

REGIONAL AQUATIC INVASIVE SPECIES STRATEGY AND MANAGEMENT PLAN

June 2011

Pacific Northwest Region, USDA Forest Service

THE THREAT

New Zealand mudsnails have been documented replacing 90% of native macroinvertebrate community biomass in the bed of a river, just one year after the detected invasion, significantly disrupting the river food chain (Stenberg 2009 and Howell et al. 1993). Nonnative brook trout have displaced native cutthroat trout and bull trout populations and affected Threatened bull trout population genetics (Gunckel et al. 2002). Prolific zebra and quagga mussels have transformed lake ecosystems they have invaded, covering any substrate available for attachment and depositing their sharp shells where water recreationists cut their feet (Ontario Federation of Anglers and Hunters 2011). Nonnative elodea and Eurasian watermilfoil develop thick mats of vegetation in lakes they have invaded, affecting native aquatic biota and eliminating water recreation (USGS 2011). Knotweed and tamarisk can dominate riparian areas to the extent of affecting adjacent aquatic habitat physically, chemically, and by disrupting food webs (Peihong et al. 2010 and DiTomaso 1996). These are examples of the severe impacts known aquatic invasive species (AIS) have on aquatic and riparian habitat and populations and their uses. If not already present, these species have the potential to invade the waters of the Pacific Northwest. For every known invader, there's a suite of others on the horizon.

While the environmental and recreational impacts from AIS are significant, the economic cost to battle the invasion is staggering. The total U.S. cost from invasive species is estimated at greater than \$143 billion per year (Cusack et al 2009). The cost from zebra and quagga mussels alone is estimated at \$1.12 billion annually (Cusack et al 2009). The cost of aquatic weed management in the United States exceeds \$250 million per year (Weed Science Society of America 2011). The threat requires interagency action. This plan reflects the Pacific Northwest Region's action to cooperatively address these threats.

AGENCY DIRECTION AND RESPONSIBILITIES

A 2010 Office of Inspector General audit of USDA Forest Service invasive species program found it lacked many of the internal controls ordinarily associated with the effective stewardship of Federal funds, such as a proper control environment, an overall assessment of the risks posed by invasive species, effective control activities, effective communication of relevant information within the agency, and adequate monitoring of the program's performance.

Whether they are plants, invertebrates, vertebrates, or disease-causing pathogens that are non-native to an ecosystem, invasive species can cause harm to the environment, the economy, and human health. The USDA Forest Service has the responsibility to sustain the health, diversity, and productivity of the Nation's forests and grasslands. The National Forest Management Act requires the agency to maintain viable populations of native species across the landscape. To maintain populations of native species, the agency is responsible for preventing the introduction

of invasive species into the lands it manages, and combating those invasive species that have already been introduced. The Forest Service Manual provides additional direction that supports Forest Service action against AIS.

- 2602-Objectives: Maintain ecosystem diversity and productivity by maintaining at least viable populations of all native and desired nonnative wildlife, fish, and plants in habitats distributed throughout their geographic range on National Forest System lands.
- 2603 Policy: Serve the American People by maintaining diverse and productive wildlife, fish and sensitive plant habitats as an integral part of managing National Forest ecosystems. This includes recovery of threatened or endangered species, maintenance of viable populations of all vertebrates and plants, and production of featured species commensurate with public demand, multiple-use objectives and resource allocation determined through the land management planning process.
- 2670.22 Sensitive Species
 - Develop and implement management practices to ensure that species do not become Threatened or Endangered because of USFS actions.
 - Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.
 - Develop and implement management objectives for populations and/or habitat of Sensitive species.
- 2670.31 Threatened and Endangered Species: Place top priority on conservation and recovery of Endangered, Threatened, and Proposed species and their habitats through relevant National Forest System, State and Private Forestry, and Research activities and programs.
- 2670.32 Sensitive Species: Avoid or minimize impacts to species whose viability has been identified as a concern.

Additional direction can be found in:

- Federal Noxious Weed Act of 1974 (Section 15, Management of Undesirable Plants on Federal Lands): Section 15 of the Act requires Federal land management agencies to develop and establish a management program for control of undesirable plants that are classified under State or Federal law as undesirable, noxious, harmful, injurious, or poisonous, on Federal lands under the agency's jurisdiction.
- Executive Order 13112: Federal invasives programs are guided by this executive order which defines an invasive species as “an alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” The order also states that federal agencies shall “prevent the introduction of invasive species...” and “not authorize, fund, or carry out actions

that it believes are likely to cause or promote the introduction or spread of invasive species in the United States...” The executive order was issued in 1999 to enhance federal coordination and response to the complex and accelerating problem of invasive species.

- USDA Departmental Regulation Number 9500-10: 1990 Departmental regulation establishing department policy in the coordination and management of weed activities of USDA agencies. This includes direction for protection, research/development, protection, cooperation, outreach/education, and inventory of noxious weeds.
- Forest Service Manuals 2080 and 2900 (in development)

COLLABORATION

The formidable threat of AIS can only be effectively addressed through collaboration among agencies, organizations, and the public. The challenge is too expensive in human power and finances for an agency to address alone. While everyone shares some responsibilities (such as ensuring they are not transporting AIS between watersheds), some agencies or organizations may be responsible for taking the lead in other management actions (such as the selling and management of boat stickers by the states). The Forest Service has responsibilities to help prevent AIS invasions on agency land, limit the spread of established populations on Forests, assist in the education of resource users to minimize spread, and foster collaboration among internal and external partners.

MISSION STATEMENT

Our mission is to cooperatively develop and implement effective programs that address the threat of aquatic invasive species throughout the Pacific Northwest Region of the Forest Service.

AIS STRATEGY GOALS

- Prevent new introductions of AIS into waters of the Region.
- Limit the spread of established populations of AIS into uninfested waters.
- Provide a cooperative environment that encourages coordinated activities among all affected parties throughout the Region.

GOALS AND OBJECTIVES

Goal: Prevent new introductions of AIS into waters of the Region.

- *Help to foster a public that understands their role in AIS prevention*
 - *Teach the public that use waters of the Region to inspect, clean, dry and to drain their watercraft.*
 - *Develop and/or adopt a marketing campaign that is consistent throughout the Region and consistent with national efforts.*
 - *Develop and/or adopt universal signage to be used around infested waters.*

- *Foster cooperation between State, Federal, University, and NGO AIS efforts.*
 - *Develop an agency understanding of AIS prevention*
 - *Cooperate with the agency fire organization to incorporate protection against the spread of AIS in fire management operations.*
 - *Institutionalize behaviors and procedures that reduce potential for spread*
 - *Identify and capitalize on opportunities to foster an understanding of the AIS threat among agency personnel, including contractors, permittees, and volunteers.*
 - *Identify and interrupt pathways of introduction*
 - *Identify and address key AIS vector routes*
 - *In cooperation with other agencies and organizations, develop a strategic and efficient network of cleaning/treatment infrastructure*
 - *Develop or adopt standard cleaning protocols for agency personnel*
 - *Identify and develop consistent inspection protocols*
 - *Integrate Hazard Analysis Critical Control Point (HACCP) planning inot the standard operating procedures of the agency. For more information on HACCPs, refer to <http://www.haccp-nrm.org/>*
- *Goal: Limit the spread of established populations of AIS into uninfested waters.*
 - *In cooperation with our partners, inventory and monitor the Region's aquatic habitats to determine presence and distribution of AIS*
 - *Prioritize specific bodies of water for surveying*
 - *Identify existing survey methodologies.*
 - *Adopt and/or develop universal/consistent/comparable survey methodologies*
 - *Use existing databases to capture survey data.*
 - *Develop uniformity among AIS survey efforts across the region.*
 - *Develop a uniform AIS identification training program for stream surveyors (AREMP, PIBO, Level II Stream Surveyors) and other field-going personnel.*
 - *Identify regional reference experts for advanced identification of AIS*
 - *In cooperation with our partners, adopt and implement an early detection and rapid response system*
 - *Develop a communication structure within the Region*
 - *Define authorities and responsibilities in a rapid response model*
 - *Define response protocol*
 - *Utilize current models of collaboration in a rapid response scenario*
 - *Develop a network of AIS experts that can assist on species identification during rapid response events*
 - *Integrate efforts with existing national reporting systems*
 - *Articulate what research and technology needs are within the Region*
 - *Continue to encourage additional research*
 - *Work in partnership with PNW Research Station and other research organizations to address these needs.*

- *Work with other agencies to strategize need and location of wash stations.*
- Goal: Foster a cooperative environment that encourages coordinated activities among all affected parties throughout the Region.
 - *Pool resources where appropriate to achieve goals and eliminate duplicity*
 - *Coordinate with national, regional, and local efforts, including state AIS programs, 100th Meridian Basin Teams, state invasive species councils, and Western Regional Panel.*

PREVENTING NEW INTRODUCTIONS OF AIS INTO THE REGION'S WATERS

The Pacific Northwest Region of the Forest Service has established the goal to prevent new introductions of aquatic invasive species. There are three objectives associated with the goal; foster public understanding and action, develop agency awareness and facilitate action, and identify and interrupt introduction pathways. These objectives are inter-related and dependent upon each other in the protection of the health of our watersheds. The actions and their associated costs are described below.

