February 7, 2023

MEMORANDUM

TO: **Council Members**

FROM: **Stacy Horton, Washington Policy Analyst/Biologist**

SUBJECT: **Invasive Species that Threaten Fish, Wildlife, and Habitats of the Columbia River Basin**

BACKGROUND:

Presenters: **Blaine Parker,** Columbia River Intertribal Fish Commission, Aquatic Invasive Species Coordinator; **Nick Zurfluh,** Section Manager, Invasive Species Coordination and Outreach, Idaho State Department of Agriculture; **Liz Lodman**, Administrator, Montana Invasive Species Council; **Rick Boatner**, Oregon Department of Fish and Wildlife, Invasive Species Wildlife Integrity Supervisor; **Justin Bush**, Executive Coordinator, Washington Invasive Species Council.

Summary: Invasive species can have devastating impacts on ecosystems, food webs, and biodiversity. Habitat investments can be diminished, and ecosystem function degraded when invasive species become a problem as their environmental cost is vast - they transmit disease, increase predation, compete for resources, outnumber native species, reduce species diversity, and create cascading ecosystem effects like trophic food web changes. To raise awareness of this issue and share simple actions to prevent and stop the spread of invasive species, regional state and tribal invasive species coordinators will discuss some of the Northwest priority invasive species, as well as prevention and management efforts to address them.

Relevance: The 2014 Columbia River Basin Fish and Wildlife Program (Program) includes a strategy (P. 46-48) to address non-native and invasive species. The Program acknowledges the threat to fish habitat and wildlife mitigation projects that invasive species pose through competition, predation, and habitat modification. In providing guidance to Bonneville on emerging program priorities, the Council's third highest priority is to 'aggressively address non-native and invasive species …important to preserve program effectiveness.' (P. 116 Program)

Background: Prevention, suppression, and eradication efforts are called for in the Council Program strategy on non-native and invasive species. The Council acknowledges the direct threats to the program's fish and wildlife restoration efforts from invasive and non-native species.

The 2014 Program defines an invasive species as:

> "A species that establishes and reproduces rapidly outside its native range. It may threaten the diversity or abundance of native species through predation, competition, parasitism, hybridization with native populations, introduction of pathogens, or the physical or chemical alteration of the invaded habitats."
> (P. 135 Program)

Principles developed by the Council to address invasive species include early detection and rapid response, public education, coordination, and shared data efforts, legislative work, and other actions to rapidly respond, prevent, contain, eradicate, enforce, educate, and conduct outreach to control species where they threaten the Columbia Basin ecosystem and the regional hydropower system.

Some of the actions called for under the General measures on non-native invasive species in the Program call for:

- ***Evaluate potential adverse impacts***, to include coordination with federal, state, tribal and regional partners such as the 100th Meridian Initiative.

- ***Prevent establishment in conjunction with partners,*** to include monitoring and managing pathways of introduction, development of control strategies, public outreach tools, and a request that Bonneville Power Administration assist state efforts to prevent the establishment of zebra and quagga mussels.

- ***Monitor and control introductions and dispersal*** by calling on the four Northwest states to closely coordinate species management plans and prevention efforts, to include British Columbia.

- ***Remove and eradicate*** by applying new and existing research to maximize effectiveness, using removal methods that are effective and protect native species, monitor success, use lethal control methods consistent with laws, prioritize control actions to address most significant threats, and finally calls on BPA, federal agencies, and FERC-licensed utilities to support rapid response efforts should zebra and quagga mussels become established.

- ***Regional Coordination*** directed at addressing those species that pose the greatest risk to the Columbia River Basin and the regional hydropower system by assisting with regional communication, coordination, and public outreach efforts, by facilitation of science/policy forums on non-native invasive species issues and helping with legislative efforts directed at invasive species.

- More Info:
  - Western Aquatic Invasive Species Resource Center
  - Western Governors' Biosecurity and Invasive Species Initiative Special Report
  - Western Governors' Policy Resolution 2022-11, Biosecurity an Invasive Species Management
  - Washington Invasive Species Council Website, 2020-2025 Statewide Strategy, and 2021-2022 Biennial Report
  - [Washington] State of the Salmon in Watersheds Report, How Invasive Species Threaten Salmon Story Map
  - Montana Invasive Species Council

INVASIVE SPECIES OF IDAHO

Northwest Power and Conservation Council

February 15, 2023

IDAHO STATE DEPARTMENT OF AGRICULTURE

IDAHO INVASIVE SPECIES COUNCIL

INVASIVE SPECIES OF IDAHO

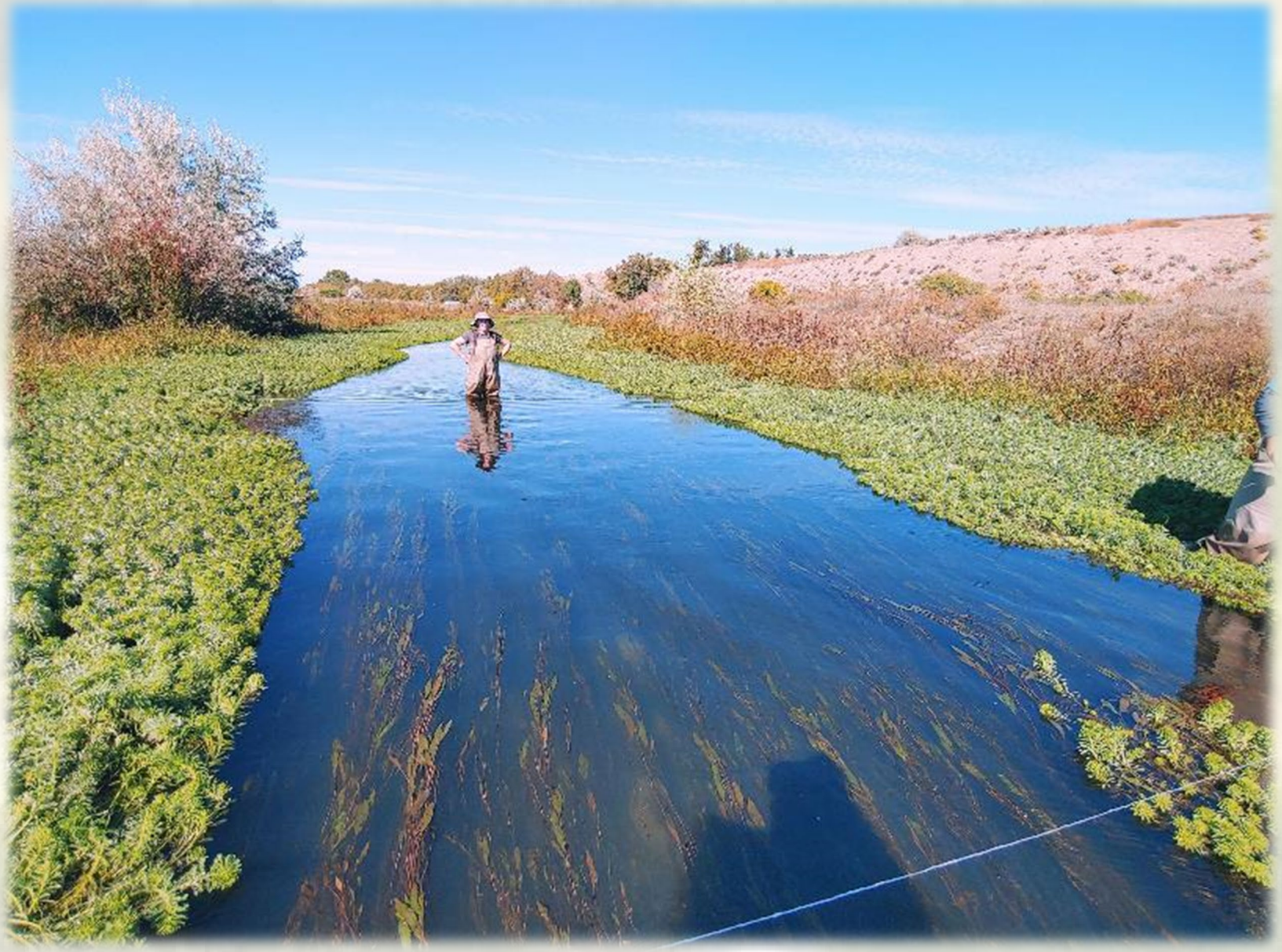
Invasive Species Program Areas

- Prevention
  - Watercraft Inspection
  - **Product inspection**
- Early Detection Monitoring
  - Plankton tow- Veliger
  - Adult surveys
- Management and Control
  - Active control programs
  - Rapid response planning
  - Permitting
- Education and Outreach
  - Public campaigns
  - Partnerships

INVASIVE SPECIES OF IDAHO

Product Inspection

INVASIVE SPECIES OF IDAHO



Payette River, Idaho

INVASIVE SPECIES OF IDAHO

INVASIVE SPECIES OF IDAHO

Twin Falls, Idaho

INVASIVE SPECIES OF IDAHO

Marimo Moss Ball

- 1st detection in Seattle, WA; pet store employee via USGS NAS alert system on March 2, 2021
- Product sourced from Ukraine & distributed through California
- Initiated multi-partner communications (cross regions/states/provinces,)
  - 46 states and multiple provinces
  - ~1,000 emails, phone calls, meetings, etc.

INVASIVE SPECIES OF IDAHO

Two Primary Management Objectives

- Stop the importation of zebra mussel contaminated moss ball products into the United States

- Properly dispose of contaminated moss ball products already in the U.S. supply chain, retail stores, on-line eCommerce, and home aquariums. Ensure systems that are infested are properly decontaminated.

INVASIVE SPECIES OF IDAHO

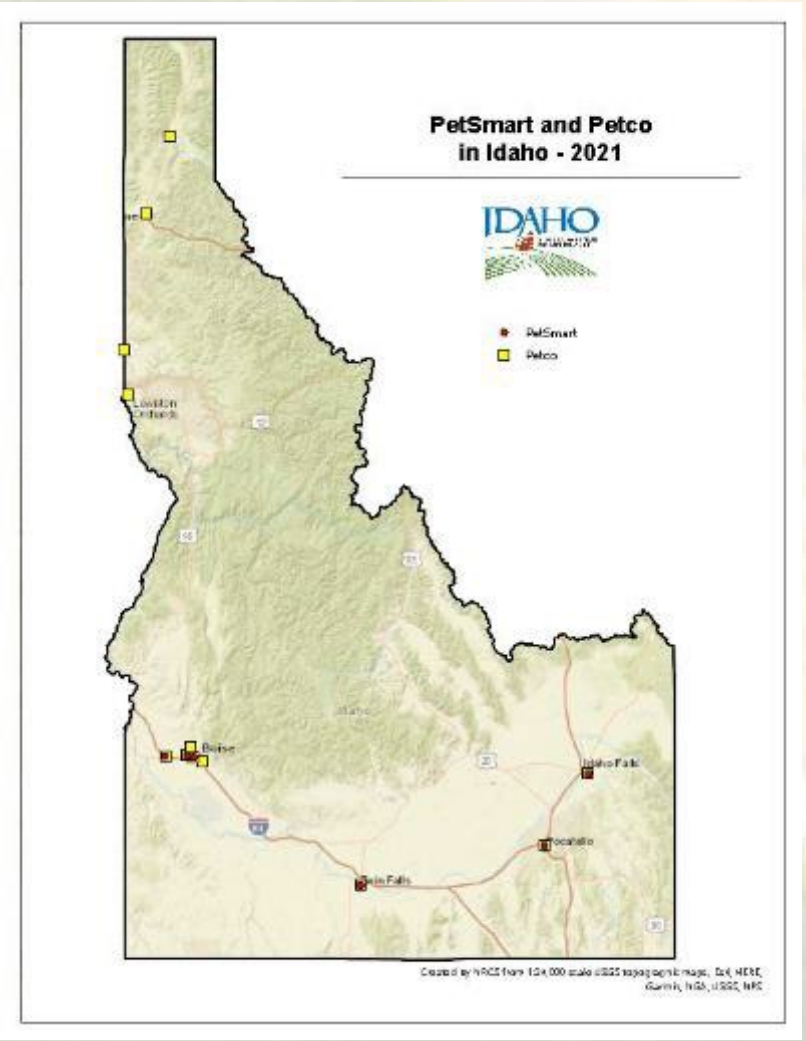
Idaho Response

- Within 24 hours of initial detection
  - 18 stores with potentially contaminated product
  - Initial goal to quickly identify and verify Zebra mussels in shipments
    - Visual inspection & microscopy
  - Identify brand, product, label & SKU #
- Within 48 hours of initial detection
  - Idaho removed contaminated product statewide

INVASIVE SPECIES OF IDAHO

Idaho Response

- Petco and Petsmart
  - 18 locations; 12 Petco & 6 Pestsmart
  - Corporate office directed stores to remove product from shelf awaiting ISDA staff
  - ~600 units seized and destroyed
  - Very cooperative
- ISDA follow-up inspection found additional moss ball product in 6 additional stores



INVASIVE SPECIES OF IDAHO

Idaho Response

- Media releases (March 4th & 11th)
  - Background on the issue
  - Disposal methods
  - Regional coordination
  - Rapid Response Plan
  - Next steps

IDAHO STATE DEPARTMENT OF AGRICULTURE

Idaho State Department of Agriculture
P.O. Box 7249 • Boise, Idaho 83707
P: 208.332.8500 • F: 208.334.2170
www.agri.idaho.gov
BRAD LITTLE, GOVERNOR
CELIA GOULD, DIRECTOR

FOR IMMEDIATE RELEASE
March 4, 2021

Media contact: Lloyd Knight
Phone: (208) 859-4173
Lloyd.knight@isda.idaho.gov

Idaho Discovers Invasive Mussels in Aquarium Products

The Idaho State Department of Agriculture's (ISDA) Invasive Species Program announced today the detection of invasive zebra mussels in aquarium products sold in the state. The ISDA has found live, viable zebra mussels in Marimo moss balls which commonly are sold for use in aquariums.

