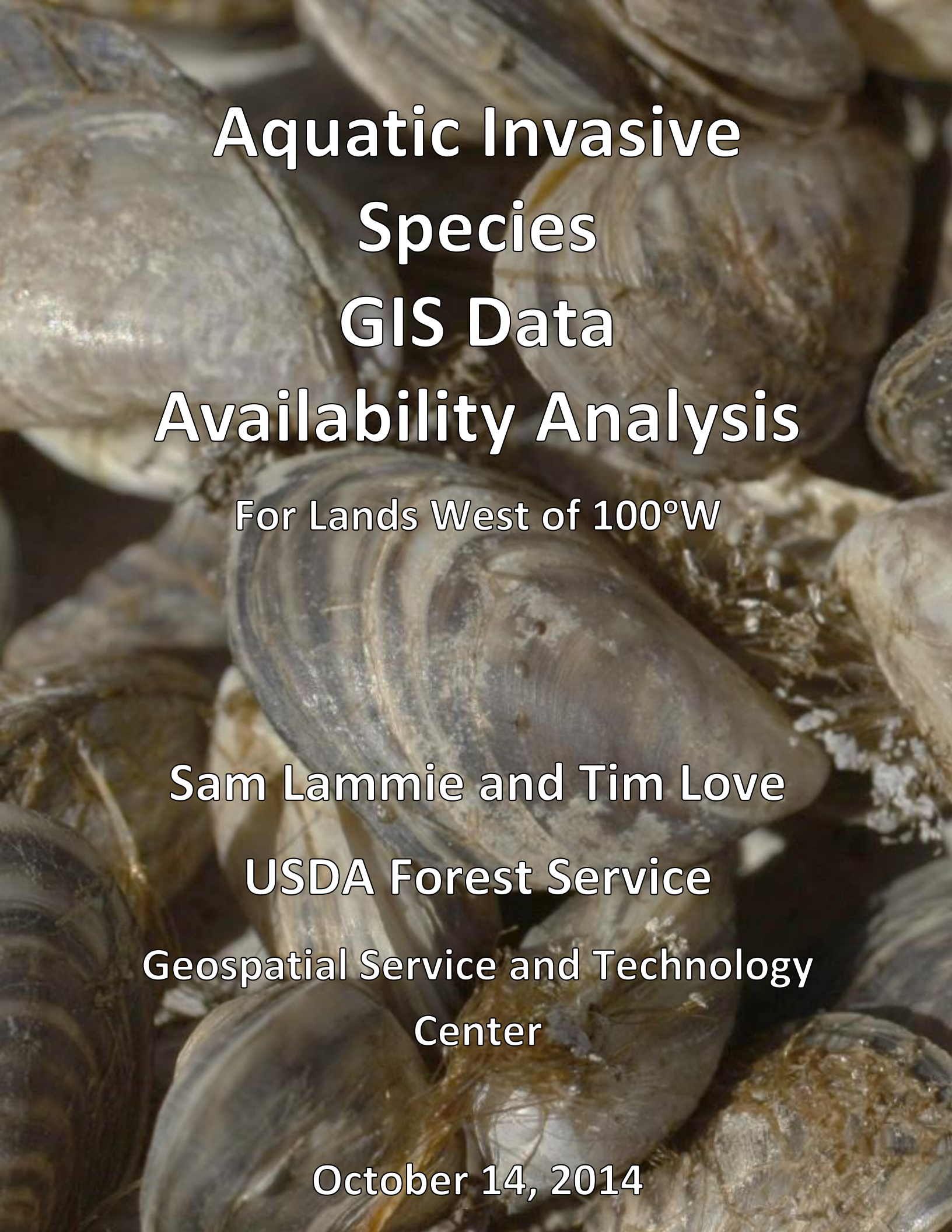


# Aquatic Invasive Species GIS Data Availability Analysis

For Lands West of 100°W


Sam Lammie and Tim Love

USDA Forest Service

Geospatial Service and Technology Center


October 14, 2014

The end goal of this study is to investigate the potential of digital and hard copy map products that identify aquatic invasive species occurrences and infested waters west of the 100th meridian. These maps would provide fire operations (ground and air ops, and READS) known locations of aquatic invasive species to avoid during drafting operations or if unable to avoid, prepare for decontamination actions after use. The specific purpose of this project is to query aquatic invasive species datasets from the FS, BIA, USGS, FWS, and State Agencies west of 100 degrees W.

This document presents the summary of our findings, facilitated through a series of interviews with state and federal contacts. Our goal was to discover the current state of AIS information in GIS format in order to guide potential next steps to develop a centralized interagency geodatabase. Results are presented within the next pages, starting with a summary of answers to desired questions, then moving into a presentation of information retrieved for each state and organization queried.

## Executive Summary

This study attempts to quantify the availability of geospatial Aquatic Invasive Species (AIS) data across the western U.S. In order to facilitate a complete analysis of available geospatial AIS data, we focused on obtaining a concise but holistic contact list of State agencies and National organizations who may use or maintain AIS information. We then developed a standard set of questions and an associated spreadsheet to capture AIS data availability from each agency. This report summarizes this information. We found that there is no standardized methodology for maintaining or sharing geospatial AIS data, and that data varies wildly from state to state and between Federal agencies in terms of format, maintenance, attributes, storage, and data sharing capabilities. There currently does not appear to be a straightforward way to map AIS across the western U.S., and an attempt to pull information together on a one-time basis would likely lead to inconsistent results. However; there is agreement among contacts that there are benefits from making AIS data available across boundaries, and that an effort to develop a more centralized approach, using either new or existing mechanisms, would be worthwhile.

Contact Information:

Timothy Love
Sr. Geospatial Applications Developer
USDA Forest Service
Geospatial Service and Technology Center
2222 W 2300 S, Salt Lake City, UT, 84119
tblove@fs.fed.us 801-975-3432

Cover page photo credit: Rob Schumacher/The Republic

# Contents

## Answers to Specific Questions

***Q1:*** *Will we have maps for only draftable waterbodies, or all AIS sites? Is there a national layer that identifies draftable and non-draftable water that we should be considering?*

**A1:** It appears that when agencies/states have available AIS data, they have maintained this information for all AIS sites. Through this investigation, a national layer of draftable vs non-draftable water was not made known. Available AIS data generally does not distinguish by water type.

***Q2:*** *Will we label the species on the maps?*

**A2:** GIS aquatic invasive species information available at the state or agency level would allow for labeling species' names on a map.

