



IWM (IPM) CONCEPTS FOR  
**AQUATIC**  
INVASIVE PLANTS

**BETHANY MUFFLEY - SW IDAHO AG SPECIALIST  
ISDA NOXIOUS WEEDS AND INVASIVE SPECIES**

THE IDAHO STATE DEPARTMENT OF AGRICULTURE  
DIVISION OF PLANT INDUSTRIES

INVASIVE SPECIES

Nic Zurfluh

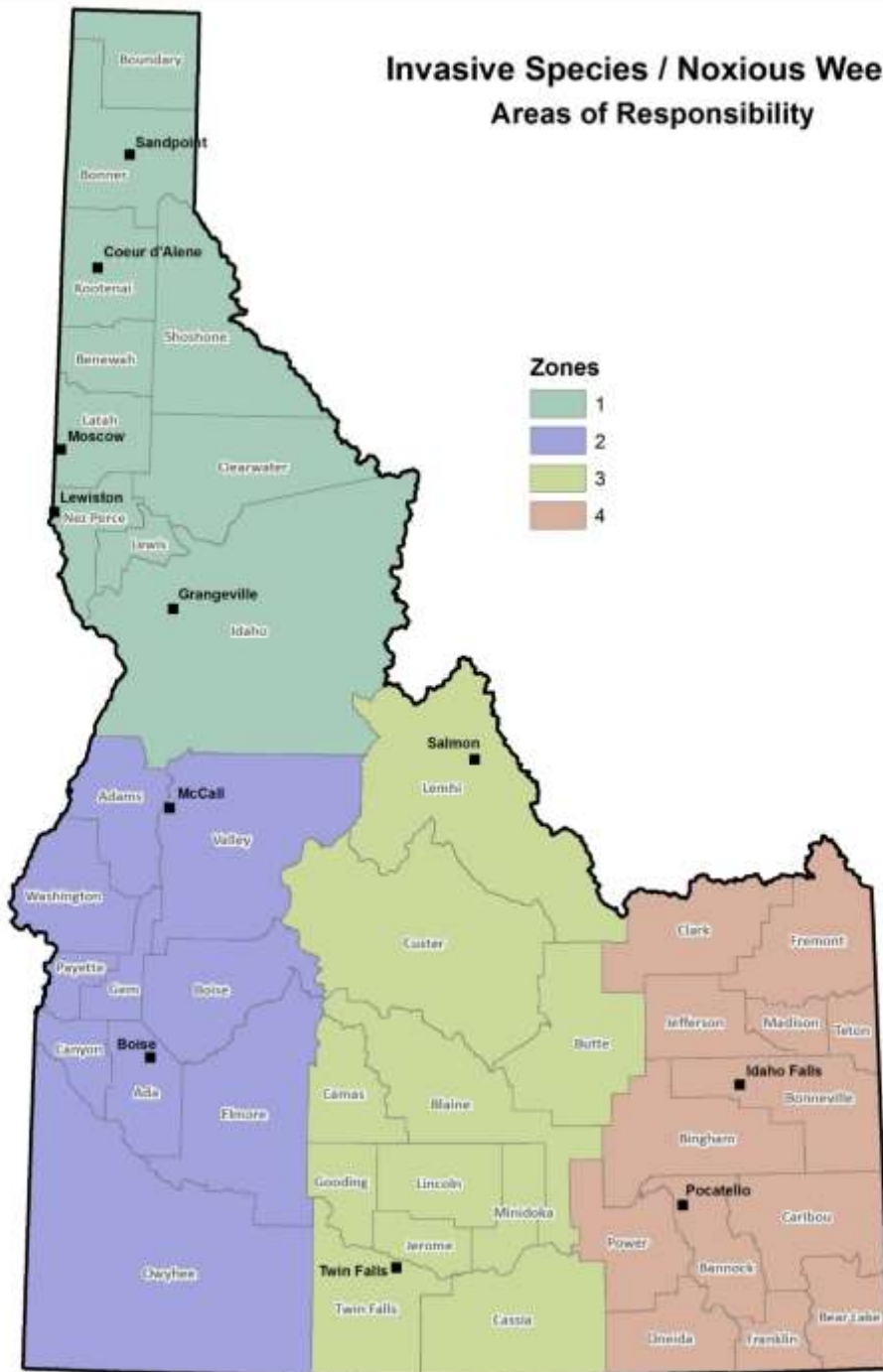
NOXIOUS WEEDS

Jeremey Varley

PROGRAM SPECIALISTS AND TECHNICIANS

Dan Safford-----Statewide  
Dr. Kim Holzer & Dr. Paul Rhodes ----- North Idaho  
Bethany Muffley & Phoebe Wallace ----- SW Idaho  
Aaron Ursenback ----- SC Idaho  
Cole Morisson & Madi Patterson ----- SW Idaho

## Invasive Species / Noxious Weeds Areas of Responsibility



Dr. Kim Holzer &  
Dr. Paul Rhodes

Bethany Muffley &  
Phoebe Wallace

Aaron Ursenback

Cole Morrison &  
Madi Patterson



# ISDA RESPONSIBILITIES



Our position is to uphold the **Laws and Rules Governing Invasive Species and Noxious weeds.**

In those rules, we have the authority to **designate, define, inspect, permit, decontaminate, eradicate, quarantine, enforce, and keep records.**

# COUNTY RESPONSIBILITIES

Each county is required to employ a County Weed Superintendent.

- Establish/maintain a coordinated noxious weed control program.
- Authority to give notice to landowners that fail to control Noxious Weeds.
- Implement enforcement action.
- Quarantine land that is infested within its jurisdiction and beyond the ability for the landowner to control it.
- Propose, accept, and implement **integrated weed management plans**.

# LANDOWNER/CITIZEN RESPONSIBILITIES

## TITLE 22. AGRICULTURE AND HORTICULTURE CHAPTER 24. NOXIOUS WEEDS

### **22-2407. LANDOWNER AND CITIZEN DUTIES**

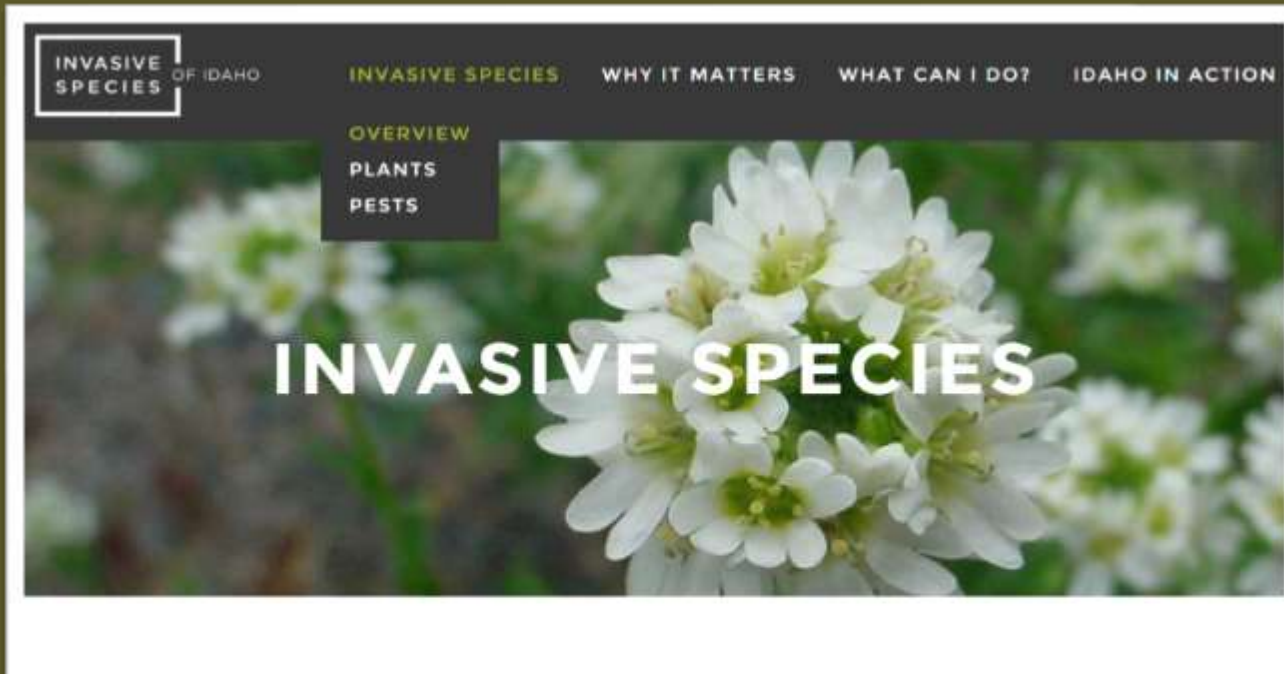
- It shall be the duty and responsibility of all landowners to control noxious weeds on their land and property.
- The cost of controlling noxious weeds shall be the obligation of the landowner.
- Noxious weed control must be for prevention, eradication, rehabilitation, control or containment efforts.