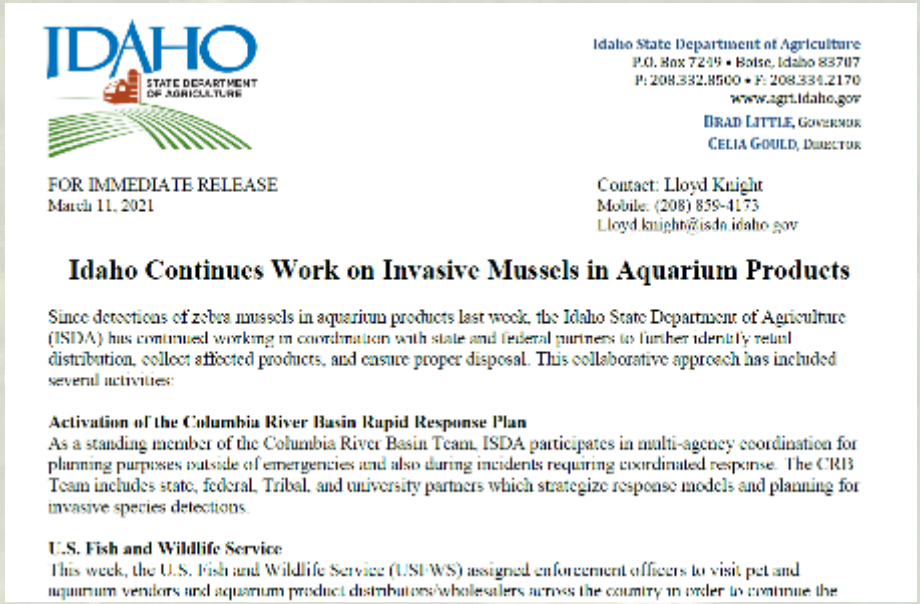
ISDA officials were first made aware of the issue Wednesday and agency personnel immediately responded with in-person inspections. ISDA's response has been part of a coordinated nationwide effort to remove these products from store shelves and advise stores and the public about proper disposal of affected material.

ISDA is working with local Petco store managers to obtain any additional product currently in transit. "Store managers and staff have been very cooperative in this process," said Nic Zurfluh, Invasive Species Section Manager. "They have worked with us, and we are grateful for their understanding."

What the Public Can Do
Do not dump aquarium tank water or dispose of moss balls in natural waterbodies.

Aquarium owners can safely dispose of the moss ball(s) by one of two methods:

- Remove the moss ball(s) and place in a plastic bag. Put the bag in a freezer and leave for at least 24 hours. After that, the moss ball(s) can be disposed of in the trash.
- Place moss ball(s) in boiling water for at least one full minute. After that, the moss ball(s) can be



IDAHO STATE DEPARTMENT OF AGRICULTURE

Idaho State Department of Agriculture
P.O. Box 7249 • Boise, Idaho 83707
P: 208.332.8500 • F: 208.334.2170
www.agri.idaho.gov
BRAD LITTLE, GOVERNOR
CELIA GOULD, DIRECTOR

FOR IMMEDIATE RELEASE
March 11, 2021

Contact: Lloyd Knight
Mobile: (208) 859-4173
Lloyd.knight@isda.idaho.gov

Idaho Continues Work on Invasive Mussels in Aquarium Products

Since detections of zebra mussels in aquarium products last week, the Idaho State Department of Agriculture (ISDA) has continued working in coordination with state and federal partners to further identify retail distribution, collect affected products, and ensure proper disposal. This collaborative approach has included several activities:

Activation of the Columbia River Basin Rapid Response Plan
As a standing member of the Columbia River Basin Team, ISDA participates in multi-agency coordination for planning purposes outside of emergencies and also during incidents requiring coordinated response. The CRB Team includes state, federal, Tribal, and university partners which strategize response models and planning for invasive species detections.

U.S. Fish and Wildlife Service
This week, the U.S. Fish and Wildlife Service (USFWS) assigned enforcement officers to visit pet and aquarium vendors and aquarium product distributors/wholesalers across the country in order to continue the

INVASIVE SPECIES OF IDAHO

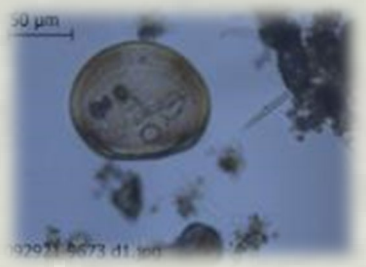
Idaho Response

- Continued outreach for the Don’t Let it Loose (DLL) Program
  - ISDA contracted with Invasive Species Action Network (ISAN) through the USFWS to enhance DLL messaging in Idaho
  - ISDA staff perform follow-up regulatory and outreach visits to Idaho pet stores

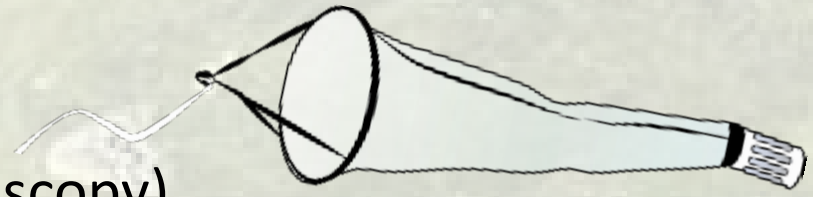
DON'T LET IT LOOSE!
BE A RESPONSIBLE PET OWNER

Early Detection Monitoring

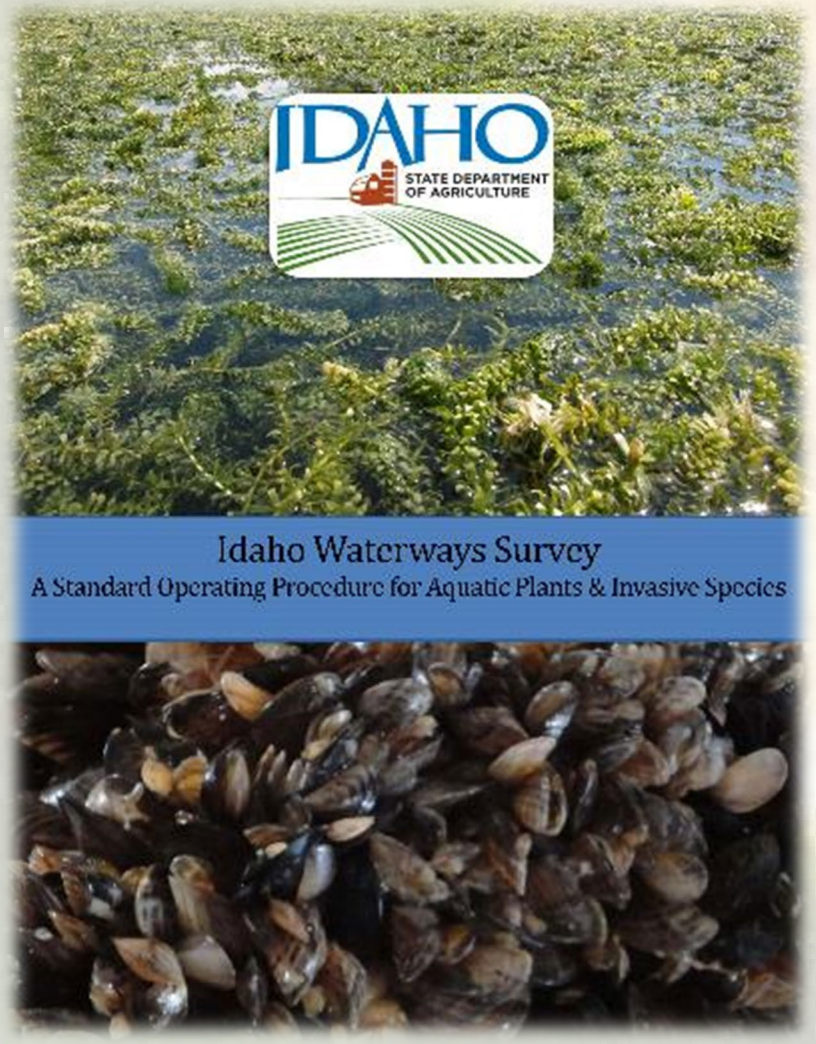
- 2022- 13th year of monitoring in Idaho
- All taxa survey
- No invasive mussel detections to date
- Assistance from partners across the state
- Activate Idaho rapid response plan if detection occurs



2022 Early Detection Monitoring



- Veliger Monitoring (microscopy)
  - **1,650** plankton samples collected from **119** waterbodies
    - Multiple sample events, bi-weekly, per waterbody
    - Priority overnight shipment
    - 2 week turnaround for lab analysis
- Adult Monitoring (visual)
  - **1,500** surveys conducted collected from **112** waterbodies
  - Reservoir drawdown, substrate and benthic grab sampling
- **Shift monitoring focus for Marimo moss ball**
- Monitoring Webmap:
  - https://www.arcgis.com/apps/webappviewer/index.html?id=2b06354e1d79436a924db5053ecfcac7



Invasive Nonnative Crayfish

Northwest Power and Conservation Council

February 15, 2023

Rick Boatner
Invasive Species Wildlife Integrity Supervisor
Rick.j.boatner@odfw.Oregon.gov

Outline

Stone Soup by Jan Eliot

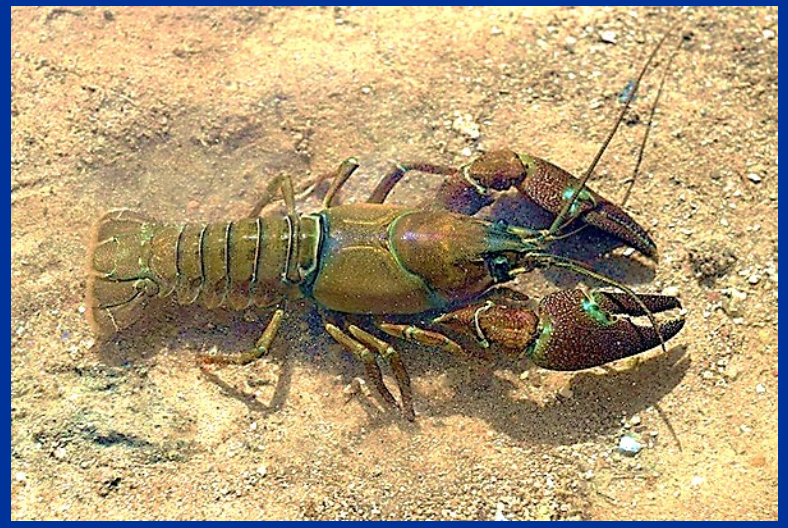
- Signal Crayfish
- Rusty Crayfish
- Louisiana Red Swamp
- Ringed crayfish
- New Discovery
- Eradication Efforts