***Q3:*** *After we start into the query of data, do we need to pare down species presented on maps?*

**A3:** Results of this study show that certain states/agencies do maintain other aquatic species' GIS data that are different from the species queried in this investigation Aquatic invasive GIS data is very state-dependent and seems to indicate that a more detailed look at GIS data sets is required to determine map content. Many states expressed concern that we were focused on a set species list. We should recognize that states' needs may be different than federal needs.

***Q4:*** *What are the future issues with data storage and upkeep? Estimated costs for updating data and map production or data host site costs?*

**A4:** Based on the results of this project, data is currently available on various platforms using various software tools. The most common method of data storage, when GIS information representing aquatic invasive species was even available, was for a state or organization to hold their data locally, not in an enterprise manner which would allow others to easily share data and maintain a single database. There were two exceptions: utilization of the USGS NAS database, and a web-based server called IMapInvasives.

Though use of the USGS Nonindigenous Aquatic Species database was not common across the field, a number of responses stated that at least a portion of their aquatic invasive species information is held in this database. Note that although NAS is not geospatial in nature (i.e., is mainly tabular), locational information is present as geographic coordinate locations (i.e., in latitude, longitude).

IMapInvasives is an online web portal to facilitate sharing of invasive species information across state and agency boundaries. Within our study area west of 100 deg W, BLM, Arizona and Oregon are currently using this database. This tool certainly warrants further investigation into its potential use.

Costs to develop and maintain an interagency AIS database are difficult to determine at this point. Specific details as to a states/organizations' data maintenance process and even their willingness to participate in this coordinated effort are not known at this time. We would suggest that the team attempt to utilize an existing tool or location, such as IMapInvasives, or modify properties of the USGS NAS database rather than developing an entirely new centralized database. Historical attempts within the Forest Service to create enterprise, national, interagency data repositories have been met with difficulty and large costs both in terms of resources and time.

***Q5:*** *Can we sell this to WFDSS to store data?*

**A5:** WFDSS would prefer not to act as the authoritative data repository to store aquatic invasive species GIS data. They are willing to ingest information from another source however if a centralized database is created.

***Q6:*** *Can we produce a hardcopy map for preplanning work?*

**A6:** See Answer #7.

***Q7:*** *What kind of digital data can we pull together for WFDSS and future use?*

**A7:** This is truly the crux of the issue and the answer is our primary question to answer for this project. From an enterprise view considering data standardization and availability, there does not currently appear to be a straightforward way to bring invasive aquatic species GIS information together to form an interagency dataset across state boundaries west of 100W that would provide fire operations a reliable map for use in fire/bucket activities. Looking further down the road based on current status, the maintenance and updating of such a dataset could be an even more difficult task which would require strong collaboration between agencies and states to make it happen. However; this has been a difficult proposal from the onset and a straightforward approach to develop a centralized GIS database was not seen as a likely possibility. There are some good things going on here and there seem to be opportunities to develop something that can be useful to a number of groups. Some positive aspects of the information obtained during this study include:

- Virtually everyone that was contacted during this study held the aquatic invasives team sponsoring this effort in high regard. This leads us to believe that they are willing to support a well-reasoned approach that the team may develop.
- Interest exists within most entities contacted to utilize GIS data showing aquatic invasives.
- Two collaborative databases already exist that could offer effective solutions for displaying and analyzing aquatic invasive data: IMapInvasives and USGS NAD.
- Collection of aquatic invasives GIS data from states/organizations to develop a one-time database of information is possible. However, note that this dataset would not likely be all-inclusive for every state and that many holes would exist.
- There is agreement that the current state of AIS data continues to warrant investigation into further standardizing information and facilitating data sharing across boundaries.

A goal of this study was to determine if a western-US GIS database could be created that would serve as the root for aquatic invasives mapping. As mentioned in the previous bullet, this could happen, but the question becomes what is the completeness of this information. Unfortunately, there are limited observed standards for maintaining GIS invasives data between entities contacted. For example, one state may have an annually-updated, accurate database that is available to partners, while the next may have a few point locations on a staff member's hard drive. Due to the limited resources available for this study and the time required to make the right contacts and then facilitate retrieval of general information of what is available at each state/organization, we were not able to dive into (or generally obtain) raw GIS data. Therefore, many aspects that we had hoped to quantify, such as data completeness, accuracy, and documentation, remain unanswered. We can state that given the information we have discovered, any resultant dataset would certainly have gaps. The question then is, are these data gaps sufficiently limited that a map would be useful for fire operations.

The next section of this report details each State or organization's geospatial AIS data as informed by contacted individuals.

# Arizona

- Contact: Jami Kuzek
- Provided a response spreadsheet: *AzAquaticInvasivesForm_0814.xlsx*

***Aquatic Invasive Species (AIS) List***

| | Common Name | Scientific Name | Species Type | Agency | Department | Contact Name | Data (y/n) |
|---|---|---|---|---|---|---|---|
| | Asian Carp** : Black | Mylopharyngodon piceus | | | | | |
| | Asian Carp** : Bighead | Aristichthys nobilis | | | | | |
| | Asian Carp** : Silver | Hypophthalmichtys molotrix | | | | | |
| 1 | Asian clam | *Corbicula fluminea* | Aquatic Invertebrate | AGFD | Habitat Branch | Jami Kuzek | Y |
| 2 | Bd Chytrid | *Batrachochytrium dendrobatidis* | Fungus | AGFD | Nongame Branch | Tom Jones | unsure |
| | Bullfrog | *Rana Catesbeiana* | | AGFD | Habitat Branch | Jami Kuzek | Y |
| | Channeled Apple Snail | Pomacea canaliculata | | AGFD | Habitat Branch | Jami Kuzek | Y |
| 3 | Chinese mysterysnail | *Cipangopaludina chinensis* | Invasive mollusks | AGFD | Habitat Branch | Jami Kuzek | Y |
| 4 | Didymo** | *Didymosphenia geminata* | Diatom | | | | |
| 5 | Eurasian watermilfoil | *Myriophyllum spicatum L.* | **Plant** | | | | |
| 6 | Faucet snail | *Bithynia tentaculata* | Invasive mollusks | | | | |
| | Giant Salvinia | *Salvinia molesta* | | AGFD, BLM | | J Kuzek, Denise Hosler | Y |
| 7 | Hydrilla | *Hydrilla verticillata* | **Plant** | AGFD | Habitat Branch | Jami Kuzek | Y |
| | Island Apple Snail | Pomacea insularum | | AGFD | Habitat Branch | Jami Kuzek | Y |
| | Largemouth Bass Virus | Family: *Iridoviridae* | | | | | |
| 8 | New Zealand mudsnail | *Potamopyrgus antipodarum* | Aquatic Invertebrate | USGS | NAS | Pat Fuller | Y |
| 9 | Parrot feather watermilfoil | *Myriophyllum aquaticum* | **Plant** | | | | |
| 10 | Port Orford Cedar Root Disease | *Phytophthora lateralis* | Microbe | | | | |
| 11 | Quagga mussel | *Dreissena rostriformis bugensis* | Aquatic Invertebrate | AGFD | Habitat Branch | Jami Kuzek | Y |
| | Red Claw Crayfish** | *Cherax quadricarinatus* | | | | | |
| | Rusty Crayfish** | *Orconectus rusticus* | | | | | |
| | Snakehead** | Family: *Channidae* | | | | | |
| 12 | Spiny waterflea | *Bythotrephes cederstroemi* | Aquatic Invertebrate | | | | |
| 13 | Spring Viremia of Carp | *Rhabdovirus carpio* | Microbe - Virus | | | | |
| 14 | Sudden Oak death | *Phytophthora ramorum* | Microbe | | | | |
| 15 | Viral Hemorrhagic Septicemia | *Novirhabdovirus sp* | Microbe - Virus | | | | |
| 16 | Whirling disease | *Myxobolus cerebralis* | Microbe | NPS? | Alexandra Rhode | | |
| 17 | Zebra mussel** | *Dreissena polymorpha* | Aquatic Invertebrate | | | | |

