Snake River Quagga Mussel

Treatment Plan October 2023

IDAHO STATE DEPARTMENT OF AGRICULTURE

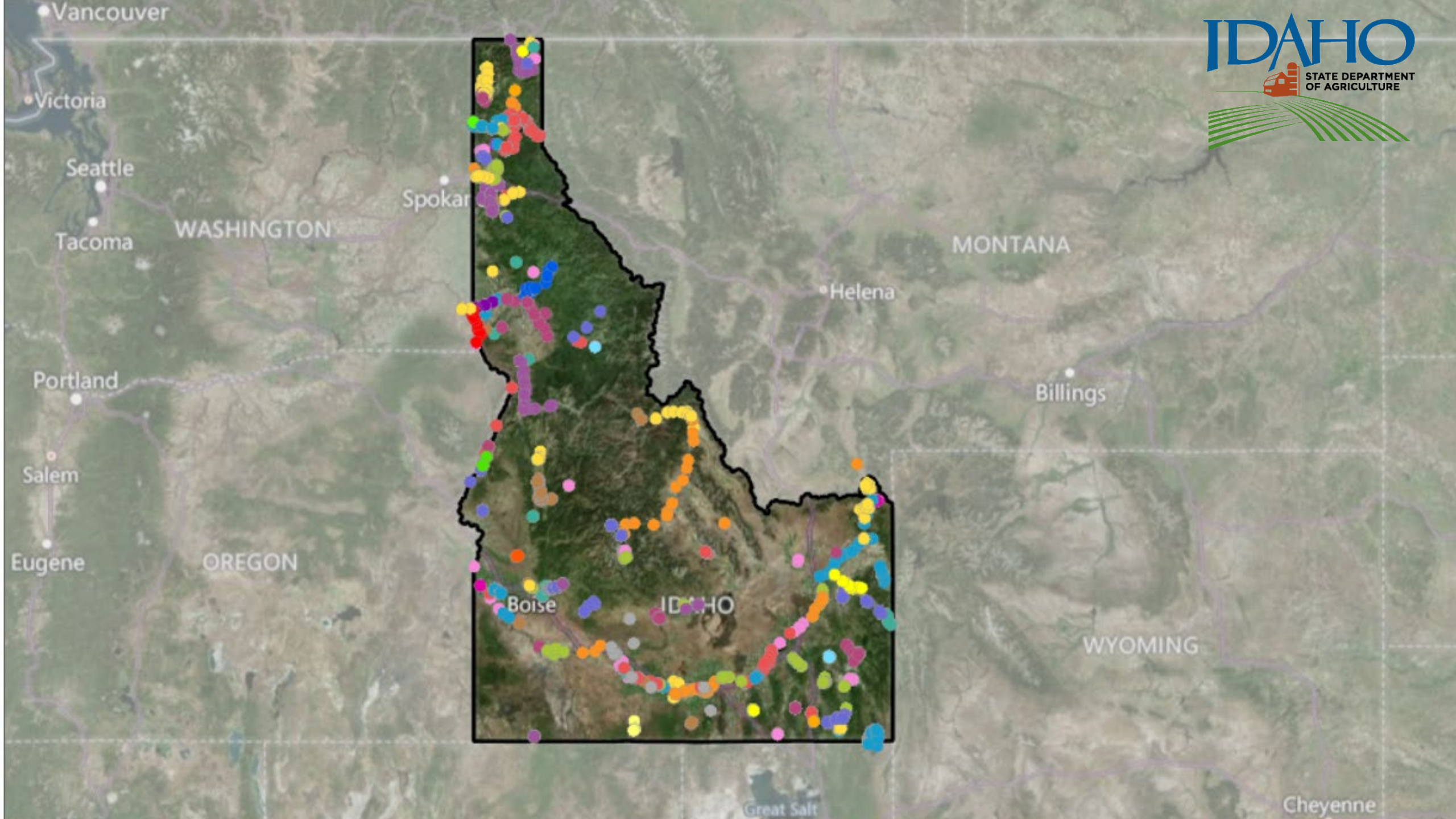
Prepared/Treatment recommendation by Jeremey Varley, Idaho Professional Applicators License No 50369

Quagga Mussels

- One mussel can produce 30,000 to 1,000,000 veligers per year
  - ~82 to 2739 per day
- These veligers will move downstream with currents for up to 30 days as a veliger before it settles.
- The dissemination of the downstream veligers needs to be just as big of a concern as settled mussels.