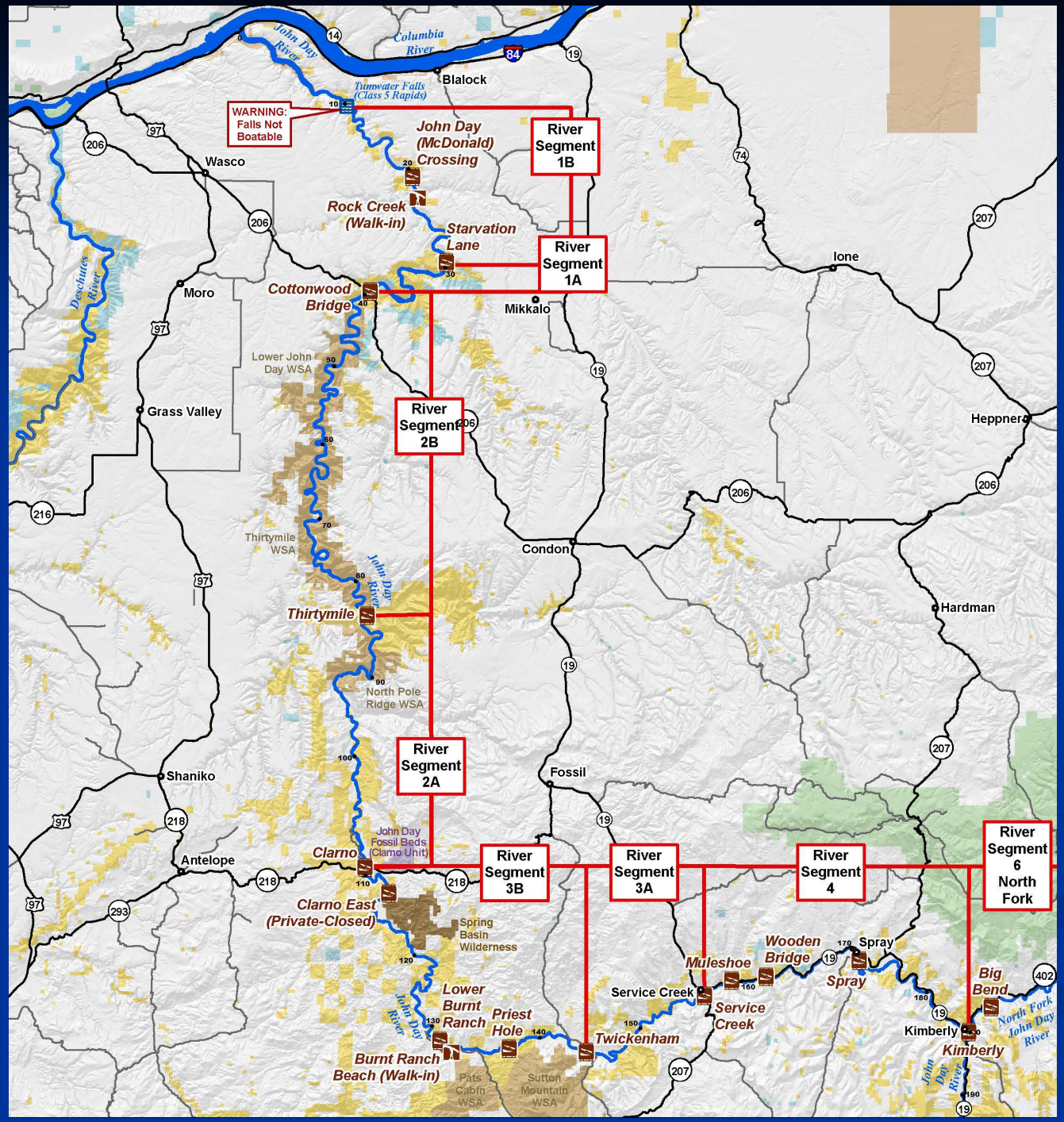
Signal crayfish (*Pacifasticus leniusculus*)

- Native to Idaho, Oregon, & Washington
- Wide Thorax
- White patch
- Smooth claws

Rusty crayfish (*Orconectes rusticus*)

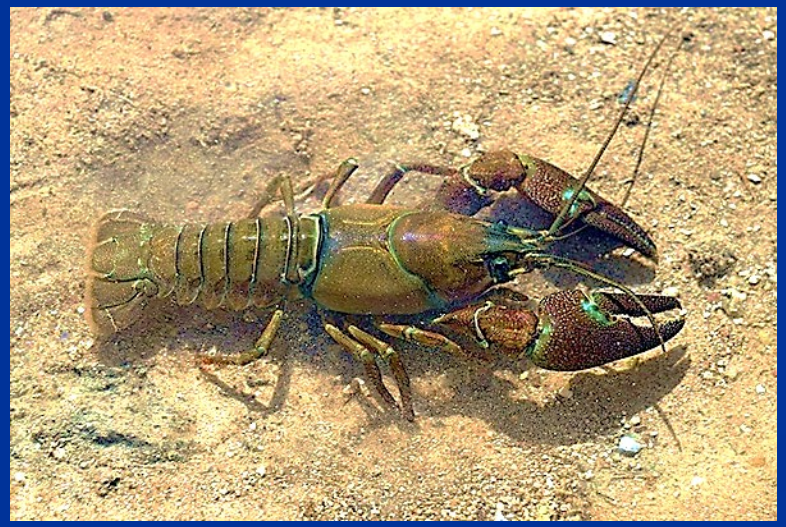
- Native to the Ohio River Basin
- 2004 discovered in the John Day River
- Large claws, very aggressive; less likely to be consumed by fish
- Diet: Fish eggs, small fish, aquatic invertebrates and plants; they grazing behavior destroys plant beds




John Day River
Columbia River
Blalock
Tumwater Falls (Class 5 Rapids)
WARNING: Falls Not Boatable
John Day (McDonald) Crossing
River Segment 1B
Wasco
Rock Creek (Walk-in)
Starvation Lane
River Segment 1A
Deschutes River
Moro
Cottonwood Bridge
Mikkalo
Ione
Lower John Day WSA
Grass Valley
River Segment 2B
Heppner
Condon
Thirtymile WSA
Hardman
Thirtymile
North Pole Ridge WSA
River Segment 2A
Fossil
Shaniko
John Day Fossil Beds (Clamo Unit)
Clarno
River Segment 3B
River Segment 3A
River Segment 4
River Segment 6 North Fork
Antelope
Clarno East (Private-Closed)
Spring Basin Wilderness
Wooden Bridge
Spray
Muleshoe
Service Creek
Service Creek
Big Bend
Lower Burnt Ranch
Priest Hole
Twickenham
Kimberly
Kimberly
North Fork John Day River
Burnt Ranch Beach (Walk-in)
Pats Cabin WSA
Sutton Mountain WSA
John Day River

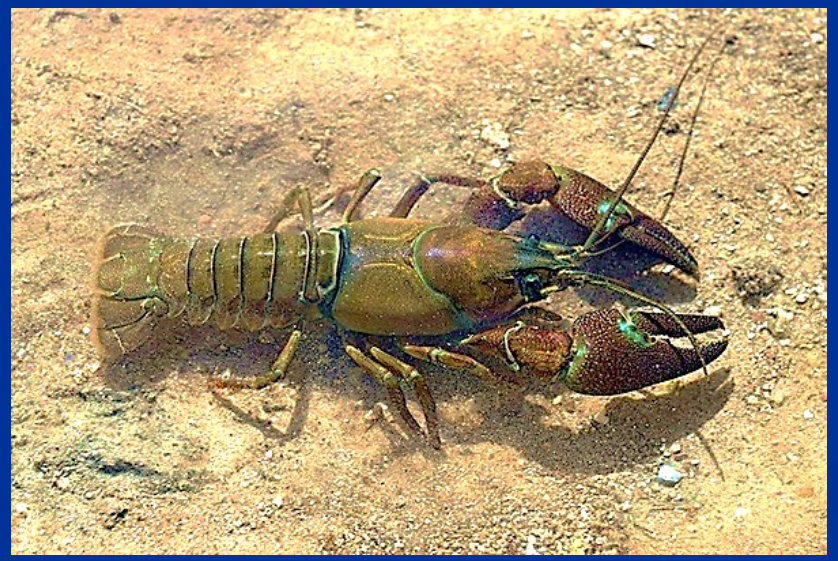
Louisiana red swamp crayfish (*Procambarus clarkii*)

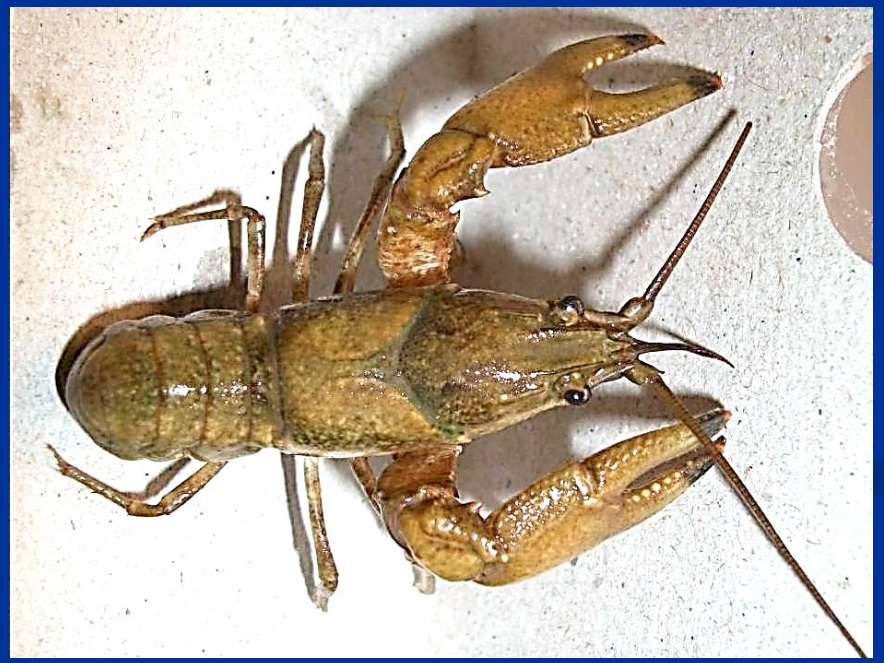
- Native to Gulf Coast, the Mississippi River up to Illinois
- Most invasive crayfish worldwide
- Burrowing activities destabilize banks
- Diet: tadpoles, plants, snails, insect and newt larvae



Ringed crayfish (*Orconectes neglectus*)

- Native to the Central Plains and Ozarks
- Discovered in the Umpqua in the 1960's
- Discovered in the Rowe River 2015 (Willamette Basin)
- In its native range the ringed crayfish is considered an imperiled species

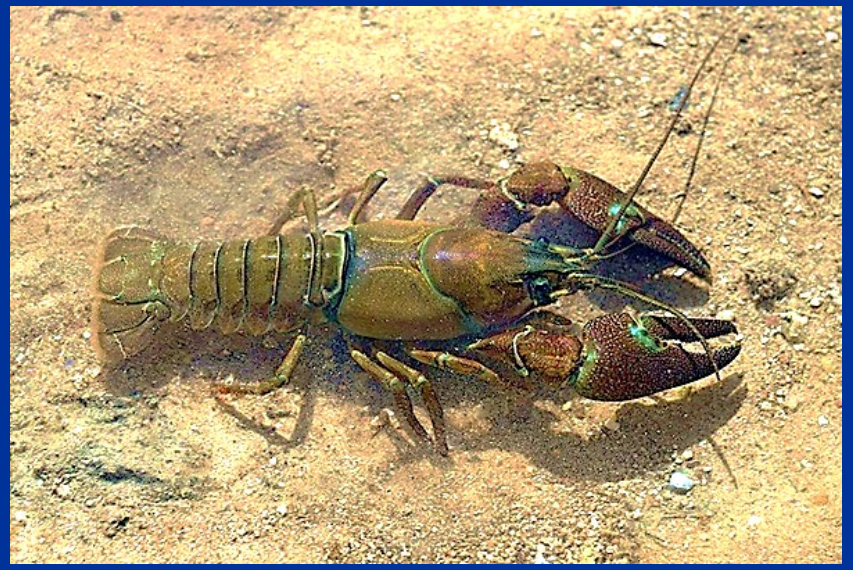




Northern Crayfish (*Faxonius virilis*) in Oregon

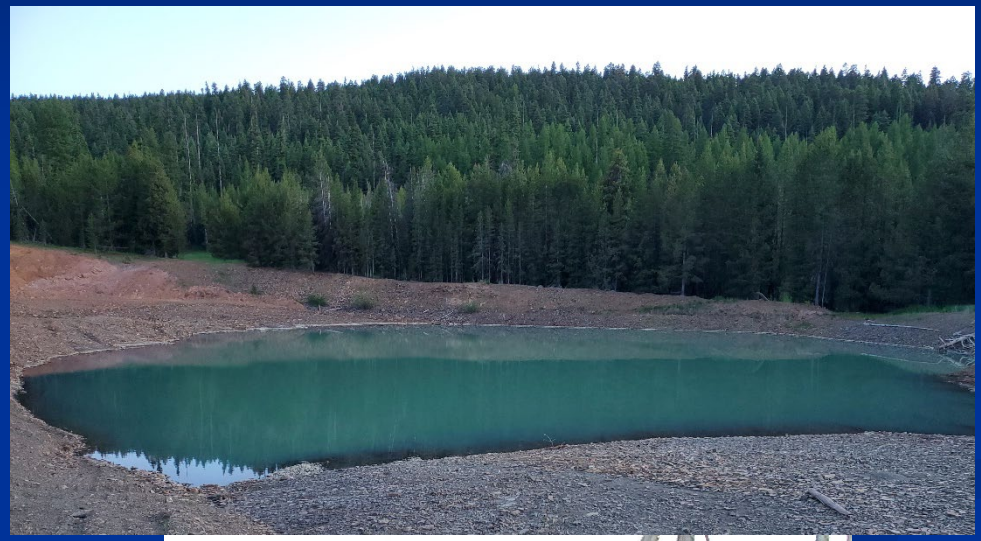
Northern crayfish (*Orconectes virilis*)

- Native to the Great Lakes, upper Midwest
- Possible small population in the Talent area.
- Dark brown edges on edge of thorax




OREGON
POPULATED PLACES
500,000 – 999,999 Portland
100,000 – 499,999 Eugene
25,000 – 99,999 Springfield
24,999 and less Grants Pass
State capital Salem
TRANSPORTATION
Interstate; limited access highway
Other principal highway
Railroad
Airport PDX
PHYSICAL FEATURES
Streams: perennial; intermittent
Lakes: perennial; intermittent
Highest elevation in state (feet) +11239
Other elevations (feet) +10497
The lowest elevation in Oregon is sea level (Pacific Ocean).
© Nations Online Project
WASHINGTON
IDAHO
CALIFORNIA
NEVADA
PACIFIC OCEAN
Columbia River
Astoria
Seaside
St Helens
Hillsboro
PDX
Gresham
Portland
Tillamook
Beaverton
McMinnville
Keizer
Salem
Albany
Corvallis
Newport
Willamette R
Coast Range
Florence
Eugene
Springfield
EUG
Reedsport
Umpqua R
North Bend
Coos Bay
Roseburg
Port Orford
Grants Pass
Rogue R
Medford
MFR
Ashland
Siskiyou Mts
Brookings
Mt McLoughlin
2,893 m (9,493 ft)
Cascade Range
Crater Lake
Deschutes R
Bachelor Butte
2,764 m (9068 ft)
Mt Jefferson
3,201 m (10502 ft)
Mt Hood
3,429 m (11249 ft)
The Dalles
John Day R
Condon
Hermiston
Pendleton
Columbia Mts
Blue Mts
La Grande
Enterprise
Wallowa Mts
Hells Canyon
Snake River
Baker City
Madras
Prineville
Redmond
RDM
Bend
Crooked R
John Day River
Canyon City
Ontario
Vale
Burns
Malheur Lake
HARNEY BASIN
Harney Lake
Owyhee R
Jordan Valley
Columbia Plateau
Summer Lake
Lake Abert
Steens Mountain
Upper Klamath Lake
Klamath Falls
Bly
Lakeview
Goose Lake
N
0 20 40 60 80 100 120 km
0 20 40 60 80 mi

Rusty crayfish (*Orconectes rusticus*)



Questions?