| | |
|---|---|
| ***Information Sources:*** | *Jami's Key* |
| *Idaho Invasive Species List* | Yellow Highlighted Cells: Species that I added to the list |
| *USDA FS Region 4 2014 AIS of Concern to FireFighters* | Red Lettering: Species that are important to G&F, they are listed in the Director's Orders |
| *USGS Nonindigenous Aquatic Species* | 2 asterisks: Species that are not yet detected in AZ. |

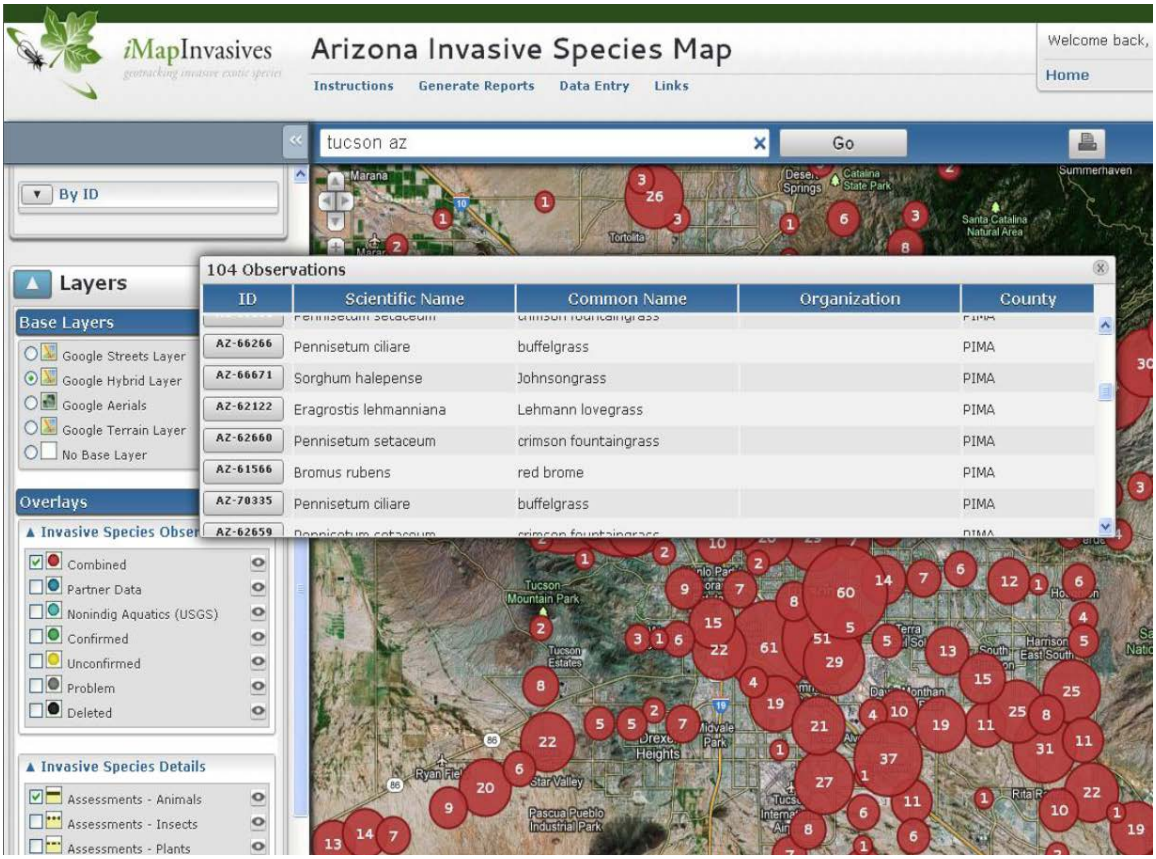
## *Available GIS data:*

- Asian Clam, Bullfrog, Channeled Apple Snail, Chinese Mysterysnail, Giant Salvinia, Hydrilla, Island Apple Snail, New Zealand Mudsnail, Qagga Mussel
- Data is online on IMapInvasives
- Data is in UTM projection
- Completeness is generally up to 2002-2013
- Update frequency is generally annual
- They are still sampling and plan to update data in November 2014

## *Other Information*

- They use IMapInvasives to share data: http://imapinvasives.org/
  - It is a web-based, publicly accessible (but password protected) database of invasive species location information. The database has several functions that facilitate different uses, including: A)Storing data compiled from several sources, 2) Acting as a main database for users without their own systems.

- AZ has been collecting data for about 3 years now, and has been successful in some areas but unsuccessful in others. The data is not comprehensive and not always up-to-date but point observations of aquatic species seem to cover a large amount of the distribution among water bodies. This is all viewable within the application, but can also arrange a data exchange.
- See *2014.08.13jkuzek_imapinvasives.pdf*



## Bureau of Reclamation

- Contact: Denise Hosler

***Available GIS Data:***

- They have a map of Quagga and Zebra Mussels for the area generally below 42 degrees North (Colorado southward) and west of and including Kansas/Oklahoma
- http://www.usbr.gov/mussels/
- This is point data in GIS format.

