquatic v. Terrestrial: Freshwater Aquatic
Pathways of Concern:

- Non-Native Animal or Plant Release
- Recreational Watercraft
- Movement of Water

State Regulating Program: Oregon Noxious Weeds Control

Causes Disease: No
Human Health Impacts:
Economic Impacts:
EcoRegion Suitability: No records
Ecological Impacts:
Native Range Information: Native to Uruguay and southern Brazil
Current Infestations:

- Lane County
- Linn County
- Marion County
- Yamhill County
- Benton County
- Clackamas County
- Multnomah County

Statewide Establishment Level: Established - limited
Suitable Habitat (natural and non-natural):

- Non-natural water bodies (reservoirs, ponds, etc)
- Natural Lakes
- Wetlands

Reporting: To call in a sighting, call our Invasive Species Hotline: 1-866-INVADER (1-866-468-2337) or make a report at https://oregoninvasiveshotline.org/reports/create.
Look-alikes:

Ludwigia palustris

Look-alike Notes:
Impacts Notes: Ludwigia species forms dense mats that clog waterways, and this can interfere with water recreation, irrigation, fish passage, and flood control. When it clogs waterways, it also reduces the amount of oxygen in the water which can make it hard for other plants and animals to survive. As this species can out-compete other species, it can reduce the diversity of plants, and reduce the available habitat for birds and fish. It can spread and reproduce through leaf and stem fragments, as well as seeds, making control extremely difficult.
Distribution Map: https://www.eddmaps.org/distribution/usstate.cfm?sub=18428
iMap Invasives Distribution: https://imapinvasives.natureserve.org/imap/services/page/map.html?x=-119.3767&y=44.0340&z=7&fspec=646&fstyp=n
Life History Notes:
Best season(s) to look for this species:

- Summer

Attachments (from Associated Resources)

WaterPrimroseProfile.pdf
Document Link (URL) (from Associated Resources)
https://www.oregon.gov/oda/shared/Documents/Publications/Weeds/WaterPrimroseProfile.pdf,
https://www.oregon.gov/oda/programs/weeds/oregonnoxiousweeds/pages/aboutoregonweeds.aspx

Table C2: List of Species of Concern to Oregon (OISC, 2023) (** indicates species that exist in limited/isolated populations in Oregon with the potential for much greater distribution)

Group	**Taxa**	**Scientific Name**	**Common Name**	**Habitat**
Algae	Algae	*Caulerpa taxifolia*	caulerpa	Marine and/or Estuarine
Algae	Algae	*Codium fragile ssp. tomentosoides*	dead man's fingers	Marine and/or Estuarine
Algae	Algae	*Cylindrospermopsis raciborskii*	toxic bacterium	Freshwater
Algae	Algae	*Prymnesium parvum*	golden algae	Marine and/or Estuarine
Algae	Algae	*Undaria pinnatifida*	undaria	Marine and/or Estuarine
Fishes	Fish	*Channa spp.*	snakeheads	Freshwater
Fishes	Fish	*Dorosoma petenense*	threadfin shad**	Freshwater
Fishes	Fish	*Esox lucius*	northern pike	Freshwater
Fishes	Fish	*Esox masquinongy*	muskie	Freshwater
Fishes	Fish	*Gymnocephalus cernuus*	Eurasian ruffe	Freshwater
Fishes	Fish	*Hypophthalmichthys molitrix*	silver carp	Freshwater
Fishes	Fish	*Hypophthalmichthys nobilis*	bighead carp	Freshwater
Fishes	Fish	*Mylopharyngodon piceus*	black carp	Freshwater
Fishes	Fish	*Neogobius melanostomas*	round goby	Freshwater
Fishes	Fish	*Tridentiger bifasciatus*	Shimofuri goby	Estaurine, Freshwater
Invertebrates	Crustaceans - Cladocera	*Bythotrephes cederstroemi*	spiny waterflea	Freshwater, Marine and/or Estuarine
Invertebrates	Crustaceans - Cladocera	*Cercopagis pengoi*	fishhook waterflea	Freshwater, Marine and/or Estuarine

Group	Taxa	Scientific Name	Common Name	Habitat
Invertebrates	Crustaceans - Crabs	*Hemigrapsus sanguineus*	Japanese shore crab	Marine and/or Estuarine
Invertebrates	Crustaceans- Crabs	*Eriocheir sinensis*	Chinese mitten crab	Marine-Freshwater
Invertebrates	Ctenophores	*Mnemiopsis leidyi*	warty comb jelly	Marine and/or Estuarine
Invertebrates	Echinoderms	*Asterias amurensis*	North Pacific sea star	Freshwater, Marine and/or Estuarine
Invertebrates	Mollusks - Bivalves	*Dreissena polymorpha*	zebra mussel	Freshwater
Invertebrates	Mollusks - Bivalves	*Dreissena rostriformis bugensis*	quagga mussel	Freshwater
Invertebrates	Mollusks - Bivalves	*Potamocorbula amurenisis*	overbite clam	Marine and/or Estuarine
Invertebrates	Mollusks - Gastropods	*Rapana venosa*	rapa welk	Marine and/or Estuarine
Invertebrates	Nematodes	*Bothriocephalus acheilognath*	Asian tapeworm	Freshwater
Microorganisms, Fungi and Diseases	Pathogens	*Novirhabdovirus spp. (VHSV)*	viral hemorrhagic septicemia virus	Freshwater, Marine and/or Estuarine
Plants	Plants	*Lagarosiphon major*	elodea, curly waterweed, oxygen weed	Freshwater
Plants	Plants	*Limnobium laevigatum*	smooth frogbit	Freshwater

Group	Taxa	Scientific Name	Common Name	Habitat
Plants	Plants	*Salvinia molesta*	salvinia	Freshwater
Plants	Plants	*Stratiotes aloides*	water soldier, water pineapple	Freshwater
Plants	Plants	*Trapa natans*	water chestnut	Freshwater
Plants	Plants	*Cyperus rotundus*	nutgrass	Freshwater
Plants	Plants	*Hydrilla verticillata*	hydrilla	Freshwater
Plants	Plants	*Hydrocharis morsus-ranae*	European frogbit	Freshwater
Plants	Plants	*Sporobolus anglicus, Spartina anglica*	English cordgrass	Brackish
Plants	Plants	*Aponogeton distachyos*	cape pondweed	Freshwater
Plants	Plants	*Myriophyllum heterophyllum*	variable-leaf watermilfoil	Freshwater
Plants	Plants	*Myriophyllum spicatum x Myriophyllum sibiricum*	hybrid watermilfoil	Freshwater
Plants	Plants	*Tamarix spp.*	tamarisk	Freshwater

Appendix C3: Aquatic Noxious Weeds

Oregon Noxious Weed Policy and Classification
The State of Oregon classifies listed species as 'A', 'B,' and 'T,' listed weeds. The State Noxious Weed List is used to prioritize activities at the state level and provide direction in the development of county weed lists that guide local control programs. This list is part of a Noxious Weed Policy and Classification System and is jointly maintained by the Oregon State Weed Board and the Noxious Weed Control Program. The noxious weed quarantine is listed in Oregon Administrative Rule (OAR 603-052-1200) and designates

the prohibited acts for these species. This includes the Federal noxious weed list and most of the weeds in the Oregon noxious weed policy. State noxious weed quarantines prohibit the import, transport, propagation, or sale of a subset of weeds listed on both state and federal noxious weed lists.

Table C3a. A Listed Aquatic Weeds (ODA, 2022).

List	***Scientific Name***	**Common name**	**Habitat**	**Status**
A	*Hydrocharis morsus-ranae*	common frogbit	freshwater	Not known to occur
A	*Spartina anglica*	common cordgrass	estuarine	Not known to occur
A	*Trapa natans*	European water chestnut	freshwater	Limited
A	*Hydrilla verticillata*	hydrilla	freshwater	Not known to occur
A	*Limnobium laevigatum*	West Indian sponge plant	freshwater	Not known to occur
A	*Stratiotes aloides*	water soldiers	freshwater	Not known to occur
A, T	*Spartina densiflora*	dense flowered cord grass	estuarine	Limited
A, T	*Butomus umbellatus*	flowering rush	freshwater	Limited,
A, T	*Lysimachia vulgaris*	garden yellow loosestrife	freshwater	Limited
A, T	*Spartina patens*	saltmeadow cordgrass	estuarine	Limited
A, T	*Spartina alterniflora*	smooth cordgrass	estuarine	Limited
A, T	*Nymphoides peltata*	yellow floating heart	freshwater	Limited
A, T	*Sagittaria platyphylla*	delta arrowhead	freshwater	Limited

Table C3b. B Listed aquatic weeds

List	*Scientific Name*	Common name	Habitat	Status
B	*Egeria densa*	South American waterweed	freshwater	Widespread
B	*Phragmites australis*	common reed	freshwater	Limited
B	*Myriophyllum spicatum*	Eurasian watermilfoil	freshwater	Limited
B	*Myriophyllum aquaticum*	parrots feather	freshwater	Widespread
B	*Lythrum salicaria*	purple loosestrife	freshwater	Widespread
B	*Iris psuedocorus*	yellow flag iris	freshwater	Widespread
B, T	*Ludwigia hexapetala, peploides*	water primrose	freshwater	Widespread

Table C3c. T Designated aquatic weeds (ODA, 2022)

List	*Scientific Name*	Common name	Habitat	Status
Plant	*Ludwigia hexapetala, peploides*	water primrose	freshwater	Widespread
Plant	*Spartina densiflora*	dense flowered cord grass	estuarine	Limited
Plant	*Butomus umbellatus*	flowering rush	freshwater	Limited
Plant	*Lysimachia vulgaris*	garden yellow loosestrife	freshwater	Limited
Plant	*Spartina patens*	saltmeadow cordgrass	estuarine	Limited
Plant	*Spartina alterniflora*	smooth cordgrass	estuarine	Limited
Plant	*Nymphoides peltata*	yellow floating heart	freshwater	Limited

Plant	*Sagittaria platyphylla*	delta arrowhead	freshwater	Limited

Appendix C4: Prohibited and Controlled Fish and Aquatic Wildlife

Table C4. Prohibited and Controlled Fish and Aquatic Wildlife (OAR 635-056)

Taxa	***Scientific Name***	**Common name**	**Habitat**	**Designation**
Amphibians	*Acris all species and hybrids*	Cricket frog	freshwater	Prohibited
Amphibians	*All nonnative species and hybrids*	Spadefoot toads	freshwater	Prohibited
Amphibians	*Alytes — all species and hybrids*	Midwife toads	freshwater	Prohibited
Amphibians	*Ambystoma tigrinum — all nonnative sub-species;*	Tiger salamander	freshwater	Prohibited
Amphibians	*Amphiumas — all species and hybrids;*	Amphiumas	freshwater	Prohibited
Amphibians	*Bombina — all species and hybrids*	Fire-bellied toads	freshwater	Prohibited
Amphibians	*Bufo — all nonnative species and hybrids except Bufo marinus*	True toads	freshwater	Prohibited
Amphibians	*Crinia — all species and hybrids*	Australian froglets	freshwater	Prohibited
Amphibians	*Cryptobranchidae — all species and hybrids;*	Giant salamanders and hellbenders	freshwater	Prohibited
Amphibians	*Cynops — all species and hybrids;*	Firebelly newts	freshwater	Prohibited