Empowering Boaters and Recreators to Prevent and Stop Aquatic Invasive Species

A Pilot Program and Next Steps

WASHINGTON STATE
RECREATION AND CONSERVATION OFFICE
Washington Invasive Species Council

Washington Department of FISH and WILDLIFE

February 15, 2023

Clean, Drain, Dry

- **Clean:** When leaving the water, clean all equipment that touched the water by removing all visible plants, algae, animals, and mud.
- **Drain:** Drain any accumulated water from boats or gear, including the bilge and live and transom wells, before leaving the water access point.
- **Dry:** Once home, fully dry all gear before using it in a different waterbody.

Drano Lake Boat Launch, Home Valley, WA

CD^3
(Clean, Drain, Dry, Dispose)

Units

Empower boaters to clean-drain-dry their boats

Reduces the risk of spreading of aquatic invasive species (AIS)

Waterless

Critical resource for boaters that are not currently present at boat launches

Great education and outreach tools

Lake Roosevelt National Recreation Area Kettle Falls Marina

CD³ Wayside Solar

Solar powered for sites with roughly 100 boat visits per day. Fast install option is available with precast base.

CD³ Roadside/CD³ Outpost

Either unit is best suited for smaller or overflow launch areas. Both include tethered hand tools on lockable reels. Each comes with installation instructions and multiple mounting options.

CD³ Station

Grid-connected, for unlimited use. Tools include wet/dry vacuum, air blower, tethered hand tools and LED lights. Unit has concrete base with 220 volt, 30 amp service required.

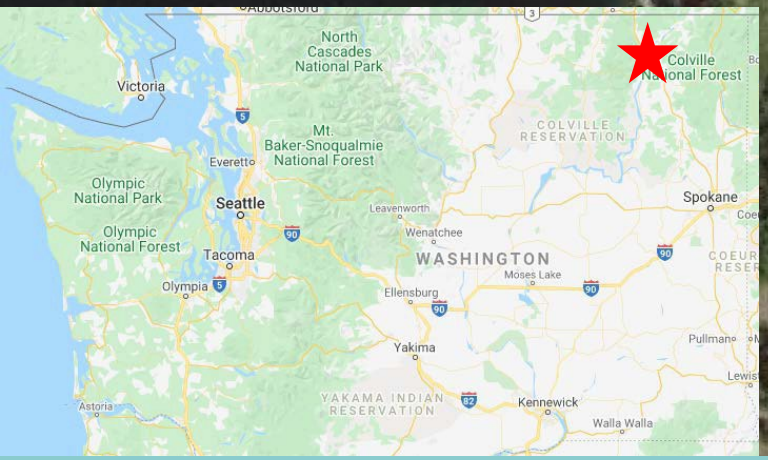
CD³ Mobile Trailer

Mobile unit with ratchet down base, removable wheels and storage deck. Solar powered or recharge option with 120v smart charger.

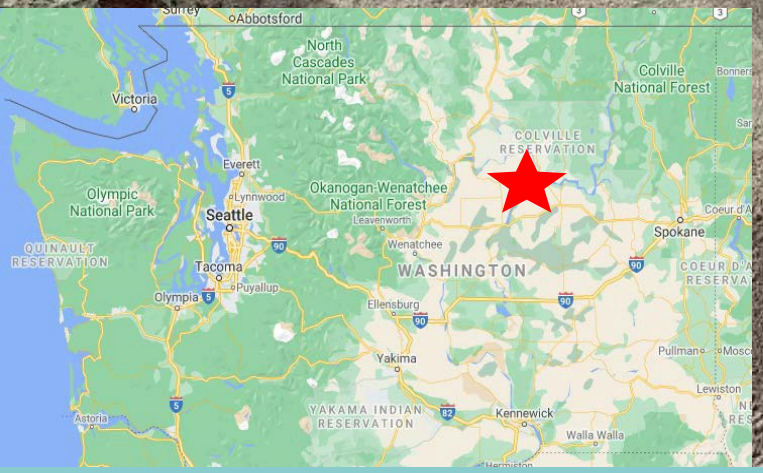
Columbia River, Ringold Springs

Lake Roosevelt National Recreation Area, Kettle Falls Marina

48.59923, -118.12109



Steamboat Rock State Park, Northup Boat Launch



47.870663 -119.096894

CD³ Trailer

Highly mobile, the CD³ trailer is available for loan across the state for large events.

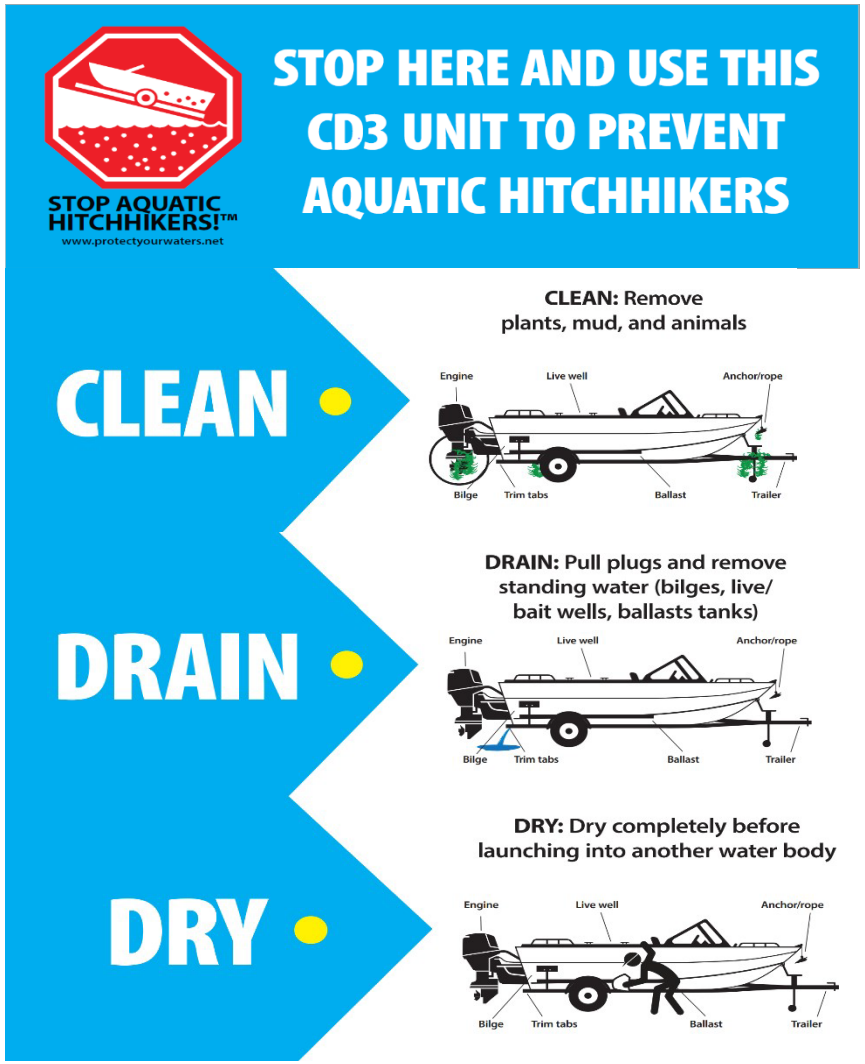
Great for education and outreach events to teach boaters to clean, drain, and dry their watercraft to remove potential AIS.

CD³ Trailer

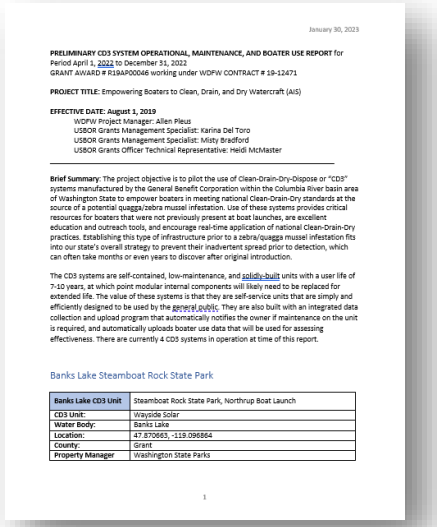
Scan the QR code with a smartphone or tablet for information about the CD³ and how to loan it out for an event.

You can also visit the Washington Invasive Species Council website at: https://invasivespecies.wa.gov/campaigns/clean-drain-dry/cd3-unit-information/

Educational Signage



Use Data and Next Steps



January 30, 2023

PRELIMINARY CD3 SYSTEM OPERATIONAL, MAINTENANCE, AND BOATER USE REPORT for Period April 1, 2022 to December 31, 2022
GRANT AWARD # F19AP00046 working under WDFW CONTRACT # 19-12471

PROJECT TITLE: Empowering Boaters to Clean, Drain, and Dry Watercraft (AIS)

EFFECTIVE DATE: August 1, 2019
WDFW Project Manager: Allen Pleus
USBOR Grants Management Specialist: Karina Del Toro
USBOR Grants Management Specialist: Misty Bradford
USBOR Grants Officer Technical Representative: Heidi McMaster

Brief Summary: The project objective is to pilot the use of Clean-Drain-Dry-Dispose or "CD3" systems manufactured by the General Benefit Corporation within the Columbia River basin area of Washington State to empower boaters in meeting national Clean-Drain-Dry standards at the source of a potential quagga/zebra mussel infestation. Use of these systems provides critical resources for boaters that were not previously present at boat launches, are excellent education and outreach tools, and encourage real-time application of national Clean-Drain-Dry practices. Establishing this type of infrastructure prior to a zebra/quagga mussel infestation fits into our state's overall strategy to prevent their inadvertent spread prior to detection, which can often take months or even years to discover after original introduction.

The CD3 systems are self-contained, low-maintenance, and solidly-built units with a user life of 7-10 years, at which point modular internal components will likely need to be replaced for extended life. The value of these systems is that they are self-service units that are simply and efficiently designed to be used by the general public. They are also built with an integrated data collection and upload program that automatically notifies the owner if maintenance on the unit is required, and automatically uploads boater use data that will be used for assessing effectiveness. There are currently 4 CD3 systems in operation at time of this report.

Banks Lake Steamboat Rock State Park

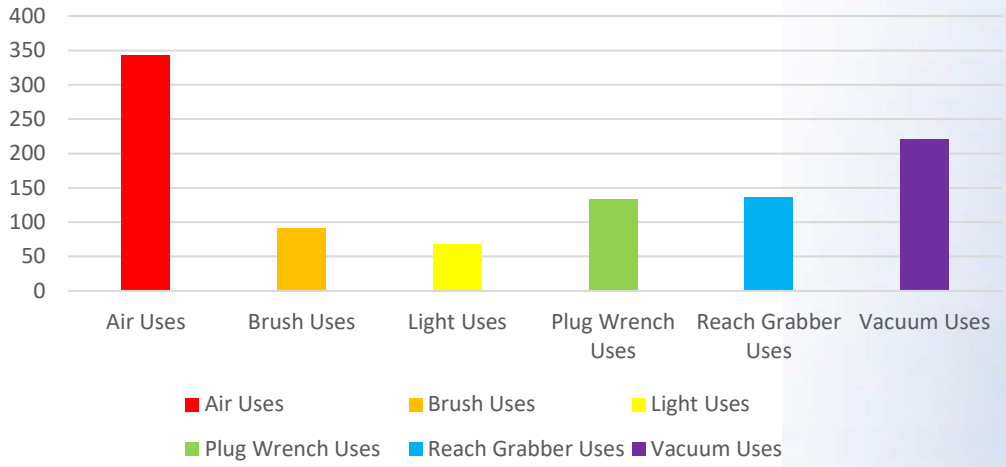
Banks Lake CD3 Unit	Steamboat Rock State Park, Northrup Boat Launch
CD3 Unit:	Wayside Solar
Water Body:	Banks Lake
Location:	47.870663, -119.096864
County:	Grant
Property Manager	Washington State Parks

1

CLEAN DRAIN DRY INITIATIVE

Wildlife Forever

Banks Lake Tool Use Breakdown 2022



Steamboat Rock State Park Grand Opening Event

WASHINGTON STATE RECREATION AND CONSERVATION OFFICE
Washington Invasive Species Council

Washington Department of FISH and WILDLIFE

Questions?