# Forest Service

## California / PSW

- Contact: James Furnish
- Provided a response spreadsheet: *JamesFurnishAquaticInvasivesForm_0814_SLammie_CTait.xlsx*

***Aquatic Invasive Species (AIS) List***

| | Common Name | Species Type | Department | Contact Name | Data (y/n) |
|---|---|---|---|---|---|
| 1 | Asian clam | Aquatic Invertebrate | U.S. Forest Service | Joseph Furnish | Y |
| 2 | Bd Chytrid | Fungus | U.S. Forest Service | Joseph Furnish | Y |
| 3 | Chinese mysterysnail | Aquatic Invertebrate | | | |
| 4 | Didymo | Diatom | U.S. Forest Service | Joseph Furnish | Y |
| 5 | Eurasian watermilfoil | **Plant** | U.S. Forest Service | Joseph Furnish | Y |
| 6 | Faucet snail | Invasive mollusks | | | |
| 7 | Hydrilla | **Plant** | U.S. Forest Service | Joseph Furnish | Y |
| 8 | New Zealand mudsnail | Aquatic Invertebrate | U.S. Forest Service | Joseph Furnish | Y |
| 9 | Parrot feather watermilfoil | **Plant** | U.S. Forest Service | Joseph Furnish | Y |
| 10 | Port Orford Cedar Root Disease | Microbe | U.S. Forest Service | Joseph Furnish | Y |
| 11 | Quagga mussel | Aquatic Invertebrate | U.S. Forest Service | Joseph Furnish | Y |
| 12 | Spiny waterflea | Aquatic Invertebrate | | | |
| 13 | Spring Viremia of Carp | Microbe - Virus | | | |
| 14 | Sudden Oak death | Microbe | U.S. Forest Service | Joseph Furnish | Y |
| 15 | Viral Hemorrhagic Septicemia | Microbe - Virus | | | |
| 16 | Whirling disease | Microbe | U.S. Forest Service | Joseph Furnish | Y |
| 17 | Zebra mussel | Aquatic Invertebrate | U.S. Forest Service | Joseph Furnish | Y |

***Information Sources:***

*Idaho Invasive Species List*

*USDA FS Region 4 2014 AIS of Concern to FireFighters*

*USGS Nonindigenous Aquatic Species*

*Available GIS Data:*

- They have data for 12 of the 17 species listed, plus at least four others not included:
  - Alligator Weed Alternanthera philoxeroides
  - Purple loosestrife Lythrum salicaria
  - Red-rimmed melania snail Melanoides tuberculatus
  - A red freshwater alga Compsopogon coeruleus
- MS Access Database format
- Available to FS staff only
- Accurate to one minute
- Data available at the PSW Region web site
  - http://fsweb.r5.fs.fed.us/program/risit/aquatics/
  - Geospatial data and some map products
  - Some data are fairly old

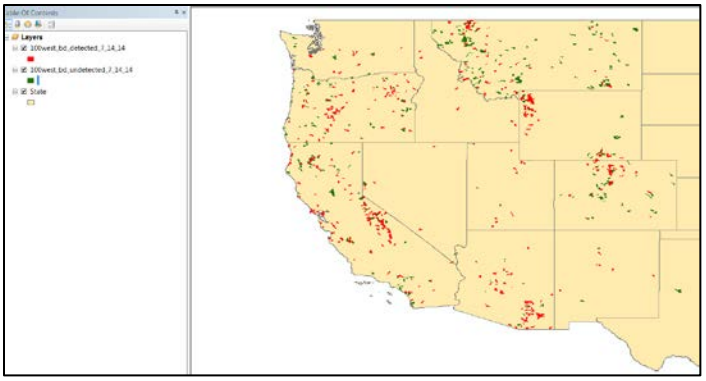
o Dede Olson of the PNW Lab in Corvallis, OR has chytrid fungus records

## Southwest Region

o Contact: Yvette Paroz
o Mentioned that they are tracking Didymo and Whirling Disease, but no other details regarding GIS.

## Northwest Region

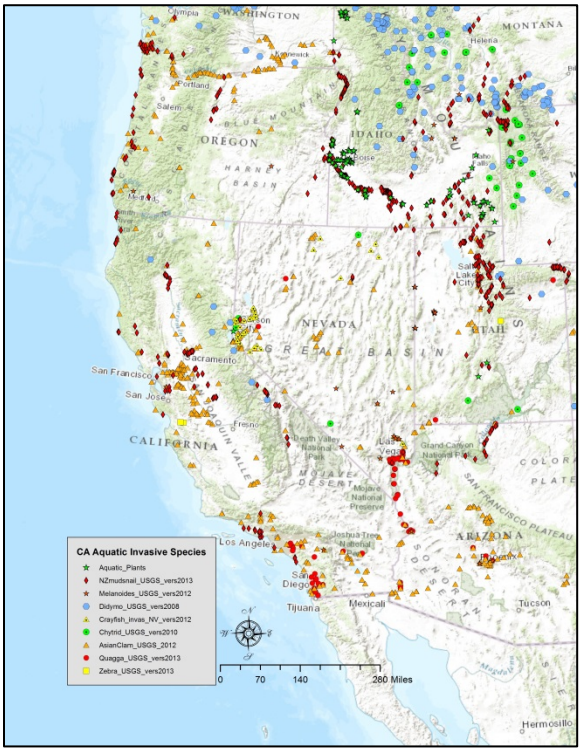
o Contact: Jim Capurso
  - They use the USGS NAS database as well as the FS TESP-IS database to store and update their data.
o Contact: Dede Olson
  - Have compiled an update of global taxonomic and geographic patterns (FrogLog 111, July issue) of the chytrid fungus Bd.
  - Map of 6th-field HUC watersheds of occurrence in the U.S.
  - These data were shared with Cynthia
  - Their updated maps of Bd occurrence are downloadable for scientist and manager uses (available at: http://www.fs.fed.us/pnw/lwm/aem/people/olson.html).