Potential Impact

- Quickly clogs pipes that deliver water for drinking, energy, agriculture, recreation, and a variety of other uses.
- Potential to eliminate Idaho's diverse biological landscape.
- Threat to the Columbia River Basin
- Hundreds of millions of dollars in actual and indirect costs to Idaho.



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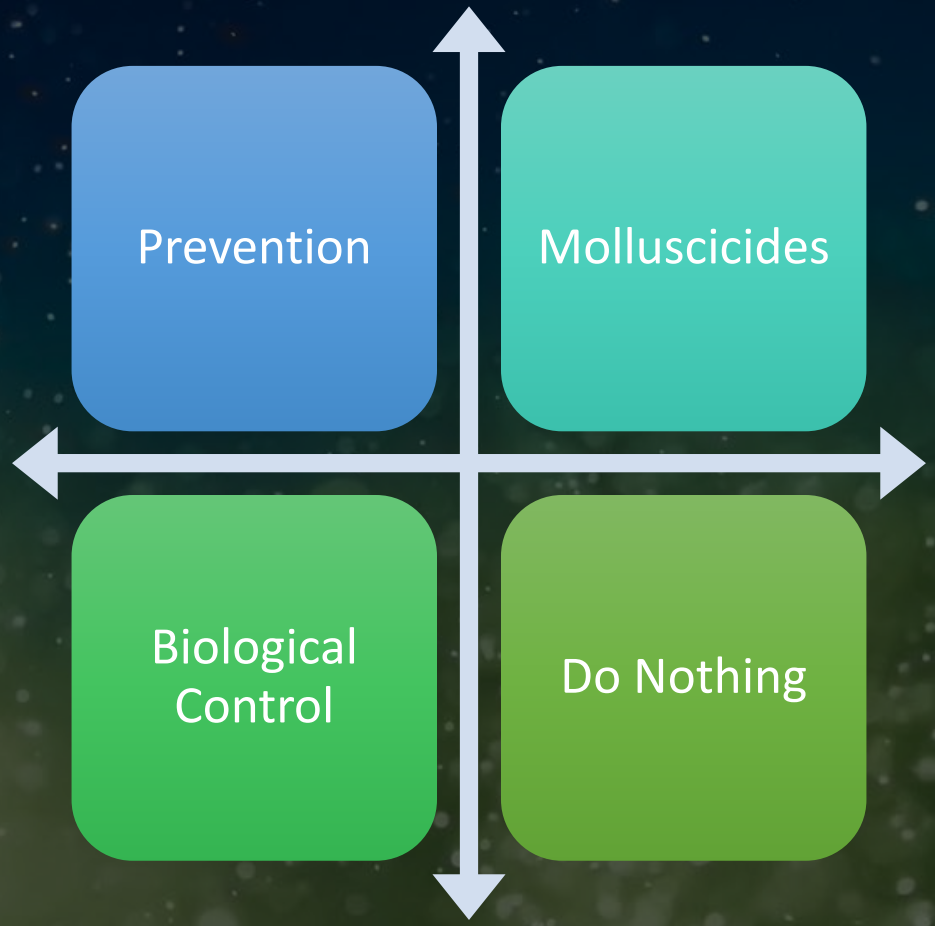
Quagga Mussel Veliger presence
September 27, 2023
Centennial Park
Pillar Falls
Shoshone Falls
Twin Falls
Legend
Number of Veligers

Collaborative Treatment Plan

- Governor's Office
- Idaho Department of Fish and Game
- Idaho Office of Species Conservation
- Idaho Department of Environmental Quality
- Idaho Department of Water Resources
- Idaho Department of Parks and Recreation
- Idaho Department of Lands
- Idaho Power
- Canal companies
- Idaho Water Users Association
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- U.S. Army Corps of Engineers
- U.S. Bureau of Land Management
- U.S. Bureau of Reclamation

What treatment options are viable for quagga mussels?