CLEAN DRAIN DRY INITIATIVE

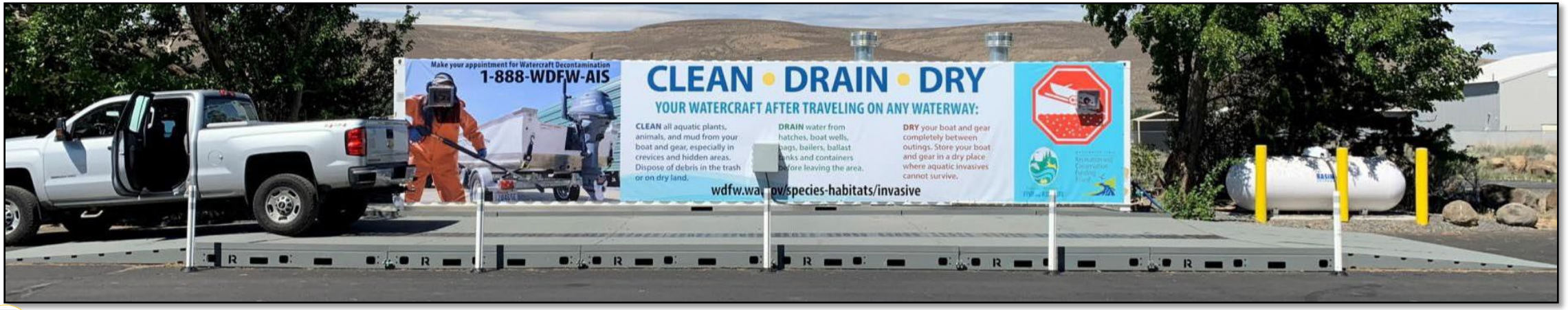
Wildlife Forever

Justin Bush, Executive Coordinator, Justin.Bush@rco.wa.gov, 360-704-0973

Jesse Schultz, Lead Prevention Biologist, Jesse.Schultz@dfw.wa.gov, 360-480-2105

Zach Burnside, Program Coordiantor, zburnside@wildlifeforever.org, 736-253-0222

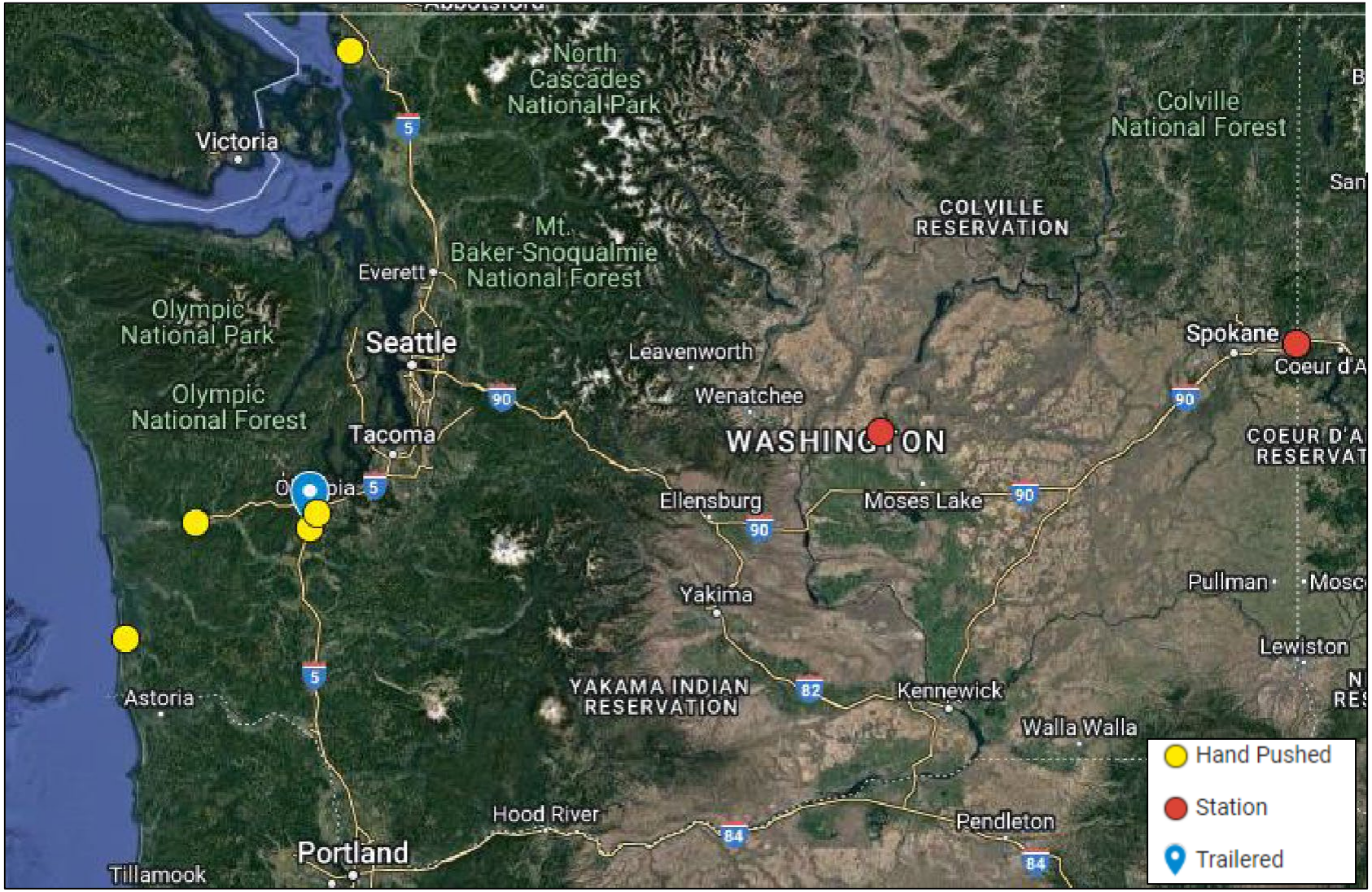
Other Decontamination Units



AIS Decontamination Units

Make	Model	Description	Location	Address	County	WDFW Region	Latitude	Longitude
Riveer	E530HNE3LB	Station	WDFW Spokane Watercraft Check Station	26715 E Appleway Ave Liberty Lake, WA 99019	Spokane	1	47.696034	-117.051308
Riveer	E530HNE3LB	Station	WDFW Region 2 Ephrata Office	1550 Alder St NW Ephrata, WA 98823	Grant	2	47.336372	-119.534058
Power Jet	PJ04004-12HGP	Hand Pushed	WDFW Lake Terrell Wildlife/Enforcement Area	5975 Lake Terrell Rd Ferndale, WA 98248	Whatcom	4	48.857472	-122.691416
Hotsy	1075SSE	Hand Pushed	WDFW Ocean Park Field Station	26700 Sandridge Rd Ocean Park, WA 98640	Pacific	6	46.49556	-124.033324
Hydro Engineering	5/3000 GHO-WDS	Trailered	WDFW Tumwater 93rd Warehouse	9628 Lathrop Industrial Dr SW Olympia, WA 98512	Thurston	6	46.948211	-122.941084
Hotsy	1075SSE	Hand Pushed	WDFW Tumwater 93rd Warehouse	9628 Lathrop Industrial Dr SW Olympia, WA 98512	Thurston	6	46.947868	-122.941221
Power Jet	PJ04004-12HGP	Hand Pushed	WDFW Region 6 Montesano Office	48 Devonshire Rd MontesanoWA, 98563	Grays Harbor	6	47.010662	-122.896647
Power Jet	PJ04004-12HGP	Hand Pushed	WDFW Tumwater Cleveland Warehouse	3939 Cleveland Ave SE Loading Dock B Tumwater, WA 98501	Thurston	6	47.010662	-122.896647

Decontamination Unit Map



Huckleberries to Salmon, First Foods Impacted by Invasive Species

Blaine L. Parker

Invasive Species Coordinator

Columbia River Inter-Tribal Fish Commission

Northwest Power and Conservation Council

February 15, 2023




First Foods

Roots

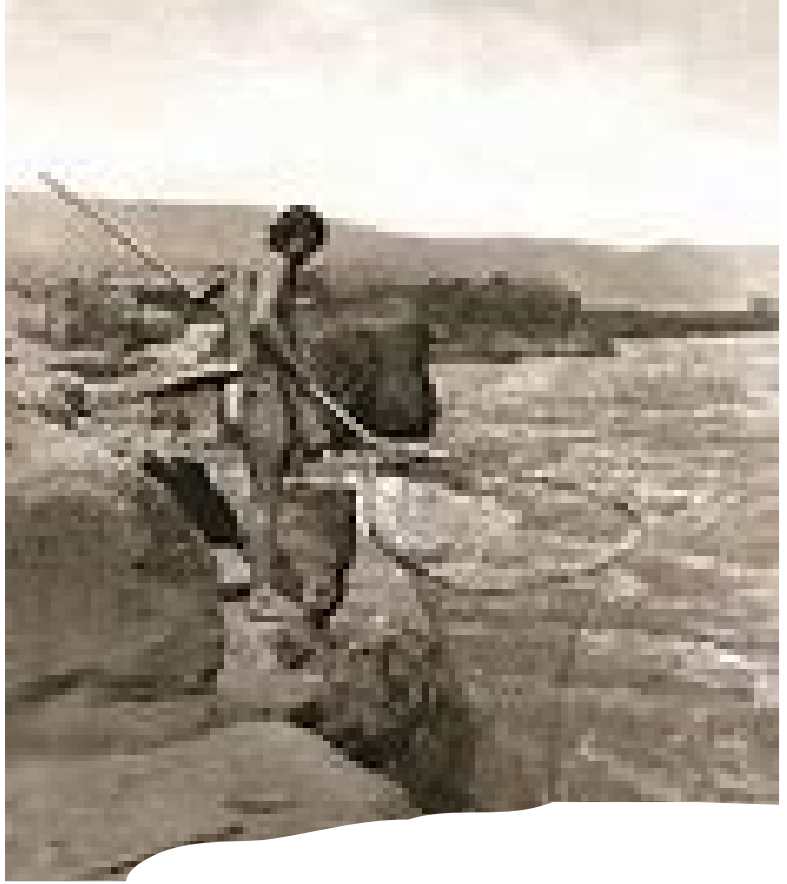
- Recent reports of root plants affected by unknown pests/pathogens, research and monitoring important.
- Habitat under siege from invasive plants such as cheatgrass, spotted knapweed, and yellow star thistle.
- Climate change exerbate impacts from invasive species by declining snowpacks, increased drought severity, and increased fire frequency/severity.