Taxa	***Scientific Name***	**Common name**	**Habitat**	**Designation**
Amphibians	*Dicamptodontidae — all nonnative species and hybrids;*	American giant salamanders	freshwater	Prohibited
Amphibians	*Discoglossus —all species and hybrids*	Painted frogs	freshwater	Prohibited
Amphibians	*Euproctus — all species and hybrids;*	European mountain or brook salamanders	freshwater	Prohibited
Amphibians	*Hyla arborea*	European tree frog	freshwater	Prohibited
Amphibians	*Hyla chrysoscelis*	Cope's gray tree frog	freshwater	Prohibited
Amphibians	*Hyla cinerea*	Green tree frog	freshwater	Prohibited
Amphibians	*Hyla meridionalis*	Mediterranean tree frog	freshwater	Prohibited
Amphibians	*Hyla versicolor*	Gray tree frog	freshwater	Prohibited
Amphibians	*Hynobiidae — Ranodon All species and hybrids;*	Asian salamanders	freshwater	Prohibited
Amphibians	*Leurognathus marmoratus;*	Shovel-nosed salamander	freshwater	Prohibited
Amphibians	*Limnodynastes — all species and hybrids*	Australian swamp frogs	freshwater	Prohibited
Amphibians	*Mertensiella — all species and hybrids;*	Caucasus or spine-tailed salamanders	freshwater	Prohibited
Amphibians	*Mixophyes — all species and hybrids*	Barred frogs	freshwater	Prohibited
Amphibians	*Necturus — all species and hybrids;*	Waterdogs	freshwater	Prohibited

Taxa	*Scientific Name*	Common name	Habitat	Designation
Amphibians	*Notophthalmus viridescens;*	Red-spotted or eastern newt	freshwater	Prohibited
Amphibians	*Pachytriton — all species and hybrids;*	Chinese newts	freshwater	Prohibited
Amphibians	*Paramesotriton — all species and hybrids;*	Warty newts	freshwater	Prohibited
Amphibians	*Pleurodeles — all species and hybrids;*	Ribbed newts	freshwater	Prohibited
Amphibians	*Pseudacris — all nonnative species and hybrids*	Chorus frog	freshwater	Prohibited
Amphibians	*Pyxicephalus — all species and hybrids*	African bull frog	freshwater	Prohibited
Amphibians	*Rana altaica*	Siberian frog	freshwater	Prohibited
Amphibians	*Rana amurensis*	Khabarovsk frog	freshwater	Prohibited
Amphibians	*Rana areolata*	Crawfish frog	freshwater	Prohibited
Amphibians	*Rana arvalis*	Swedish swamp frog	freshwater	Prohibited
Amphibians	*Rana asiatica*	Asian frog	freshwater	Prohibited
Amphibians	*Rana berlandieri*	Rio Grande leopard frog	freshwater	Prohibited
Amphibians	*Rana blairi*	Plains leopard frog	freshwater	Prohibited
Amphibians	*Rana camerani*	Caucasus frog	freshwater	Prohibited
Amphibians	*Rana catesbeiana*	Bullfrog	freshwater	Controlled
Amphibians	*Rana chensinensis*	Inkiapo frog	freshwater	Prohibited

Taxa	***Scientific Name***	**Common name**	**Habitat**	**Designation**
Amphibians	*Rana chevronta*	Toudaohe frog	freshwater	Prohibited
Amphibians	*Rana clamitans*	Green frog	freshwater	Prohibited
Amphibians	*Rana dalmatina*	Spring frog	freshwater	Prohibited
Amphibians	*Rana dybowskii*	Dybowski's frog	freshwater	Prohibited
Amphibians	*Rana graeca*	Tream frog	freshwater	Prohibited
Amphibians	*Rana grylio*	Pig frog	freshwater	Prohibited
Amphibians	*Rana heckscheri*	River frog	freshwater	Prohibited
Amphibians	*Rana holtzi*	Turkish frog	freshwater	Prohibited
Amphibians	*Rana iberica*	Iberian frog	freshwater	Prohibited
Amphibians	*Rana japonica*	Agile frog	freshwater	Prohibited
Amphibians	*Rana latastei*	Italian agile frog	freshwater	Prohibited
Amphibians	*Rana longicrus*	Kokarit or Taipa frog	freshwater	Prohibited
Amphibians	*Rana macrocnemis*	Brusa frog	freshwater	Prohibited
Amphibians	*Rana ornativentris*	Nikko frog	freshwater	Prohibited
Amphibians	*Rana palustris*	Pickeral frog	freshwater	Prohibited
Amphibians	*Rana septentrionalis*	Mink frog	freshwater	Prohibited
Amphibians	*Rana sylvatica*	Wood frog	freshwater	Prohibited
Amphibians	*Rana tagoe*	Tago frog	freshwater	Prohibited
Amphibians	*Rana temporaria*	European common frog	freshwater	Prohibited

Taxa	***Scientific Name***	**Common name**	**Habitat**	**Designation**
Amphibians	*Rana tsushimensis*	Tsushima frog	freshwater	Prohibited
Amphibians	*Rana virgatipes.*	Carpenter frog	freshwater	Prohibited
Amphibians	*Salamandra — all species and hybrids*	Fire salamanders	freshwater	Prohibited
Amphibians	*Sirenidae — all species and hybrids.*	Sirens	freshwater	Prohibited
Amphibians	*Taricha rivularis and T. torosa*	Roughskin newts	freshwater	Prohibited
Amphibians	*Triturus — all species and hybrids*	Alpine newts	freshwater	Prohibited
Amphibians	*Tylotriton — all species and hybrids*	Crocodile newts	freshwater	Prohibited
Amphibians	*Xenopus — all species and hybrids*	African clawed frog	freshwater	Prohibited
Crustaceans	*Callinectes sapidus*	Blue crab	marine	Prohibited
Crustaceans	*Cambaridae and Parastacidae*	Crayfish	freshwater	Controlled
Crustaceans	*Carcinus maenas*	Green crabs	marine	Controlled
Crustaceans	*Eriocheir — all species*	Chinese mitten crab	estuarine	Prohibited
Crustaceans	*Litopenaeus vannamei*	Whiteleg shrimp	marine	Controlled
Crustaceans	*Macrobrachium rosenbergii*	Giant river prawns	marine	Controlled
Fishes	*All species and hybrids*	Walking catfish (ORS 498.242 (Possession of walking catfish and piranha restricted))	freshwater	Prohibited

Taxa	***Scientific Name***	**Common name**	**Habitat**	**Designation**
Fishes	*Amia calva*	Bowfin	freshwater	Prohibited
Fishes	*Channa— all species and hybrids*	Snakehead	freshwater	Prohibited
Fishes	*Ctenopharyngodon idella*	Grass carp	freshwater	Controlled
Fishes	*Esox lucius X Esox masquinongy*	Tiger muskellunge	freshwater	Controlled
Fishes	*Gymnocephalus cernuus*	Ruffe	freshwater	Prohibited
Fishes	*Hypophthalmichthys — all species and hybrids*	Asian carp	freshwater	Prohibited
Fishes	*Leuciscus idus*	Ide	freshwater	Prohibited
Fishes	*Misgurnus anguillicaudatus*	Oriental weatherfish	freshwater	Prohibited
Fishes	*Mozambique tilapia Oreochromis mossambicus, Nile tilapia O. niloticus, Wami tilapia O. urolepsis, Blackchin tilapia Sarotherodon melanotheron, and hybrids thereof*	Tilapia	freshwater	Controlled
Fishes	*Mylopharyngodon piceus*	Black carp	freshwater	Prohibited
Fishes	*Neogobius melanostomus*	Round goby	freshwater	Prohibited
Fishes	*Order Lepisosteiformes — all species and hybrids.*	Order Lepisosteiformes: Gar	freshwater	Prohibited

Taxa	*Scientific Name*	Common name	Habitat	Designation
Fishes	*Order Salmoniformes: — all species and hybrids except tiger muskellunge (Esox lucius X Esox masquinongy) in Phillips Reservoir located in Baker County*	Order Salmoniformes: Pikes, Pickerel, Muskellunge	freshwater	Prohibited
Fishes	*Piranha or Caribe: All species and hybrids except carnivorous species of Pygocentrus, Serrasalmus or Pristobrycon pursuant to ORS 498.242 (Possession of walking catfish and piranha restricted)*	Piranha or Caribe	freshwater	Prohibited
Fishes	*Sander lucioperca*	Zander or Pike-perch	freshwater	Prohibited
Fishes	*Scardinius erythropthalmus.*	Rudd	freshwater	Prohibited
Mammals	*Lontra canadensis lataxina.*	North American Otter, Eastern subspecies	freshwater	Prohibited
Mammals	*Lutrinae Aonyx cinerea*	Asian Small-clawed Otter	freshwater	Prohibited
Mammals	*Myocastor coypus*	nutria	freshwater	Prohibited
Mollusks	*Ceratostoma inornatum.*	Japanese oyster drill	marine	Prohibited
Mollusks	*Cipangopaludina chinensis*	Chinese mystery snail	freshwater	Prohibited
Mollusks	*Cipangopaludina japonica*	Japanese mystery snail	freshwater	Prohibited

Taxa	***Scientific Name***	**Common name**	**Habitat**	**Designation**
Mollusks	*Corbiculidae*	Asian clam	freshwater	Prohibited
Mollusks	*Dreissenidae — all species (whether live or dead).*	Zebra mussel, Quagga mussel		Prohibited
Mollusks	*Softshell clam (Mya arenaria), Japanese varnish clam (Nuttalia obscuratai), and Japanese littleneck clam (Venerupis philipinnarum)*	clams	marine	Controlled
Mollusks	*Suminoe oysters (Crassostrea ariakensis), Pacific oysters (C.gigas), Kumamoto oysters (C. sikamea), Eastern oysters (C. virginica), and European flat oysters (Ostrea edulis)*	oysters	marine	Controlled
Reptiles	*All species and hybrids*	Snapping turtle	freshwater	Prohibited
Reptiles	*Apalone — all species and hybrids*	North American soft shell	freshwater	Prohibited
Reptiles	*Chinemys — all species and hybrids*	Chinese pond turtle	freshwater	Prohibited
Reptiles	*Chrysemys — all nonnative sub-species*	Painted turtle	freshwater	Prohibited
Reptiles	*Clemmys — all nonnative species*	Pond turtle	freshwater	Prohibited
Reptiles	*Emydoidea blandingii*	Blanding’s turtle	freshwater	Prohibited
Reptiles	*Emys orbicularis*	European pond turtle	freshwater	Prohibited

Taxa	***Scientific Name***	**Common name**	**Habitat**	**Designation**
Reptiles	*Graptemys — all species and hybrids*	Map turtle	freshwater	Prohibited
Reptiles	*Kinosternon odoratum*	Common musk turtle	freshwater	Prohibited
Reptiles	*Kinosternon subrubrum*	Common mud turtle	freshwater	Prohibited
Reptiles	*Mauremys — all species and hybrids*	Asian pond turtle	freshwater	Prohibited
Reptiles	*Order Crocodylia*	Crocodiles, Alligators and Gavials	freshwater	Controlled
Reptiles	*Pseudemys and Trachemys — all species and hybrids*	Pond slider	freshwater	Prohibited
Reptiles	*Trionyx triunguis.*	African soft shell	freshwater	Prohibited

Appendix C5: Invasive Species listed in the Oregon Conservation Strategy

Table C5. Invasive Species listed in the Oregon Conservation Strategy (OCS, 2016).