Fostering a Public that Understands their Role in the Prevention of AIS

Given that the main method of transporting AIS is through human activities, the success of our entire strategic plan rests on the success of our outreach efforts to engage the public through active participation in prevention efforts. The success of the AIS Program, locally, regionally, nationally, and globally depends upon the public. There is a need to foster understanding of the threat that AIS poses to them and their role in its prevention and control. There is a need to teach people to inspect/clean/dry, develop consistent social and product marketing plans throughout the Region, develop signage to post near waters infested with AIS, and foster cooperative relationships with Oregon and Washington state AIS programs, NGO programs, university programs, the US Fish and Wildlife Service AIS program, and other federal agency AIS programs.

What:	Integrate AIS education into existing community outreach programs including Salmon Watch, Cascade Stream Watch, Free Fishing Day, sportsmen shows, and school, scout, and outdoor enthusiast presentations.
Who:	Regional, Forest, and District Personnel. Regional Invasive Species Coordinator and Fisheries Biologist will recommend programs and materials.
When:	Ongoing
What:	Identify and adopt AIS curriculum for schools and distribute to Forests and Districts for relatively uniform outreach schools programs.
Who:	Regional, Forest, and District Personnel. Regional Invasive Species Coordinator and Fisheries Biologist will recommend programs and materials.
When:	2012
What:	Train available recreation personnel (particularly those with regular contact with water recreationists such as river rangers and campground personnel) in invasive species identification and boat inspection. This can be integrated into existing scheduled training or independent training sessions can be established.
Who:	Available Forest and District Recreation personnel (particularly those with regular contact with water recreationists such as river rangers and campground personnel) and others that have regular contact with the public. State AIS Management Personnel are available to train willing and available FS personnel.
When:	Initiate in 2012 and continue annually.

What:	Adopt an existing or, if not existing, establish a universal visitor questionnaire to collect AIS vector data. Adopt state questionnaires if available and appropriate. If they do not exist, develop a universal regional questionnaire. Through coordinating with partners, determine where questionnaires are currently being administered and what agencies are doing this work, in order to enhance our efficiency and effectiveness. When time and opportunity allow, Forest and District personnel who have regular contact with water recreationists will administer the questionnaire. Field personnel will annually submit completed visitor questionnaires to the Regional Fisheries Biologist. At the end of the calendar year, the Regional Fisheries Biologist will submit the completed questionnaires to the 100 th Meridian for entry into the National AIS Database. Coordinate this effort with other agencies and organizations collecting similar data.
Who:	Regional Fisheries Biologist, Invasive Species Coordinator, and Forest and District personnel who have regular contact with water recreationists. This should be in coordination with other agencies and organizations conducting this work.
When:	Questionnaires will be adopted from existing State efforts or developed in 2011 and administered to water recreationists annually starting in 2012. Completed questionnaires will be submitted to the 100 th Meridian at the end of each calendar year by Regional Fisheries personnel.
What:	Adopt or, if not available, develop an AIS product and social marketing campaign that is consistent throughout the region and consistent with national campaigns. Use visitor questionnaire to supplement data for marketing.
Who:	Regional Fisheries Biologist will lead this effort in coordination with the Public Affairs Staff and the Washington Office and will communicate campaign parameters to the Forests. Due to limited availability of social marketing skills within the agency, much of this work will likely be conducted by a consultant.
When:	If an AIS product and social marketing campaign is currently available and applicable to the Region, it will be adopted and implemented in 2012. If it has to be created, it will be completed in 2013.
What:	Develop or adopt universal AIS signage to be posted around infested waters to decrease the potential of AIS spread.
Who:	Regional Fisheries Biologist and Regional Invasive Species Coordinator, in coordination with states.
When:	2013
What:	Identify, secure, and distribute appropriate AIS handout material for the public in field offices and public contacts. If appropriate handouts/brochures don't exist, create them. Maintain consistency throughout Region.
Who:	Regional Fisheries Biologist, Regional Public Affairs Officer, Regional Invasive Species Coordinator, and Recreation in coordination with states.
When:	2012

Developing an Agency Understanding of AIS Prevention and Safeguards

The USDA Forest Service is a conservation leader, typically leading by example. Many agency employees use and/or work near water. Certain precautions and actions need to be incorporated into our day-to-day activities to decrease the potential of spread AIS while conducting our duties.

What:	USFS fire organization will adopt equipment cleaning protocol that will decrease the potential of AIS spread between drainages.
Who:	Regional Fire Information Specialist in cooperation with Regional Fisheries Biologist
When:	Completed for 2011, will be updated annually.
What:	Inspect key AIS cleaning and inspection references and determine additional tools that would be useful to adopt. These would include: Bureau of Reclamation Zebra Quagga Mussel Website: http://www.usbr.gov/mussels/ USBR Equipment Inspection and Cleaning Manual: http://www.usbr.gov/mussels/prevention/docs/EquipmentInspectionandCleaningManual2010.pdf Dry Time Calculator: http://www.100thmeridian.org/emersion.asp Provide Fire Organization with hot water pressure washer sources and encourage their procurement during wildfire incidents for use to decontaminate firefighting gear.
Who:	Regional Fire Organization and Regional Fisheries Biologist
When:	2012
What:	Develop an AIS distribution map featuring focal invasive species in the Pacific Northwest to be used by the USFS/BLM fire organization when determining water sources for fire suppression operations. Although precautions should be implemented whenever transporting water between watersheds, additional caution will be emphasized when working in or around the AIS infested areas identified on the map. See Appendix II.
Who:	Regional Fisheries Biologist, Regional Invasive Species Coordinator, and USGS
When:	2011
What:	Develop a short introductory AIS slideshow to be distributed to the field to be used during annual fire crew trainings to develop informed and supportive field personnel
Who:	Regional Fisheries Biologist will prepare the slideshow. Forest and/or District Fisheries Biologists or other appropriate personnel will show it at fire crew trainings.
When:	The slideshow was developed and distributed May 2011 and will be presented annually.
What:	Develop and schedule AIS presentations/briefings for Forest Leadership Team meetings throughout the region to foster localized pockets of understanding and support. Request assistance from State AIS Coordinators to present at each Forest.
Who:	Regional Fisheries Biologist will coordinate scheduling between the Forests and State AIS Coordinators. State AIS Coordinators will present.
When:	Ongoing in 2011.
What:	Adopt or Develop a regional field gear decontamination protocol for field units to use when in or around water.

Who:	Regional Fisheries Biologist, Regional Invasive Species Coordinator, and Pesticide Use Coordinator.
When:	2011
What:	Adopt, develop, or reinforce heavy equipment decontamination policy and ensure it is included in contracts for water-related projects. Ensure this issue is addressed in Forest Plans.
Who:	Regional Fisheries Biologist, Regional Invasive Species Coordinator, Regional Contracting Officer, and Special Use Administrator
When:	2012
What:	Phase in feltless wading systems as budget allows for FS field personnel that wade frequently unless there's an associated safety concern. Identify appropriate types of feltless wading shoes/waders available and share findings with Forests. As an interim alternative, provide the Forests with decontamination options for their incorporation into Forestwide gear treatment policy to be developed by the 2012 field season. Provide feltless options and gear treatment protocols to Forests by letter during winter of 2011-2012.
Who:	Regional Fisheries Biologist, Regional Hydrologist, Letter from Regional Office
When:	2012
What:	Train appropriate field-going personnel in the identification, survey, and documentation of AIS. Where needed, train personnel in boat washing. Invite field-going personnel to participate in the AREMP and Level II crew AIS training.
Who:	Regional Fisheries Biologist, Regional Invasive Species Coordinator, AREMP leader, and others in cooperation with AIS experts at Portland State University and Oregon State University and the State AIS Coordinators.
When:	2012 and annually

Identify and Interrupt Pathways to Introduction

The expansion of the range of particular AIS is not random. The potential of AIS introduction/spread is higher along popular vectors and those vectors can be determined and safeguards implemented to decrease the overall potential of AIS introductions. This is necessary for an efficient and effective AIS program.