Berries

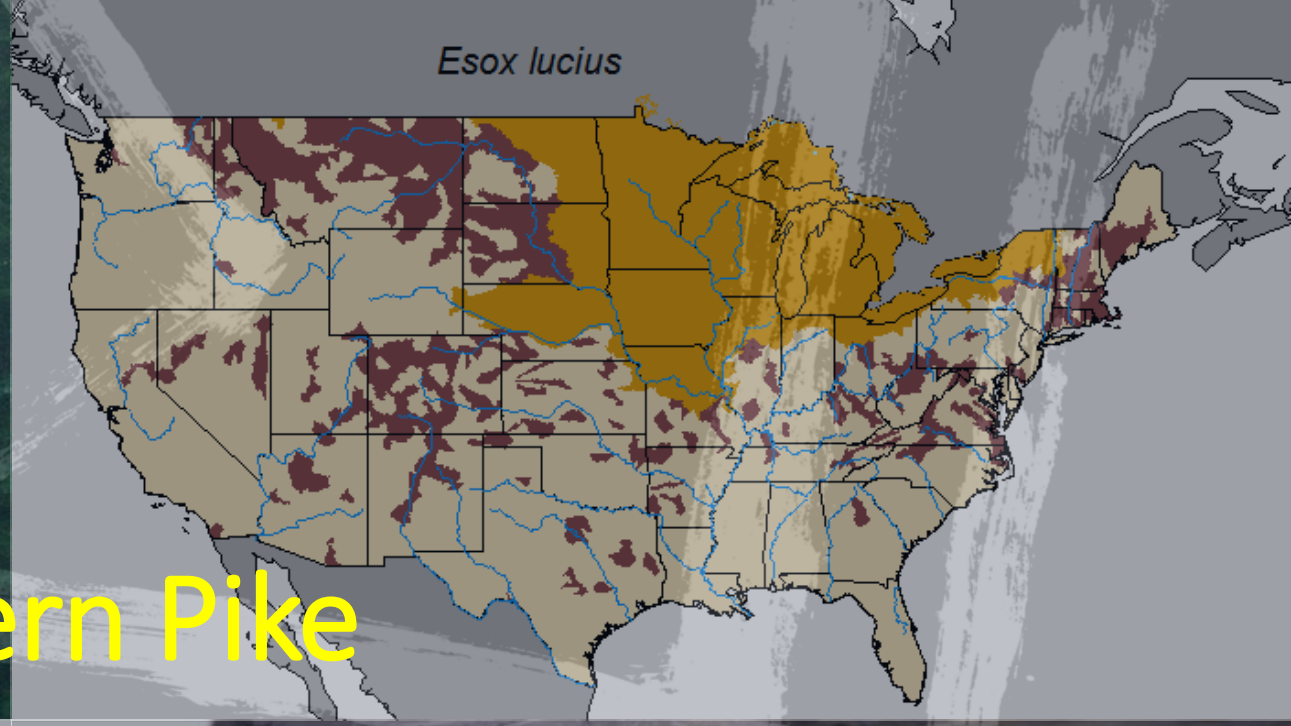
- Spotted Wing Drosophila *D. suzukii* was first positively identified infested raspberry fruit in California in 2008, now found across US.
- "Wormy" huckleberries first reported in 2013 to WSU Skamania Extension.
- Research conducted 2013-15 in and near traditional picking locations for Yakama Nation and Warm Springs members.
- Elevation increase does not restrict infestation, damage highly variable
- Spotted Wing Drosophila in High Elevation and Culturally Significant *Vaccinium* Species in Southwest Washington State and Northwest Oregon *by* T.A. Murray1, N.C. Aflitto1, P.W. Shearer2 and S.P. Castagnoli2 1 Washington State University Extension, Pullman, USA; 2 Oregon State University, Hood River, USA
- More research is necessary to document impacts to culturally critical resource

Deer, Elk

- Deer and Elk resources impacted by:
- Hair Loss Syndrome (exotic lice),
- Hoof disease (bacteria)
- Chronic Wasting Disease (prions)

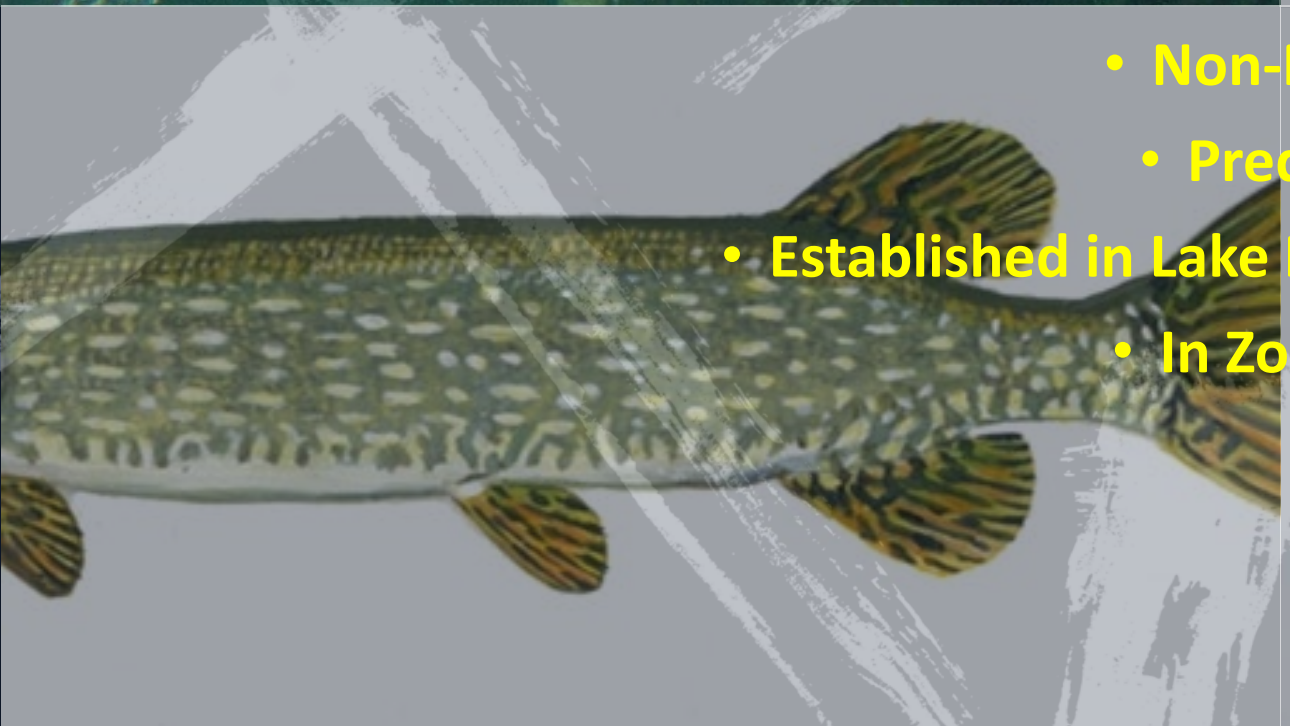


Salmon
Cultural Lifeblood: Past Present and Future



Northern Pike

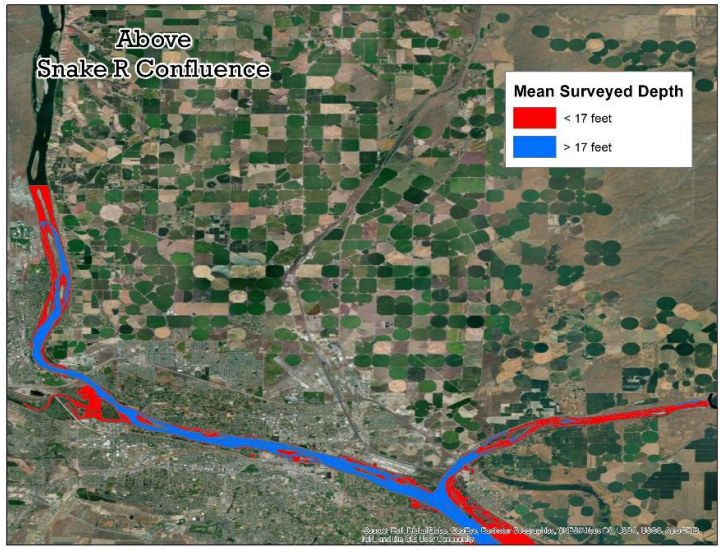
- Non-Native
- Predator
- Established in Lake Roosevelt since 2011
- In Zone 6 ?

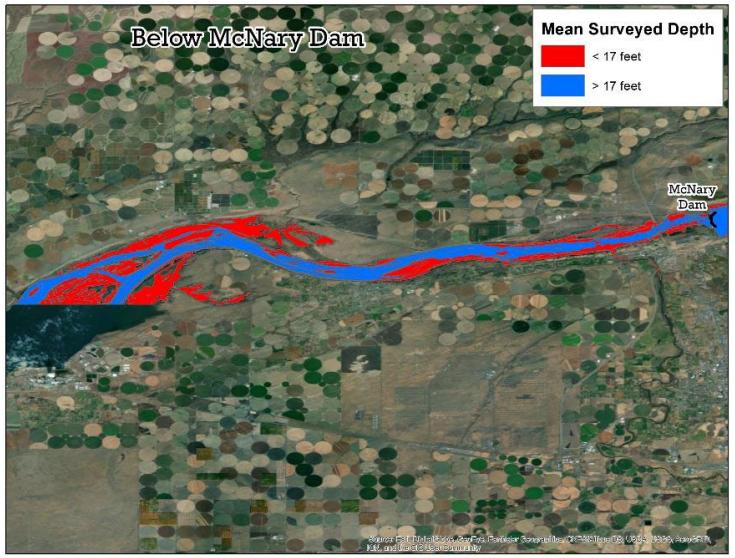


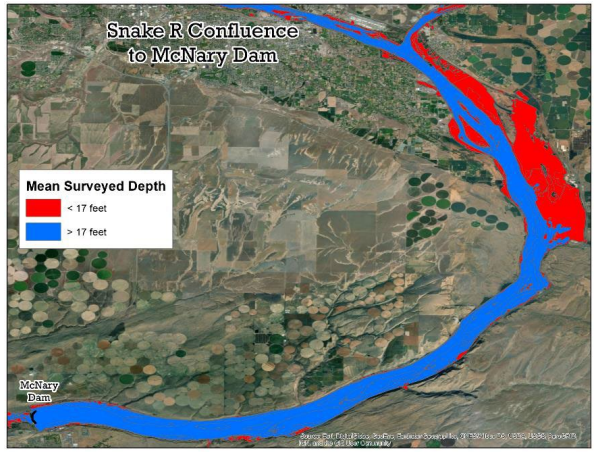
Are Northern Pike Really That Bad?

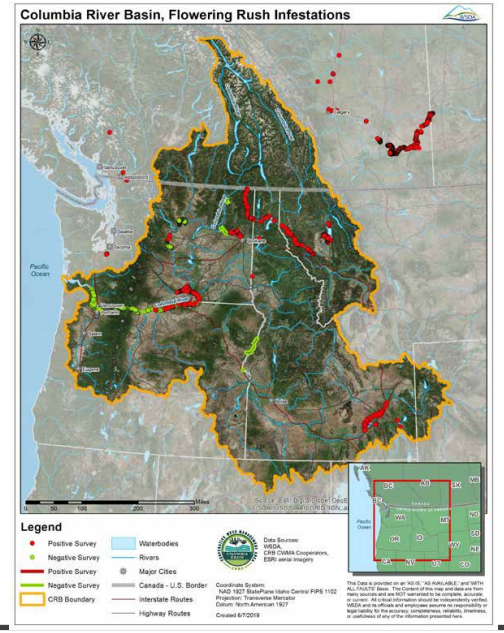
History of Flowering Rush, “Ecosystem Engineer”

- **Flowering Rush is an Old World Palearctic and Asian emergent aquatic plant species**
- **Found across 17 northern US states and all Canadian Providences, serious problem in Great Lakes with thousands of infested acres, particularly serious impact on wild rice**
- **In the PNW, first noted in Snake River in 1956, Montana on in Flathead Lake in 1964.**
- **Generalist plant found from shoreline to water depths of 6 meters or more, slow back waters to flowing waters**
- **“Ecosystem Engineer” with the capacity to alter and modify a variety of habitats in the CRB**
- **Dense stands create physical, temporal and special changes by reducing water flow, increasing water temperatures, changing nutrient transfer mechanisms**









Distribution of Flowering Rush in the Columbia Basin

Summary

- **First Foods are being impacted at all levels from Invasive Species**
- **Research and Monitoring particularly important for the *Sister Foods*, Roots and Berries, while protecting the ecosystems that support these culturally significant plants.**
- **The *Brother Foods* Deer, Elk & Salmon are impacted by prions, parasites, and bacteria while Salmon are at risk from invasive fish, present an array of challenges for the Tribes and their partners in Federal & State agencies and Academia.**
- **First Foods are critically important for non-Tribal citizens; therefore, it is important to coordinate and collaborate throughout the region to protect these Foods for the next 7 generations.**