Species	Blue Mountains	Coast Range	Columbia Plateau	East Cascades	Klamath Mountains	Northern Basin and Range	West Cascades	Willamette Valley	Nearshore
American Bullfrog (*Lithobates catesbeianus*)	BM	CR	CP	EC	KM	NBR	WC	WV	NS
Amur Goby (*Rhinogobius brunneus*)		CR						WV	
Asian Clam (*Corbicula fluminea*)	BM	CR	CP	EC	KM	NBR	WC	WV	NS
Asian Sea Squirt (*Styela clava*)		CR							NS
Australasian Burrowing Isopod (*Sphaeroma quoianum*)		CR							NS
Chinese Mysterysnail (*Cipangopaludina chinensis malleata*)		CR		EC	KM			WV	
Colonial Tunicate (*Didemnum vexillum*)		CR							NS
Common Carp (*Cyprinus carpio*)	BM	CR	CP	EC	KM	NBR	WC	WV	
Common Snapping Turtle (*Chelydra serpentina*)		CR			KM		WC	WV	
Fathead Minnow (*Pimephales promelas*)		CR		EC				WV	
Freshwater Jellyfish (*Craspedacusta sowerbyi*)					KM			WV	
Golden Shiner (*Notemigonus crysoleucas*)	BM	CR		EC	KM	NBR	WC	WV	
Goldfish (*Carassius auratus*)		CR		EC	KM			WV	
Grass Carp (*Ctenopharyngodon idella*)*		CR	CP	EC				WV	
Griffen's Isopod (*Orthione griffenis*)		CR							NS
Japanese Eel Grass (*Zostera japonica*)		CR							NS

Japanese Oyster Drill (*Ocinebrellus inornatus*)		CR							NS
Japanese Seaweed (*Sargassum muticum*)		CR							NS
Mute Swan (*Cygnus olor*)	BM			EC	KM			WV	
New Zealand Mudsnail (*Potamopyrgus antipodarum*)	BM	CR	CP	EC	KM	NBR	WC	WV	NS
Nutria (*Myocastor coypus*)	BM	CR	CP	EC	KM		WC	WV	
Purple Varnish Clam (*Nuttallia obscurata*)		CR							NS
Red-eared Slider (*Trachemys scripta elegans*)		CR		EC	KM			WV	
Red Fox (*Vulpes vulpes*)**	BM	CR			KM			WV	
Red Swamp Crayfish (*Procambarus clarkii)*		CR		EC				WV	
Ringed Crayfish (*Orconectes neglectus*)		CR		EC	KM	NBR	WC	WV	
Rock Pigeon (*Columba livia*)	BM	CR	CP	EC	KM	NBR	WC	WV	
Siberian Prawn (Exopalaemon modestus)		CR	CP					WV	
Western Mosquitofish (*Gambusia affinis*)***		CR	CP		KM	NBR	WC	WV	
Yellow Bellied Slider (*Trachemys scripta scripta*)					KM			WV	

** Grass Carp may be permitted by ODFW for vegetation management in certain approved and controlled situations. (**Prohibited and Controlled Fish, Mollusks, and Crustaceans**)*

*** There is also a native Red Fox found in the Wallowa Mountains.*

**** The Western Mosquitofish is a controlled species that may be used in man-made troughs or ponds that are not connected to natural waterways, in certain situations to control mosquitoes. (**Oregon Administrative Rule 635-007-0620**)*

Appendix D: Federal Entities and Oversight

The following Federal entities are pertinent to the management of AIS in Oregon:

U.S. Department of Agriculture (USDA)

USDA Forest Service (USFS)

The USFS has the authority to manage aquatic and terrestrial invasive species on all areas of the National Forest System. The Forest Service Manual 2900, Invasive Species Management (2011) (FSM2900), sets forth National Forest System policy, responsibilities, and direction for the prevention, detection, and control of invasive species. In addition, this Forest Service policy calls for close coordination with state, tribal, and local partners to address invasive species issues on National Forest System lands and waters. This includes cooperation with state entities to implement and enforce statewide aquatic invasive species management plans and other applicable regulations. FSM 2900 is further supplemented by broad management guidance in the National Strategic Framework for Invasive Species Management (USDA Forest Service 2013).

As part of the USFS Aquatic and Riparian Effectiveness Monitoring Program (AREMP), teams perform aquatic invasive species surveys in Washington, Oregon, and Northern California. AREMP consists of USFS and Bureau of Land Management (BLM) employees working together to monitor the effectiveness of the Northwest Forest Plan's Aquatic Conservation Strategy and the BLM's Western Oregon Resource Management Plans in maintaining and restoring watershed conditions within the NWFP area. In addition, the USFS has as seat on the OISC.

The USFS has adopted the Interagency Standards for Fire and Fire Aviation Operations protocols to address minimizing the transport of AIS in wildland fire fighting activities which are updated on an annual basis by the Interagency Standards for Fire and Fire Aviation Operations Group, National Interagency Fire Center.

USDA Animal and Plant Health Inspection Service (APHIS)

APHIS is charged with protecting U.S. agriculture and natural resources against the entry, establishment, and spread of economically and environmentally significant invasive pests and diseases, regulates genetically engineered crops, and helps people and wildlife coexist. To safeguard the U.S. from invasive species, APHIS is involved in the development of regulations that outline the types of scientific information needed to assess organisms that are potential plant pest risks or pose a risk to animals.
APHIS is responsible for implementing several multilateral and bilateral international treaties directly or indirectly related to invasive species. These include:

- International Plant Protection Convention,
- Convention on Prevention of Diseases in Livestock (United States-Mexico),
- Convention on International Trade in Endangered Species of Wild Flora and Fauna,
- Convention for the Protection of Migratory Birds (United States-Canada), and
- Convention for the Protection of Migratory Birds and Game Animals (United States-Mexico).

Domestic laws that APHIS implements include the Plant Pest Act, the Plant Quarantine Act, the Federal Noxious Weed Act, certain provisions of the Federal Seed Act, and the Honeybee Act.

The control and management of nutria, *Myocaster coypus*, a semi-aquatic invertebrate, falls under the purview of APHIS Wildlife Services, which provides technical assistance as well as direct management for nutria conflicts, and implements management programs to eliminate nutria in a number of states.

APHIS has a seat on the OISC.

U.S. Department of Commerce

National Oceanic and Atmospheric Administration (NOAA)

NOAA is tasked with the conservation and management of coastal and marine ecosystems and their resources. In addition to oversight of marine invasive species of concern to Oregon, such as Caulerpa and green crab, NOAA Fisheries is also involved in developing research standards for ballast water in coordination with the U.S. Coast Guard and exploring marine debris as a potential pathway for AIS. NOAA also serves as the co-chair of the Aquatic Nuisance Species Task Force with the USFWS.

NOAA's National Sea Grant College Program, established by Congress in 1966, plays an important role in AIS management in Oregon. Through Oregon Sea Grant, the National Sea Grant College Program provides funds for basic and applied research on AIS as well as education and outreach. Oregon Sea Grant achieved college status in 1971 and is based at Oregon State University. They serve Oregon's coastal communities through an integrated program of research, outreach, and education to provide the public with information based on sound research and innovative science. A representative of Oregon Sea Grant is an ex-officio member of the OISC.

Located at the University of Mississippi Law School, the National Sea Grant Law Center coordinates and enhances Sea Grant's activities in legal scholarship and outreach related to coastal and ocean law issues. In 2016, the Law Center began working with the Western Association of Fish and Wildlife Agencies (WAFWA) to address the transportation of dreissenid mussels on watercraft and develop standardized legislative and regulatory guidance documents that would be consistent across states in the West.

Lastly, the Endangered Species Act (ESA (ESA; 16 U.S. Code § 1531) is administered jointly by the U.S. Fish and Wildlife Service (USFWS) for freshwater and terrestrial species and NOAA Fisheries for anadromous and marine species. The goal of the ESA is the recovery (and long-term sustainability) of endangered and threatened species and the ecosystems on which they depend. Invasive species not only pose a significant threat to listed species and their habitats, but also many proposed for the control or eradication of AIS may pose a risk to listed species. As a result, NOAA Fisheries would play a significant role in any pesticide-related response actions undertaken in Oregon that could affect species or critical habitat listed under the ESA (such as anadromous salmon). In those cases, an ESA Section 7 consultation would be needed.

U.S. Department of Defense (DOD)

U.S. Army Corps of Engineers (USACE)

The 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 Aquatic Nuisance Species Research Program (ANSRP) was authorized by NANPCA 1990 to address those invasive aquatic species that are problematic to the nation's waterways, infrastructure, and associated resources.

In addition, the USACE typically administers the bulk of the Water Resources Development Act (WRDA) requirements. WRDA is a biennial bill enacted by Congress that authorizes new water transportation infrastructure projects as well as protecting and maintaining existing water infrastructure systems, including ports, dams, locks, and waterways. The bill includes provisions to support the management of AIS, including aquatic weeds, non-native carp, and dreissenid mussels. WRDA authorized the Secretary of the Army to establish watercraft inspection stations in the Columbia River Basin in the States of Idaho, Montana, Oregon, and Washington at locations with the highest likelihood of preventing the spread of aquatic invasive species at Corps-managed reservoirs. The wording of WRDA also directs the Secretary to assist the referenced states with early detection and rapid response actions. WRDA is strictly authorizing legislation; it does not include funding. The funding of WRDA-authorized studies and projects is provided separately through the annual Energy and Water Development appropriations process and, at times, through supplemental appropriations.

Oregon sits within the Northwestern Division of the USACE, which spans 14 states, 63 Congressional districts, and 106 sovereign tribal nations and covers two of the country's longest rivers – the Missouri and Columbia. In 2019 the Northwestern Division published the Dreissenid Mussel Rapid Response Action Plan Programmatic Environmental Assessment to prepare for a potential dreissenid mussel introduction in the Columbia River. Within the Northwestern Division, the Portland District of the USACE covers most of Oregon and southwestern Washington. The District operates locks, dams, and hydropower facilities along the Columbia River, operates dams in the Willamette Valley for flood risk management, and maintains Oregon's coastal rivers for navigation. In addition to coordinating on state and regional AIS issues, the District publishes a Cat Calendar to raise awareness of local USACE facilities and projects.

U.S. Department of Homeland Security

U.S. Coast Guard (USCG)

The USCG authority over the transport and introduction of AIS in ballast water and hull fouling on commercial ships operating in the waters of the United States was established in NANPCA (1990) as amended by NISA (1996) (see also Subpart D of 33 CFR 151 "Ballast Water Management for Control of Nonindigenous Species in Waters of the United States").

Incidental discharges from ships (including ballast water) are jointly regulated by the USCG and the EPA under the "Vessel Incidental Discharge Act" (VIDA), which established a framework for the regulation of discharges incidental to the normal operation of a vessel under the Clean Water Act (CWA) Section 312(p). The VIDA standards (replacing the Vessel General Permit) are intended to streamline the patchwork of federal, state, and local ballast water requirements for the commercial vessel community. VIDA amended the CWA to include a section titled "Uniform National Standards for Discharges Incidental to Normal Operation of Vessels," requiring the EPA to develop new national standards of performance for commercial vessel discharges and the USCG to develop corresponding implementing regulations. The EPA published a Notice of Proposed Rulemaking for discharge standards in October 2020 and expects to publish a supplemental notice in late 2023, with a final rule coming in 2024. During this process, the USCG is developing complementary regulations to implement compliance and enforcement of EPA standards, which are due two years after the EPA's Final Rule.

The USCG also partners with entities such as the Smithsonian, EPA, and Navy on various AIS research projects, such as the National Ballast Information Clearinghouse (NBIC). NBIC is a joint program of the Smithsonian Environmental Research Center (SERC) and the USCG that collects, analyzes, and interprets data on the ballast water management practices of commercial ships that operate in the waters of the United States.

U.S. Customs and Border Protection (CBP)

Whereas CBP's top priority is to keep terrorists and their weapons from entering the U.S. while also facilitating travel and commerce, CBP officers and agents enforce all applicable U.S. laws, including working closely with USFWS Wildlife Enforcement Offices to prevent smuggling and illegal importation of prohibited species. A CPB representative sits on the OISC.

U.S. Department of the Interior (DOI)

DOI is the largest land and water manager in the United States; unsurprisingly, invasive species management is a part of most bureau and office responsibilities and missions. The 2020 DOI Departmental Manual on Invasive Species Management: Invasive Species Policy directs the department to "manage the risk of invasive species in their activities, and minimize that risk where applicable and practicable, in cooperation with others as appropriate. This includes helping prevent the introduction, establishment, and spread of invasive species; promoting early detection and rapid response; and providing for eradication and control to minimize adverse impacts, such as impacts to the environment, human health and safety, cultural resources, recreation, infrastructure, and the economy." As a result, there are bureaus and offices within the DOI that have authorities pertinent to the management of AIS, both nationally and within Oregon.

As demonstrated in the Final Report Safeguarding the West from Invasive Species; Actions to Strengthen Federal, State, and Tribal Coordination to Address Invasive Mussels (DOI, 2020b), DOI's commitments to prevent, contain, and control invasive mussels in the western United States involves high-level interagency coordination both within the DOI and with other state and federal entities.