- In particular, United States maps of Bd occurrence by 5th- and 6th-field watersheds are provided for on-the-ground decisions such as: 1) during water draws for fire-fighting where inadvertent invasive-disease transmission might warrant consideration; 2) where field disinfection procedures and public education about not transporting animals or water might be of paramount importance; or 3) for scientists interested in advancing our knowledge of Bd-host ecology and epidemiology

## Cynthia Tait

- Has compiled point locations of AIS:



SOURCES FOR AIS OCCURRENCE DATA USED BY C. TAIT FOR R4's AIS DATABASE (2008-2013)

| AGENCY | SPECIES TRACKED | CONTACT | CONTACT INFO |
|---|---|---|---|
| Idaho Department of Agriculture (Idaho only) | Idaho aquatic plants<br>Asian clams<br>didymo<br>*Melanoides* (red rimmed melania) snails | Tom Woolf | Thomas.Woolf@agri.idaho.gov<br>(208) 608-3404 |
| BLM/USU National Aquatic Monitoring Center (largely westwide) | Asian clams<br>New Zealand mudsnails<br>*Melanoides* snails | Scott Miller, Director | http://www.usu.edu/buglab/ |
| USGS NAS database (nationwide) | Asian clams<br>Q/Z mussels<br>New Zealand mudsnails<br>*Melanoides* snails | Pam Fuller | http://nas.er.usgs.gov/<br>Point spatial data are available if you ask for it<br>pfuller@usgs.gov |
| PNW Research Station (PNW) | chytrid fungus | Dede Olson | dedeolson@fs.fed.us |
| UDWR (UT only) | chytrid fungus<br>didymo<br>Utah aquatic plants | Jordan Nielson, AIS coordinator | jordannielson@utah.gov<br>801-850-1221 |
| USGS Forest and Rangeland Ecosystem Science Center Boise, Idaho | chytrid fungus, multiple states in NW | David Pilliod | dpilliod@usgs.gov<br>208-426-5202 |
| USGS (nationwide) | didymo (not updated since 2008) | Sarah Spaulding | sarah.spaulding@colorado.edu<br>(303) 492-5158 |
| WY agencies (WY only) | didymo | Sublette Co Conservation District, WY DEQ, Bridger Teton NF | |
| Idaho Dept Fish& Game (ID only) | whirling disease | Phil Mamer | Eagle Fish Health Laboratory. 208-939-2413; data were digitized from cuff records by Sawtooth NF |
| NV Department of Wildlife (NV only) | whirling disease | | NDOW hadn't kept GPS records, and data were digitized from cuff records in 2008 by HT NF |
| WY Dept Game & Fish (WY only) | whirling disease | | Wyoming Game and Fish Department Fish Health Laboratory in Laramie |
| UDWR Fisheries Experimental Station (UT only) | whirling disease | Chris Wilson | ChrisWilson@utah.gov<br>(435) 752-1066, extension 201 |

## Idaho

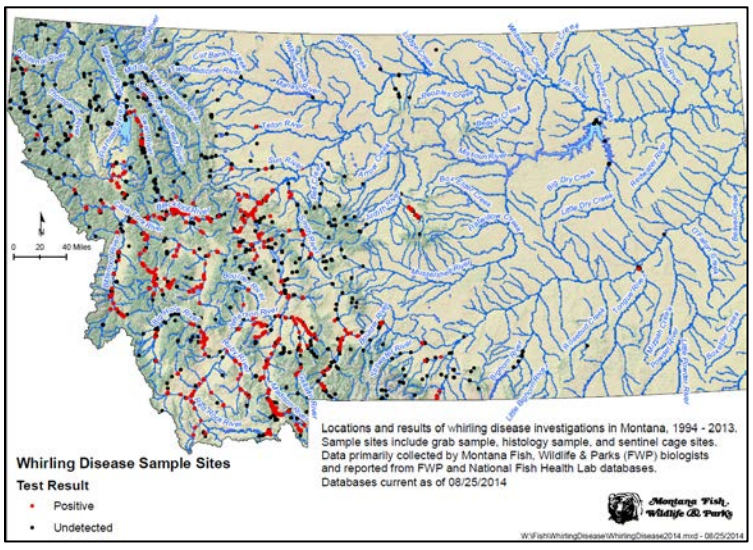
- Contact: Tom Woolf, from the Idaho Department of Agriculture
- Contact: Phil Mamer/Dave Parrish, Idaho Game and Fish Department
  - Both contacts work with Cynthia in terms of providing her with data

## Montana

- Ken Staigmiller; Linnaea Schroeer
- Provided their own spreadsheet: *MtWD_DataCompilation_08252014.xls*