Wild Pigs - Feral Hog - Wild Boar

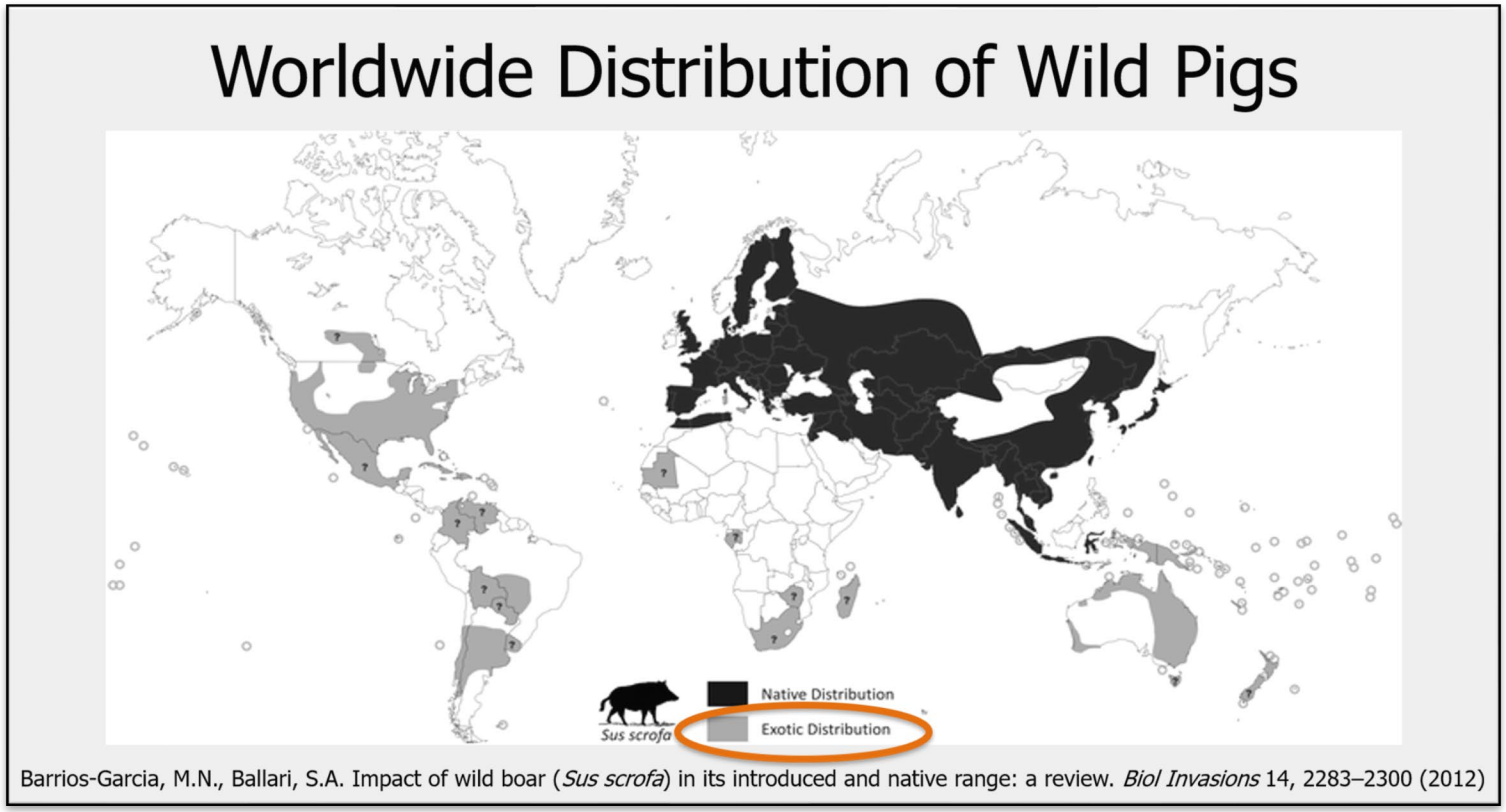
the perfect worst invasive species

Liz Lodman
Montana Invasive Species Council

MISC
Montana Invasive Species Council

Feral Swine – Wild Pigs

Intelligent
Secretive
Adaptable



Barrios-Garcia, M.N., Ballari, S.A. Impact of wild boar (*Sus scrofa*) in its introduced and native range: a review. *Biol Invasions* 14, 2283–2300 (2012)

Feral Swine – Prolific Breeders

- Average lifespan: 4-5 years
- Sexual maturity: 6-10 months
- Gestation: 115 days
- Litter size: 4-14 piglets
- 1-3 litters/year
- Breed year-round
- Group of pigs = Sounder

Feral Swine – Impacts

Major threat to biodiversity

- Compete with wildlife for food, water, and space
- Opportunistic – prey on wildlife young, reptiles, amphibians, eggs of ground nesting birds
- Consume large quantities of herbaceous vegetation; diet is up to >80% plant
- Impact water quality and riparian systems

Feral Swine – Impacts

Agriculture

- Wild pigs damage every sector of agriculture
- High value crops: corn, grains
- Farm infrastructure: fences, gates, irrigation systems

Feral Swine – Impacts

Pasture - Rangeland

- Soil disturbance increases erosion, weakens earthen dams, and spread invasive plants
- Consume, contaminate, and destroy supplemental feed and mineral sources

Feral Swine – Impacts

Livestock

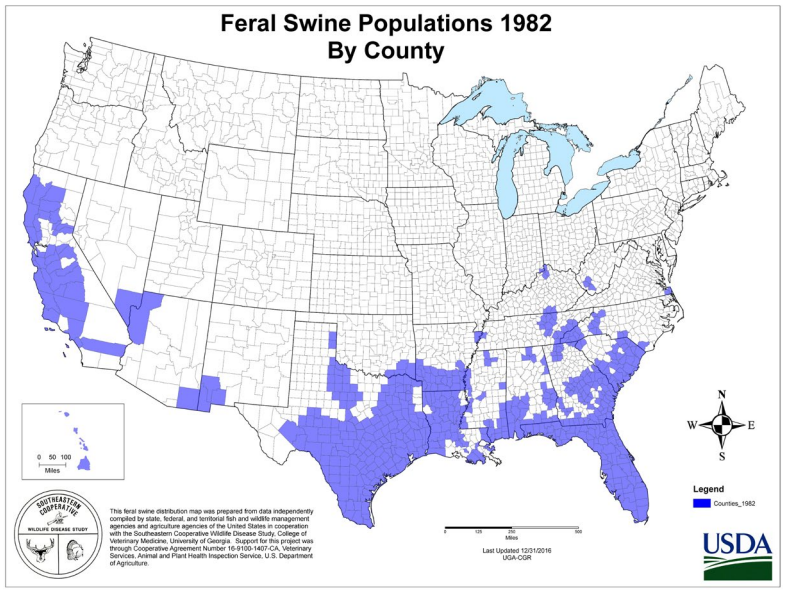
- Prey on livestock; primarily calves and lambs
- Can transmit numerous diseases and parasites to livestock

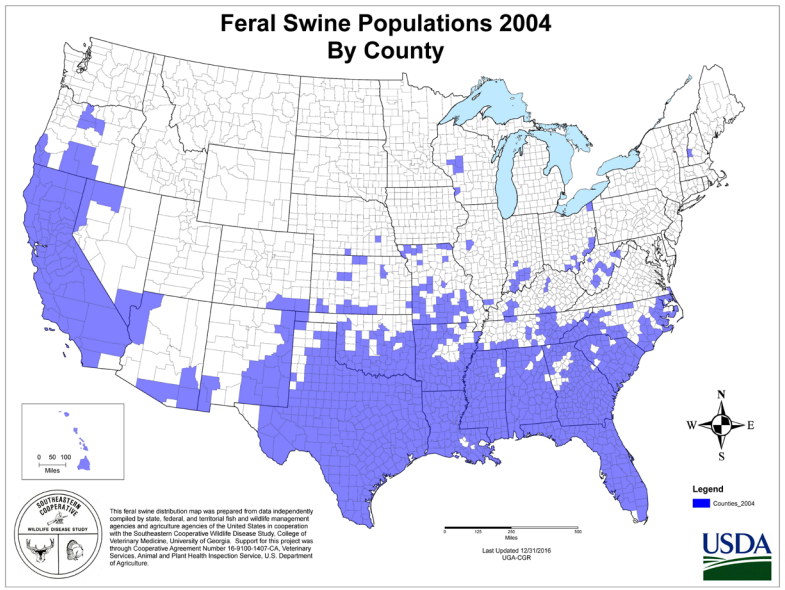
Feral Swine – Diseases

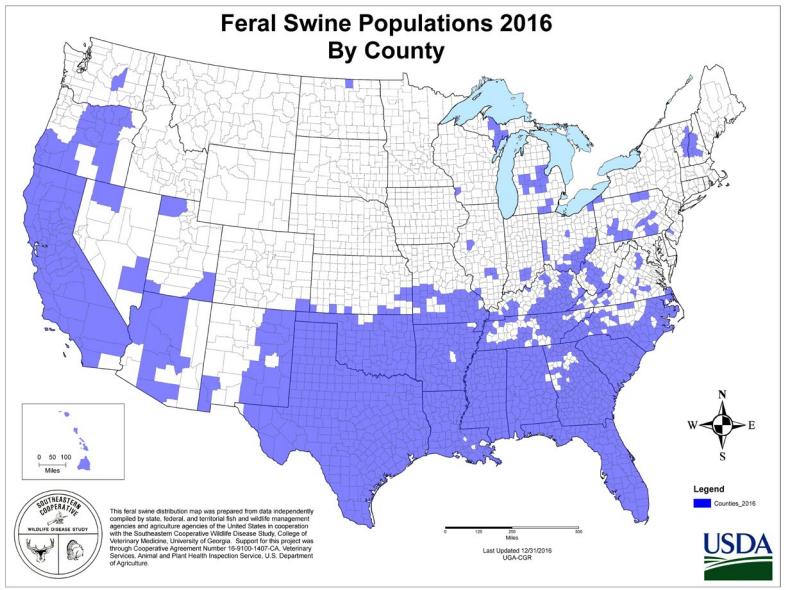
BACTERIAL DISEASES
Avian tuberculosis [b]
Anthrax [a]
Atrophic rhinitis [c]
Brucellosis [a, b, c]
Bovine tuberculosis [a, b, c]
Erysipelothrix infections [a]
Eperythrozoonosis [c]
Helicobacter spp. [a]
Leptospirosis [a, b, c]
Pasteurellosis [a]
Plague [a, b]
Pneumonia [c]
Q fever [b]
Salmonellosis [a, c]
Tularemia [b]
Yersiniosis [a, c]

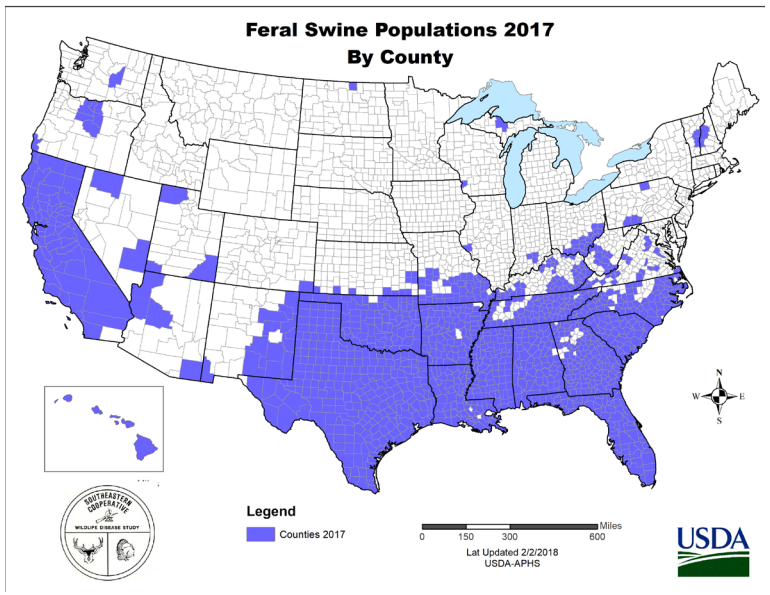
VIRAL DISEASES	
African swine fever virus [b]	Porcine enterovirus [c]
Bovine herpesvirus [a]	Porcine parvovirus [b, c]
Classic swine fever virus (hog cholera) [a, b, c]	Porcine reproductive and respiratory syndrome virus [b]
Coronaviral infections [a]	
Encephalomyocarditis [a, c]	Pseudorabies virus (aujeszky's disease) [a, b]
Foot-and-mouth disease [a]	Rabbit hemorrhagic disease [a]
Hepatitis E virus [b]	Reovirus [c]
Hemagglutinating encephalomyelitis virus [c]	Rinderpest [a]
Influenza A [a]	Rotavirus [c]
Japanese encephalitis virus [b]	San miguel sea lion virus [a]
Louping-ill virus [a]	Swine vesicular disease [a]
Malignant catarrhal fever [a]	Swine influenza virus [c]
Menangle virus [a]	Swinepox virus [a]
Papillomavirus infections [a]	Torque teno virus [b]
Parainfluenva infections [a]	Transmissible gastroenteritis virus [c]
Pestivirus infections [a]	Vesicular stomatitis virus [a, c]
Porcine circovirus-associated diseases [b]	Vesicular swine virus [a]