What:	In cooperation with State AIS Coordinators and USFWS Regional AIS Coordinator, use water recreationist questionnaire data and additional 100 th Meridian data to determine most popular waters for recreationists coming from AIS infested areas outside the Region. Identify the routes taken to popular regional waters from AIS infested areas outside the region. Incorporate safeguards at strategic locations along the route to interrupt the pathways of introduction that may include signage, an inspection station, a wash station, enforcement, or other measures.
Who:	Regional Fisheries Program and Regional Invasive Species Coordinator in Coordination with State AIS Coordinators, Recreation, Universities, and USFWS Regional AIS Coordinator.
When:	2012

What:	Adopt a standard protocol for inspecting and cleaning water vessels and field gear and communicate it to the field.
Who:	Regional Fisheries Biologist and State AIS Coordinators
When:	2011.
What:	Annually review questionnaire data and inventory/monitoring data to verify our understanding of AIS vectors. Change management strategy if vectors change.
Who:	Regional Fisheries Biologist, Regional Aquatic Invasive Species Coordinator, and AREMP Leader.
When:	Annually

LIMITING THE SPREAD OF ESTABLISHED AIS POPULATIONS INTO UNINFESTED WATERS

AIS populations have been established within the region and it is the responsibility of those that use and manage natural resources in the region to limit the spread of those populations. The inventory and monitoring of AIS, adopting an early detection/rapid response strategy, and facilitating research/development help to limit the spread of established AIS populations into uninfested waters. Wash stations are also addressed.

AIS Surveys/Early Detection

A primary need to limit the spread of established AIS populations is to determine where they occur. There are currently 3 major aquatic habitat survey efforts conducted by the Forest Service occurring in the Region; Aquatic and Riparian Effectiveness Monitoring Program for the Northwest Forest Plan (AREMP), Pacific Anadromous and Inland Fish Strategy Biological Opinion monitoring (PIBO), and Level II Stream Survey. Each survey effort can be used to collect biological AIS data in a coordinated fashion and the data can be entered into a common database. The survey crews should receive consistent training in species identification and survey protocol. Surveys should occur at locations and in a frequency that can detect invasion in a timely fashion. This may require additional survey effort beyond existing strategies.

What:	Adopt or develop a standardized AIS inventory and monitoring protocol for use on the Forests to supplement data collected by the PIBO, AREMP, and Level II survey teams.
Who:	Regional Fisheries Biologist for use by Field Biologists, Regional Invasive Species Coordinator, and AREMP Leader.
When:	2012
What:	To the degree possible, coordinate AIS inventory and monitoring protocols between PIBO, AREMP, and Level II Stream Survey Crews.
Who:	Regional Fisheries Biologist and leaders from PIBO, AREMP, and Level II survey crews.
When:	Initial coordination between crews complete. Additional refinement ongoing.
What:	Identify regional reference experts for advanced identification of AIS. Distribute contact information to the field. Use these experts to provide consistent training for field crews.
Who:	Regional Fisheries Biologist, Regional Invasive Species Coordinator, State Aquatic Invasive Coordinators
When:	2011
What:	Identify national database for AIS monitoring and inventory data. Use the Forest Service database NRIS for initial data entry and develop crosswalk between NRIS and identified national database (USGS NAS database). Communicate database choice to the field and regional survey efforts.

Who:	Regional Fisheries Biologist, National Fisheries Biologist, NRIS, R4 Aquatic Invasive Species Coordinator, and Washington Office.
When:	2011 and ongoing.

Rapid Response

It is obviously best to prevent further introductions of AIS into the region. However, thought should be given upfront to the containment/treatment of AIS if they are introduced. Abating the impacts of AIS is time consuming, costly, and often ineffective. However, not attempting any control of AIS is inviting further spread within the Region and contamination to other outside areas. Removing or even lessening a well-established AIS problem within a waterway is at times unrealistic. However, in many such situations much can be done to contain the problem and prevent further spread to unaffected waters. Such measures may involve mandatory inspections and cleaning, or even local seasonal closures or quarantines.

District, Forest, and Regional personnel must have access to rapid response plans for appropriate action to AIS detection. Updated contact lists are essential. These plans have been or are being created in an interagency fashion. The agency will participate in the creation/update/revision of these plans and in associated practice drills.

What:	Provide Forests with a rapid response protocol and guidance to be used if they believe they detected the presence of a new AIS population.
Who:	Regional Fisheries Biologist and Regional Invasive Species Coordinator
When:	2011
What:	Participate in Rapid Response planning and practice exercises for AIS and where the opportunity arises and it is appropriate, sign on to existing AIS response plans such as the Columbia Basin Rapid Response Plan for Zebra and Quagga Mussels.
Who:	Regional Fisheries Biologist, Regional Invasive Species Coordinator, and appropriate Forest personnel, depending on scale of Rapid Response plan or drill.
When:	Ongoing
What:	Identify appropriate AIS reporting mechanism in case of discovery of a population and make information available to the Forests.
Who:	Regional Fisheries Biologist and Regional Invasive Species Coordinator
When:	2012
What:	Update AIS contact lists for use in a rapid response exercise
Who:	Regional Fisheries Biologist and Regional Invasive Species Coordinator
When:	Annually
What:	Ensure states and federal agencies have general containment plans that are

	applicable to typical AIS scenarios throughout the Region.
Who:	Regional Fisheries Program and Regional Invasive Species Coordinator
When:	2012
What:	Facilitate or assist in the development of containment plans in high priority areas where they do not exist.
Who:	Regional Fisheries Program and Regional Invasive Species Coordinator
When:	2013
What:	Outline feasible treatments and necessary procedures for Forests. Provide support for NEPA efforts.
Who:	Regional Fisheries Program, Regional Invasive Plant and Pesticide Use Program.
When:	2012

Regional Research and Development Needs

Research and development is imperative in the battle against AIS. Currently few tools exist to eradicate AIS populations if they become established. We need to continue to develop methods to address invasions. Each AIS may require a different method of treatment, if one even exists for the species. Research branches of agencies such as USDA Forest Service, US Army Corps of Engineers, and US Geological Survey can potentially provide those services. In addition, universities such as Portland State and Oregon State may be good sources of AIS information and research.

To ensure we are equipped with the tools and methods to abate ecologic, socioeconomic, and public health/safety impacts from AIS introductions, we need to identify research and technology needs within the Region and encourage additional research.

The science of how to effectively contain, control, and eradicate AIS populations continues to develop. It is important to stay current with the latest methods and techniques and to encourage the development of new methods when necessary. The Regional AIS Plan supports scientific research within state and federal agencies and academic institutions that investigate potential control strategies and associated environmental impacts. Identification of what the AIS research needs are within the Region will be an ongoing process as infestations occur and new threats are detected. Possible topics for current research needs include inventories, vectors, high priority waters, high probability waters, most probable invaders, rates of spread, and ecological impacts. It is important to participate in a technology transfer program to be used to distribute research findings.

What:	Determine what AIS research and development needs occur within the region and communicate needs to research and universities.
Who:	Regional Fisheries Biologist and Regional Invasive Species Coordinator
When:	Annually

What:	Remain current with latest applicable abatement research and techniques
Who:	All personnel
When:	ongoing
What:	Facilitate the development of applicable abatement techniques when necessary through contributing funding, personnel, and study sites when possible
Who:	Regional and Forest offices
When:	ongoing

Wash Stations

There is a need to develop a strategic network of cleaning/treatment infrastructure and adopt a standard cleaning protocol. AIS and natural ecosystems don't observe political boundaries. Likewise, successful suppression or prevention necessitates an effort that has no boundaries. Part of education and prevention is instilling a new ethic or behavior to reduce the threat of spread. This new behavior entails the decontamination or cleaning of equipment that has been in contact with water and organisms that may be spread to another area.

Observations of AIS infestations demonstrate how AIS can make quantum leaps to major water bodies and then spread from there much like spokes from a wheel. Strategically, to be effective we must successfully intercept these new threats before they develop new populations.

Relying solely on a cleaning and treatment infrastructure is not effective by itself. Too heavy of an emphasis on cleaning and treatment infrastructure may ignore the need for individual responsibility of inspecting, removing, cleaning, and drying their gear once home and between waters. Education of the user in regards to their role in prevention of spread of AIS needs to be incorporated in any cleaning infrastructure. Questionnaires and inspections need to be integrated with cleaning infrastructure to target likely carriers that need a more rigorous decontamination and quarantine.

The development of a cleaning station infrastructure requires consideration of maintenance and personnel costs. This is a significant expense. Most agencies do not have the human-power or funding to maintain cleaning sites through time.