Bureau of Indian Affairs (BIA)

The BIA's 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." There are nine federally recognized tribes in Oregon. The Branch of Fisheries, Wildlife and Recreation provides competitive grant funding to federally recognized Tribes and Tribal Organizations' projects to address the negative impacts of invasive species on their lands. Previously funded invasive species projects in the Pacific Northwest include the Confederated Tribes of the Colville Reservation's Northern pike suppression program.

Bureau of Land Management (BLM)

The BLM administers a variety of landscapes for multiple uses over more than 16 million acres of public land in Oregon and Washington, including numerous national wild scenic rivers. 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 to new invasions. There are eight BLM districts in the state of Oregon. The complexity of habitats overseen by the BLM in Oregon means that they are involved in AIS management issues that range from compliance with the Interagency Standards for Fire and Fire Aviation Operations protocols to aquatic weed surveys (Miller et al., 2013). In addition, the BLM partners with the USFS via AREMP to assess the Western Oregon Resource Management Plans for watershed condition and survey for AIS within the Northwest Forest Plan area. The BLM has a seat on the OISC.

Bureau of Reclamation (Reclamation)

The mission of Reclamation is "to manage, develop, and protect water and related resources in an environmentally and economically sound manner." As such, Reclamation is responsible for water, water storage, and water delivery infrastructure from canals to wetlands, lakes, hydropower dams, and reservoirs, all of which are at risk from AIS. There are numerous Reclamation projects in Oregon, many focusing on the delivery of irrigation water to the more arid eastern part of the state, while other projects include municipal and industrial water, hydropower, flood control, recreation, and fish and wildlife water resources. Reclamation operates more than 25 dams in Oregon, most in the eastern and central parts of the state. While Reclamation management covers many different AIS, since 2007, with the spread of dreissenid mussels west of the 100th Meridian, Reclamation has focused extensively on invasive mussels. Reclamation activities include water sampling and monitoring, facility vulnerability assessments, support for watercraft inspection and decontamination (WID) through various partnerships, outreach and education, and research and implementation of control technologies for post-infestation. In addition to conducting annual sampling for dreissenid mussels at Reclamation projects in Oregon, Reclamation also sits on the OISC.

National Park Service (NPS)

The NPS is tasked with the management of historical, cultural, and natural park locations. There are five National Parks and Monuments within Oregon, the most well-known of which is Crater Lake National Park, along with one (subterranean) Wild and Scenic River managed by NPS and three National Trails administered by NPS.

Guided by their latest Management Policies document (NPS 2006), NPS is charged with preventing the introduction of exotic species into NPS areas, preventing and containing those non-native plants and animals where possible, and cooperating with other agencies with jurisdiction and oversight. Additional guidance, specific to dreissenid mussels comes from the Quagga/Zebra Mussel Infestation Prevention and Response Planning Guide (NPS, 2007), which assists with both risk assessment and the implementation of appropriate prevention and monitoring actions.

Current AIS work by the NPS in Oregon includes studying the impacts of invasive crayfish on lake ecosystems (introduced into Crater Lake in 1915), with a particular focus on the endemic Mazama newt.

U.S. Fish and Wildlife Service (USFWS)

The USFWS has multiple programs that address AIS management, including multiple programs that AIS threats to trust resources, including migratory birds, threatened and endangered species, and fisheries. For example, in Oregon, the USFWS manages 17 National Wildlife Refuges, many of which are dealing with AIS such as nutria, water primrose, purple loosestrife, and common carp. In addition, the Ecological Services (ES) program, charged with conserving at-risk species and their habitats, incorporates invasive species management actions into Section 7 (ESA) consultations as well as conservation and species recovery plans.

Nationally, the USFWS addresses AIS through the Branch of Aquatic Invasive Species (BAIS), which is housed in the Fisheries and Aquatic Conservation program. The USFWS 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 USFWS is charged with the management of the injurious wildlife listing process as defined by the Injurious Wildlife Provisions of the Lacey Act (18 U.S.C. 4). The BAIS also works to build capacity, coordinate, and implement AIS prevention and control activities authorized under NANPCA (1990) and NISA (1996), including: co-chairing and administering the ANSTF, supporting regional panels such as the WRP, and distributing funds for state and interstate ANS management plans.

The USFWS Office of Law Enforcement, working closely with CBP, directs the inspection of wildlife shipments at ports of entry, and enforces wildlife laws against trafficking in interstate and foreign commerce of injurious and invasive species.

Oregon sits in the Pacific Region of the USFWS as well as housing a state USFWS office, both of which are involved in AIS issues in the state. A representative from the state USFWS office sits on the OISC.

U.S. Geological Survey (USGS)

While the USGS does not manage any land or water resources, they nonetheless play a critical role in AIS management. The USGS not only develops tools, technologies, and decision support systems to detect, monitor, assess risk and impacts, and control AIS, but they also collect and synthesize data on AIS distribution and other information. The Nonindigenous Aquatic Species

(NAS) information resource - a central repository for spatially referenced biogeographic accounts of introduced aquatic species - is an essential reference for AIS mapping and distribution throughout Oregon and the west.

U.S. Environmental Protection Agency (EPA)

The EPA's mission is to protect human health and the environment. The two primary areas where EPA oversight is relevant to Oregon's management of AIS are the registration of pesticides (for AIS rapid response and control efforts) under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and the regulation of ballast water discharge under the Vessel Incidental Discharge Act (VIDA).

Incidental discharges from ships (including ballast water) are jointly regulated by the USCG and the EPA under VIDA, which established a framework for the regulation of discharges incidental to the normal operation of a vessel under the Clean Water Act (CWA) Section 312(p). The new VIDA standards are intended to streamline the patchwork of federal, state, and local ballast water requirements for the commercial vessel community. VIDA amended the CWA to include a section titled "Uniform National Standards for Discharges Incidental to Normal Operation of Vessels," requiring the EPA to develop new national standards of performance for commercial vessel discharges and the USCG to develop corresponding implementing regulations. The EPA published a Notice of Proposed Rulemaking for discharge standards in October 2020 and expects to publish a Supplemental notice in late 2023 and a Final Rule by late 2024. During this process, the USCG is developing complementary regulations to implement compliance and enforcement of EPA standards, which are due two years after the EPA's Final Rule.

Appendix E: State Programs

Although many state agencies in Oregon have authority over the management of aquatic resources, no one central agency has responsibility for managing AIS, and each Oregon agency with an AIS program has a separate statutory role or mission.

Links to Bills and Statues for each entity have been provided below, along with excerpts of the relevant language.

Oregon Invasive Species Council (OISC)

In 2001, the Oregon Legislature established the Oregon Invasive Species Council (OISC) (HB 2181).

HB 2181 Relating to pests; creating new provisions; amending ORS 634.665; repealing ORS 634.670; and appropriating money.

…
(2) The Invasive Species Council shall:

(a) Create and maintain appropriate Internet sites, toll-free telephone numbers or other means of communication for statewide use in reporting sightings of invasive species.
(b) Encourage the reporting of invasive species sightings by publicizing means of communication made available by the council under paragraph (a) of this subsection.
(c) Forward reports of invasive species sightings to appropriate agencies.
(d) Produce educational materials and press releases concerning invasive species.
(e) Conduct educational meetings and conferences.
(f) Develop a statewide plan for dealing with invasive species. The plan should include, but need not be limited to, a review of state authority to prevent the introduction of invasive species and to eradicate, contain or manage existing invasive species.
(g) Solicit proposals and review applications for grants or loans to further projects providing education about invasive species.
(h) Provide grants or loans to agencies, organizations or individuals for eradicating new invasions.

…

Further clarification of the role of the OISC as well as it structure and responsibilities are laid out in statute:

ORS 570.750 Legislative findings

The Legislative Assembly finds and declares that:

(1) The land, waters and other natural resources of this state are severely affected by an increasing number of invasions by harmful nonnative species;
(2) Invasions by harmful nonnative species are damaging to the environment and cause economic hardship within this state;

(3) The Invasive Species Council is a leader for the conducting of a coordinated and comprehensive effort to prevent the entry of invasive species into this state and to eliminate, reduce and mitigate the effects of invasive species present in this state;
(4) The Invasive Species Council has a strong network of local, state, federal, tribal and private entities that actively and cooperatively combat the threat posed by harmful invasive species;
(5) Rapid response and eradication are the most effective, least costly and most feasible strategies for combating harmful invasive species and preventing expansion by those invasive species;
(6) Invasive species present a serious threat that adversely affects industries vital to the economy of this state, including but not limited to the agriculture, forestry, fishing and tourism industries;
(7) Failure to eradicate or control new infestations and infections of invasive species will reduce the productivity of industries in this state and adversely affect marketing by those industries, resulting in a loss of business and the loss of existing jobs; and
(8) The eradication or control of new infestations or infections of invasive species using funding provided through the Invasive Species Council will benefit the economy of this state by preventing the loss of existing jobs, by promoting and expanding business and by preventing the decline of business. [2009 c.825 §1]

ORS 570.755 Definition of Invasive Species

Invasive Species Council Duties

(1) As used in this section, "invasive species" means nonnative organisms that cause economic or environmental harm and are capable of spreading to new areas of the state. "Invasive species" does not include humans, domestic livestock or nonharmful exotic organisms.
(2) The Invasive Species Council shall:
    (a) Create and maintain appropriate Internet sites, toll-free telephone numbers or other means of communication for statewide use in reporting sightings of invasive species.
    (b) Encourage the reporting of invasive species sightings by publicizing means of communication made available by the council under paragraph (a) of this subsection.
    (c) Forward reports of invasive species sightings to appropriate agencies.
    (d) Produce educational materials and press releases concerning invasive species.
    (e) Conduct educational meetings and conferences.
    (f) Develop a statewide plan for dealing with invasive species. The plan should include, but need not be limited to, a review of state authority to prevent the introduction of invasive species and to eradicate, contain or manage existing invasive species.
    (g) Solicit proposals and review applications for grants or loans to further projects providing education about invasive species.
    (h) Provide grants or loans to agencies, organizations or individuals for eradicating new invasions.
(3) The council may:

(a) Approve the expenditure of funds by the council, or any member thereof, for the production of educational materials or the presentation of educational materials.
(b) Enter into contracts and other agreements with persons, the federal government, state governments and local governments or units of federal, state or local governments or with Indian tribes, on matters pertaining to invasive species.
(c) Adopt rules or perform other acts the council considers reasonable for carrying out the powers, duties and functions of the council. [Formerly 561.685]

ORS 570.770 Invasive Species Council
Membership
Terms

(1) The Invasive Species Council is established within the State Department of Agriculture. Except as provided in subsection (2) of this section, the council consists of 22 members, as follows:
(a) Eight members are ex officio voting members with terms that do not expire. The ex officio voting members are:
(A) The Director of Agriculture, or a designated representative.
(B) The Director of the Center for Lakes and Reservoirs, or a designated representative.
(C) The State Fish and Wildlife Director, or a designated representative.
(D) The director of the Sea Grant College program, or a designated representative.
(E) The State Forester, or a designated representative.
(F) The Director of the Department of Environmental Quality, or a designated representative.
(G) The State Marine Director, or a designated representative.
(H) The State Parks and Recreation Director, or a designated representative.
(b) Ten members are voting members. The ex officio voting members identified in paragraph (a) of this subsection shall jointly appoint the voting members for a term of two years, but each appointed voting member serves at the pleasure of the ex officio voting members. Before a voting member's term expires, the ex officio voting members shall appoint a successor with a term that begins on January 1 next following. An appointed voting member may not serve on the council for more than two consecutive terms. If a vacancy in a voting member's position occurs, the ex officio members shall make an appointment that becomes immediately effective and that continues until the end of the term of the vacating voting member. In appointing voting members, the ex officio voting members shall ensure to the extent possible that the appointments represent the geographic, cultural and economic diversity of this state. Each appointment of a voting member must represent a different category of interest, as follows:
(A) A member who represents an organization or association with the purpose of advocating environmental stewardship;
(B) A member who represents an organization or association that advocates on behalf of private industry in this state;

(C) A member who represents a native American or Indian tribe or association of tribes within this state;
(D) A member who represents an entity, regardless of the form of the entity, with a headquarters or principal operations in Coos, Curry, Douglas, Jackson or Josephine Counties and with a purpose of responding to invasive species concerns;
(E) A member who represents an entity, regardless of the form of the entity, with a headquarters or principal operations in Gilliam, Hood River, Jefferson, Morrow, Sherman, Umatilla, Union, Wallowa, Wasco or Wheeler Counties and with a purpose of responding to invasive species concerns;
(F) A member who represents an entity, regardless of the form of the entity, with a headquarters or principal operations in Clatsop, Columbia, Lincoln or Tillamook Counties and with a purpose of responding to invasive species concerns;
(G) A member who represents an entity, regardless of the form of the entity, with a headquarters or principal operations in Baker, Crook, Deschutes, Grant, Harney, Klamath, Lake or Malheur Counties and with a purpose of responding to invasive species concerns;
(H) A member who represents an entity, regardless of the form of the entity, with a headquarters or principal operations in Benton, Lane, Linn, Marion or Polk Counties and with a purpose of responding to invasive species concerns;
(I) A member who represents an entity, regardless of the form of the entity, with a headquarters or principal operations in Clackamas, Multnomah, Washington or Yamhill Counties and with a purpose of responding to invasive species concerns; and
(J) A member who represents the public.

