USFS PNW Region Aquatic Invasive Species Inventory and Monitoring Proposal

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Presentation Contents

- Review FS Direction and R6 AIS Management Strategy
- Recent Accomplishments
- AIS Monitoring Plan

 - Draft Plan
 - Questions, Suggestions, Support?



Agency AIS Direction

The White House Office of the Press Secretary For Immediate Release December 05, 2016

Executive Order -- Safeguarding the Nation from the Impacts of Invasive Species

EXECUTIVE ORDER

SAFEGUARDING THE NATION FROM THE IMPACTS OF INVASIVE SPECIES

USFS Agency Direction

- Forest Service Manual emphasizes protection of ecosystem diversity and biodiversity.
- Federal Noxious Weed Act of 1974: Requires Federal land management agencies to develop a management program for undesirable plants
- Executive Order 13112: Requires federal response to invasive species.
- USDA Dept. Regulation Number 9500-10: Direction for protection, research/development, protection, cooperation, outreach/education, and inventory of noxious weeds.

R6 AIS Management Plan

- Plan adopted by Region October 2011
- Our mission is to cooperatively develop and implement effective programs that address the threat of AIS throughout the Pacific Northwest Region of the Forest Service.



OSU

R6 AIS Plan 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.



Recent Accomplishments

LEOs for AIS Outreach

- USFS Law Enforcement Officers are usually among people using NFS lands.
- People on NFS lands congregate near water, where there is higher AIS threat.
- If authorized and trained, USFS LEOs could serve as additional agency eyes, ears, and outreach agents for AIS management.





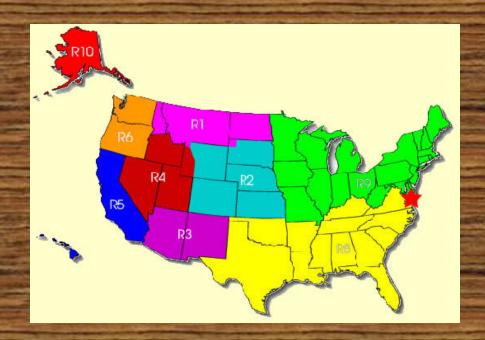
LEOs for AIS Outreach

- During the winter of 2016, the RO completed NEPA activating 2 CFRs prohibiting the transfer of animal and plant invasive species across NFS lands.
- LEOs continue to be trained on AIS inspection and identification.



Fire Management AIS Concerns

- Potential for infected water and gear to be transported into the region.
- Potential for infected water and gear to be transported between watersheds within the region.



Highlights of R6 AIS Fire Safeguards

 Regional Interagency Fire Guidance available at:

http://www.fs.fed.us/r6/fire/aquatic-invasive-species/

- Safeguards to address the threats from AIS are shared with the field through:
 - Annual Fire Guidance
 - Annual presentations at fire fighter refresher trainings throughout Region by local Fish Bios.





Highlights of R6 AIS Fire Safeguards

- Guidance Includes:
 - Allowable water sources
 - Drafting instructions
 - Restrictions on transport and use of water between watersheds while fire fighting.
 - Guidance on equipment cleaning.
 - Feedback loop
- Regional Fire Equipment Contract has AIS cleaning requirement clause for equipment.





Regional AIS Inventory and Monitoring

Inventory and Monitoring

- AIS Subcommittee
 Chair of the Greater
 Yellowstone
 Coordinating
 Committee
- Greater YellowstoneArea AIS SurveyDesign
- We want to develop an inventory/monitoring strategy that:
 - Allows us to state lack of AIS presence with certain degree of certainty
 - Provides data for ED/RR.

National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science



Developing a Survey (Probability) Design to Evaluate the Presence and Distribution of Aquatic Invasive Species in Low Risk Waterbodies in the Greater Yellowstone Area

Natural Resource Report NPS/GRYN/NRR-2011/428



Inventory and Monitoring

- Long term
 monitoring sites
 established
 throughout the FS
 Region:
 - **♦ PIBO**
 - **AREMP**
- Regionwide instructions for positive observations of AIS
- Corporate database and shared with USGS NAS
- Each crew trained in ID of Regional AIS Focal Species