### **22-2409. PENALTIES FOR VIOLATIONS**

- Any person who violates or fails to comply with any provisions of this chapter or any rules promulgated hereunder may be assessed a civil penalty by the control authority of not more and \$10,000 for each offense.

Black henbane	Iberian starthistle	Saltcedar
Bohemian knotweed	Japanese knotweed	Scotch broom
Brazilian elodea	Johnsongrass	Scotch thistle
Buffalobur	Jointed goatgrass	Small bugloss
Canada thistle	Leafy spurge	Spotted knapweed
Common crupina	Matgrass	Squarrose knapweed
Common/european frogbit	Meadow knapweed	Syrian beancaper
Common reed	Mediterranean sage	Tall hawkweed
Curlyleaf pondweed	Milium	Tansy ragwort
Dalmation toadflax	Musk thistle	Variable-leaf milfoil
Diffuse knapweed	Orange hawkweed	Vipers bugloss
Dyer's woad	Oxeye daisy	Water chestnut
Eurasian watermilfoil	Parrotfeather milfoil	Water hyacinth
Fanwort	Perennial pepperweed	White bryony
Feathered mosquito fern	Perennial sowthistle	Whitetop
Field bindweed	Plumeless thistle	Yellow devil hawkweed
Flowering rush	Poison hemlock	Yellow flag iris
Giant hogweed	Policeman's helmet	Yellow floating heart
Giant knotweed	Puncturevine	Yellow hawkweed
Giant salvinia	Purple loosestrife	Yellow starthistle
Hoary alyssum	Purple starthistle	Yellow toadflax
Houndstongue	Rush skeletonweed	
Hydrilla	Russian knapweed	

# INVASIVESPECIES.IDAHO.GOV



INVASIVE SPECIES OF IDAHO

INVASIVE SPECIES WHY IT MATTERS WHAT CAN I DO? IDAHO IN ACTION

OVERVIEW  
PLANTS  
PESTS

## INVASIVE SPECIES

## INVASIVE SPECIES OF IDAHO

INVASIVE SPECIES

OVERVIEW  
PLANTS  
PESTS


### OVERVIEW

Invasive species are harmful, non-native plants, animals, and environments. Invasives can disrupt the ability of those systems to be persistent, and can create monocultures that nurture Idahoan life the nation.

INVASIVE SPECIES

OVERVIEW  
PLANTS  
PESTS

REPORT NOXIOUS WEEDS/INVASIVE PLANTS. PLEASE CONTACT:  
Idaho Association of Weed Superintendents  
University of Idaho Extension Office



Invasive / Noxious Terrestrial Plants >



Invasive / Noxious Aquatic Plants >



# TERRESTRIAL PLANTS

REPORT NOXIOUS WEEDS/INVASIVE PLANTS, CONTACT:

Idaho Association of Weed Superintendents

University of Idaho Extension Office

Idaho has 67 weed species and 4 genera designated noxious by state law – 51 of these species are terrestrial.

## CATEGORIES:

**Statewide Prohibited Genera**– All plants, plant parts, and subtaxa of listed genera are prohibited in Idaho.

**Early Detection Rapid Response**– (EDRR) Weeds shall be eradicated during the same growing season as identified.

**Control**– Concentration of weeds where control and/or eradication may be possible.

**Containment**– Reduce or eliminate new or expanding weed populations.

### STATEWIDE EDRR LIST



Giant Hogweed



Iberian Starthistle



Purple Starthistle



Squarose Knapweed

### STATEWIDE CONTROL LIST



Black Henbane



Bohemian Knotweed



Common Crupine



Dyer's Wood

### STATEWIDE CONTAINMENT LIST



Canada Thistle



Dalmatian Toadflax



Field Bindweed



Hoary Alyssum

*Nymphoides peltata*  
**Yellow Floating Heart**

Menyanthaceae, the buckbean family  
 Category: **EDRR**



**Diagnostic Characteristics**

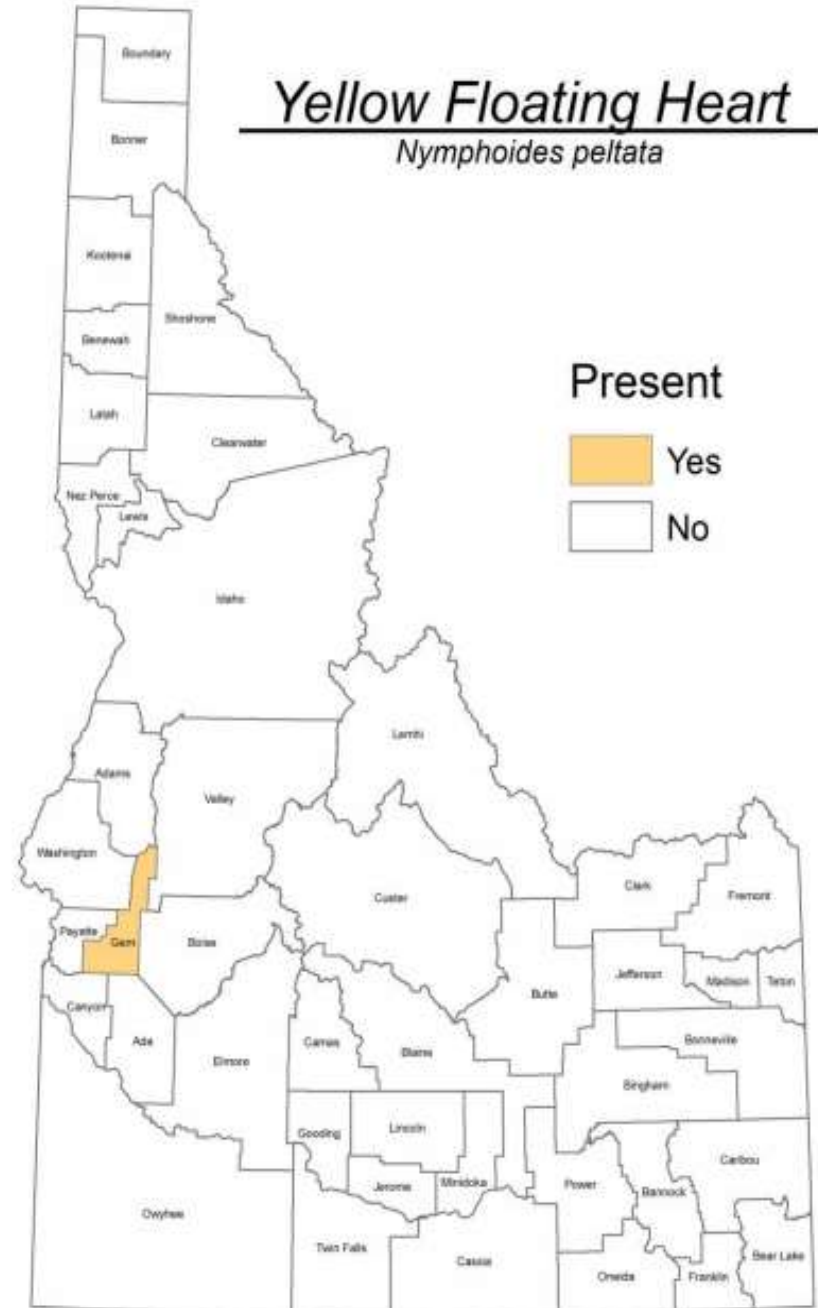
- Floating perennial; rope-like stems rooted in sediment
- Leaves are heart-shaped, ovular, dark green, shiny, and 2-6 inches in size
- Leaves are alternate along stems and opposite on flowering stalks
- Flowers are showy with 5 petals, yellow, 1.2-2 inches in size, and rise 3 inches above water
- Seeds are contained in beaked capsules, are flat and ovular, and measure 0.5-1 inch in length