(c) Four members are ex officio nonvoting members without a specified term of service. The ex officio nonvoting members are:
(A) The State Invasive Species Coordinator;
(B) A representative of the Governor with expertise in natural resource issues;
(C) A member of the Senate appointed by the President of the Senate; and
(D) A member of the House of Representatives appointed by the Speaker of the House of Representatives.

(2.) The voting members of the council shall invite the United States Department of the Interior, the United States Department of Agriculture and the United States Department of Homeland Security, and may invite other federal agencies, to designate representatives as ex officio nonvoting members of the council without specified terms of service.

(3.) A member of the council is not entitled to compensation under ORS 292.495 (Compensation and expenses of members of state boards and commissions). A member of the council other than the State Invasive Species Coordinator is not entitled to reimbursement for expenses. At the discretion of the council, council members may be reimbursed from funds available to the council for actual and necessary travel and other expenses that members of the council incur in performing the members' official duties, subject to the limits described in ORS 292.495

(Compensation and expenses of members of state boards and commissions). [Formerly 561.687; 2013 c.181 §1; 2015 c.486 §1; 2019 c.622 §2; 2021 c.97 §69]

Additional Oregon Revised Statues governing the OISC are as follows:

ORS 570.775 Officers
Quorum
Schedule
Rules

ORS 570.780 Invasive Species Coordinator
Administrative expenses of Invasive Species Council

ORS 570.790 Advisory and technical committees

ORS 570.800 Invasive Species Council Account

ORS 570.810 Invasive Species Control Account
Control effort funding
Reimbursement of administrative expenses

ORS 570.815 Reporting of council activities

Oregon Aquatic Invasive Species Prevention Program (AISPP)

In 2009, the Oregon Legislature passed (HB 2220) to create the Aquatic Invasive Species Prevention Program (AISPP) , and established a new user fee for boaters - Aquatic Invasive Species Prevention Permit (amending ORS 830.565) to help keep Oregon's lakes, rivers, and streams free of destructive invasive species like zebra and quagga mussels. The bill also established civil penalties for knowingly transporting AIS, created the Aquatic Invasive Species Prevention Fund (funded by the sale of AIS permits), and established exemptions for the new rules.

HB 2220 An Act relating to aquatic invasive species; creating new provisions; amending ORS 830.990; appropriating money; and declaring an emergency.

Watercraft inspections began in spring of 2010 and in 2011, with the passage of HB 3399, roadside watercraft inspections became mandatory

HB 3399 Authorizes State Department of Fish and Wildlife, State Marine Board and State Department of Agriculture to require person to stop and submit recreational or commercial watercraft to inspection for aquatic invasive species.

> SECTION 1. ORS 570.855 is amended to read:
> 570.855. (1) The State Department of Fish and Wildlife, the State Marine Board and the State

Department of Agriculture [are authorized to] may require a person operating or transporting a recreational or commercial watercraft to stop at a check station for the purpose of inspect- ing the watercraft for the presence of aquatic invasive species.[:]
[(a) Operate check stations for the purpose of inspecting recreational or commercial watercraft for the presence of aquatic invasive species.]
[(b)] (2) The State Department of Fish and Wildlife, the State Marine Board and the State Department of Agriculture may decontaminate, or recommend decontamination of, any recreational or commercial watercraft that is inspected at a check station operated under authority of this section.
[(2)] (3) All check stations operated under authority of this section must be plainly marked by signs that comply with all state and federal laws and must be staffed by at least one uniformed employee of the State Department of Fish and Wildlife, the State Marine Board or the State Department of Agriculture trained in inspection and decontamination of recreational or commercial watercraft.

ORS 830.560 Launching boat with aquatic invasive species prohibited
Rules

1) As used in this section:
    a) "Aquatic invasive species" means any aquatic life or marine life determined by the State Fish and Wildlife Commission by rule to be invasive or any aquatic noxious weed determined by the State Department of Agriculture to be invasive.
    b) "Launch" means any act that places a boat into a waterway for recreational boating, for flushing or testing an engine or for any other purpose.
2) Except as provided in subsection (3) of this section, a person may not launch a boat into the waters of this state if:
3) The boat has any visible aquatic species on its exterior hull or attached to any motor, propulsion system or component, anchor or other attached apparatus outside of the hull, or on the trailer or other device used to transport the boat; or
4) The boat has any aquatic invasive species within its bilge, livewell, motorwell or other interior location.
5) The State Fish and Wildlife Commission, in consultation with the State Department of Agriculture, by rule may allow the presence of certain aquatic species on or within a boat for activities including but not limited to hunting and photography.
6) The State Marine Board shall provide information to the public about any rules adopted under subsection (3) of this section. [2009 c.303 §2]

ORS 830.565 Permit required

A person may not operate a sailboat that is at least 12 feet in length or a motorboat on the waters of this state without first obtaining an aquatic invasive species prevention permit from the State Marine Board under ORS 830.570 (Board to issue permit). [2009 c.764 §7; 2019 c.507 §12]

ORS 830.570 Board to issue permit
Fees

ORS 830.575 Annual fee for permit

1) Notwithstanding ORS 830.790 (Certificate or registration fees) (3), the annual fee for issuance and renewal of an aquatic invasive species prevention permit for a sailboat that is at least 12 feet in length and not registered in Oregon or a motorboat that is not registered in Oregon is $20.
2) All fees collected under this section shall be deposited into the Aquatic Invasive Species Prevention Fund established under ORS 830.585 (Aquatic Invasive Species Prevention Fund). [2009 c.764 §9; 2019 c.154 §5; 2019 c.389 §5; 2019 c.507 §14c]

ORS 830.580 Rules

ORS 830.585 Aquatic Invasive Species Prevention Fund
Uses of fund

1) The Aquatic Invasive Species Prevention Fund is established in the State Treasury, separate and distinct from the General Fund. Interest earned by the Aquatic Invasive Species Prevention Fund shall be credited to the fund. Moneys in the fund are continuously appropriated to the State Marine Board.
2) a) The fund consists of:
   (A) Moneys deposited into the fund under ORS 830.575 (Annual fee for permit);
   (B) Moneys transferred to the fund from the federal government, other state agencies or local governments;
   (C) Any other moneys appropriated to the fund by the Legislative Assembly; and
   (D) Moneys deposited into the fund under paragraph (b) of this subsection.

   b) The board may receive gifts, grants or contributions from any source, whether public or private. Moneys received under this paragraph shall be deposited into the fund.
3) The board may use the moneys in the fund:
   a) To pay the administrative costs of the aquatic invasive species prevention permit program;
   b) To award grants and enter into grant agreements to prevent and control aquatic invasive species; and
   c) For any other purpose of the board as described in ORS 830.565 (Permit required) to 830.575 (Annual fee for permit), 830.589 (Watercraft check stations) and 830.594 (Report of prevention efforts). [2009 c.764 §11; 2019 c.154 §8]

ORS 830.587 Definitions for ORS 830

ORS 830.589 Watercraft check stations
Rules
Penalty

1) The State Department of Fish and Wildlife, the State Marine Board or the State Department of Agriculture may require a person transporting a recreational or commercial watercraft to stop at a check station to inspect the watercraft for the presence of aquatic invasive species. The purpose of the administrative search authorized under this section is to prevent and limit the spread of aquatic invasive species within Oregon.

2) (a) The State Department of Fish and Wildlife, the State Marine Board or the State Department of Agriculture may decontaminate, or order the decontamination of, any recreational or commercial watercraft that the agency inspects at a check station operated under authority of this section. If the State Department of Fish and Wildlife, the State Marine Board or the State Department of Agriculture orders decontamination, the person transporting the watercraft shall cooperate with the agency to complete the decontamination.
(b) Failure to cooperate with the ordered decontamination process is subject to penalties under ORS 830.998 (Penalty for failing to stop at an aquatic invasive species check station).
3) All check stations operated under authority of this section must be plainly marked by signs that comply with all state and federal laws and must be staffed by at least one uniformed employee of the State Department of Fish and Wildlife, the State Marine Board or the State Department of Agriculture trained in inspection and decontamination of recreational or commercial watercraft.
4) An agency that operates a check station under this section shall require all persons transporting recreational or commercial watercraft to stop at the check station, and the agency shall inspect every recreational or commercial watercraft that goes through the check station.
5) Notwithstanding ORS 496.992 (Penalties), a person transporting a recreational or commercial watercraft who stops at a check station for inspection and who cooperates in the decontamination process is not subject to criminal sanctions for possessing or transporting aquatic invasive species.
6) The State Department of Fish and Wildlife, the State Marine Board and the State Department of Agriculture may adopt rules to carry out the provisions of this section. [Formerly 570.855; 2019 c.154 §10]

ORS 830.591 Request to proceed to nearest station
Penalty

ORS 830.594 Report of prevention efforts

ORS 830.998 Penalty for failing to stop at an aquatic invasive species check station

1) A person who is transporting a recreational or commercial watercraft and fails to stop and submit to an inspection or complete the ordered decontamination at an aquatic invasive species check station operated by the State Department of Fish and Wildlife, the State Marine Board or the State Department of Agriculture as provided under ORS 830.589 (Watercraft check stations) commits a Class D violation.
2) Notwithstanding ORS 153.042 (Citations generally), a peace officer may issue a citation under subsection (1) of this section when the conduct alleged to constitute a violation has not taken place in the presence of the peace officer, if the peace officer has reasonable grounds to believe that the conduct constitutes a violation on the basis of information received from an employee of an agency authorized to operate an aquatic invasive species check station who observed the violation. [Subsections (1) and (2) of 2011 Edition formerly 570.990 (Penalties)(2) and (3); 2019 c.154 §14]Note: 830.998 (Penalty

for failing to stop at an aquatic invasive species check station) was enacted into law by the Legislative Assembly but was not added to or made a part of ORS chapter 830 or any series therein by legislative action. See Preface to Oregon Revised Statutes for further explanation.

ORS 830.999 Penalty for transporting aquatic invasive species
Exceptions
Use of penalty moneys
Rules

Oregon Department of Agriculture

The Oregon Department of Agriculture (ODA) Noxious Weed Control Program provides statewide leadership for the coordination and management of state-listed noxious weeds (including listed marine, estuarine, and freshwater plants) (ORS 569 Weed Control, ORS 570 Plant Pest Control; Invasive Species; OAR 603-052-1200 Quarantine; Noxious Weeds).

The Noxious Weed Control Program also supports the Oregon State Weed Board (OSWB) with the administration of the OSWB Grant Program, developing statewide management objectives, developing weed risk assessments, and maintaining the state noxious weed list (ORS 569).