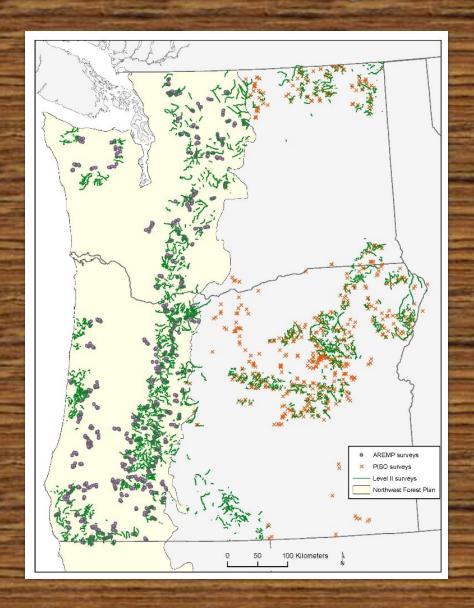


2016 FS Pacific Northwest Region AIS Focal Species List

Туре	Common name	Genus species
	New Zealand mudsnails	Potamopyrgus antipodarum
	Zebra mussels	Dreissena polymorpha
	Quagga mussels	Dreissena rostriformis bugensis
	Rusty Crayfish	Orconectes rusticus
	Red Swamp Crayfish	Procambarus clarkii
Aquatic animals	Ringed Crayfish	Orconectes neglectus
1	Bullfrog	Rana catesbeiana
	Northern Crayfish	Orconectes virilis
	Nutria	Myocaster coypus
	Asian Clam	Corbicula flumina
	Chinese mystery snail	Cipangopaludina chinensis
	Big Eared Radix	Radix auricularia
	Yellow Flag Iris	Iris pseudacorus
	Hydrilla	Hydrilla verticillata
	Nonnative Milfoils	Myriophyllum species
Aquatic plants	Yellow Floating Heart	Nymphoides peltata
	Giant Salvinia	Salvinia molesta
	Giant Reed	Arundo donax
	Brazilian Elodea	Egeria densa
	Didymo	Didymosphenia geminata
	Flowering rush	Butomus umbellatus
	Common reed	Phragmites austalis
	Curly-leaf pondweed	Potamogeton crispus
	Purple Loosestrife	Lythrum salicaria
	Garden Loosestrife	Lysimachia vulgaris

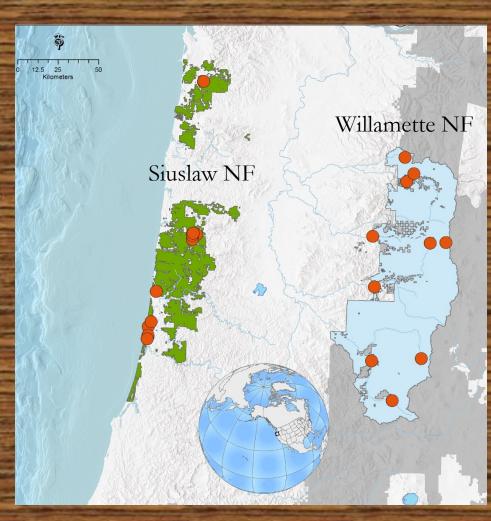
Inventory and Monitoring

- AREMP and PIBO sites cover most of the Region
- PNW Research analysis determined they generally represent the Region's waters well, except for:
 - Nonwadeable waters
 - High use/high probability waters
- We can fill this sampling gap with eDNA samples.



Inventory and Monitoring

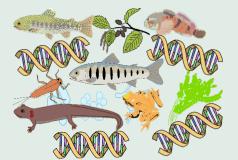
- In 2017, evaluate eDNA sampling protocols for AIS in Big Water
- Nonwadable, high risk
 waters on the Siuslaw and
 Willamette National Forests
- ♦ Proposal:
 - Evaluate eDNA field techniques for use in high risk locations
 - Develop appropriate sample designs for big water
 - Evaluate probability of detection for different species



eDNA metabarcoding

Water Filtration --> DNA Extraction -->





DNA Amplification — of targets using PCR



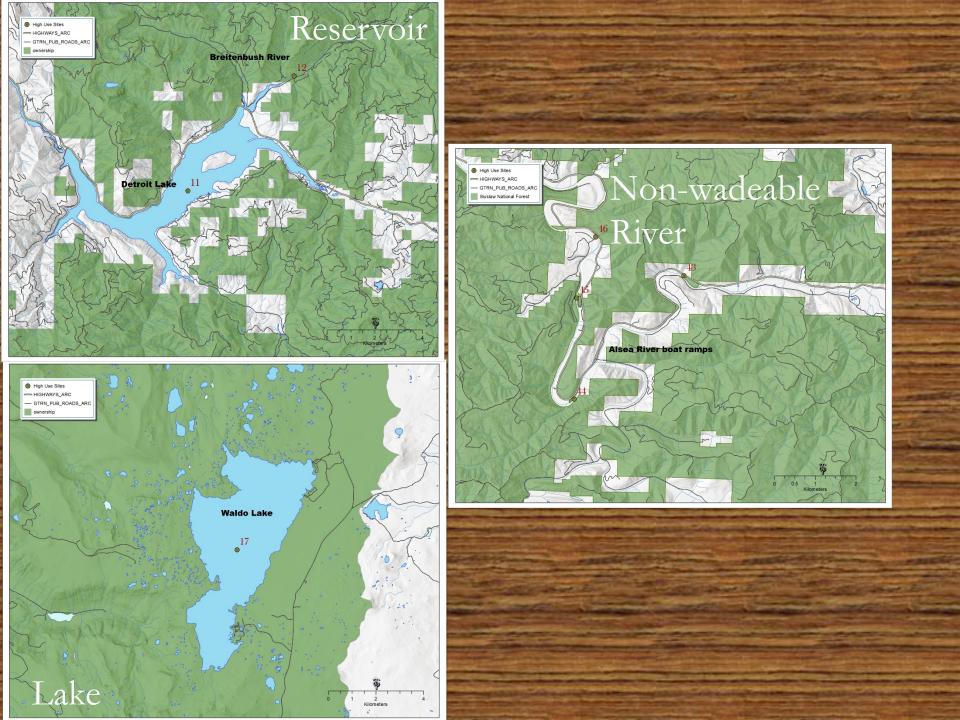
48 targets x 48 samples = 2,304 PCR reactions