**Background**

- Native to Eurasia; introduced as an ornamental for water gardens
- Inhabits slow moving water areas found in rivers, ponds, lakes, and canals
- Reproduces by seeds, stem fragments, and rhizomes; tiny hairs on seeds allow them to float and attach to waterfowl
- Forms dense mats of vegetation on the water's surface
- Out-competes native vegetation; impedes recreation

Photo Credit:  
 540215 - David Crippen, Michigan State University, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources  
 540716 - Rob Andros, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources  
 540717 - Rob Andros, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources  
 545706 - Leslie J. McEluff, University of Connecticut, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources, Department of Conservation & Natural Resources

**Yellow Floating Heart**  
*Nymphoides peltata*





# OUTLINE

## WHAT IS IWM?

- *Definition*
- *Advantages*
- *Misconceptions*

## STRATEGIES

- *Prevention*
- *Techniques*
- *Monitoring*

## AIS PLANT MANAGEMENT

- *Hydrilla*
- *Eurasian Watermilfoil*
- *Flowering Rush*
- *Parrotfeather Milfoil*





A landscape photograph showing a river or stream winding through a lush, green area. The foreground is dominated by dense, bright green vegetation, possibly a wetland or marsh. The river flows through the middle ground, surrounded by tall grasses and reeds. In the background, there are more trees and a hazy, overcast sky. The overall scene is natural and somewhat overgrown.

What do you think  
about when someone  
mentions integrated  
weed management?

*Who are the people out there doing it?*




## DEFINITION

Integrated weed management (IWM) is the control of weeds through a long-term management approach, using a variety of weed management techniques that can include physical, chemical, biological, and cultural controls.



# ADVANTAGES

- Reduce the chance that weeds will develop resistance against repeated control techniques.
- Strategies can be site specific and focus on the most economical, ecological and effective control methods can be considered.
- Effective long-term management should reduce the extent of weeds and seed bank without degrading the landscape.

- 
- I tried it last year. Didn't work!
  - This is just a “feel good” approach that will only cost me money!
  - Herbicides create superweeds!

MISCONCEPTIONS





# Strategies

*What are some of the aquatic weed control techniques available?*









# Prevention

- Most effective method.

KNOW WHAT YOU GROW!

KNOCK IT OFF!

CLEAN > DRAIN > DRY









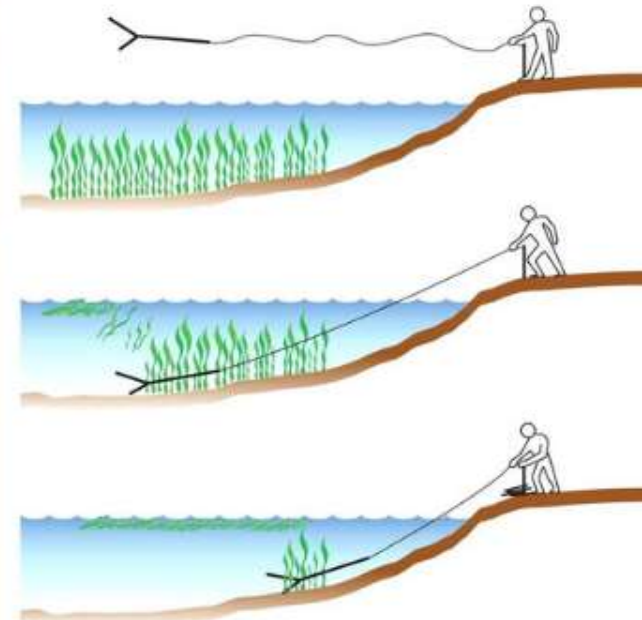
## Physical and Cultural Control

- Weed Roller
- Hand Removal
- Aeration





- Hand Rake
- Hand Cutter
- Drawdown
- Benthic Barrier





## Mechanical Control

- Mowing
- Harvesters
- Cutter boats
- Shredder boats
- Rotovator
- Dredge





## Chemical Control

- Foliar applications
- Submersed applications
- Contact herbicide
- Systemic herbicide