| 1 | COLLDATE | RECID | Waterbody Name | LLID | Region | Site Name | Location | LATITUDE | LONGITUDE | SAMPLETYPE | SPECIES |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 535 | 5/7/2008 | 22744 | Green Hollow Reservoir #2 | 1113541455125 | 3 | Green Hollow Pond #2 | Upper pond above Turner | 45.51212000 | -111.35550000 | Routine/Certification | Brook Trout |
| 536 | 5/20/2009 | 22743 | Green Hollow Reservoir #2 | 1113541455125 | 3 | Green Hollow Pond #2 | Upper pond above Turner | 45.51212000 | -111.35550000 | Routine/Certification | Arctic Grayling |
| 537 | 10/8/1998 | 25641 | Deep Creek | 1115122462844 | 3 | Deep Creek | Deep Creek, fish trap nr T | 46.28420000 | -111.51200000 | Sentinel Cage | Rainbow Trout |
| 538 | 7/18/1998 | 25640 | Deep Creek | 1115122462844 | 3 | Deep Creek | Deep Creek, fish trap nr T | 46.28420000 | -111.51200000 | Sentinel Cage | Rainbow Trout |
| 539 | 5/13/1999 | 25639 | Deep Creek | 1115122462844 | 3 | Deep Creek | Deep Creek, fish trap S.W | 46.28420000 | -111.51200000 | Sentinel Cage | Rainbow Trout |
| 540 | 3/23/2002 | 26631 | | 1115340455426 | 3 | Three Dollar Bridge Spring Creek | 3$ Sprg Cr, middle | 44.83244000 | -111.52823000 | Sentinel Cage | Brook Trout |
| 541 | 3/23/2002 | 26618 | | 1115340455426 | 3 | Three Dollar Bridge Spring Creek | 3$ Sprg Cr, middle | 44.83244000 | -111.52823000 | Sentinel Cage | Brown Trout |
| 542 | 2/8/2002 | 26616 | | 1115340455426 | 3 | Three Dollar Bridge Spring Creek | 3$ Sprg Cr, middle | 44.83244000 | -111.52823000 | Sentinel Cage | Brown Trout |
| 543 | 3/26/2002 | 25299 | | 1115340455426 | 3 | Three Dollar Bridge Spring Creek | 3$ Sprg Cr, middle | 44.83244000 | -111.52823000 | Sentinel Cage | Rainbow Trout |
| 544 | 2/8/2002 | 25297 | | 1115340455426 | 3 | Three Dollar Bridge Spring Creek | 3$ Sprg Cr, middle | 44.83244000 | -111.52823000 | Sentinel Cage | Rainbow Trout |
| 545 | 3/3/2006 | 22601 | Three Dollar Spring Creek | 1115161448327 | 3 | Three Dollar Bridge Spring Creek | 3$ 2, middle, upstream of | 44.83244000 | -111.52823000 | Live Cage M. cerebralis testing | Rainbow Trout |
| 546 | 10/1/2002 | 1767 | Cliff Lake | 1115469447719 | 3 | Cliff Lake | | 44.76620000 | -111.54570000 | Cranial Elements | Rainbow Trout |
| 547 | 10/17/2001 | 1749 | Cliff Lake | 1115469447719 | 3 | Cliff Lake | | 44.76920000 | -111.54720000 | Cranial Elements | Mountain Whitefish |
| 548 | 10/17/2001 | 1748 | Cliff Lake | 1115469447719 | 3 | Cliff Lake | | 44.76920000 | -111.54720000 | Cranial Elements | White Sucker |
| 549 | 10/17/2001 | 1610 | Cliff Lake | 1115469447719 | 3 | Cliff Lake | | 44.76920000 | -111.54720000 | Cranial Elements | Rainbow Trout |
| 550 | 10/1/2002 | 1766 | Cliff Lake | 1115469447719 | 3 | Cliff Lake | | 44.77120000 | -111.54780000 | Cranial Elements | Mountain Whitefish |
| 551 | 10/1/2002 | 1765 | Cliff Lake | 1115469447719 | 3 | Cliff Lake | | 44.77280000 | -111.55050000 | Cranial Elements | White Sucker |
| 552 | 11/29/1995 | 27506 | Wade Lake Spawning Channel | 1115598448045 | 3 | Wade Lake Spawning Channel | | 44.80395889 | -111.55941010 | Entire Fish | Rainbow Trout |
| 553 | 11/29/1995 | 27505 | Wade Lake Spawning Channel | 1115598448045 | 3 | Wade Lake Spawning Channel | | 44.80395889 | -111.55941010 | Entire Fish | Rainbow Trout |
| 554 | 5/4/2005 | 22587 | | | 1 | Crystal Lakes Hatchery | | 48.78220000 | -114.87690000 | Routine/Certification | Rainbow Trout |
| 555 | 11/1/2005 | 22586 | | | 1 | Crystal Lakes Hatchery | | 48.78220000 | -114.87690000 | Routine/Certification | Brook Trout |
| 556 | 10/27/2010 | 22585 | | | 1 | Crystal Lakes Hatchery | | 48.78220000 | -114.87690000 | Routine/Certification | Rainbow Trout |
| 557 | 10/27/2010 | 22584 | | | 1 | Crystal Lakes Hatchery | | 48.78220000 | -114.87690000 | Routine/Certification | Brook Trout |
| 558 | 10/28/2009 | 22583 | | | 1 | Crystal Lakes Hatchery | | 48.78220000 | -114.87690000 | Routine/Certification | Rainbow Trout |
| 559 | 5/19/2008 | 22582 | | | 1 | Crystal Lakes Hatchery | | 48.78220000 | -114.87690000 | Routine/Certification | Rainbow Trout |
| 560 | 8/25/2004 | 22581 | | | 1 | Crystal Lakes Hatchery | | 48.78220000 | -114.87690000 | Routine/Certification | Rainbow Trout |
| 561 | 8/25/2004 | 22580 | | | 1 | Crystal Lakes Hatchery | | 48.78220000 | -114.87690000 | Routine/Certification | Brook Trout |
| 562 | 4/10/2013 | 22579 | | | 1 | Crystal Lakes Hatchery | | 48.78220000 | -114.87690000 | Routine/Certification | Rainbow Trout |

  - Information about sampling for invasives/pathogens only. Includes Whirling Disease.
  - Identifies if an invasive/pathogen was detected.
  - Collection date, waterbody name, site name, location, Latitude, Longitude, sample method, species, number of fish tested, comments
- Also see Pdf map of Whirling Disease sampling: *MtWDPosMap.pdf*
- Website for data: [http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html](http://fwp.mt.gov/doingBusiness/reference/gisData/dataDownload.html)



## NOAA

- Contact: Susan Pasko
- Provided feedback spreadsheet: *AquaticInvasivesForm_0814_NOAA Response.xlsx*

***Aquatic Invasive Species (AIS) List***

| | Common Name | Agency | Department | Contact Name | Data (y/n) | Coverage/Extent |
|---|---|---|---|---|---|---|
| 1 | Asian clam | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 2 | Bd Chytrid | | | | | |
| 3 | Chinese mysterysnail | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 4 | Didymo | | | | | |
| 5 | Eurasian watermilfoil | NOAA- Fisheries | NWFSC | Katie Barnas or Beth Sanderson | Y | WA/OR/ID |
| | | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 6 | Faucet snail | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 7 | Hydrilla | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 8 | New Zealand mudsnail | NOAA- Fisheries | NWFSC | Katie Barnas or Beth Sanderson | Y | WA/OR/ID |
| | | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 9 | Parrot feather watermilfoil | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 10 | Port Orford Cedar Root Disease | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 11 | Quagga mussel | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 12 | Spiny waterflea | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 13 | Spring Viremia of Carp | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 14 | Sudden Oak death | | | | | |
| 15 | Viral Hemorrhagic Septicemia | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 16 | Whirling disease | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |
| 17 | Zebra mussel | *NOAA* | *GLERL* | Rochelle Sturtevant Y | Y | Great Lakes Region |

### *Available GIS Data:*

- Nearly all species requested
- Coverage is generally only the Great Lakes Region

- Are using the USGS NAS database
- Point location data

*Other information:*

- Received input for the Great Lakes and Northwest regions. However, CNMI also asked to note that their work is not a clean fit to this request, but may be of some interest.
- The region is just finalizing a baseline setting study focused on identifying high risk hull fouling species in the harbors of Saipan, Tinian and Rota. Thus far, they have not had any hits on the list of species listed on the spreadsheet, but genetic analysis of the slurry is still ongoing.
- If you have any question regarding the CNMI activity you are welcome to contact Steve McKagan (steven.mckagan@noaa.gov)

## North Dakota

- Contact: Fred Ryckman
- Provided response spreadsheet: *FrNdAquaticInvasivesForm_0814.xlsx*