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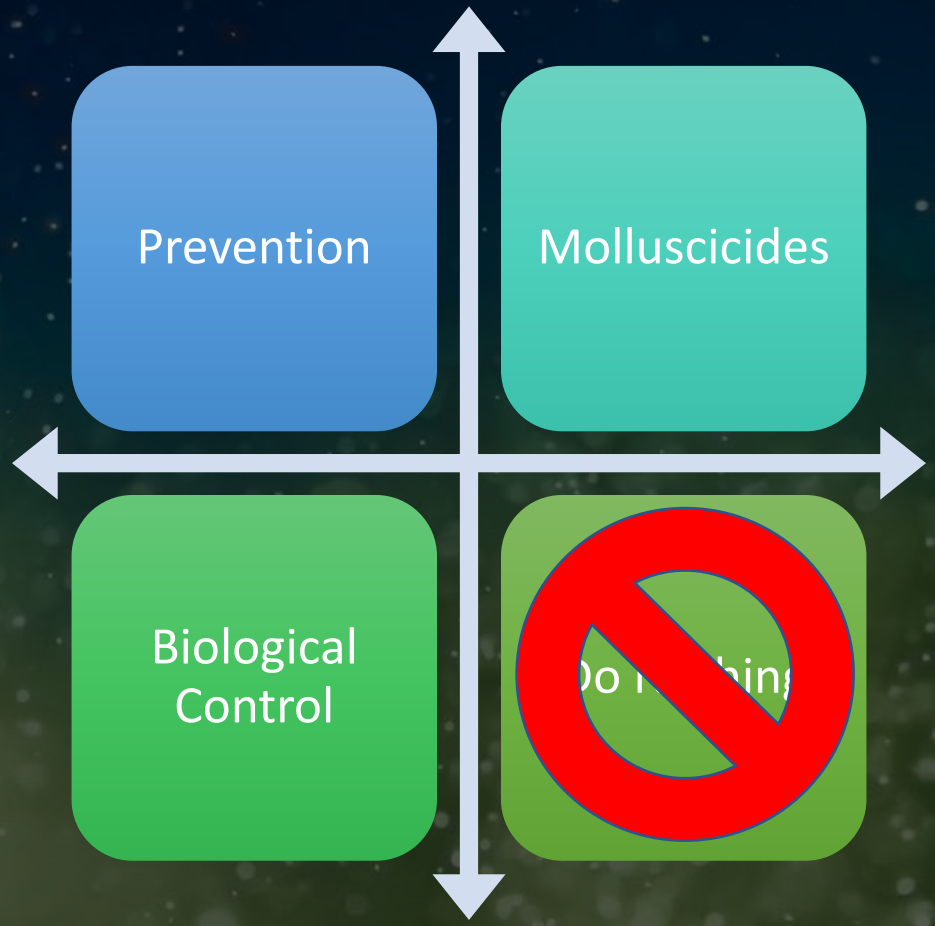
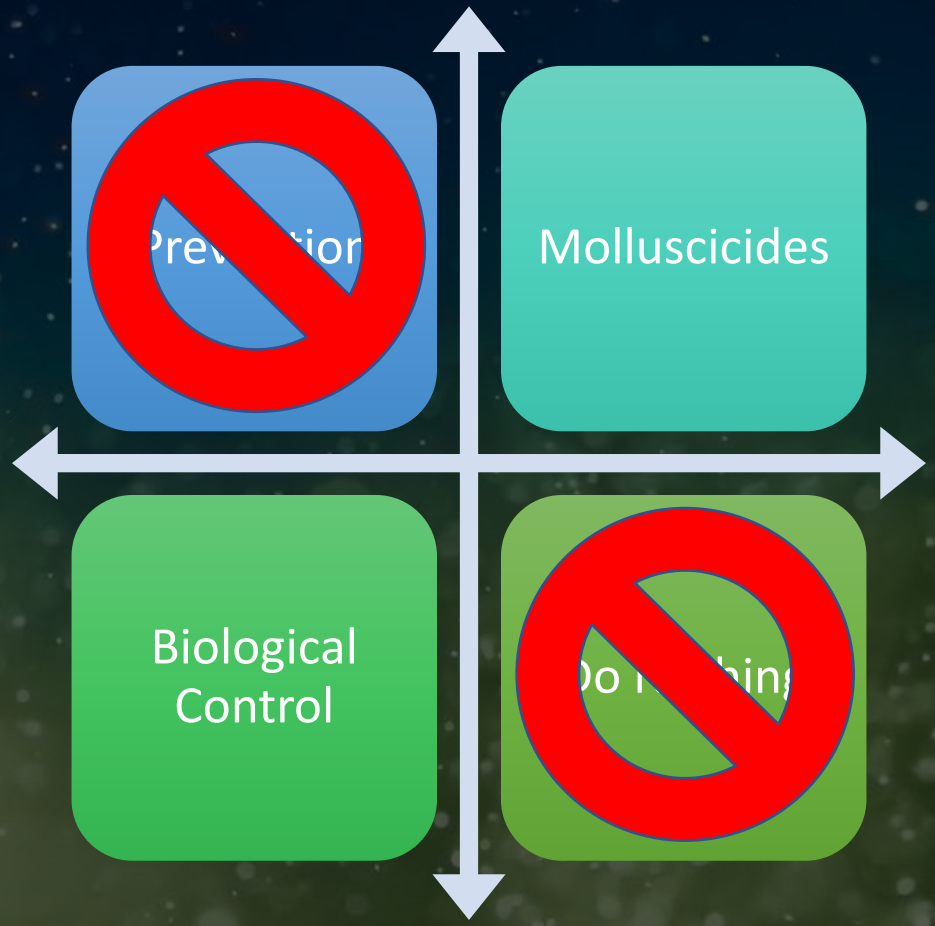