# Biological Control

- Bacterial
- Insect
- Grass Carp

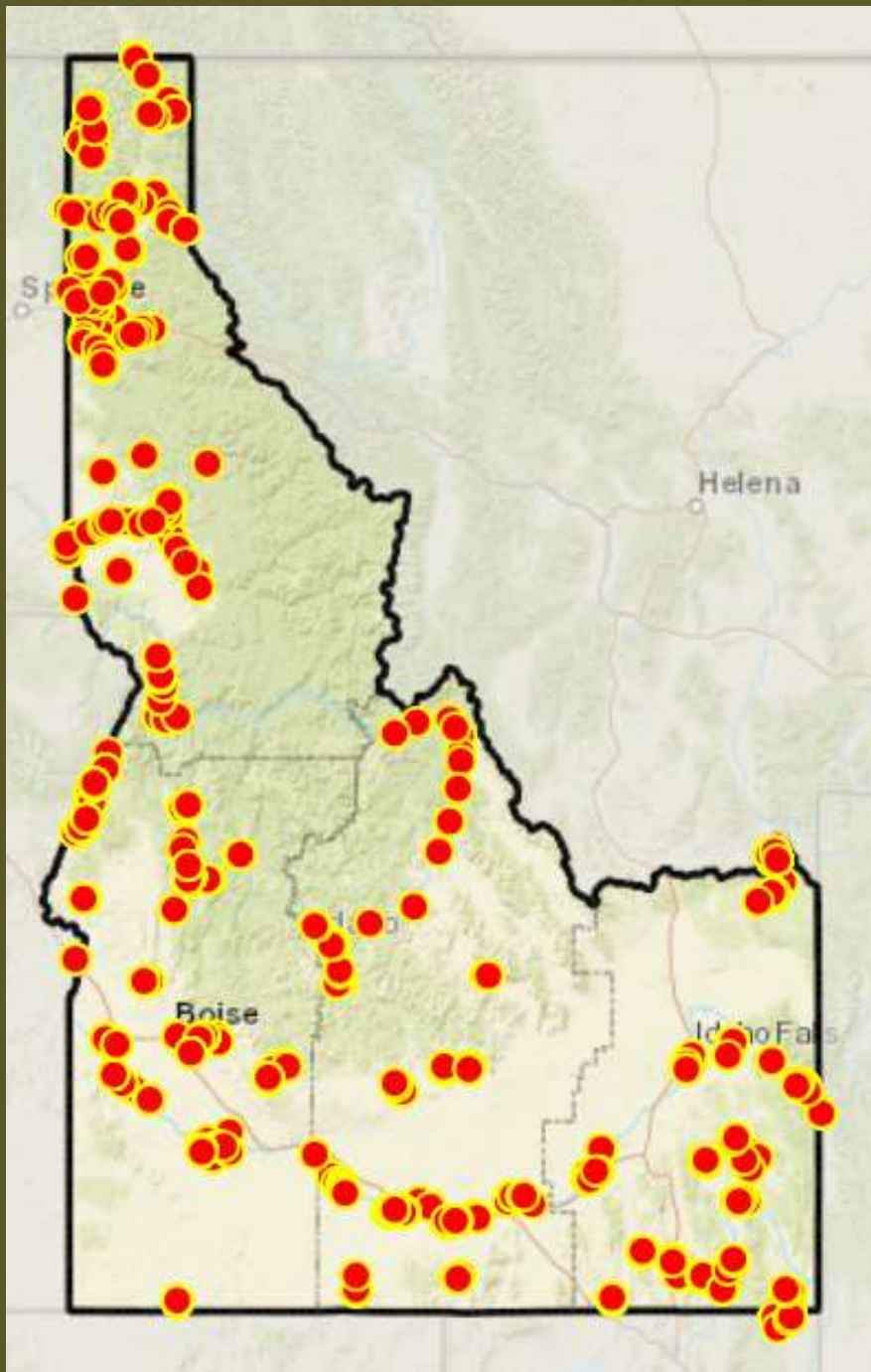




# Monitoring

- Important!
- ISDA Monitors!