ORS 569 - WEED CONTROL

ORS 569.175 Definitions for ORS 569

As used in ORS 569.175 (Definitions for ORS 569) to 569.195 (Cooperation with department):

1) "Noxious weed" means a terrestrial, aquatic or marine plant designated by the State Weed Board under ORS 569.615 (Duties of board) as among those representing the greatest public menace and as a top priority for action by weed control programs.

ORS 569.180 Noxious weeds as public nuisance
Policy
In recognition of the imminent and continuous threat to natural resources, watershed health, livestock, wildlife, land and agricultural products of this state, and in recognition of the widespread infestations and potential infestations of noxious weeds throughout this state, noxious weeds are declared to be a public nuisance and shall be detected, controlled and, where feasible, eradicated on all lands in this state. It is declared to be the policy of this state that priority shall be given first to the prevention of new infestations of noxious weeds and then to the control and, where feasible, eradication of noxious weeds in infested areas. [Formerly 452.615]

ORS 569.185 State Department of Agriculture authority
Rules
Integrated weed management approach

The State Department of Agriculture shall administer and enforce ORS 569.175 (Definitions for ORS 569) to 569.195 (Cooperation with department). The department may:

1) Adopt rules to carry out ORS 569.175 (Definitions for ORS 569) to 569.195 (Cooperation with department). In adopting the rules the department shall consider:
    a) The effect on the immediate environment of the use of chemical, biological or other means for control or eradication; and
    b) The overall benefit to be derived compared to the costs to be incurred.
2) Implement an integrated weed management approach that focuses on the prevention of noxious weeds through:
    a) A combination of techniques that may include, but need not be limited to, the use of:
        (A) Surveillance and monitoring;
        (B) Early detection;
        (C) Eradication or other rapid response techniques;
        (D) Mechanical control;
        (E) The selective use of pesticides;
        (F) Cultural practices;
        (G) Modified land management; and
        (H) Biological controls; and

    b) Control practices selected and applied to achieve desired weed management objectives in a manner that minimizes risks to human health, non-target organisms, native fish and wildlife habitat, watersheds and the environment.
3) Cooperate with Oregon State University or any other person in the administration and enforcement of ORS 569.175 (Definitions for ORS 569) to 569.195 (Cooperation with department).
4) Collect, publish, disseminate and furnish information, statistics and advice concerning the research, experimentation, control and eradication of noxious weeds and the land management and cultural practices recommended for such control and eradication.
5) Notwithstanding any provisions of ORS 279.835 (Definitions for ORS 279) to 279.855 (Entities that may obtain goods and services through Oregon Department of Administrative Services) and 561.240 (Contracts and agreements with other agencies, governmental units and other persons) and ORS chapters 279A, 279B and 279C to the contrary, enter into contracts with Oregon State University or any other person for the purpose of research, experimentation, control or eradication of noxious weeds, to receive and expend funds pursuant to such contracts and to employ or authorize personnel to act on behalf of the department.
6) Rear, propagate and release biological control agents approved by the United States Department of Agriculture, including insects or disease organisms, and to construct, purchase, maintain and operate facilities and equipment for such purpose.
7) Control, or direct control of, predators and diseases of biological control agents, and to limit or prohibit the movement or use of pesticides or other agriculture chemicals that reasonably could damage or injure such biological control agents.
8) Purchase, use and apply chemical control agents, including pesticides, and purchase, maintain and operate any application equipment for such purpose.
9) Regulate, restrict or prohibit the movement or sale of hay, straw, seed, other agricultural crops or residues thereof, that are found to contain noxious weeds or seeds or propagules of noxious weeds.

10) Limit or prohibit the collection or taking of any biological control agents from public or private lands within this state.
11) Develop appropriate measures for the control or eradication of noxious weeds on any lands in this state.
12) Have access to all lands within this state to carry out ORS 569.175 (Definitions for ORS 569) to 569.195 (Cooperation with department), including survey, control and eradication activities and the establishment of quarantines.
13) Request any person owning or controlling land within this state to control, prevent the spread of or, when feasible, eradicate noxious weeds, and to supervise such activities.
14) If abatement procedures are required of a landowner, recommend that the landowner and the department jointly develop a management strategy or plan that describes a course of action to address the abatement requirement.
15) To the extent funds are available for such purpose, employ or use personnel of other agencies of this state, including but not limited to persons acting under work-release, rehabilitation or youth programs or persons employed and paid from funds received under federal or state programs intended primarily to alleviate unemployment or to advance research.
16) Establish advisory committees to assist the department and the State Weed Board in carrying out ORS 569.175 (Definitions for ORS 569) to 569.195 (Cooperation with department). [Formerly 452.620; 2011 c.9 §76]

ORS 569.190 - 569.195 Additional Authories

ORS 569.350 Necessity of eradication of weeds
Cooperation in control and eradication

ORS 569.400 - 569.495
Refusal or failure to control weeds, weed control fund, cost - share, and grants

ORS 569.515 Legislative findings

The Legislative Assembly finds and declares that:
(1) Noxious weeds present a serious threat that adversely affects industries vital to the Oregon economy, including but not limited to the agriculture, forestry, fishing and tourism industries;
(2) Failure to control the spread of noxious weeds in Oregon will reduce the productivity of Oregon industries and adversely affect marketing by those industries, resulting in a loss of business and the loss of existing jobs;
(3) The use of aggressive measures to control the spread of noxious weeds will improve the actual and perceived quality of Oregon products and further the promotion and expansion of markets for those products; and
(4) The control of noxious weeds through county weed control district programs will benefit Oregon's economy by preventing the loss of existing jobs, by promoting and expanding Oregon business and by preventing the decline of Oregon business. [2011 c.392 §1]

ORS 569.520 Grants for carrying out county weed control district duties

ORS 569.600 - 569.620
State Weed Board, membership, duties

ORS 569.990 - 569.995
Violations and civil penalties
ORS 570 - PLANT PEST CONTROL; INVASIVE SPECIES

ORS 570.001 Definitions

(3) "Plant pest" means:

(a) A disease, microscopic organism, insect, nematode, arthropod, parasite or a noxious weed as defined in ORS 569.175 (Definitions for ORS 569), capable of having a significant adverse effect on the environmental quality of this state or of causing a significant level of economic damage in this state, including but not limited to damage to agricultural, horticultural or forest plants, crops, commodities or products; and

(b) Any biotic agent identified in an order or rule of the department as capable of having a significant adverse effect on the environmental quality of this state, or of causing a significant level of economic damage in this state, including but not limited to damage to agricultural, horticultural or forest plants, crops, commodities or products. [2015 c.203 §4]

ORS 570.010 - 570.110
County horticultural inspectors, inspections

ORS 570.115 Quarantine establishment

ORS 570.120 Quarantine powers exercised only in emergencies

ORS 570.125 - 570.190
Shipments and inspections

ORS 570.210 Control of plant pests not subject to quarantine
Rules

The State Department of Agriculture may adopt rules requiring the use of measures to control the spread of a specific plant pest that is not the subject of a quarantine if:

(1) Failure to control the plant pest will have an identifiable effect on plants, with a resulting unacceptable level of economic impact in the state; and

(2) The measures required by the department are of a type proven effective to achieve the control levels determined by the department for the plant pest. [2009 c.98 §5]

ORS 570.220 Research regarding plant pests

ORS 570.225 Public nuisance

ORS 570.305 Department officials to prevent introduction of plant pests

The Director of Agriculture, and the chief of the division of plant industry, are authorized and directed to use such methods as may be necessary to prevent the introduction into this state of dangerous insects or other plant pests, and to apply methods necessary to prevent the spread, to establish control and to accomplish the eradication of insects or other plant pests that may seriously endanger agricultural and horticultural interests of the state. The methods may be established or introduced if the director or chief considers control or eradication to be possible and practicable. [Amended by 2015 c.203 §14]

ORS 570.310 - 570.360
Coordination and cooperation

ORS 570.750-570.815 Invasive Species Council and Invasive Species Control Account (see above)

ORS 570.990 - 570.997
Penalties

ODA Administrative Rules defining Noxious Weeds

OAR 603-052-1200 QUARANTINE; NOXIOUS WEEDS

1) Establishing Quarantine. A quarantine is established against the noxious weeds listed herein. Noxious weeds have been declared a menace to the public welfare (ORS 569.180 (Noxious weeds as public nuisance) and 569.350 (Necessity of eradication of weeds)) because of the environmental and economic degradation that occurs when they become established.
2) Areas Under Quarantine. The entire State of Oregon and all other states of the United States and all foreign countries.
3) Covered Plants. For purposes of this rule the term “plants” applies to whole plants, plant parts, and seeds. This rule applies to all “A” and “B” state designated noxious weeds listed herein, except as provided in section (6). Plants on the Federal Noxious Weed List (7 C.F.R. 360.200) are also covered by this rule, with the exception of Japanese blood grass, Imperata cylindrica, var. Red Baron and Chinese water spinach, Ipomoea aquatica.
4) “A” weeds
   (a) “A” designated weeds. Weeds of known economic importance which occur in the state in small enough infestations to make exclusion, eradication, or containment possible; or which are not known to occur, but their presence in neighboring states makes future occurrence in Oregon seem imminent.
   (b) “A” weeds are controlled through exclusion, early detection, and rapid response (EDRR). Control of “A” weeds is a high priority for Oregon Department of Agriculture (ODA) and the primary goal is to prevent introduction and permanent establishment of “A” weeds. If “A” weeds are introduced, and eradication is not feasible, the secondary goal is to implement control measures to contain the “A” weeds to as small an area as possible so as to prevent widespread occurrence in Oregon.

(c) When “A” weeds are detected, control actions are mandatory and the goal of such control is eradication. Any person owning or occupying property upon which “A” weeds are detected must contact the Oregon Department of Agriculture within 48 hours of detection.
(d) Upon detection of “A” weeds, ODA may develop a survey, eradication, and monitoring plan to control or eradicate detected weeds. ODA may either develop and conduct appropriate measures to control or eradicate such weeds or may enter into a contract for the purpose of controlling or eradicating “A” weeds.
(e) Control or eradication of “A” weeds may be implemented at no cost to a person owning or controlling land within this state upon which “A” weeds are detected. However, ODA may request any person owning or controlling land within this state to control, prevent the spread of, or eradicate where feasible “A” weeds, subject to supervision of such activities by the ODA.
(f) If ODA or a county are unable to control or eradicate “A” weeds on private property, any person owning or controlling land within this state must control and take measures to eliminate or prevent the possibility of spread of “A” weeds to other lands and ownerships. Control measures for “A” weeds must be implemented in a timely manner as determined by ODA. Treatments must provide sufficient levels of control to make progress toward the goal of eradication.
(g) ODA inspectors may access all lands within Oregon for the purpose of ORS 569.175 (Definitions for ORS 569.175 to 569.195) to 569.195 (Cooperation with department)including carrying out the control or eradication of “A” weeds.
(h) Any person owning or controlling land within this state found in violation of ORS 569.175 (Definitions for ORS 569.175 to 569.195) to 569.195 (Cooperation with department) or these rules may be subject to fines up to the maximum for Class B violations.
(i) The following is a list of “A” weeds: (See Appendix C)

5) “B” Weeds

(a) “B” designated weeds means weeds of economic importance which are regionally abundant, but which may not occur or have limited distribution in some counties. “B” weeds shall be managed on a priority basis as resources allow. Control of “B” weeds may vary according to ODA-established priorities as well as site-specific or case-by-case factors. When available, biological control may be the primary long-term control strategy.
(b) The goal of “B” weed management is control and prevention of new infestations of “B” weeds in Oregon. ODA may advise persons owning or controlling lands upon which “B” weeds are detected on the control of “B” weeds on those lands as well as how to prevent “B” weeds from infesting new lands. As determined by ODA or a county, “B” weeds may be controlled or eradicated in the same manner as “A” weeds when “B” weeds appear in parts of the state where they were not previously detected or established.
(c) Pursuant to ODA’s determination as to treatment of “B” weeds, ODA may develop a regional control plan or cooperate with a county, local entity, or persons owning or controlling private lands to develop and implement a plan to control “B” weeds. ODA may assist with implementing control measures.
(d) Persons owning or controlling lands where “B” weeds are detected may request assistance from their respective local County Weed Inspector.