Not the best option as the current infestation poses considerable crisis to the entire Columbia River Basin System, not just Idaho.

What treatment options are viable for quagga mussels?

Prevention will still be the best options for all Idaho waterbodies outside of the Snake River.



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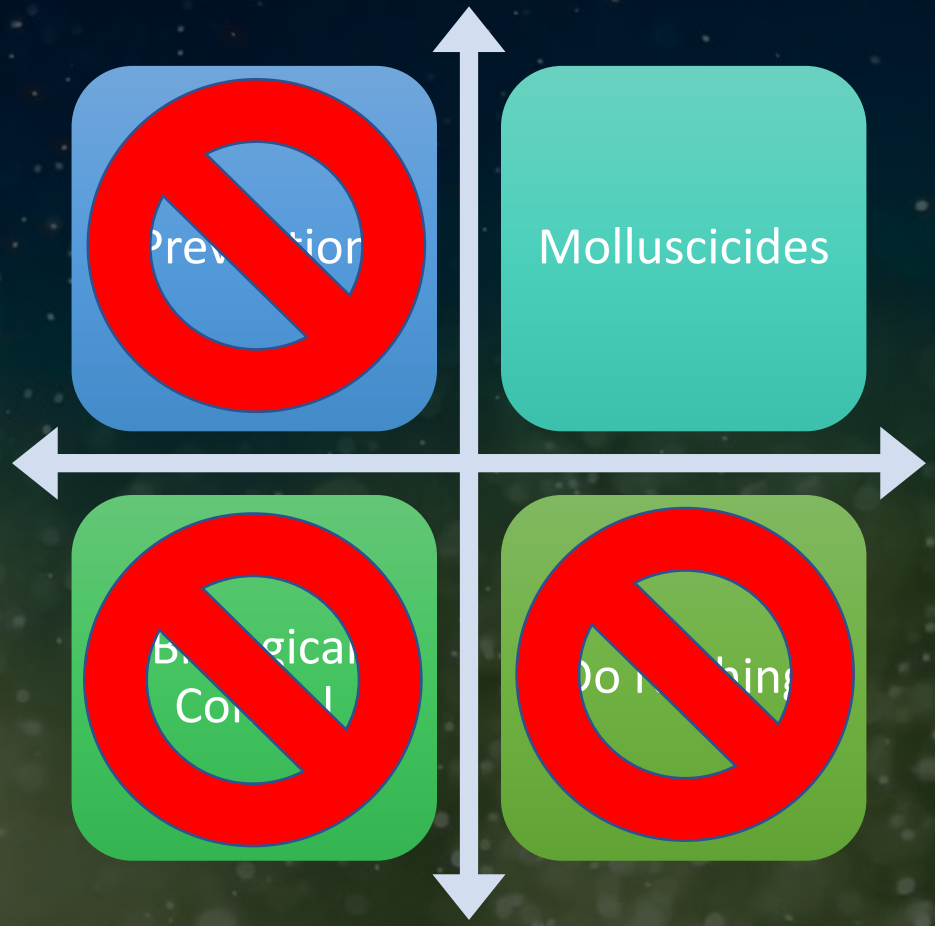
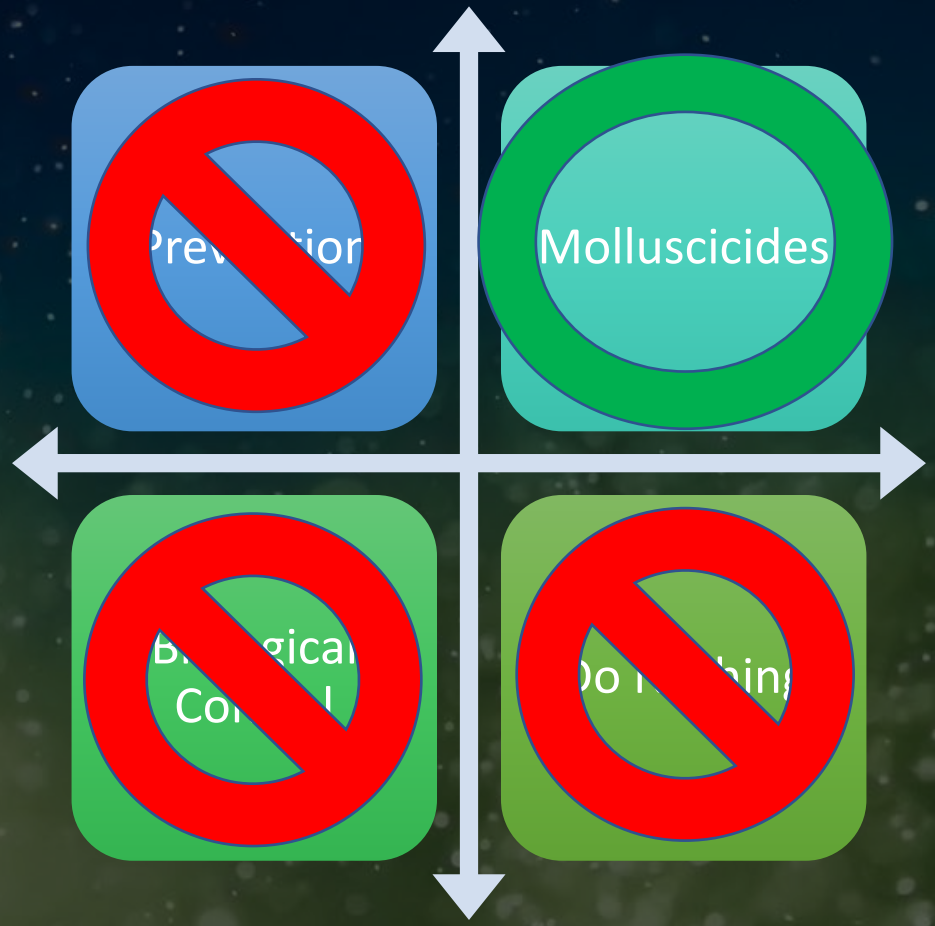


Although biological control is a good option for established infestations, it is not the choice for eradication type control.

What treatment options are viable for quagga mussels?



Molluscicides present the best options for eradicating current adult infestation. Though there are several variables that need to be considered when employing this tool.

Considerations for choosing the best option

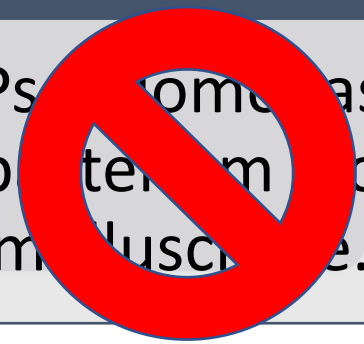
- Water depth, flow, turbidity, and PH
- Access for equipment and materials
- Public drinking water systems
- Aquaculture facilities
- ESA listed species
- Irrigation
- Permitting and regulations
- Article review on previous quagga mussel treatments (success and failure)

Molluscicide choices for in water application

- Chelated Copper
- Niclosamide
- Potassium Chloride
- Pseudomonas Bacterium Bio Molluscicide

Molluscicide choices, for in water application

- Chelated Copper
- Niclosamide
- Potassium Chloride
- Ps[illegible]as b[illegible]m [illegible]o m[illegible]e.