# Veliger Survey 2019 Points

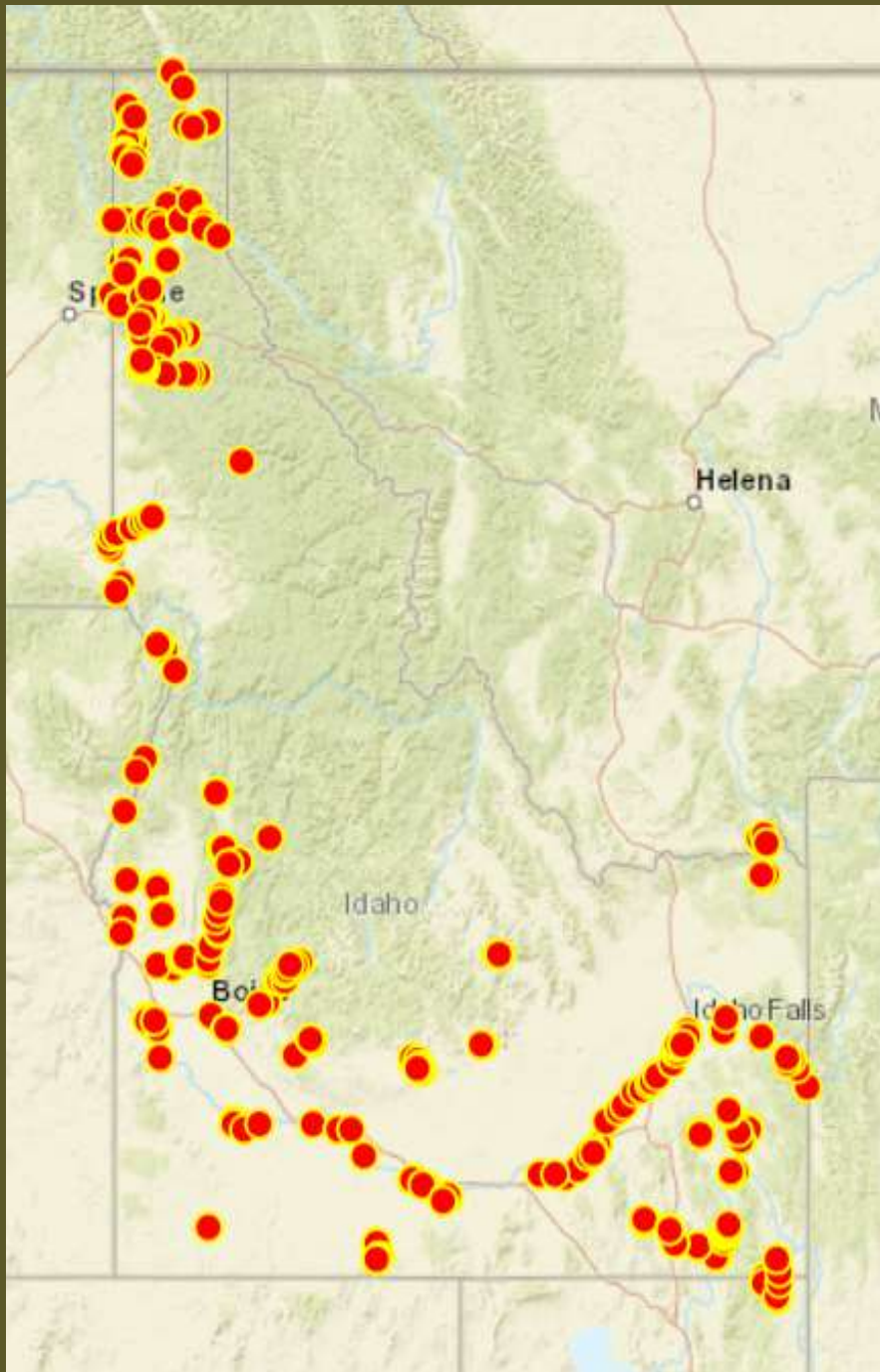
**1592** Samples  
**80+** Waterbodies





# Veliger Sampling

Dreissenid Mussel sampling in Idaho

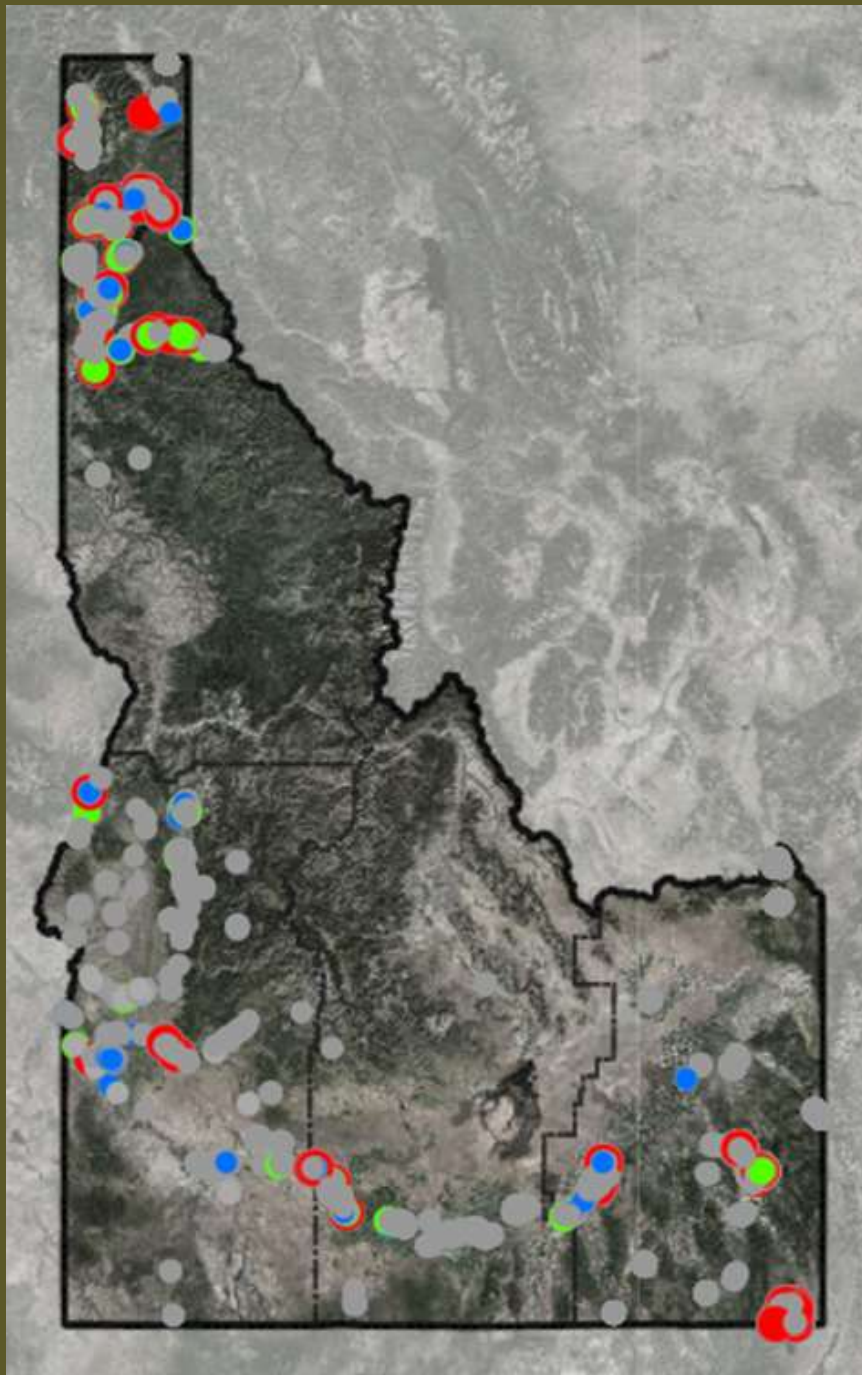


# Adult Mussel Survey 2019 Points

**640** Samples  
**80+** Waterbodies







# Aquatic Plant Survey 2019 Points

**21,398** Samples  
**80+** Waterbodies







# Aquatic Invasive Plant Management

*What is happening around Idaho?*



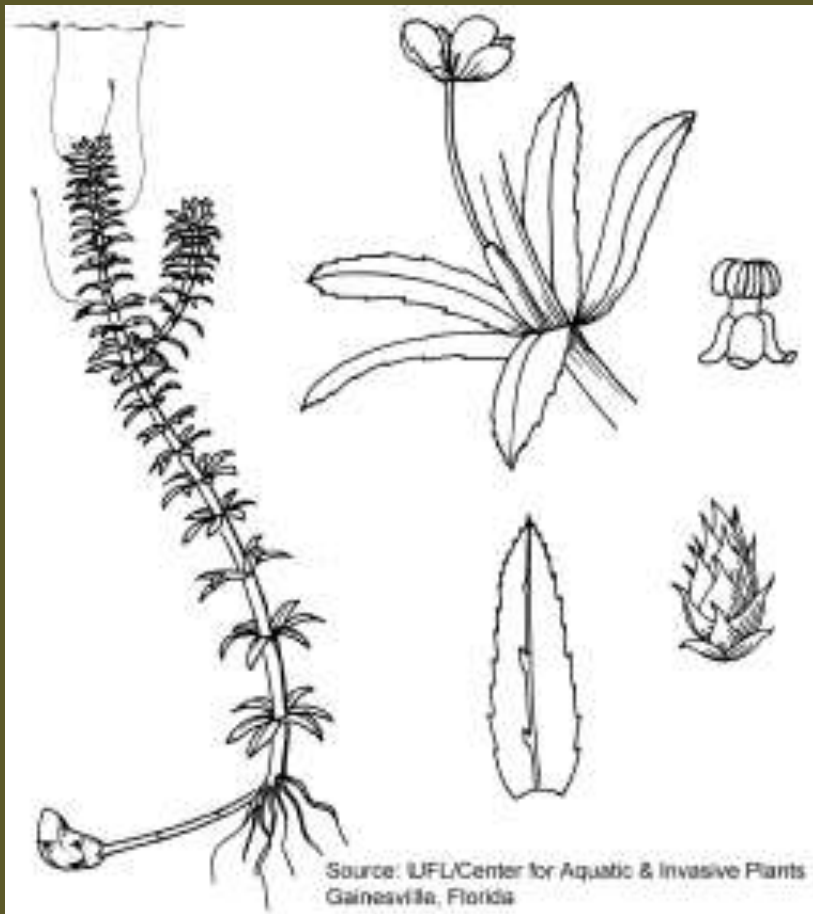


# Case Study: Hydrilla verticillata

*Results from an IWM approach in the Bruneau River...*

<https://idaho.maps.arcgis.com/apps/Cascade/index.html?appid=cb93903655b6448dbe1bdd37c4d2ac66>





# Hydrilla verticillata

- Known as the “Worst Aquatic Weed”
- Found in the Bruneau River in 2008





# Bruneau River Infestation Area







THIS IS  
MONITORING

- Surveys conducted to identify infestation zone
- Applied chemicals in upper reaches of the River in high density areas







THIS IS  
MONITORING

- Surveys conducted after treatment
- Suction removal utilized to target remaining high density areas





THIS IS  
MONITORING





*Hydrilla verticillata*  
Bruneau River  
2010



2010 – **5,548** Plants Removed

Chemical Application  
5 Backpack (diquat)