“The key message that should be shared with all groups that may be interested in installing a boat wash facility is as follows: wash stations are a poor substitute for an effective education and watercraft inspection program that emphasizes the basic ‘inspection and removal’ message, BUT washing stations can be one component of an overall prevention and control strategy.” (Beall 2005)

From an economic and feasibility standpoint it makes more sense to have a few well staffed strategically placed watercraft inspection and wash stations than many local wash stations at individual lakes that are staffed periodically with fluctuating funding and initiative. It also makes more economic sense to develop a wash station infrastructure at few infected locations rather than around all uninfected water bodies.

As part of all public education the message of inspect, clean and dry should be promoted for all aspects of AIS prevention. The message must be clear and concise with no confusion or conflict – confusion leads to inaction.

What:	Work with the States of Oregon and Washington AIS Coordinators and other State and Federal agencies to identify strategic locations for wash stations. Use local, state, regional, and national questionnaire data to inform discussion. Determine what agency will build, maintain, and staff strategic AIS wash stations.
Who:	Regional Fisheries Program, Forest Fisheries Biologists, and Regional Invasive Species Coordinator and partners
When:	2012
What:	Determine existing wash opportunities for boaters such as self-contained carwashes and agency mobile washers that could be used if needed.
Who:	Regional and Forest Fisheries Program and Regional Invasive Species Coordinator and partners. Coordinate with States on documenting existing self-contained car washes and consider a detailer to compile information into usable form.
When:	2012

FOSTER A COOPERATIVE INTERORGANIZATIONAL ENVIRONMENT

Effectively addressing the AIS challenge requires a coordinated community effort to succeed. This coordination needs to begin in the agency and tie to interagency efforts throughout the Region. This will ensure efficiency when addressing a regional threat that could quickly exhaust available resources.

What:	Participate in Western Regional Panel, 100 th Meridian Basin Teams, State Invasive Species Councils, and other AIS efforts as appropriate, remaining attentive to opportunities for outreach partnerships, and striving to eliminate duplicity.
Who:	Regional Fisheries Biologist, Regional Invasive Species Coordinator, Assistant Director of State and Private Forestry, and others as appropriate
When:	ongoing
What:	Foster cooperative relationships with Oregon and Washington state AIS programs, university AIS programs, NGO programs, and other federal agency AIS programs. Do this through typical interactions and participation in cooperative AIS forums such as Western Regional Panel and 100 th Meridian.
Who:	Regional Fisheries Biologist, Regional Aquatic Ecologist, and Regional Invasive Species Coordinator and applicable Forest and District personnel.
When:	2011 and ongoing.
What:	Identify AIS funding sources and provide list to Forests.
Who:	Regional Fisheries Biologist, Regional Invasive Species Coordinator, and Assistant Director of State and Private Forestry.
When:	Ongoing
What:	Through statewide contacts in other agencies, facilitate local partnerships in the field.
Who:	Regional Fisheries Biologist, Regional Invasive Species Coordinator, Regional Assistant Director of State and Private Forestry, Forest Fisheries Biologists, and Forest Invasive Species Coordinators.
When:	Ongoing
What:	Institutionalize this plan in the Region's culture.
Who:	Regional Invasive Species Coordinator, Assistant Director of State and Private Forestry, Regional Leadership Team, and Regional, Forest, and District personnel
When:	Ongoing

APPENDIX I

2011 Focal AIS Species List

This list was developed in coordination with Portland State University and Oregon State University and will be reviewed and adjusted annually.

Type	Common name	Genus species	Species Code
Aquatic animals	New Zealand mudsnails	<i>Potamopyrgus antipodarum</i>	POAN
	Zebra mussels	<i>Dreissena polymorpha</i>	DRPO
	Quagga mussels	<i>Dreissena rostriformis bugensis</i>	DRRO
	Rusty Crayfish	<i>Orconectes rusticus</i>	ORRU
	Red Swamp Crayfish	<i>Procambarus clarkia</i>	PRCL
	Ringed Crayfish	<i>Orconectes neglectus</i>	ORNE
	Northern Crayfish	<i>Oronectes virilis</i>	ORVI
Aquatic plants	Yellow Flag Iris	<i>Iris pseudacorus</i>	IRPS
	Hydrilla	<i>Hydrilla verticillata</i>	HYVE
	Parrot Feather Watermilfoil	<i>Myriophyllum aquaticum</i>	MYAQ
	Eurasian Watermilfoil	<i>Myriophyllum spicatum</i>	MYSP
	Giant Reed	<i>Arundo donax</i>	ARDO
	Brazilian Elodea	<i>Ergeria densa</i>	ERDE
	Didymo	<i>Didymosphenia geminata</i>	DIGE
Terrestrial animals	Feral Swine	<i>Sus scrofa</i>	SUSC
Terrestrial plants	Japanese Knotweed	<i>Fallopia japonica</i>	FAJA
	Cultivated Knotweed	<i>Polygonum polystachyum</i>	POPO
	Giant Knotweed	<i>Polygonum sachalinense</i>	POSA
	Giant Hogweed	<i>Heracleum mantegazzianum</i>	HEMA
	Old Man's Beard	<i>Clematis vitalba</i>	CLVI
	Garlic Mustard	<i>Alliaria petiolata</i>	ALPE
	Himalayan blackberry	<i>Rubus discolor</i>	RUDI
	English Ivy	<i>Hedera helix</i>	HEHE

LITERATURE CITED

- Beall, M. 2005. Aquatic invasive species, a handbook for education efforts. DNR publication WT-825 2005. 119 pp. Available at:
<http://www.uwex.edu/ces/erc/pdf/AI/AquaticInvasivesHandbook.pdf>
- Cusack, C., M. Hart, S. Chan. 2009. The economics of invasive species. Oregon Invasive Species Council. 12pp.
- DiTomaso, J.M. 1996. Identification, biology, and ecology of salt cedar. Proceedings of the salt cedar management workshop. Rancho Mirage, CA.
- Gunckel, S.L., A.R. Hemmingsen, and J.L. Li. 2002. Effect of bull trout and brook trout interactions on foraging habitat, feeding behavior, and growth. Transactions of the American Fisheries Society. 131: 1119-1130.
- Howell, P.J., D.V. Buchanan, J.M. Maule. 1992. Proceedings of the Gearhart Mountain bull trout workshop. Oregon Chapter American Fisheries Society. Corvallis, OR.
- Ontario Federation of Anglers and Hunters. 2011. Zebra mussel. InvadingSpecies.com.
- Peihong, F., K. Hostettmann, and H. Lou. 2010. Allelochemicals of the invasive neophyte *Polygonum cuspidatum*. *Chemoecology*. 20(3):223-227.
- Stenberg, M. 2009. Personal communication. PacifiCorp Environmental Coordinator. Pocatello, ID.
- US Geological Survey. 2011. Nonindigenous aquatic species website. Available at:
<http://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=237> and
<http://nas.er.usgs.gov/queries/FactSheet.aspx?speciesID=1107>
- Weed Science Society of America. 2011. Lone aquatic weed program in the U.S. under threat of elimination. Western Farm Press. 1pp.
<http://westernfarmpress.com/management/lone-aquatic-weed-control-program-us-under-threat-elimination>