### *Aquatic Invasive Species (AIS) List*

| | Common Name | Agency | Department | Contact Name | Data (y/n) | GIS Format |
|---|---|---|---|---|---|---|
| 1 | Asian clam | *NDG&F Dept* | *Fisheries Division* | Fred Ryckman | no | |
| 2 | Bd Chytrid | | | | no | |
| 3 | Chinese mysterysnail | | | | no | |
| 4 | Didymo | | | | no | |
| 5 | Eurasian watermilfoil | | | | yes | yes |
| 6 | Faucet snail | | | | no | |
| 7 | Hydrilla | | | | no | |
| 8 | New Zealand mudsnail | | | | no | |
| 9 | Parrot feather watermilfoil | | | | no | |
| 10 | Port Orford Cedar Root Disease | | | | no | |
| 11 | Quagga mussel | | | | no | |
| 12 | Spiny waterflea | | | | no | |
| 13 | Spring Viremia of Carp | | | | no | |
| 14 | Sudden Oak death | | | | no | |
| 15 | Viral Hemorrhagic Septicemia | | | | no | |
| 16 | Whirling disease | | | | no | |
| 17 | Zebra mussel | | | | yes | yes |
| | | | | | | |
| | ***Information Sources:*** | | | | | |
| | *Idaho Invasive Species List* | | | | | |
| | *USDA FS Region 4 2014 AIS of Concern to FireFighters* | | | | | |
| | *USGS Nonindigenous Aquatic Species* | | | | | |

#### *Available GIS Data:*

- Eurasian Watermilfoil, Zebra Mussel
- Is available
- Updated as needed
- Good accuracy
- Not sure where data is held

#### *His comments:*

- ND is concerned about many of the species on your list; nine of them are listed as ANS in ND. I am curious as to why these species were chosen, and especially why many others weren't?

- Fortunately, to date only two of the species on the list have been documented in ND: Eurasian watermilfoil and zebra mussel. EWM has been documented as present in portions of the Sheyenne River below Baldhill Dam, and in Dead Colt Creek (where it was apparently successfully eliminated and no longer occurs). The only documentation for zm in ND was in 2011, when veligers were detected from the Red River at Wahpeton. Specific GPS coordinates for these confirmed locations can be provided.

## Oklahoma

- Contact: Curtis Tackett
- Response:
  - The only portion of Oklahoma that is considered west of the 100th meridian is the panhandle which includes Beaver, Texas and Cimarron counties. In these three counties there are really only a couple of water bodies and none of which are monitored for AIS. These include the Cimarron River and a few of its tributaries and Lake Carl Etling.
  - Chytrid fungus has been detected extremely close to the 100th meridian in Ellis county and we will be beginning a research project to monitor this disease throughout Oklahoma January 1, 2015.

## Oregon

- Contact: Lindsey Wise
- Provided response spreadsheet: *OrLkAquaticInvasivesForm_0814.xlsx*

***Aquatic Invasive Species (AIS) List***

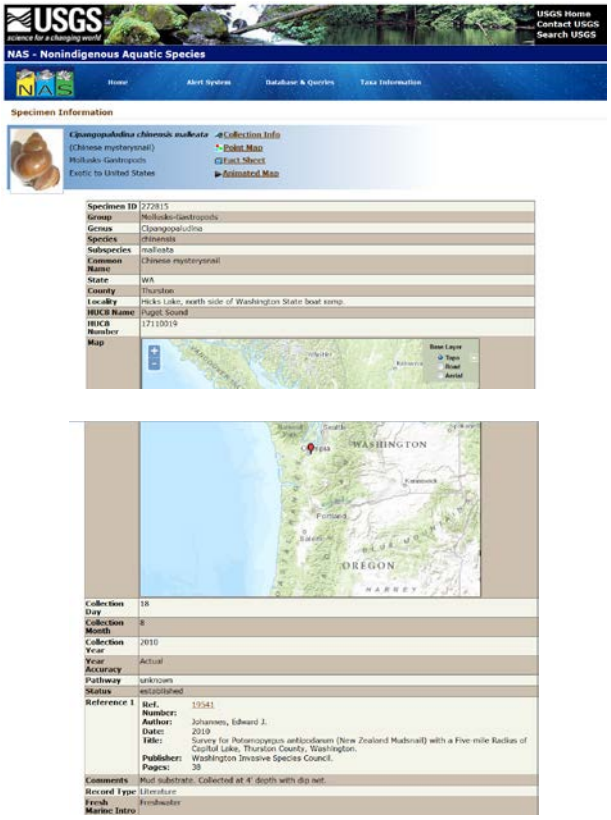
| | Common Name | Species Type | Agency | Contact Name | Data (y/n) |
|---|---|---|---|---|---|
| 1 | Asian clam | Aquatic Invertebrate | iMapInvasives, P | Lindsey Wise | y |
| 2 | Bd Chytrid | Fungus | | | n |
| 3 | Chinese mysterysnail | Invasive mollusks | iMapInvasives, P | Lindsey Wise | y |
| 4 | Didymo | Diatom | | | n |
| 5 | Eurasian watermilfoil | **Plant** | iMapInvasives, P | Lindsey Wise | y |
| 6 | Faucet snail | Invasive mollusks | | | |
| 7 | Hydrilla | **Plant** | | | |
| 8 | New Zealand mudsnail | Aquatic Invertebrate | iMapInvasives, P | Lindsey Wise | y |
| 9 | Parrot feather watermilfoil | **Plant** | iMapInvasives, P | Lindsey Wise | y |
| 10 | Port Orford Cedar Root Disease | Microbe | | | |
| 11 | Quagga mussel | Aquatic Invertebrate | | | |
| 12 | Spiny waterflea | Aquatic Invertebrate | | | |
| 13 | Spring Viremia of Carp | Microbe - Virus | | | |
| 14 | Sudden Oak death | Microbe | | | |
| 15 | Viral Hemorrhagic Septicemia | Microbe - Virus | | | |
| 16 | Whirling disease | Microbe | | | |
| 17 | Zebra mussel | Aquatic Invertebrate | | | |

### *Available GIS Data:*

- Asian Clam, Chinese Mysterysnail, Eurasian Watermilfoil, New Zealand Mudsnail, Parrot Featuer Watermilfoil
- Covers entire state
- A portion is easily shared, the remainder is from USGS (NAS?)
- BLM in Oregon shares their data with IMapInvasives
- Updated irregularly
- Some data available online via web map

## USGS

- Contact: Pam Fuller
- Manages NAS, the Nonindigenous Aquatic Species database: http://nas.er.usgs.gov/
  - Inception 1990
  - Goal: To provide timely, reliable data about the presence and distribution of nonindigenous aquatic species.
  - A vast array of invasives data
  - Sporadic usage among state/organization contacts within this project
  - Example information on webpage:




- Sarah Spaulding also provided a feedback spreadsheet: *SsUsgsAquaticInvasivesForm_0814SS.xlsx*
  - Didymo only
  - No GIS data available