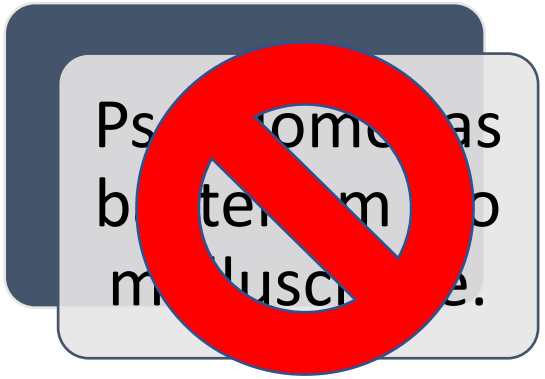


Biological control type products is not the choice for eradication type control.

Molluscicide choices, for in water application

Chelated Copper

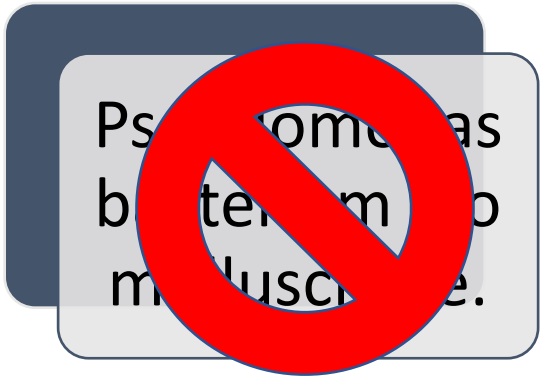
Niclosamide



Due to the high amount of algae and macrophyte in the treatment area as well as a target rate of 100ppm this just is not the best option for our site.

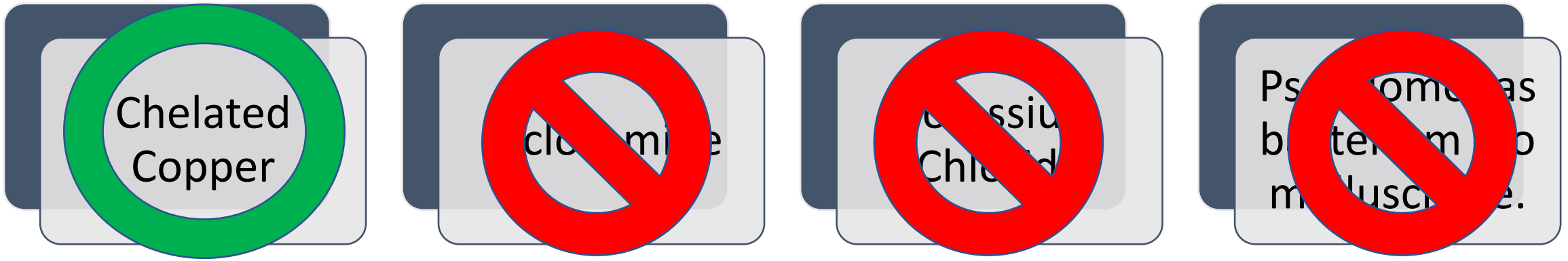
Molluscicide choices, for in water application

Chelated Copper



This product is not currently available in the U.S. Although there is some preliminary work being done by some federal agencies, we cannot use it at this time.

Molluscicide choices, for in water application



Best option that is available and registered for use with a target rate of 1 ppm for a contact time of 96 hours.

Chelated Copper vs. Copper Sulfate

Chelated Copper

- Formulation allows copper to stay in solution. Allowing for a much longer extended-release time.
- Needed for the required 96 hour contact time to be effective on quagga mussel.

Copper Sulfate

- Formulation breaks down rapidly and only those organisms contacted with direct application will be affected.
- Great for algae or macrophyte control but not for long contact time type applications.