APPENDIX II

Focal Species Distribution Maps

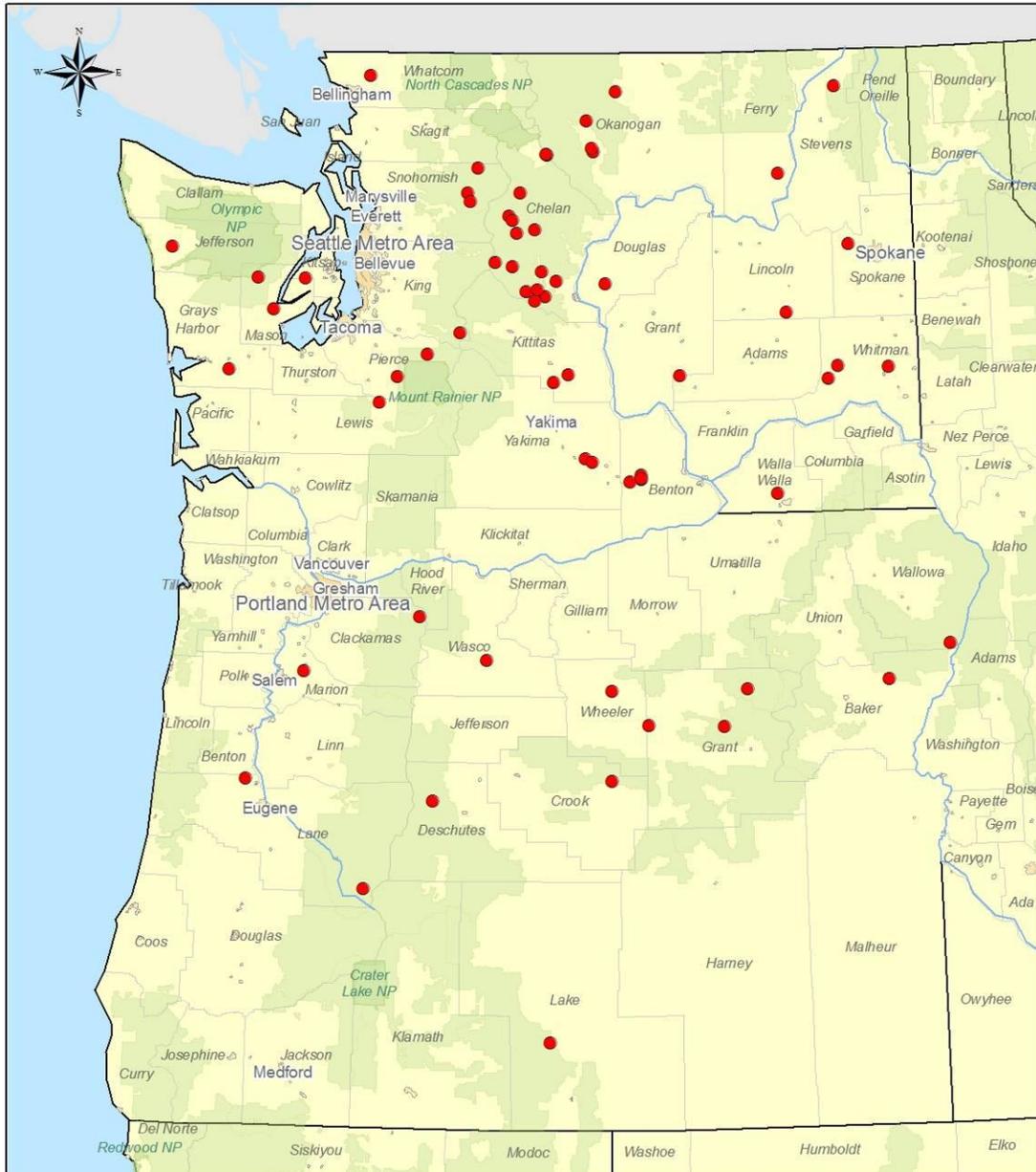
These distribution maps were developed for the Region by US Geological Survey from their national database. They depict the current known distribution of the focal species for which they have data. Partners continuously update USGS with new data, so these distribution maps may become outdated in a short period of time. It is important to help USGS maintain a current database so distribution maps can be continually updated.

Nonindigenous Aquatic Species in Oregon and Washington

Didymo (Didymosphenia geminata)

Data Source: U.S. Geological Survey

March 2011

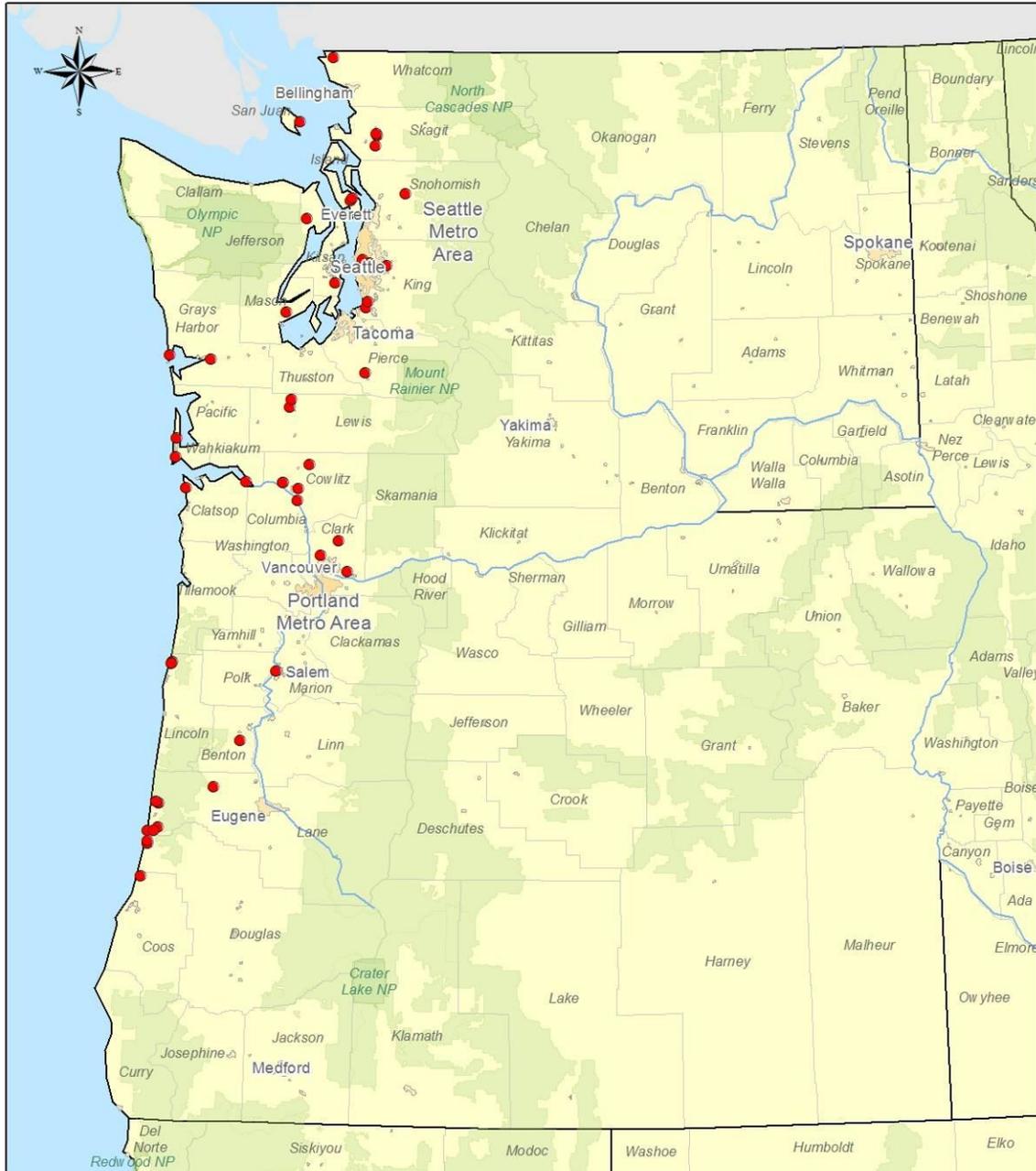


Nonindigenous Aquatic Species in Oregon and Washington

Brazilian waterweed (*Egeria densa*)