DNA Sequencing& Sequence Analysis



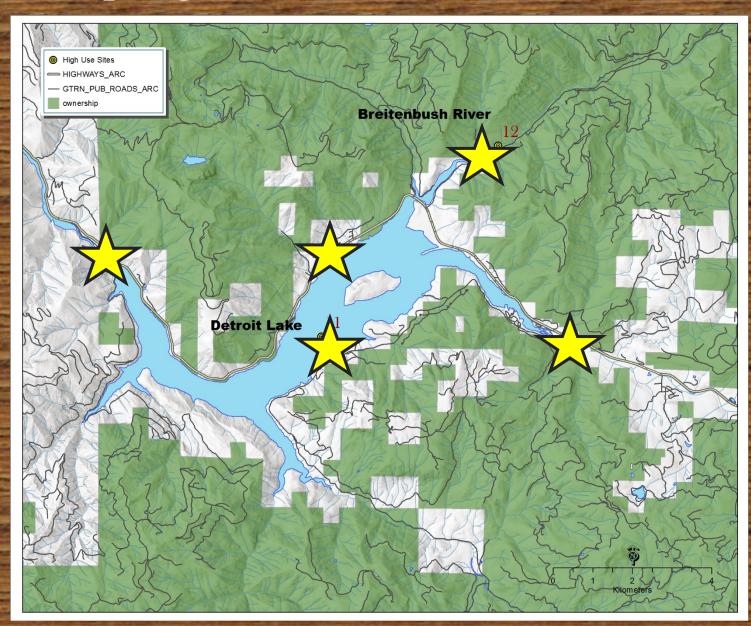
Stream Assemblage Profile
Species detection and estimation of relative abundance of targets that were preferentially amplified

Approach being developed by Penaluna, Cronn, Hauck at PNW Research Station Corvallis, OR



Example Sampling of Reservoir

- River inflow (2 locations)
- River outflow
- Up to two lake sites (boat launches)



2016 FS Pacific Northwest Region AIS Focal Species List

Туре	Common name	Genus species	Species Code	Preliminary species barcoding to run eDNA analysis available?	
	New Zealand mudsnails	Potamopyrgus antipodarum	POAN	Yes	
	Zebra mussels	Dreissena polymorpha	DRPO	Yes	
	Quagga mussels	Dreissena rostriformis bugensis	DRRO	Yes	
	Rusty Crayfish	Orconectes rusticus	ORRU	Yes	
Aquatic	Red Swamp Crayfish	Procambarus clarkii	PRCL	Yes	
animals	Ringed Crayfish	Orconectes neglectus	ORNE	Yes	
	Bullfrog	Rana catesbeiana	RACO	Yes	
	Northern Crayfish	Orconectes virilis	ORVI	Yes	
	Nutria	Myocaster coypus	MYCO	Yes	
	Asian Clam	Corbicula flumina	COFL	No; only genus information found	
	Chinese mystery snail	Cipangopaludina chinensis	CICH	Yes	
	Big Eared Radix	Radix auricularia	RAAU	Yes	
	Yellow Flag Iris	Iris pseudacorus	IRPS	Yes	
	Hydrilla	Hydrilla verticillata	HYVE	Yes	
	Nonnative Milfoils	Myriophyllum species	MYSP	Yes	
	Yellow Floating Heart	Nymphoides peltata	NYPE	Yes	
Aquatic plants	Giant Salvinia	Salvinia molesta	SAMO	Yes	
	Giant Reed	Arundo donax	ARDO	Yes	
	Brazilian Elodea	Egeria densa	EGDE	Yes	
	Didymo	Didymosphenia geminata	DIGE	Yes	
	Flowering rush	Butomus umbellatus	BUUM	Yes	
	Common reed	Phragmites austalis	PHAU	No; only one relevant entry in Genbank	
	Curly-leaf pondweed	Potamogeton crispus	POCR	Yes	
	Purple Loosestrife	Lythrum salicaria	LYSA	Yes	
	Garden Loosestrife	Lysimachia vulgaris	LYVU	Yes	
	Water primrose	Ludwigia spp.	LU	No; only genus information found	

2017 Project Costs

Tasks		Costs
Development of eDNA genomic library for aquatic invasive speci	es	\$35,000/24 species
AREMP field crew to visit west-side sites		AREMP covers costs
FS employees to visit east-side sites		FS covers costs
eDNA sampling gear and supplies	USFS Challenge	\$15,000
eDNA lab processing (supplies, genotyping, genotyping labor)	Cost Share	\$35,000/196 samples
Data output and analysis	Cost offare	\$30,000
	Total	\$115,000



- Interested in participating?
- Interested in Supporting?





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