Hand Removal  
4 Survey Events

Suction Removal  
32 Days



*Hydrilla verticillata*  
Bruneau River  
2011



2011 – **980** Plants Removed

Chemical Application

1 Backpack (diquat)

Hand Removal

4 Survey Events

Suction Removal

18 Days



*Hydrilla verticillata*  
Bruneau River  
2012



2012 - **1,310** Plants Removed

Chemical Application

None

Hand Removal

4 Survey Events

Suction Removal

Not Recorded



*Hydrilla verticillata*  
Bruneau River  
2013



2013 - **3,920** Plants Removed

Chemical Application  
None

Hand Removal

4 Survey Events (entire River)  
20 Survey Events (upper Sections)

Suction Removal

24 Days



*Hydrilla verticillata*  
Bruneau River  
2014



2014 - **2,188** Plants Removed

Chemical Application  
None

Hand Removal

4 Survey Events (entire River)  
20 Survey Events (upper Sections)

Suction Removal

24 Days



*Hydrilla verticillata*  
Bruneau River  
2015



2015 - **1,019** Plants Removed

Chemical Application  
None

Hand Removal

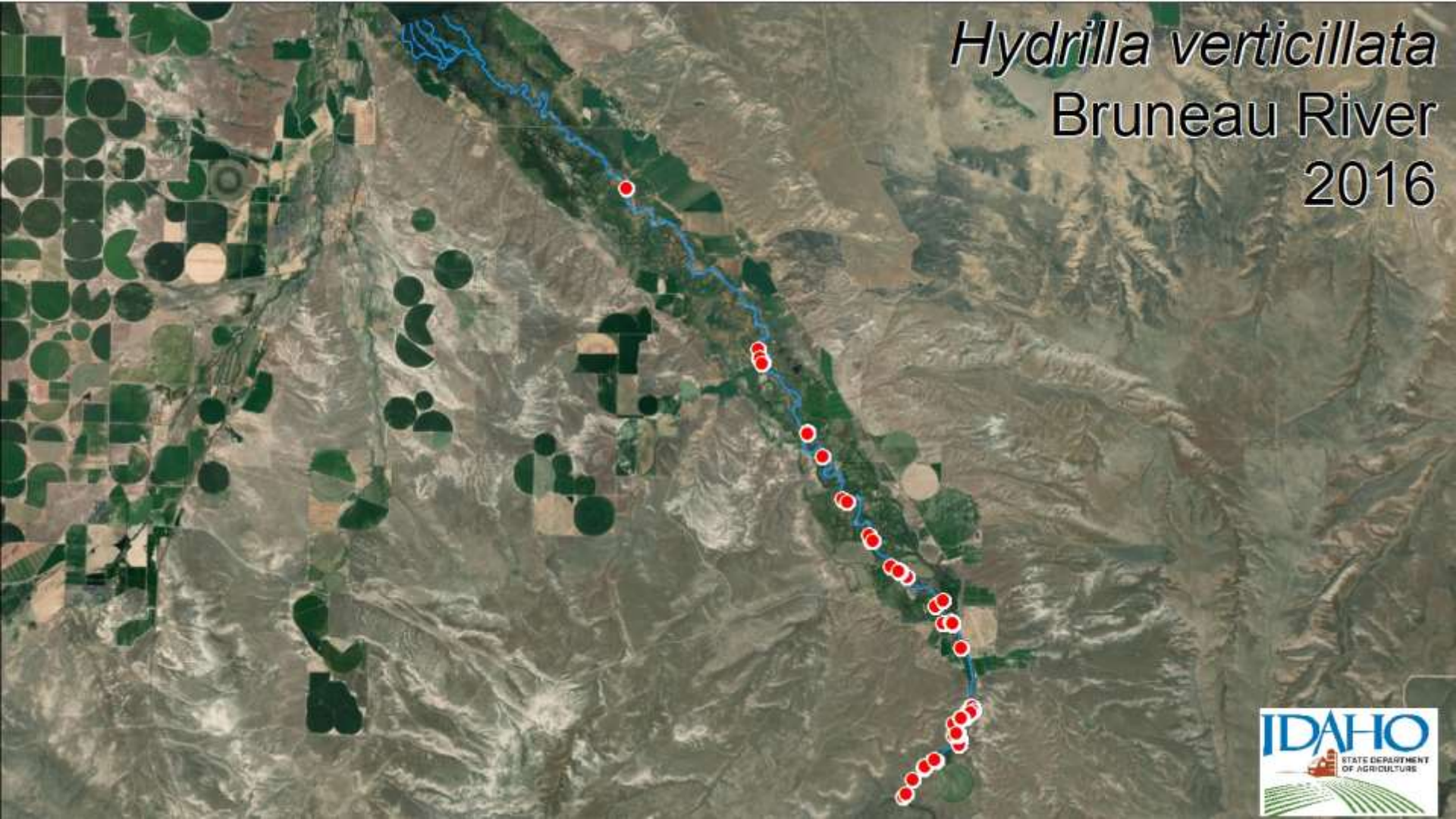
4 Survey Events (entire River)  
24 Survey Events (upper Sections)

Suction Removal

6 Days



*Hydrilla verticillata*  
Bruneau River  
2016



2016 - **183** Plants Removed

Chemical Application  
None

Hand Removal

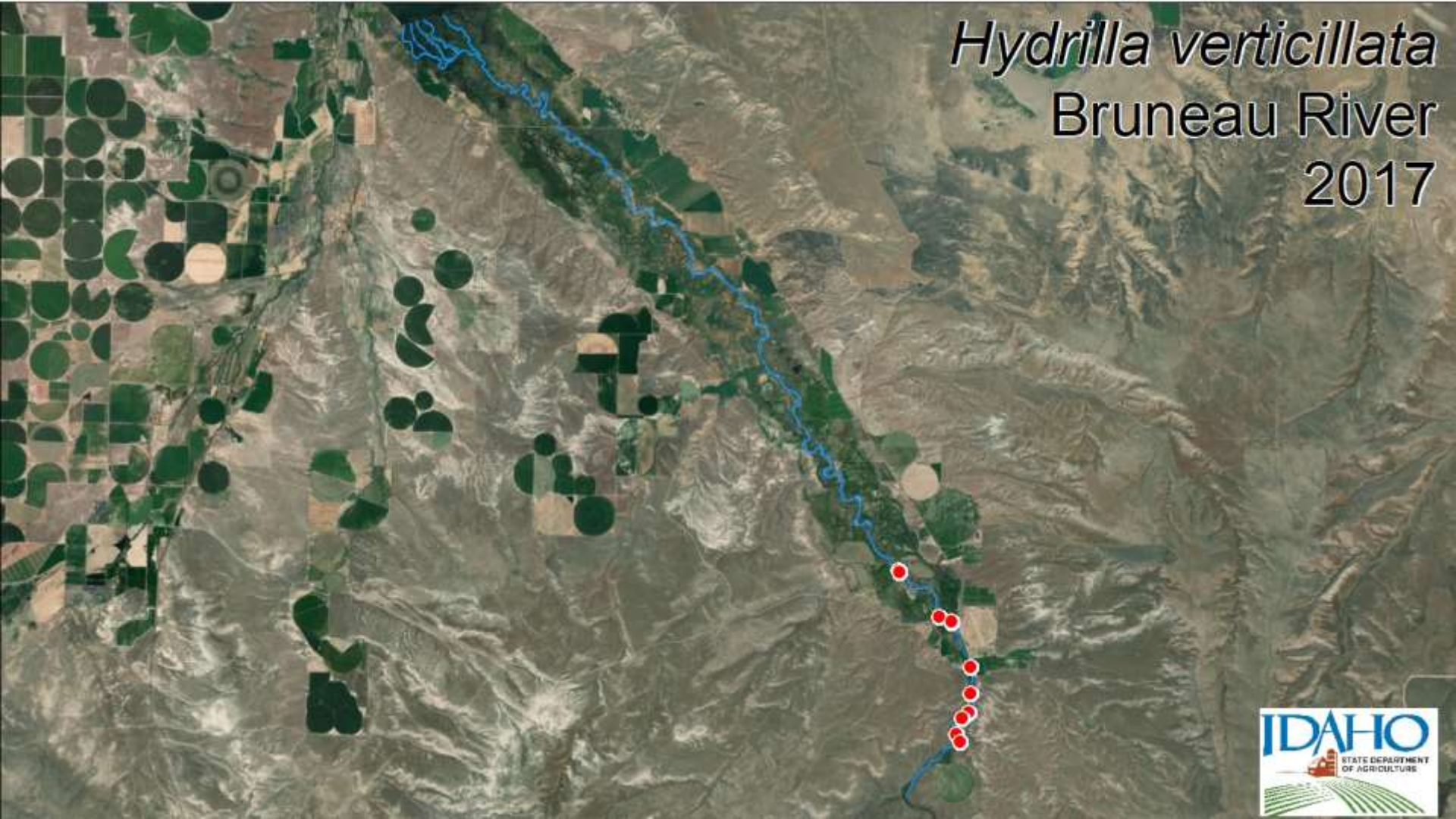
2 Survey Events (entire River)  
13 Survey Events (upper Sections)