## Utah

- Contact:
- Provided spreadsheet: *JnUtahAquaticInvasivesForm_0814.xlsx*

### *quatic Invasive Species (AIS) List*

| Common Name | Scientific Name | Species Type | Data (y/n) |
|---|---|---|---|
| Asian clam | *Corbicula fluminea* | Aquatic Invertebrate | n |
| Bd Chytrid | *Batrachochytrium dendrobatidis* | Fungus | y |
| Chinese mysterysnail | *Cipangopaludina chinensis* | Invasive mollusks | n |
| Didymo | *Didymosphenia geminata* | Diatom | y |
| Eurasian watermilfoil | Myriophyllum spicatum L. | **Plant** | |
| Faucet snail | *Bithynia tentaculata* | Invasive mollusks | n |
| Hydrilla | *Hydrilla verticillata* | **Plant** | |
| New Zealand mudsnail | *Potamopyrgus antipodarum* | Aquatic Invertebrate | y |
| Parrot feather watermilfoil | *Myriophyllum aquaticum* | **Plant** | |
| Port Orford Cedar Root Disease | *Phytophthora lateralis* | Microbe | |
| Quagga mussel | *Dreissena rostriformis bugensis* | Aquatic Invertebrate | y |
| Spiny waterflea | *Bythotrephes cederstroemi* | Aquatic Invertebrate | |
| Spring Viremia of Carp | *Rhabdovirus carpio* | Microbe - Virus | |
| Sudden Oak death | *Phytophthora ramorum* | Microbe | |
| Viral Hemorrhagic Septicemia | *Novirhabdovirus sp* | Microbe - Virus | y |
| Whirling disease | *Myxobolus cerebralis* | Microbe | y |
| Zebra mussel | *Dreissena polymorpha* | Aquatic Invertebrate | y |
| Red Rimmed Melania | *Melanoides tuberculatis* | Aquatic Invertebrate | y |
| Common Reed | *Phragmites australis* | **Plant** | |
| Curly-leaf pondweed | *Potamogeton crispus* | **Plant** | |
| Purple Loosestrife | *Lythrum salicaria* | **Plant** | |
| Tamarisk | *Tamarix spp.* | **Plant** | |
| Crayfish: | | | |
| Northern Crayfish | *Orconectes virilis* | Aquatic Invertebrate | n |
| Louisiana Crayfish | *Procambarus clarkii* | Aquatic Invertebrate | n |
| Water Nymph crayfish | *Orconectes nais* | Aquatic Invertebrate | n |
| Rusty Crayfish | *Orconectes rusticus* | Aquatic Invertebrate | n |
| Burbot | *Lota lota* | Fish | y |
| Gizzard shad | *Dorosoma cepedianum* | Fish | y |
| Western mosquito fish | *Gambusia affinis* | Fish | y |

***Information Sources:***

*Idaho Invasive Species List*

*USDA FS Region 4 2014 AIS of Concern to FireFighters*

*USGS Nonindigenous Aquatic Species*

*Utah aquatic invasive species management plan*

### *Available GIS Data:*

- Bd Chytrid, Didymo, New Zealand Mudsnail, Quagga Mussel, Viral Hemorrhagic Septicemia, Whirling Disease, Zebra Mussel, Red Rimmed Melania, Burbot, Gizzard Shad, Western Mosquito Fish
- Species name, contact
- In UTM projection
- On local PC
- Updated as necessary

# Wyoming

- Contact: Beth Bear
- Provided response spreadsheet: *AquaticInvasivesForm_0814_WY.xlsx*

## *Aquatic Invasive Species (AIS) List*

| | Common Name | Scientific Name | Species Type | Agency |
|---|---|---|---|---|
| 1 | Asian clam | *Corbicula fluminea* | Aquatic Invertebrate | WGFD-present |
| 2 | Bd Chytrid | *Batrachochytrium dendrobatidis* | Fungus | WGFD-present |
| 3 | Chinese mysterysnail | *Cipangopaludina chinensis* | Invasive mollusks | |
| 4 | Didymo | *Didymosphenia geminata* | Diatom | WGFD-present (no data) |
| 5 | Eurasian watermilfoil | Myriophyllum spicatum L. | **Plant** | WGFD-not present |
| 6 | Faucet snail | *Bithynia tentaculata* | Invasive mollusks | |
| 7 | Hydrilla | *Hydrilla verticillata* | **Plant** | WGFD-not present |
| 8 | New Zealand mudsnail | *Potamopyrgus antipodarum* | Aquatic Invertebrate | WGFD-present |
| 9 | Parrot feather watermilfoil | *Myriophyllum aquaticum* | **Plant** | |
| 10 | Port Orford Cedar Root Disease | *Phytophthora lateralis* | Microbe | |
| 11 | Quagga mussel | *Dreissena rostriformis bugensis* | Aquatic Invertebrate | WGFD-not present |
| 12 | Spiny waterflea | *Bythotrephes cederstroemi* | Aquatic Invertebrate | |
| 13 | Spring Viremia of Carp | *Rhabdovirus carpio* | Microbe - Virus | |
| 14 | Sudden Oak death | *Phytophthora ramorum* | Microbe | |
| 15 | Viral Hemorrhagic Septicemia | *Novirhabdovirus sp* | Microbe - Virus | WGFD-not present |
| 16 | Whirling disease | *Myxobolus cerebralis* | Microbe | WGFD-present |
| 17 | Zebra mussel | *Dreissena polymorpha* | Aquatic Invertebrate | WGFD-not present |

***Information Sources:***

*Idaho Invasive Species List*

*USDA FS Region 4 2014 AIS of Concern to FireFighters*

*USGS Nonindigenous Aquatic Species*

### *Available GIS data:*

- Asian Clam, Curly Pondweed, New Zealand Mudsnail, Rusty Crayfish
- Location Name, Lat, Lon, Datum, Date, Crew, Species Name
- Point data locations

## Others

- North American Invasive Species Management Association
  - http://www.naisma.org/committees/mapping-standards-committee

## Bureau of Indian Affairs

- It appears as though BIA does not have any GIS information depicting AIS

## Bureau of Indian Affairs

- Contact: John Moore
- Their Northwest Region (at least Oregon) use IMapInvasives

## Fish and Wildlife Service Southwest Region

- Contact: David Britton
- They use and provide data to USGS NAS
- AZ, NM, TX, OK

## Fish and Wildlife Service Region 8

- Contact: Ron Smith
- They use and provide data to NAS
- CA, NV

## National Parks Service

- Contact:  Alan Ellsworth
- Contact:  John Wullschleger
- They are not aware of a single national location for invasive data within the NPS.
- They rely on the USGS NAS to provide contaminated waters information