Data Source: U.S. Geological Survey and U.S. Department of Agriculture

March 2011

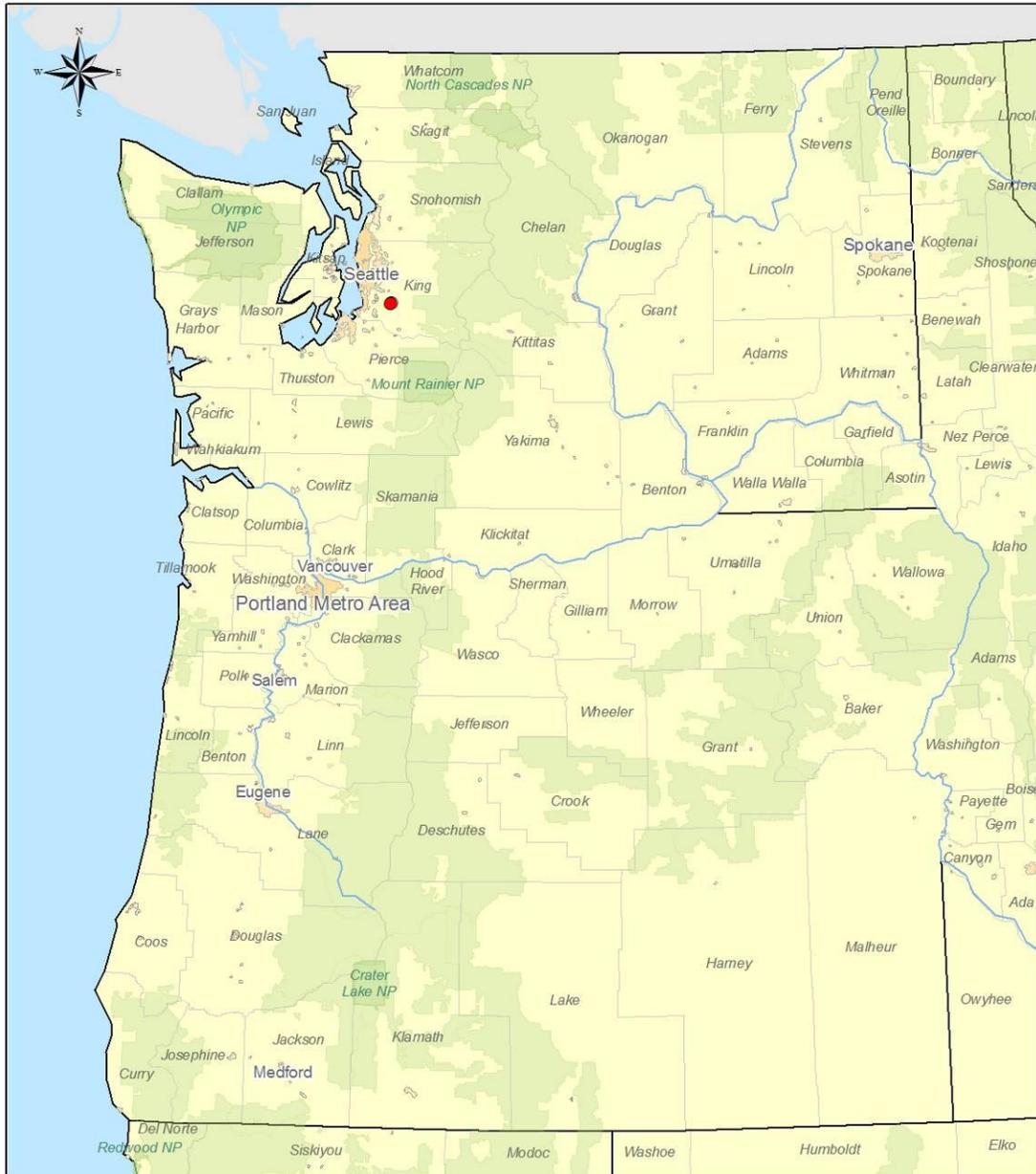


Nonindigenous Aquatic Species in Oregon and Washington

Hydrilla (*Hydrilla verticillata*)

Data Source: U.S. Geological Survey

March 2011

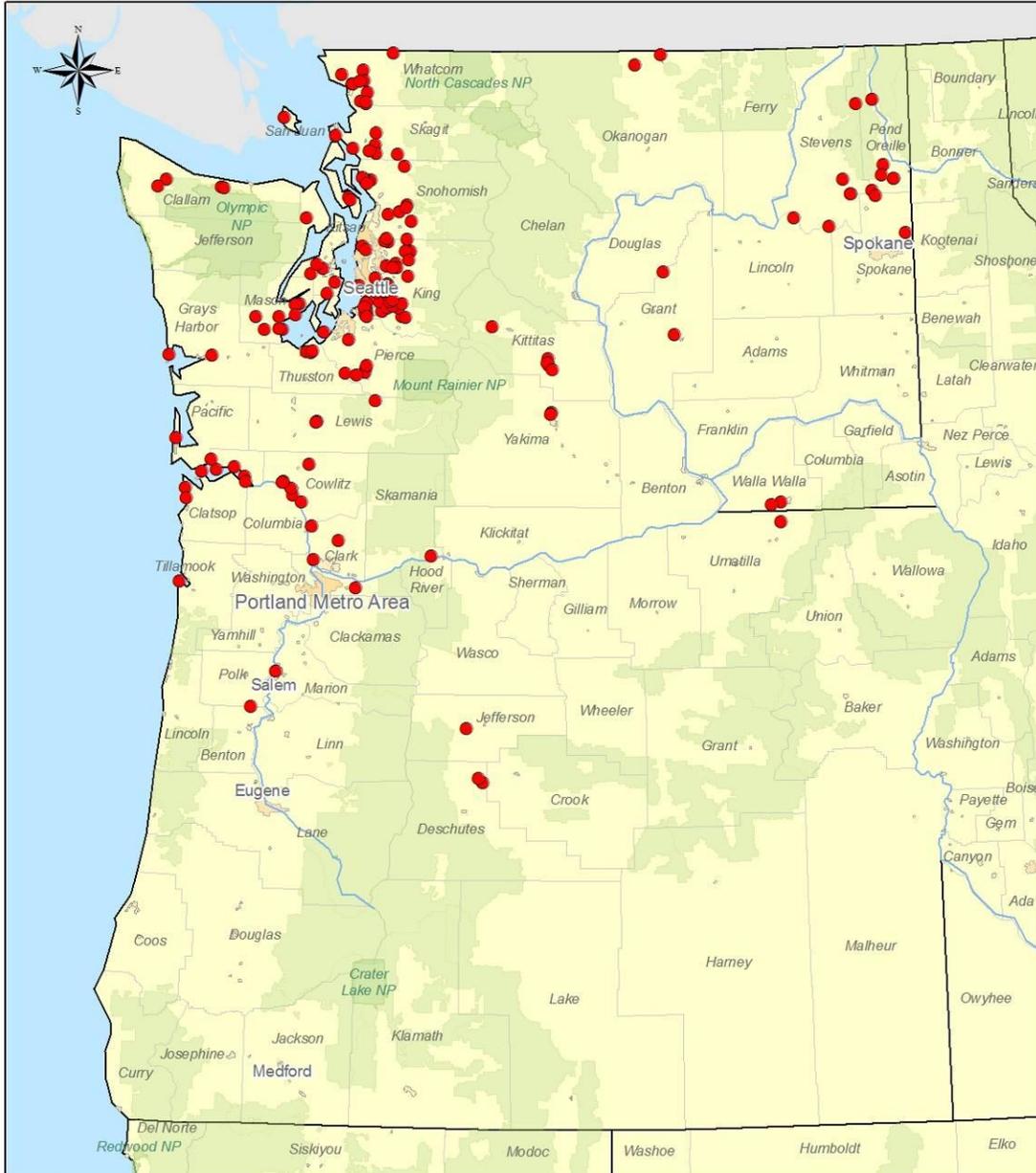


Nonindigenous Aquatic Species in Oregon and Washington

Yellow flag iris (*Iris pseudacorus*)

Data Source: U.S. Geological Survey

March 2011

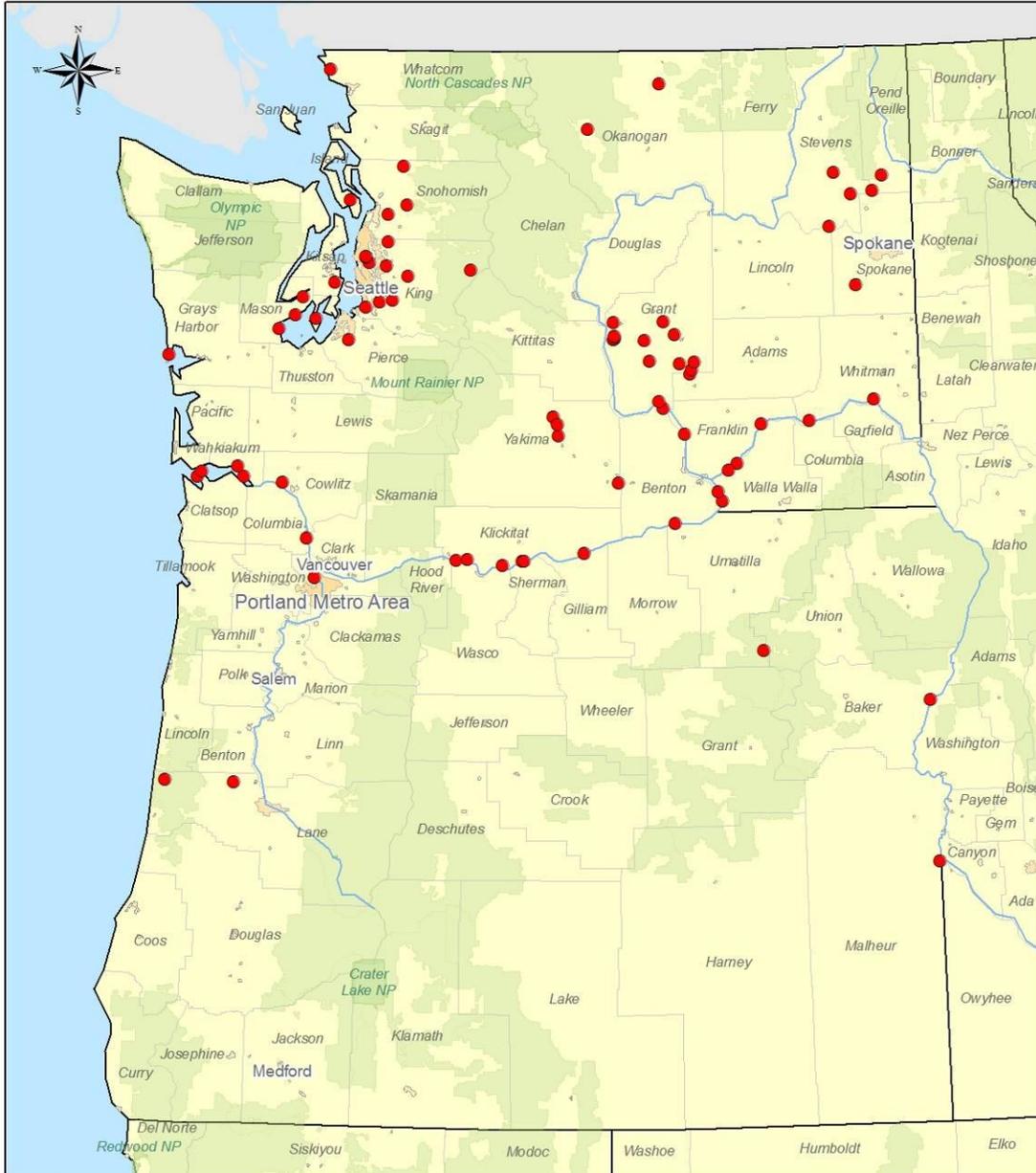


Nonindigenous Aquatic Species in Oregon and Washington

Purple loosestrife (*Lythrum salicaria*)