(e) Cost-share assistance grants may be available for the control of State listed noxious weeds to any person owning or occupying land upon which "A" or "B" weeds are detected. If within a county weed control district or special weed control district the county may provide assistance by applying for cost-share assistance grants. Information on cost-share assistance grants may be found at ODA's Plant Division website.
(f) As determined by ODA, biological control agents may be available for some "B" weeds. Information on the current availability of biological control agents is provided on ODA's Plant Division website. Releases of some biological control agents targeting noxious weeds may require reporting to ODA for tracking purposes.
(g) The following is a list of "B" weeds: (See Appendix C)

6) (6) Exemptions
(a) Agricultural seed as defined in Oregon's Seed Law, ORS 633.511 (Definitions for ORS 633.511 to 633.750) to 633.750 (Disposition of fees and charges paid under ORS 633.511 to 633.750), is exempt from this quarantine but subject to the noxious weed seed tolerances in OAR 603-056-0205 (Prohibited and Restricted Noxious Weed Seed).
(b) Other commodities, such as, but not limited to, wheat are exempt from this quarantine to the extent that they are contaminated with noxious weed seed.
7) Prohibited and Permitted Acts
(a) All plants covered in section (3) of this rule are prohibited entry into the State of Oregon.
(b) All plants listed in section (3) of this rule are prohibited from transport, purchase, sale or offering for sale in the State of Oregon.
(c) All plants listed in section (3) of this rule are prohibited from being propagated in the State of Oregon.
(d) All plants listed in section (3) may be collected from the wild in areas that are already infested with the specific species that is collected, provided that the plants, plant parts, or seed are not used for propagation or sale within the State of Oregon.
8) Disposition of Plants in Violation of the Quarantine. All covered plants listed in section (3) of this rule are found to be in violation of this quarantine shall be returned immediately to point of origin by the Oregon receiver, if from out of state, or at the owner's option be destroyed under the supervision of ODA, without expense to or indemnity paid by ODA.
9) Exceptions. The director may issue a permit allowing entry into this state, propagation, or research on plants covered by this rule, upon request, and upon investigation and finding that unusual circumstances exist justifying such action, and that the benefits of granting the permit outweigh the potential harm that may result from the requested action. The director may impose specific conditions on any permit issued hereunder, and the permit may be canceled for failure to meet the conditions therein. Any permit issued under this section shall be for a limited duration not to exceed one year.

Oregon Department of Environmental Quality (DEQ)

The mission of DEQ's Water Quality Program is to protect and improve Oregon's rivers, lakes, streams, and groundwater quality to keep these waters safe for a multitude of beneficial uses (OAR 340-041 Water Quality Standards). Since 2002, DEQ has authority, granted by the Oregon

Legislature, to implement and enforce ballast water management regulations to reduce the risk of introducing AIS (OAR 340-143).

Statutory language on ballast water for DEQ

ORS 783.620 Discharge of ballast in navigable waters

Except as provided in ORS 783.635 (Discharge of ballast water prohibited), a person may not discharge the ballast of any vessel into the navigable portions or channels of any of the bays, harbors or rivers of this state, or within the jurisdiction of this state, so as to injuriously affect such portions or channels of such bays, harbors or rivers, or to obstruct navigation thereof. [Formerly 783.600]

ORS 783.625 Definitions for ORS 783

ORS 783.630 - 783.637
Application, fees and charges for ballast water management reporting

ORS 783.638 Ballast Water Fund
Sources
Uses
(1) The Ballast Water Fund is established in the State Treasury, separate and distinct from the General Fund. Interest earned by the Ballast Water Fund shall be credited to the fund. Moneys in the fund are continuously appropriated to the Department of Environmental Quality to:

(a) Monitor vessels regulated under ORS 783.625 (Definitions for ORS 783) to 783.640 (Reporting of ballast water management);

(b) Screen ballast water management information reported to the department under ORS 783.640 (Reporting of ballast water management);

(c) Inspect vessels and collect samples of ballast water pursuant to ORS 783.640 (Reporting of ballast water management);

(d) Conduct ballast water management policy development and coordination;

(e) Coordinate with other state agencies, agencies of other states and federal agencies on issues related to ballast water management;

(f) Respond to emergencies regarding aquatic invasive species that may have resulted from the discharge of ballast water; and

(g) Provide outreach and consultation expertise to maritime industry stakeholders regarding:

(A) Best practices related to ballast water management.

(B) Standards and procedures adopted by rule by the Environmental Quality Commission under ORS 783.635 (Discharge of ballast water prohibited).

(2) The fund established by subsection (1) of this section shall consist of:

(a) Fees collected pursuant to ORS 783.636 (Fees).

(b) Late charges collected pursuant to ORS 783.637 (Late charges). [2011 c.321 §5]

ORS 783.640 - 783.992
Reporting of ballast water management, penalties

DEQ Administrative Rules on Ballast Water Management:

OAR 340-143 BALLAST WATER MANAGEMENT

340-143-0001 Authority, Purpose, and Scope

(1) These rules establish procedures for management of ballast water, and reporting of ballast water management information as regulated under ORS 783.620 (Discharge of ballast in navigable waters) through 783.640 (Reporting of ballast water management). The rules' purpose is to protect waters of the state from ecological and economic threats associated with aquatic nonindigenous species.

340-143-0005 Definitions
340-143-0010 Ballast Water Management: Discharge Prohibitions
340-143-0020 Ballast Water Management: Reporting, Management Plans and Recordkeeping
340-143-0030 Ballast Water Management: Vessel Inspections
340-143-0040 Ballast Water Management: Emergency Management Alternatives for Vessel's Declaring Safety Exemption Discharge of High-Risk Ballast Water
340-143-0050 Ballast Water Management: Shipboard Ballast Water Treatment Systems
340-143-0060 Ballast Water Management: Ballast Tank Sediment

Oregon Department of Fish and Wildlife (ODFW)

ODFW has the broadest agency responsibility for the management of aquatic invasive animals in Oregon. Under the Importation, Possession, Confinement, Transportation and Sale of Nonnative Wildlife (OAR 635-056), the agency has jurisdiction over the importation, possession, confinement, transportation, and sale of nonnative wildlife.

OAR 635-056 IMPORTATION, POSSESSION, CONFINEMENT, TRANSPORTATION AND SALE OF NONNATIVE WILDLIFE

635-056-0000 Purpose and General Information
635-056-0002 Taxonomy

635-056-0010 Definitions

(10) "Introduced" means a species, subspecies or populations which occur in Oregon because of human action or intervention, rather than natural (nonhuman) colonization or immigration.
…
(14) "Nonnative" means a wildlife species not native to Oregon; foreign or introduced.

635-056-0020 Animals Exempt from These Rules

635-056-0030 Exclusions

635-056-0040 Requirements for Importation and Possession of Live Wildlife

For species, subspecies or hybrids listed as Prohibited or those species not yet classified, a permit will not be issued allowing the importation and possession of live wildlife, except to American Zoo and Aquarium Association (AZA) accredited facilities, colleges, universities and those facilities which can demonstrate compliance with standards as provided in OAR 635-056-0050 (Prohibited Species)(2). For species, subspecies or hybrids listed as Controlled, an importation permit may be required as set forth by the commission. For species, subspecies or hybrids listed as Noncontrolled, no ODFW importation permit is required.

635-056-0050 Prohibited Species

(1) Except as otherwise provided in these rules or other rules of the commission, live wildlife listed below may not be imported, possessed, sold, purchased, exchanged or transported in the state: (See Appendix C4)

635-056-0060 Noncontrolled Species

635-056-0070 Controlled Wildlife Species

At the time the commission categorizes a species, subspecies or hybrid as Controlled, it shall also establish the controls necessary to protect native wildlife. (See Appendix C4)

635-056-0075 Controlled Fish Species

(See Appendix C4)

635-056-0080 Sale of Wildlife
635-056-0090 Transportation
635-056-0100 Holding of Nonnative Wildlife
635-056-0110 Escaped Wildlife

635-056-0130 Classification Requests

(1) For species that are not listed in these rules, no person may possess, import, purchase, sell, exchange, or offer to purchase, sell or exchange the species in Oregon.
(2) Species may be classified as Prohibited, Controlled or Noncontrolled. The classification may vary by activity (e.g., possession allowed, but sale prohibited). If a specific nonnative species, subspecies or hybrid is not classified as either Prohibited, Controlled or Noncontrolled, or is classified but not for a particular activity (e.g., import, sale, possession, transport), any person may either:
    (a) Petition the commission to classify the species or allow the particular activity pursuant to OAR 137-001-0070 (Petition to Promulgate, Amend, or Repeal Rule); or

(b) Request the director to classify the species as Noncontrolled, pursuant to OAR 635-056-0140 (Noncontrolled Classification).
(c) Any person petitioning or requesting classification shall provide information illustrating that the requested action will not harm, nor has the potential to harm, any native species or its habitat. The information should be scientific in nature, in written form and include an appropriate literature cited section.

(3) In evaluating a request to classify a species, subspecies or hybrid, the commission may consider the following factors, when appropriate:
(a) Potential to introduce disease or parasites to native wildlife populations;
(b) Potential for interbreeding or hybridizing with native wildlife;
(c) Possible competition with native wildlife for habitat, food, water, etc.;
(d) Impacts on the habitat of native wildlife;
(e) Potential predation on native wildlife;
(f) Feasibility of capturing and eradicating escaped animals;
(g) Cost of capturing and eradicating escaped animals; or
(h) Any other factor or consideration the commission considers necessary to protect and maintain native wildlife.
(i) How is the species categorized in "The IUCN Red List of Threatened Species?
(j) Is the species commercially propagated? Unknown, rarely, moderate, common

(4) The director may appoint a Wildlife Integrity Review Panel to consider the information presented by the petitioner as appropriate. The director may, in appointing the panel, consider scientific expertise, professional background, and other qualifications needed to make sound decisions. The director may seek commission recommendations in making Wildlife Integrity Review Panel appointments. If convened, the panel shall make a recommendation to the commission on the classification of the species, subspecies or hybrid and what conditions, if any, should apply to the proposed activity (e.g., import, sale, possession, transfer).

(5) The director may call for scientific based studies or other verifiable information useful in placing the requested species in the appropriate classification category.

635-056-0140 Noncontrolled Classification
635-056-0150 Grandfathering

Oregon State Marine Board (OSMB)

The OSMB is the state agency responsible for managing recreational boating and has the lead role in implementing the AISPP (see above). This permit program is an important funding mechanism for boat inspection teams, public education and outreach efforts, and other related AIS awareness and prevention activities.

OAR 250-010-0650 Aquatic Invasive Species Prevention Permit

(1) The owner of a boat for which fees for a certificate of number or registration under ORS 830.790 (Certificate or registration fees) are required will pay an aquatic invasive species prevention permit fee of $5 per biennium at the time of boat registration.

(a) The registration validation stickers are in lieu of an Aquatic Invasive Species Prevention Permit.
(b) The validation stickers are non-transferable.

(2) Out-of-state motorboats and out-of-state sailboats 12 feet in length or more that would be required to be registered in Oregon per ORS 830.790 (Certificate or registration fees) shall carry an out-of-state aquatic invasive species prevention permit on board when in use on waters of the state. Out-of-state motorboat permits are transferrable between multiple motorized boats.
(a) Watercraft registered in Washington or Idaho that launch directly into waters that form a common interstate boundary, or launch in Oregon tributaries within one mile of these waters, that have a current boat registration, Coast Guard documentation, or an aquatic invasive species prevention permit issued by the States of Idaho or Washington, are exempt from this requirement.
(b) The name on the permit does not need to match the name of the person operating the boat.

(3) A $20 annual Aquatic Invasive Species Prevention Permit may be purchased for motorized race boats which are owned by Oregon residents but that are otherwise exempt from registration under OAR 250-010-0150 (Exemptions)(2).