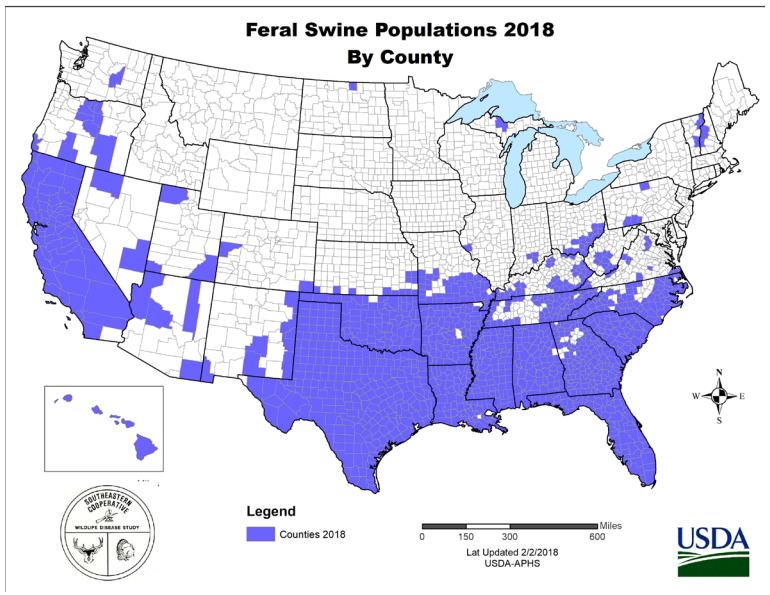
INTERNAL PARASITES	
Ascaris lumbricoides [a]	Macracanthorynchus hirudinaceus [b, e, i]
Ascaris suum [b, c, e, i]	Metastrongylus apri [b, d, i]
Ascarops strongylina [b, e, i]	Metastrongylus elongatus [a]
Balantidium coli [i]	Metastrongylus pudendotectus [b, d, i]
Choerstrongylus pudendotectus [a]	Metastrongylus salmi [b, d, i]
Cycticercus cellulosae [d]	Neospora caninum [g]
Cysticercus tenuicollis [d]	Oesophagostomum brevicaudum [i]
Dicrocoelium dendriticum [e]	Oesophagostomum denatum [b, e, i]
Dirocoelium dentriticum [b]	Oesophagostomum quadrispinulatum [i]
Echinoccus multilocularis [h]	Physocephalus sexalatus [a, b, c, e, i]
Echinococcus granulosus [b]	Sarcocytis sp. [c, i]
Eimeria cerdonis [i]	Schistosoma japonicum [e]
Eimeria debliecki [i]	Stephanurus dentatus [a, c, e, i]
Eimeria neodebliecki [i]	Strongyloides ransomi [e, i]
Eimeria perminuta [i]	Taenia hydatigena [b]
Eimeria porci [i]	Taenia hydatigena [b]
Eimeria scabra [i]	Taenia solium [b, e]
Eimeria spinosa [i]	Toxoplasma gondii [h, i]
Eimeria suis [i]	Trichinella britovi [h]
Fasciola gigantica [b]	Trichinella britovi [h]
Fasciola hepatica [e]	Trichinella nativa [h]
Fascioloides magna [h]	Trichinella pseudospiralis [h]
Globocephalus urosubulatus [b, c, i]	Trichinella pseudospiralis [h]
Gongylonema pulchrum [a, b, c, i]	Trichinella spiralis [h, i]
Hyostrongylus rubidus [e, i]	Trichostrongylus axei [i]
Isospora suis [i]	Trichuris suis [a, b, d, e, i]
Macracanthorhynchus hirudinaceus [d]	Trypanosoma cruzi [f]


Feral Swine Populations 1982
By County
Legend
Counties_1982
Last Updated 12/31/2016
UGA-CQR
USDA

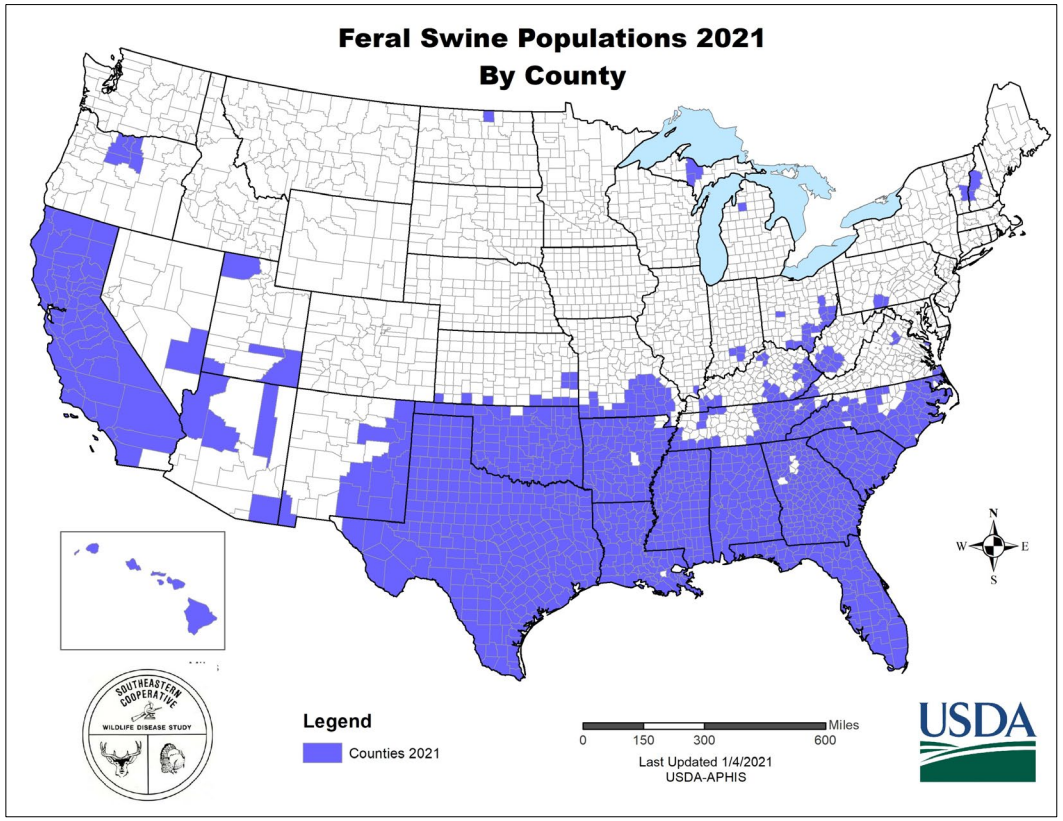

Feral Swine Populations 2004
By County
Legend
Counties_2004
Last Updated 12/31/2016
UGA-CQR
USDA

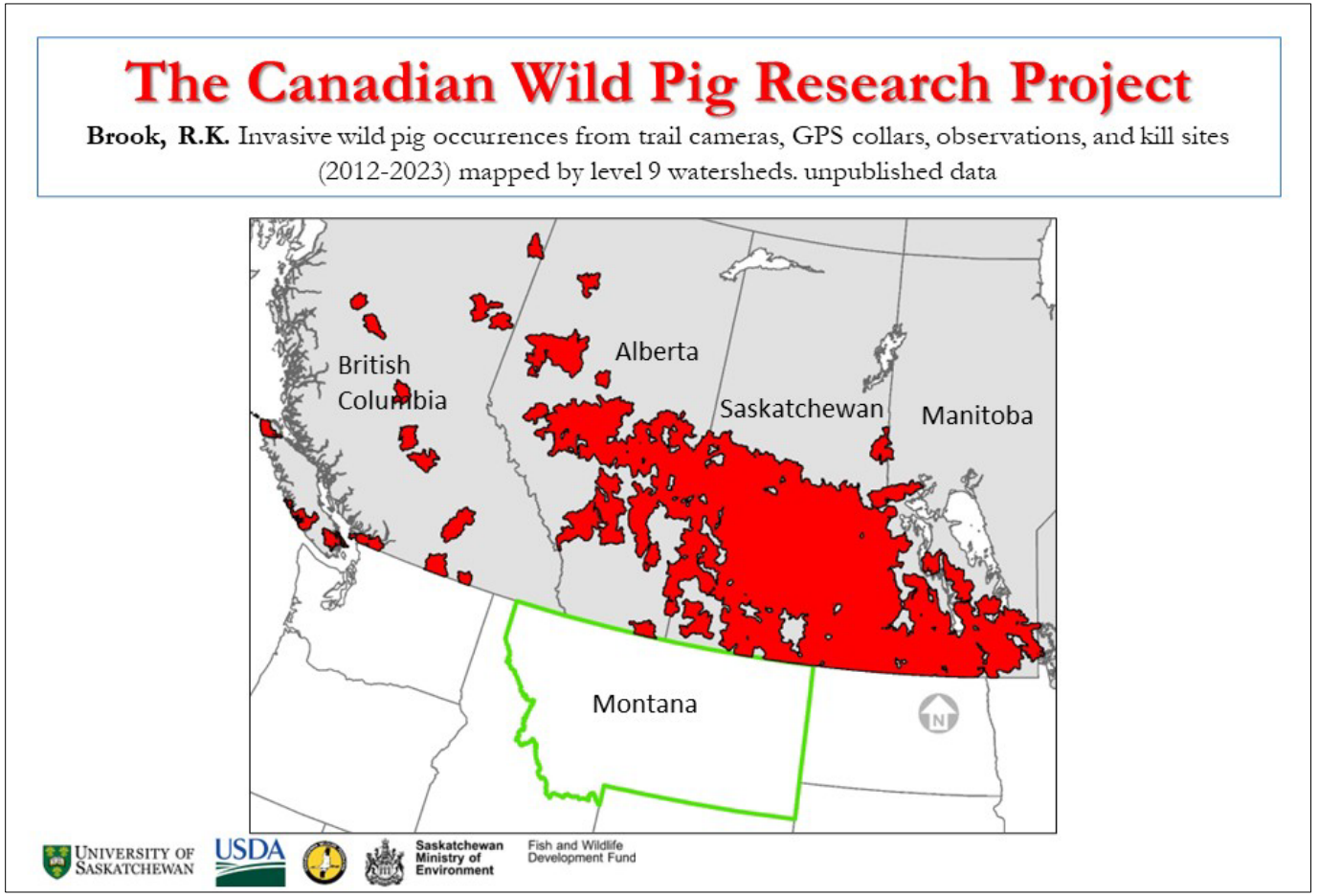

Feral Swine Populations 2016
By County
Legend
Counties_2016
Last Updated 12/31/2016
UGA-CQR
USDA


Feral Swine Populations 2017
By County
Legend
Counties 2017
Miles
0 150 300 600
Lat Updated 2/2/2018
USDA-APHS
USDA


Feral Swine Populations 2018
By County
Legend
Counties 2018
Miles
0 150 300 600
Lat Updated 2/2/2018
USDA-APHS
USDA

Feral Swine – Distribution





Feral Swine – Distribution

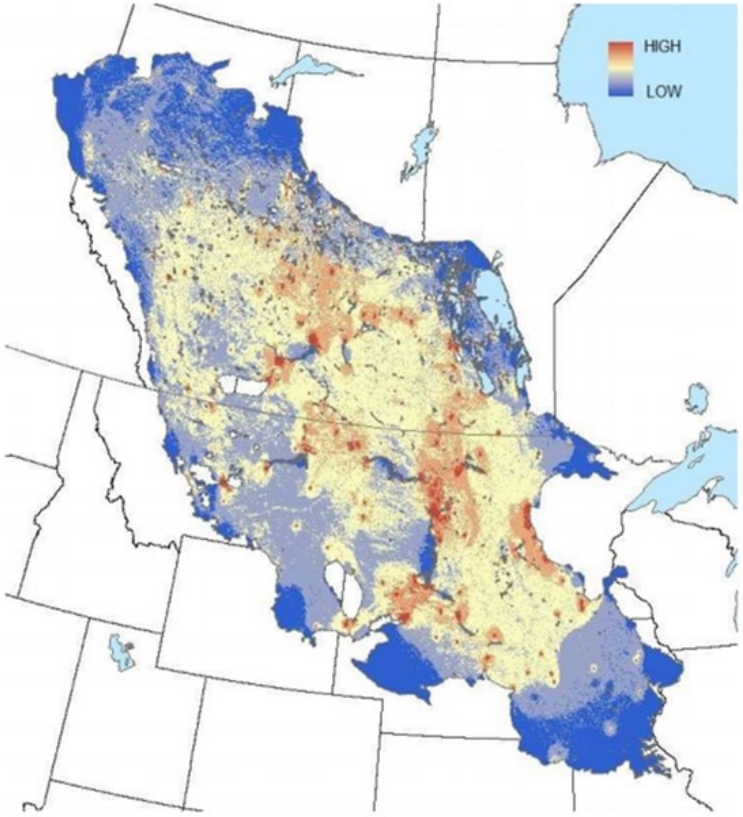


Figure 4.3: Regional connectivity for wild pigs across the North American prairies. Potential areas to monitor for wild pig transboundary movements are indicated by white stars. These include the areas around Fort Peck Lake and along the Missouri river in Montana, the areas in and around Turtle Mountain Provincial park in Manitoba, the series of wetlands which begin around Maplewood State Park in Minnesota and extend southward, as well as areas in and around South Dakota's Oahe Lake.

Figure from Corey Kramer's thesis 2001.
Student under Dr. Ryan Brook, University of Saskatchewan

Feral Swine – Why No Hunting

- It’s not effective
- Modifies behavior and movements
- Conflicting with trapping efforts
- Failing to eliminate all animals in a group (sounder) results in further dispersion of animals
- Once pressured they become more difficult to hunt and are harder to eradicate
- Creates incentive and culture

Feral Swine - Response

Monitoring

- Early detection and reporting is critical
- Squeal on Pigs public outreach campaign

In Montana if you think you see a **Feral PIG call**

In Washington, Idaho or Oregon if you think you see a **FERAL PIG call**

Feral Swine – Response

Rapid and Strategic

- Focus on whole sounder removal

Feral Swine – Coordination

Cooperate & Communicate

- Squeal on Pigs campaign
- Transboundary Feral Swine Working Group

For More Information on Invasive Species

Idaho Invasive Species Council

Oregon Invasive Species Council

Montana Invasive Species Council

Washington Invasive Species Council

Columbia River Inter-Tribal Fish Commission