Data Source: U.S. Geological Survey

March 2011



Nonindigenous Aquatic Species in Oregon and Washington

Parrot feather (*Myriophyllum aquaticum*)

Data Source: U.S. Geological Survey

March 2011

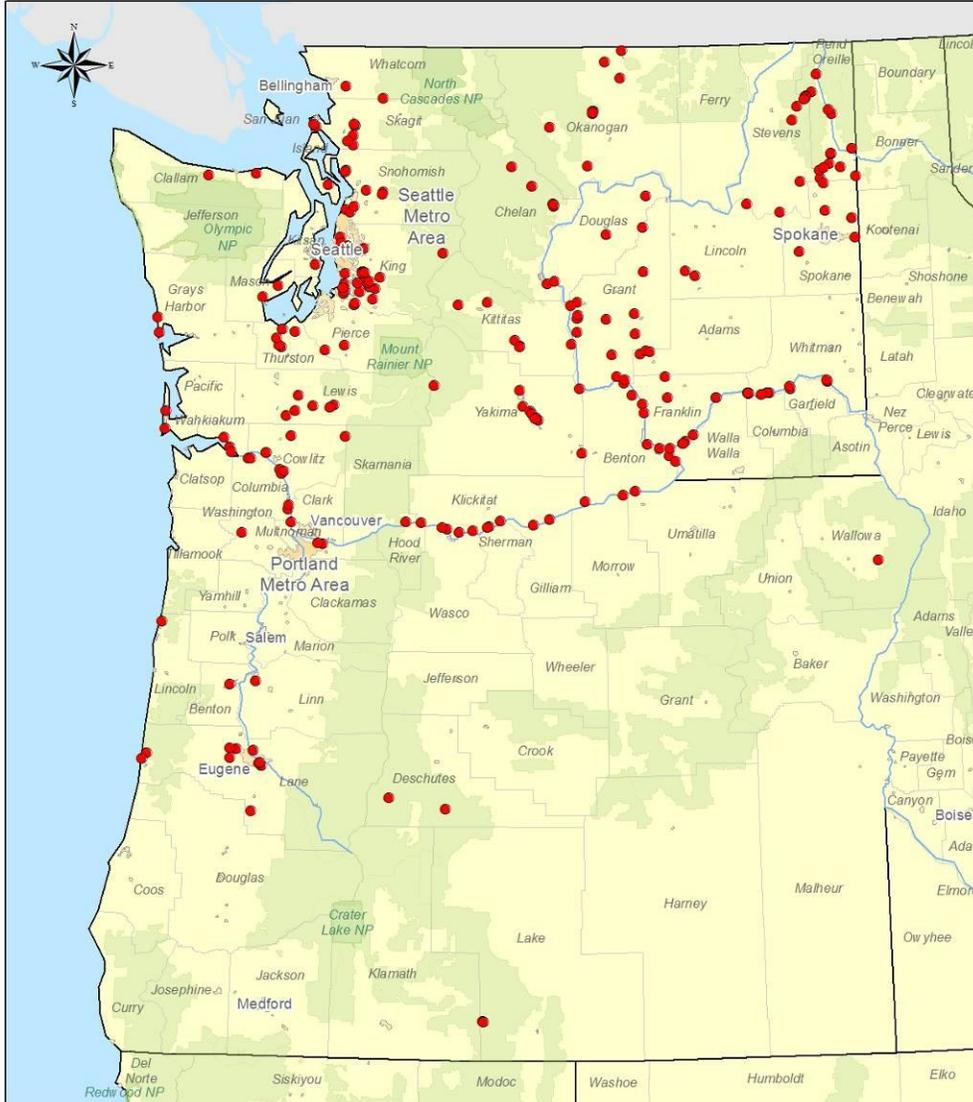


Nonindigenous Aquatic Species in Oregon and Washington

Eurasian water-milfoil (*Myriophyllum spicatum*)

Data Source: U.S. Geological Survey and U.S. Department of Agriculture

March 2011

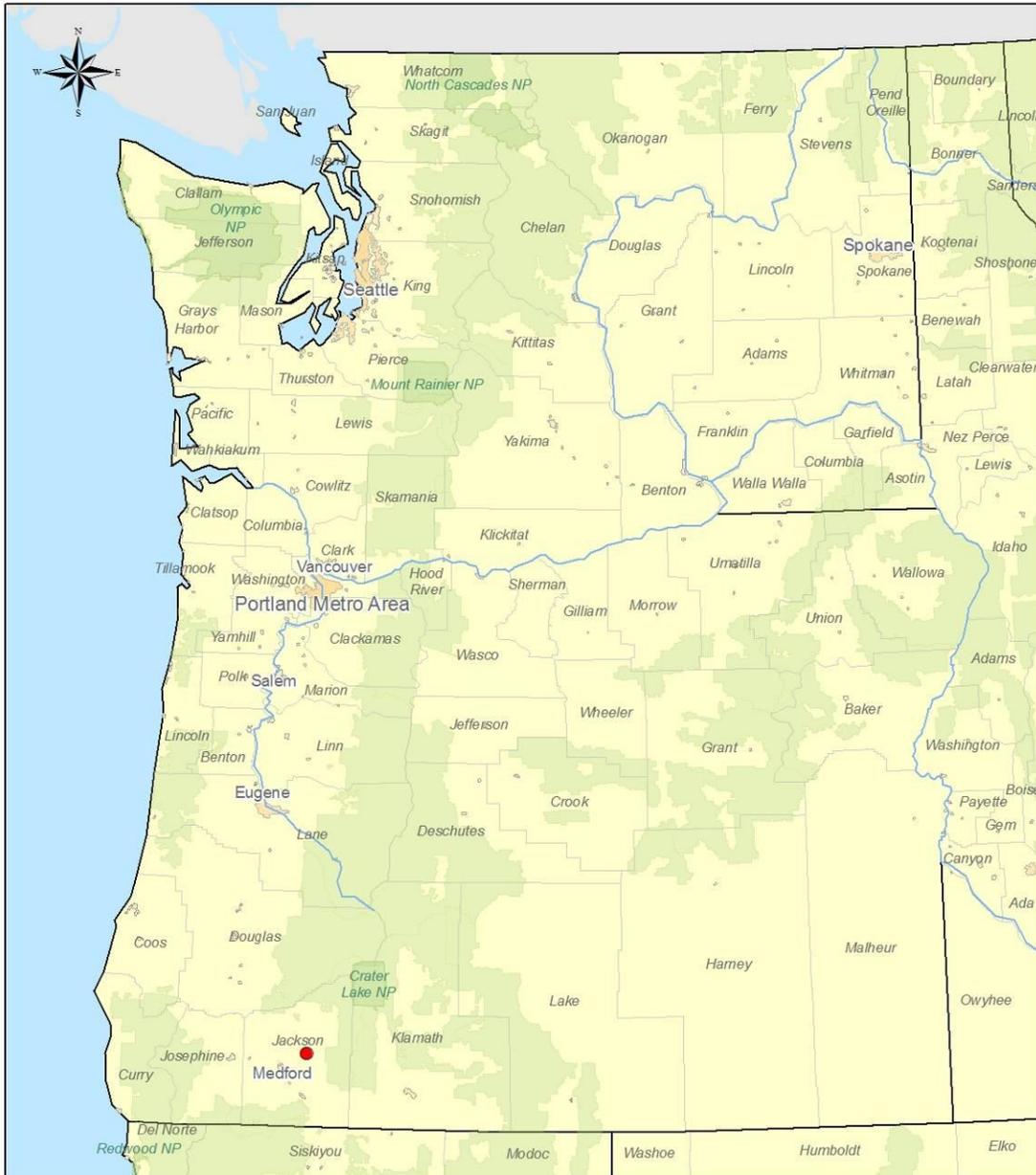


Nonindigenous Aquatic Species in Oregon and Washington

Ringed crayfish (*Orconectes neglectus*)