(4) (4) Boats required to carry permits must present their permit for inspection upon request by a law enforcement officer.

(5) A person is considered in violation of the provisions contained in this rule and subject to the penalties prescribed by law when they:
(a) Alter an aquatic invasive species prevention permit; or
(b) Produce or possess an unauthorized replica of an aquatic invasive species prevention permit; or
(c) Exhibit an altered Aquatic Invasive Species Prevention Permit to a peace officer.

(6) The following vessels or classifications are exempt from the requirement to carry an Aquatic Invasive Species Prevention Permit:
(a) Watercraft registered in Washington or Idaho that launch directly into waters that form a common interstate boundary, or launch in Oregon tributaries within one mile of these waters, that have a current boat registration, Coast Guard documentation, or an aquatic invasive species prevention permit issued by the States of Idaho or Washington.
(b) Boats owned by the federal government, or by a state, county, or municipal government.
(c) Eleemosynary-owned boats which a supervising adult can confirm through documentation are engaged in an organization-related activity.
(d) A ship's lifeboat used solely for lifesaving purposes.
(e) Seaplanes

OAR 250-010-0660 Watercraft Inspection Stations

1) For the purpose of this rule, the following definitions apply:
a) "Check Station" is a location in Oregon that a watercraft inspection team has designated for conducting watercraft inspections for aquatic invasive species.
b) "Decontamination" is the removal of aquatic invasive species from a watercraft.

c) "Inspector" is an individual certified and authorized by the Oregon Department of Fish and Wildlife to conduct boat inspections for aquatic invasive species.
d) "Inspection Certificate" is a form used by the inspector to conduct and record watercraft inspection information.
e) "Seal" is a plastic zip tie or cable with a unique number that is affixed to the trailer or other device to carry or convey the watercraft.
f) "Watercraft Inspection Team" is one or more inspectors authorized to inspect for aquatic invasive species on all types of watercraft being transported over roads.
g) "Watercraft" are recreational or commercial, motorized and non-motorized boats, including canoes, kayaks and rafts, as provided in ORS 830.005 (Definitions for chapter), and any equipment used to transport a boat and any auxiliary equipment, as provided in ORS 570.850.

2) The watercraft inspection team will select Oregon locations to conduct mandatory watercraft inspections as described in the Oregon Department of Fish and Wildlife Aquatic Invasive Species Watercraft Inspection Handbook. Signs will be placed along roads, as prescribed by the Oregon Department of Transportation, directing motorists transporting a watercraft over roads to a designated inspection station.
3) The watercraft inspection team will inspect every watercraft that enters the check station for the presence of aquatic invasive species and may order decontamination of the watercraft. The inspection will include the hull, motor, propulsion system or component, anchor or other attached apparatus, trailer or other device used to transport the boat, and the bilge, live-well, motor-well and other interior locations that could harbor aquatic plants or animals.
4) The watercraft inspection team will complete, submit and file an inspection certificate with the Oregon Department of Fish and Wildlife for each watercraft inspection conducted.
5) The watercraft owner, operator or carrier must provide to the inspector, on request, his or her name and ZIP code. If an inspector determines that decontamination is required, the owner, operator or carrier must provide the additional information requested on the inspection certificate form including contact information.
    a) The decontamination process will include the hull, motor, propulsion system or component, anchor or other attached apparatus, trailer or other device used to transport the watercraft, bilge, live-well, motor-well or other interior location that could harbor aquatic plants or animals.
    b) Means of decontamination include, but are not limited to, one or more of the following: hot water washing or flushing, high-pressure water jets, hand removal and chemical treatment as determined necessary by the watercraft inspection team.
6) The inspector will determine that the watercraft is a severe risk if the boat contains quagga or zebra mussels or other high risk aquatic invasive species, as defined in Oregon Department of Agriculture OAR chapter 603, division 052 "Quarantine; Noxious Weeds" or Oregon Department of Fish and Wildlife OAR chapter 635, division 056 "Importation, possession, confinement, transportation and sale of nonnative wildlife", or is of a design that prevents or inhibits effective on-site decontamination and the watercraft is from a known aquatic invasive species contaminated waterbody. In such cases, the inspector will place a seal on the watercraft indicating potential contamination. Only the inspector may

attach this seal. Tampered, broken or removed seals are void and no longer valid for the purposes as to when they were attached.

7) When the inspector determines the watercraft is clean or fully decontaminated, the inspector will attach a seal between the watercraft and trailer or other carriage device indicating a completed inspection. Only the inspector may attach this seal. Tampered, broken or removed seals are void.

Portland State University - Center for Lakes and Reservoirs

The Center for Lakes and Reservoirs (CLR) at Portland State University (PSU) was established in 2001 by the Oregon State legislature to address lake management and invasive aquatic species issues in Oregon (HB 2198)

HB 2198 An Act Relating to Portland State University
SECTION 3.
(1) Pursuant to ORS 351.870, there is created within the Department of Higher Education the Center for Lakes and Reservoirs. The Center for Lakes and Reservoirs shall be administered by Portland State University.
(2) The purpose of the Center for Lakes and Reservoirs is to assist state and federal agencies in researching and mitigating nonindigenous, invasive aquatic species in this state and to work with communities in developing effective management of lakes and reservoirs.

Appendix F: 2023 Plan Revisions

Over the course of the plan revision process, the Steering Committee was asked to evaluate the original list of Objectives, Strategies, and Actions. Committee members were asked to determine whether the actions had been completed, were no longer relevant, or should be considered for the revised plan. The revised Oregon ANS Plan eliminated the original list of objectives choosing to reorganize around the following six objectives, rewritten to reflect those in the Statewide Strategic Plan for Invasive Species (OISC, 2017), as well as the national Aquatic Nuisance Species Task Force Strategic Plan (ANSTF, 2020).

> Objective 1: Prevention
> Objective 2: Early Detection and Rapid Response
> Objective 3: Control and Management
> Objective 4: Education and Outreach
> Objective 5: Coordination and Leadership
> Objective 6: Research, Evaluation, and Development

The 2001 Oregon ANS Management Plan contained the following:

- 6 Objectives
- 20 Strategies
- 89 Action Items

The revised 2023 Oregon ANS Management Plan contains:

- 6 Objectives (all new)
- 26 Strategies
- 113 Action Items

Deleted Actions

Thirty-one actions were selected by the Steering Committee for removal from the original action item list. Nineteen of these were marked as completed. These included several discrete research projects, for example:

> *4A1. Explore the development of boat washing stations at infested waterbodies* completed and reported in "Tenmile Lake Boat Wash Effectiveness Monitoring" (Cimino and Strecker, 2014).

Also included in the deleted actions are actions that are now established in statue or otherwise resolved, for example:

> *2A4. Investigate the development of an inspection program for trailered boats and waterbased equipment entering Oregon* which is now covered under ORS 830.589.

Other actions items referenced potential state projects that have since been superseded by state, regional or national projects, for example:

> *6C2. Create and coordinate a central database of information on ANS*, which has been done through Oregon's Invasive Species Hub <https://www.oregoninvasivespeciescouncil.org/infohub> database as well as the USGS Nonnative Aquatic Species database and iMapInvasives Oregon.

Of the remaining 12 deleted actions, 7 were marked as no longer relevant, for example:

> *5A7. Develop ANS identification cards to be distributed with hunting and fishing licenses* – There are limited opportunities for distributing printed materials as licenses are issued as electronic receipts.

The remaining were marked as suitable for combining into a single action, for example:

> *1B1. Participate in the Aquatic Nuisance Species Task Force's Western Regional Panel* and *1B2. Support the PSMFC regional coordination effort* were combined into 5.3.1 Participate in regional AIS management efforts, including but not limited to the Western Regional Panel, 100th Meridian Columbia River Basin Team, Pacific Ballast Water Group, Pacific Northwest Economic Region, Western Invasive Species Coordinating Effort, etc.

Complete list of deleted actions:

> 1A1. Administer the Invasive Species Council.
> 1A11. Identify a state agency to be assigned jurisdiction over macroinvertebrates and microorganisms.
> 1A12. Assign a priority class to all established nonindigenous aquatic species present in Oregon.
> 1A2. Create and fund an ANS coordinator position within the ISC.
> 1A4. Establish and administer a permit program for ANS management efforts.
> 1A6. Develop an ANS management class for agency personnel, watershed council coordinators, and others.
> 1B1. Participate in the Aquatic Nuisance Species Task Force's Western Regional Panel.
> 1B2. Support the PSMFC regional coordination effort.
> 1B3. Support the 100th Meridian Project.
> 1B4. Participate in the Pacific Ballast Water Group.
> 2A1. Complete the Port of Portland's shipping traffic risk assessment.
> 2A4. Investigate the development of an inspection program for trailered boats and waterbased equipment entering Oregon.
> 2A6. Explore the possibility of distributing free boat washing token or coupons with the purchase of an out-of-state fishing license or a new boat registration to be used at car washes.
> 2B4. Publicize existing penalties for the intentional introduction of any nonindigenous species to Oregon's waters.

2C3. Establish Aquatic Vegetation Integrity rules for imported aquatic plants similar to ODFW's Wildlife Integrity rules.
2D1. Establish the authority to detain and require cleaning of any vehicle, vessel or water based equipment containing or infested with ANS that is traveling in Oregon.
2D2. Increase the ability of the State to regulate the importation of aquatic organisms (see 2C1).
2D3. Establish the authority to quarantine waterbodies to prevent ANS from spreading and to contain ANS for future eradication.
2D5. Develop cooperative agreements with states that share common waters.
3A8. Implement the mitten crab monitoring and outreach plan.
4A1. Explore the development of boat washing stations at infested waterbodies.
4B2. Continue implementation of an integrated aquatic weed control program at Lake Lytle.
4B3. Continue the control of Japanese knotweed in the Sandy R.
4B4. Develop and implement aquatic weed management plans for waterbodies on the 303-d list due of the presence of aquatic weeds.
4B6. Develop control programs for all category 2 species.
5A7. Develop ANS identification cards to be distributed with hunting and fishing licenses.
5B2. Produce a legislative manual outlining the threats of ANS, management alternatives, and the funds needed to address ANS in Oregon.
6A1. Conduct a stomach analysis study on bass in Tenmile Lake for predation on coho salmon juveniles.
6A4. Develop a better understanding of the biology and control of Egeria, the most abundant and problematic aquatic weed in Oregon.
6A6. Research the impacts of Mosquitofish on native species, and the potential to develop a native species for mosquito control.
6C2. Create and coordinate a central database of information on ANS.

Major Revisions

The remaining list of 58 actions from the original plan were evaluated, updated, and expanded by the Steering Committee and through one-on-one interviews with each of the agencies responsible for managing AIS in Oregon. Many were updated or otherwise revised to reflect continuing participation or support for the actions. Numbering of these actions was altered by the decision to rename the objectives to align with those in the Statewide Strategic Plan for Invasive Species (OISC, 2017), as well as the national Aquatic Nuisance Species Task Force Strategic Plan (ANSTF, 2020). Sources that inspired new actions (bringing action item total to 113) include the following documents:

- ANSTF Plan Development guidance documents
- Columbia River Basin Interagency Invasive Species Response Plan: Dreissenid spp. (2018)
- Effects of Climate Change on Aquatic Invasive Species and Implications for Management and Research (2008)
- Columbia Basin Flowering Rush Management Plan (2019)

- Oregon Noxious Weed Plan
- Oregon Spartina Response Plan (2007)
- Quagga-Zebra Mussel Action Plan for Western U.S. Waters (2010) (updated in 2020)
- Statewide Management Assessment of Invasive Species in Oregon (2010)
- Statewide Strategic Plan for Invasive Species 2017-2027
- Wapato Revival Plan (2021)
- Summary of Western States' Aquatic Invasive Species Outreach Campaigns: Target Audiences, Messaging, Delivery, and Lessons Learned (2021)

All actions in the Implementation Table were sent to the OISC for review prior to inclusion in the draft Oregon ANS Plan that was subsequently released for comment to the Advisory Panel and distributed for public comment in May 2023.