Suction Removal

1 Day



*Hydrilla verticillata*  
Bruneau River  
2017



2017 - **27** Plants Removed

Chemical Application

None

Hand Removal

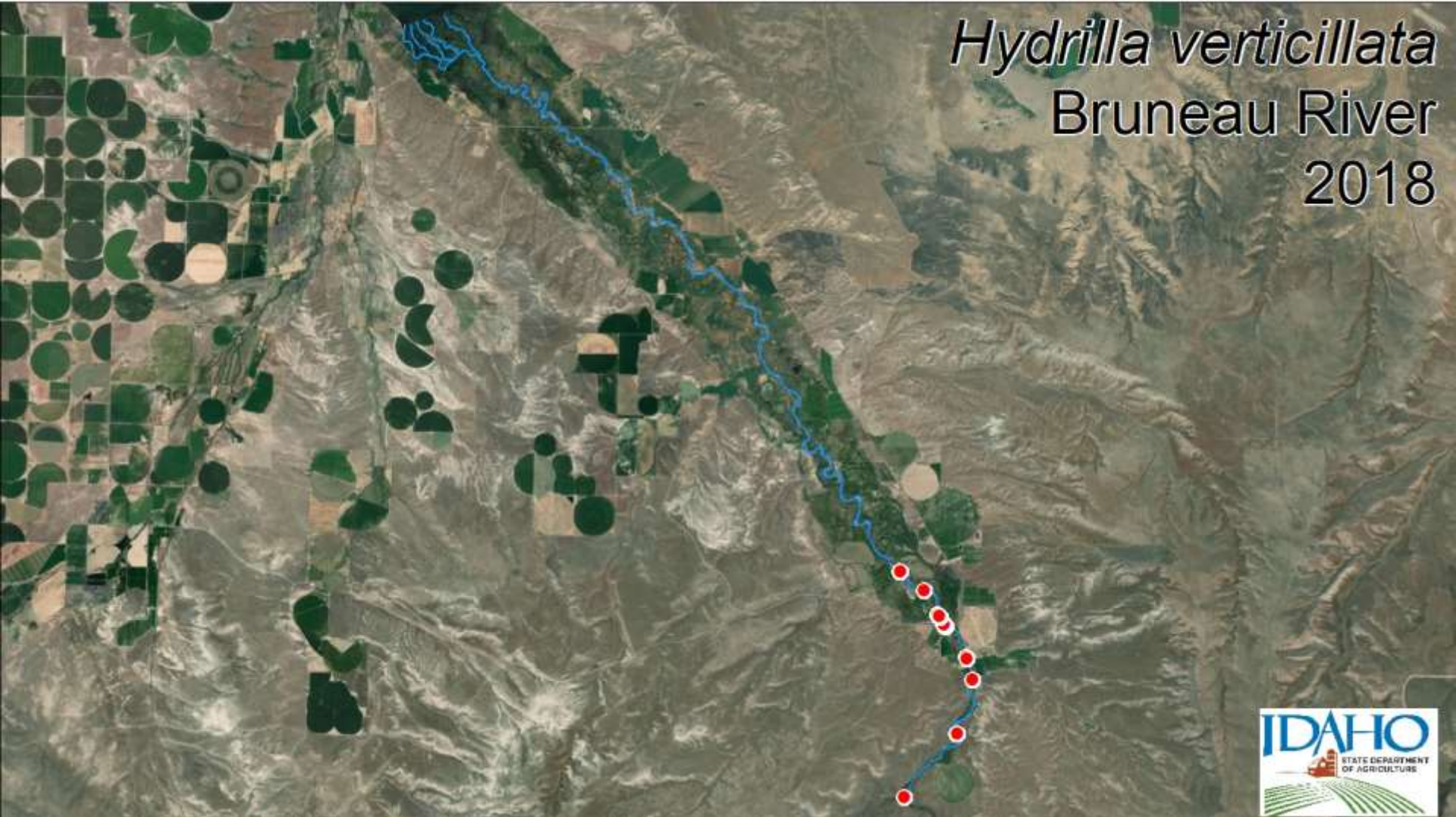
1 Survey Events (entire River)  
6 Survey Events (upper Sections)

Suction Removal

None



*Hydrilla verticillata*  
Bruneau River  
2018



2018 - **26** Plants Removed

Chemical Application

None

Hand Removal

1 Survey Events (entire River)

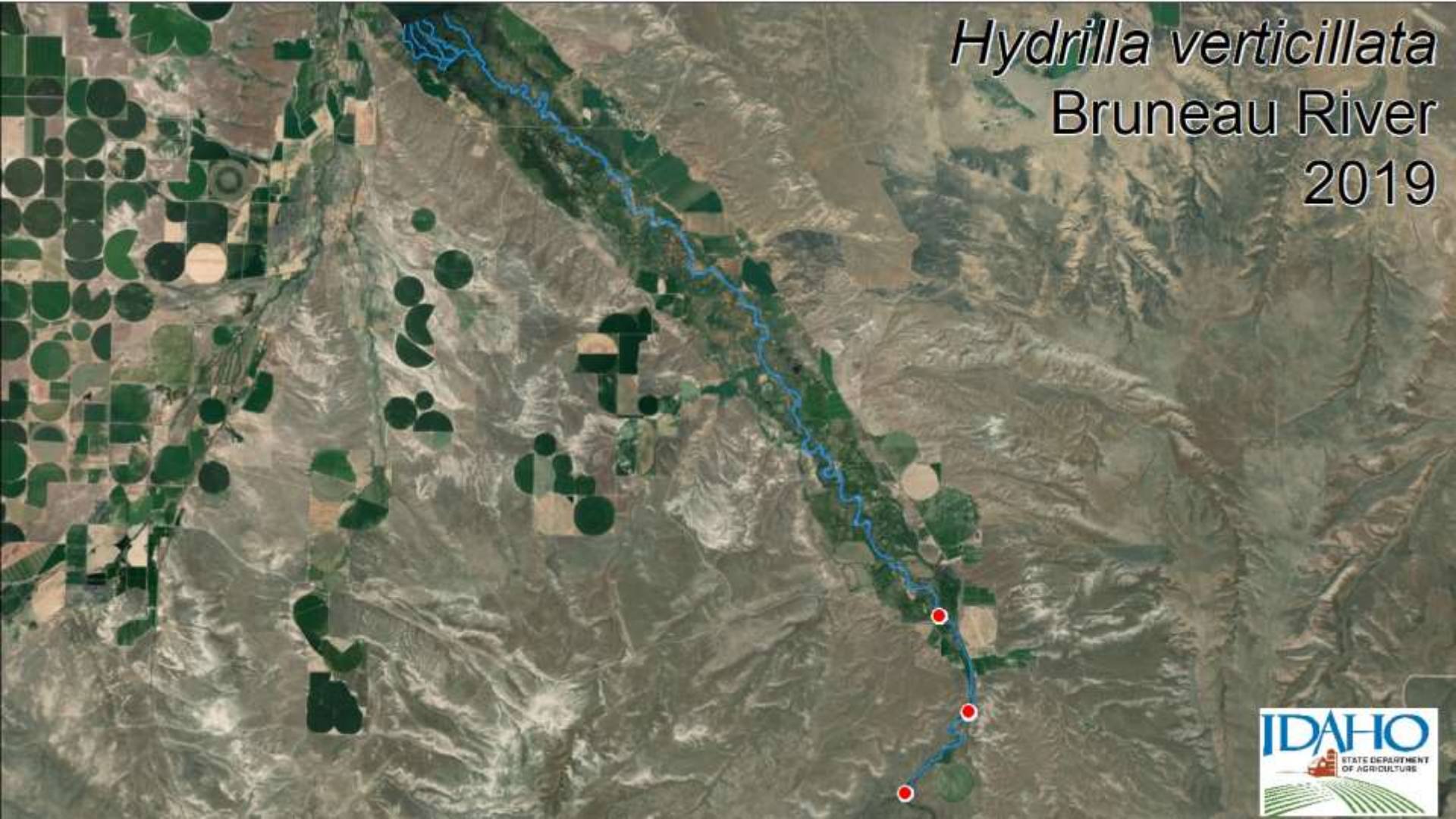
16 Survey Events (upper Sections)

Suction Removal

None



*Hydrilla verticillata*  
Bruneau River  
2019



2019 - **5** Plants Removed

Chemical Application  
None

Hand Removal

1 Survey Events (entire River)  
13 Survey Events (upper Sections)

Suction Removal  
None



# Current Hydrilla Locations in Idaho

## Owyhee and Twin Falls Counties



- ❖ The Ada County population has not observed re-growth in 4 years.