Data Source: U.S. Geological Survey

March 2011

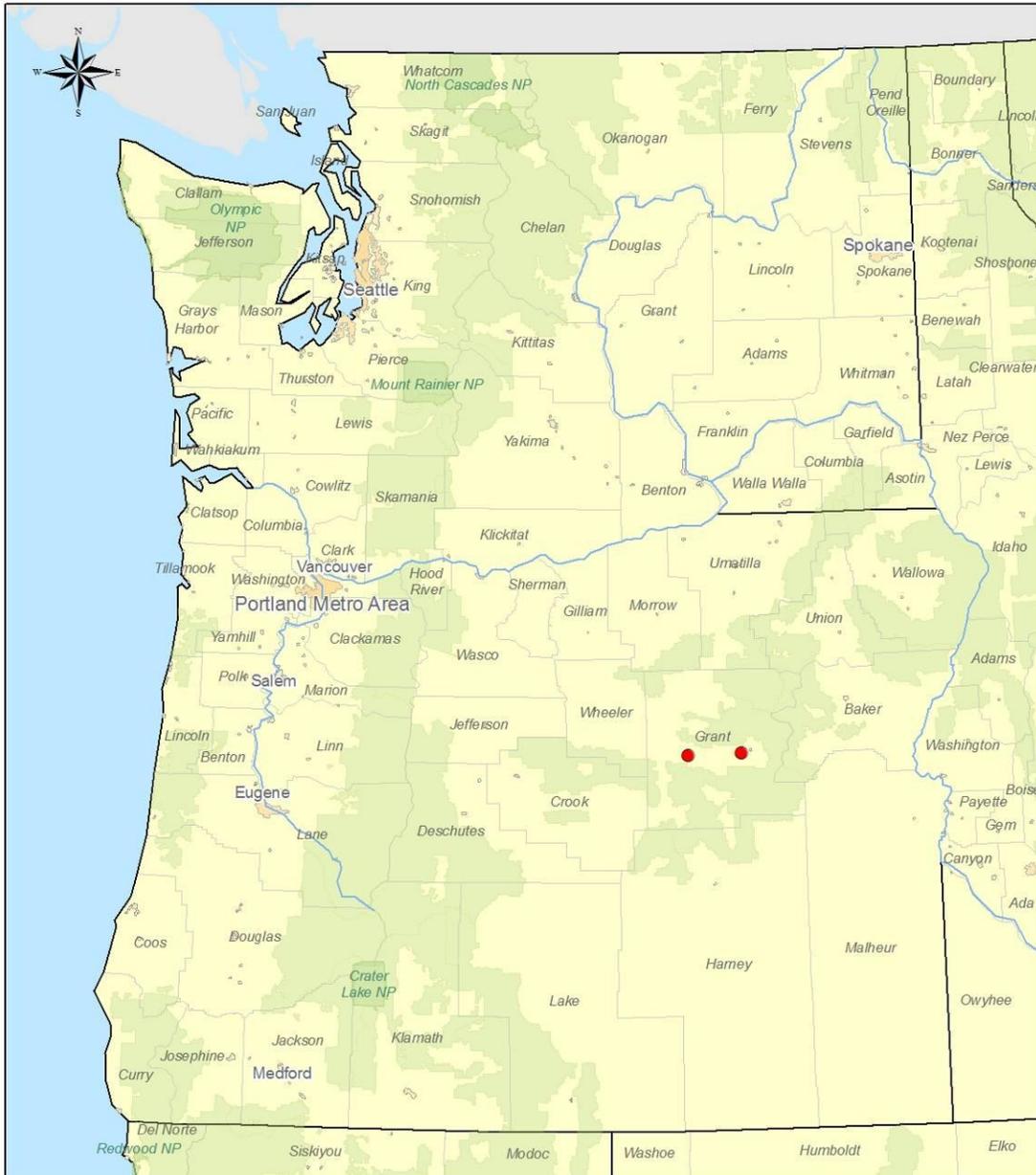


Nonindigenous Aquatic Species in Oregon and Washington

Rusty crayfish (*Orconectes rusticus*)

Data Source: U.S. Geological Survey

March 2011

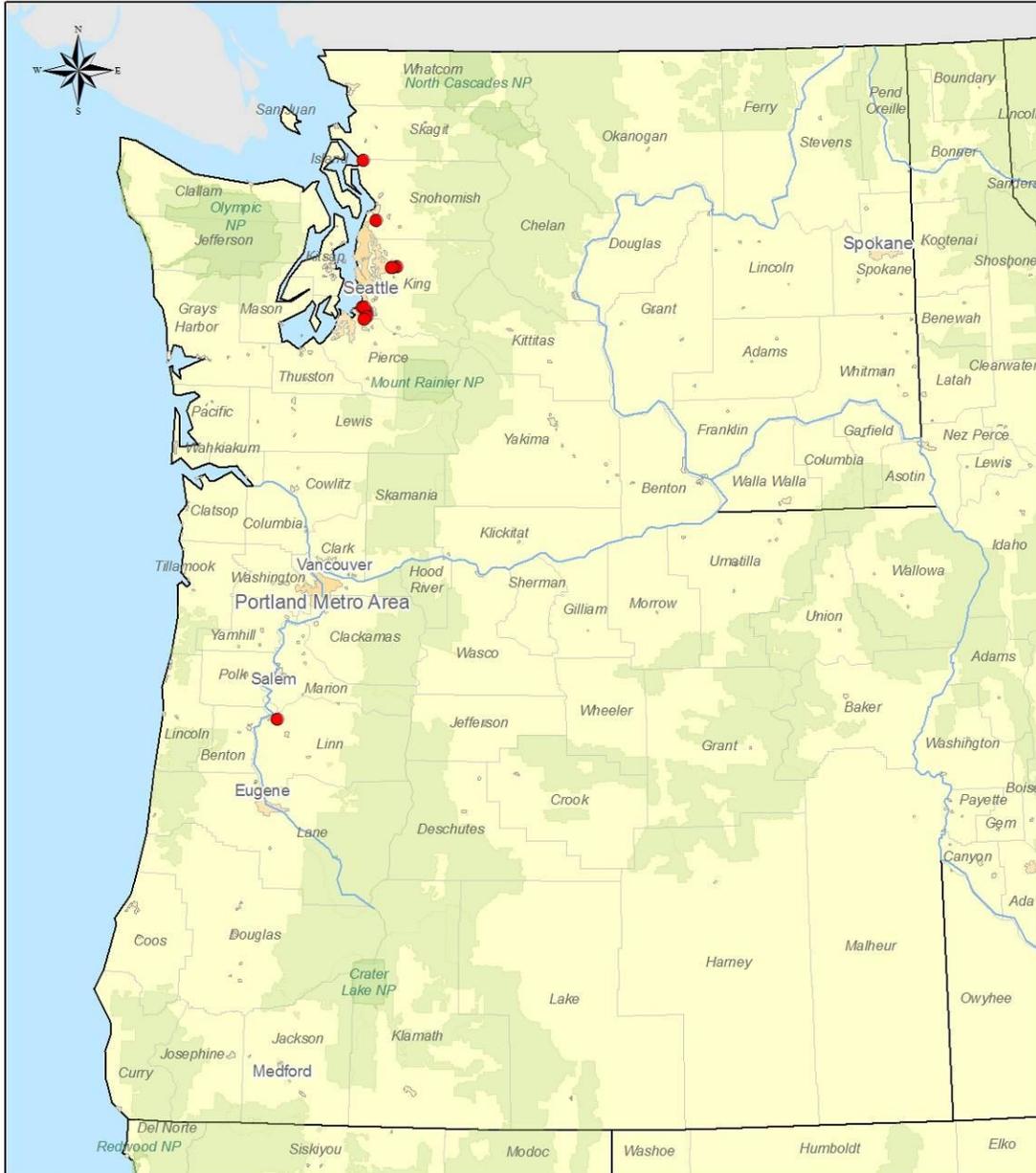


Nonindigenous Aquatic Species in Oregon and Washington

Red swamp crayfish (*Procambarus clarkii*)

Data Source: U.S. Geological Survey

March 2011



Nonindigenous Aquatic Species in Oregon and Washington

New Zealand mudsnail (*Potamopyrgus antipodarum*)

Data Source: U.S. Geological Survey

March 2011