IWM CONCEPTS | AQUATIC PLANT MANAGEMENT

# MANAGEMENT STRATEGIES: *EURASIAN WATERMILFOIL*





MANAGEMENT STRATEGIES:

*EURASIAN WATERMILFOIL*

**Prevention:** top priority

**Physical and Cultural Controls:** benthic barrier and drawdown

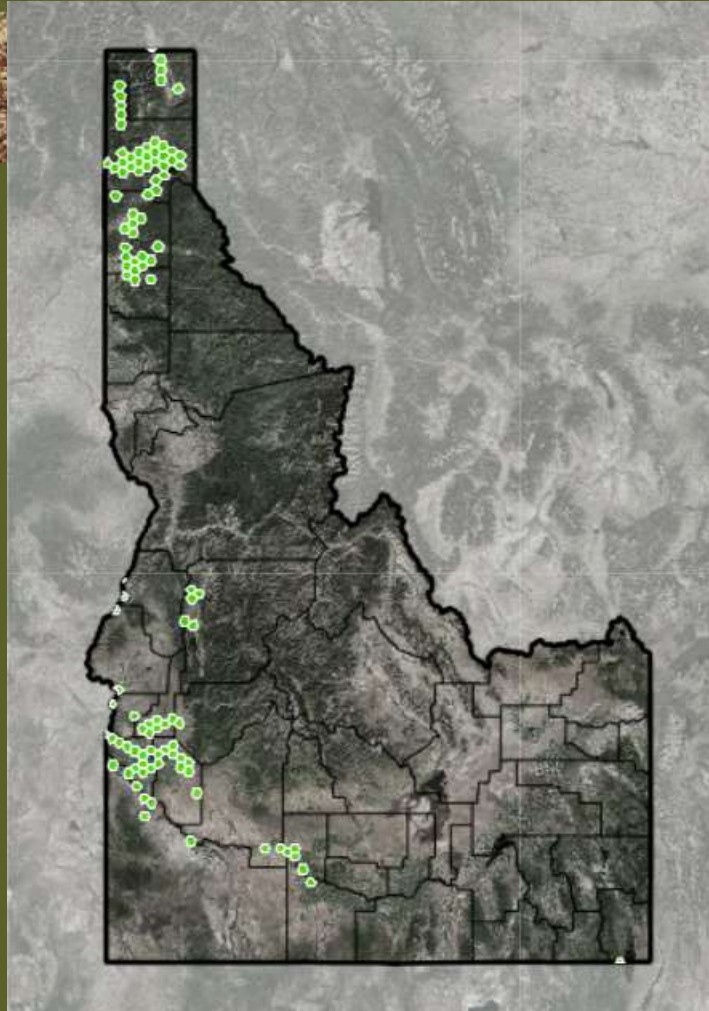
**Mechanical Controls:** suction removal (dredge)

**Chemical Controls:** diquat, 2,4-D, triclopyr, fluridone, florpyrauxifen-benzyl

**Biological Controls:** grass carp

**Monitoring:** extensively

# MANAGEMENT STRATEGIES: *EURASIAN WATERMILFOIL*





# MANAGEMENT STRATEGIES: *FLOWERING RUSH*





MANAGEMENT STRATEGIES:  
*FLOWERING RUSH*

**Prevention:** top priority

**Physical and Cultural Controls:** hand, rake, and diver aided removal

**Mechanical Controls:** suction removal (dredge)

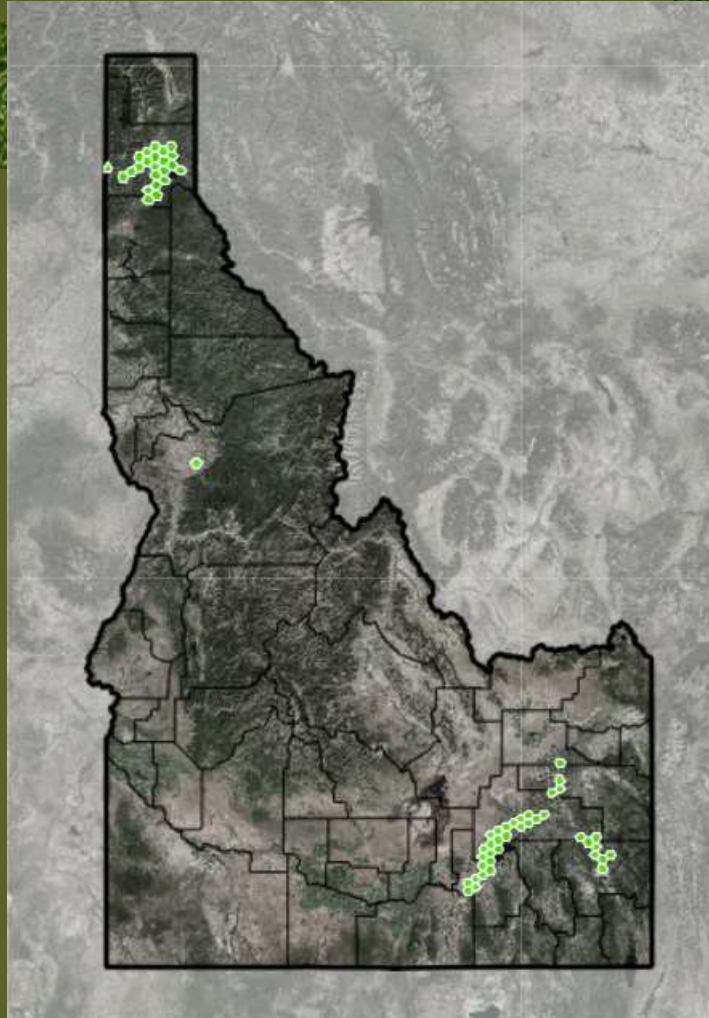
**Chemical Controls:** diquat

**Biological Controls:** none

**Monitoring:** extensively



# MANAGEMENT STRATEGIES: *FLOWERING RUSH*





IWM CONCEPTS | AQUATIC PLANT MANAGEMENT

# MANAGEMENT STRATEGIES: *PARROTFEATHER MILFOIL*





MANAGEMENT STRATEGIES:

*PARROTFEATHER MILFOIL*

**Prevention:** top priority

**Physical and Cultural Controls:** hand and rake removal

**Mechanical Controls:** suction removal (dredge)

**Chemical Controls:** glyphosate, 2,4-D, diquat, florpyrauxifen-benzyl

**Biological Controls:** grass carp (maybe)

**Monitoring:** important

# MANAGEMENT STRATEGIES: *PARROTFEATHER MILFOIL*





# Biology and Control of Aquatic Plants



**A Best Management Practices  
Handbook: Third Edition**

Lyn A. Gettys, William T. Haller and David G. Petty, editors

## CREATING AN INTEGRATED WEED MANAGEMENT PLAN

**A Handbook for Owners and Managers of Lands  
with Natural Values**

*Caring for the Land Series*  
**Volume IV**

**March 2000**



Colorado Natural Areas Program  
Colorado State Parks  
Colorado Department of Natural Resources



Division of Plant Industry  
Colorado Department of Agriculture





Well, that's it!  
**Thank you for  
your time.**

I hope it wasn't too painful!

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