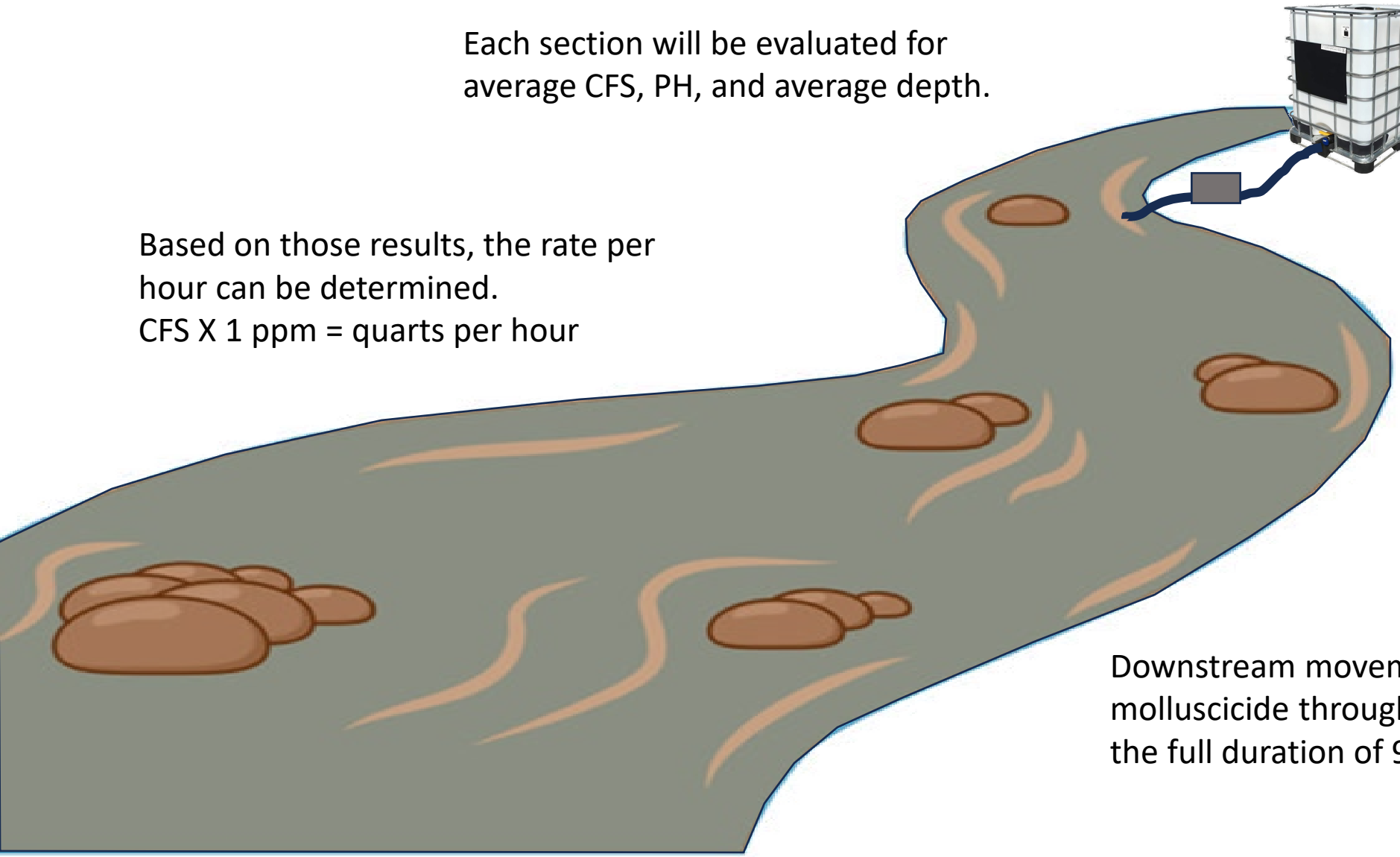
Based on veliger microscopy these three treatment areas would be required treatments to eradicate current mussel infestation.

ISDA's 3 Step Treatment Plan

How copper treatment areas will take place

Each section will be evaluated for average CFS, PH, and average depth.

Based on those results, the rate per hour can be determined.
CFS X 1 ppm = quarts per hour



Metered gravity boxes will be placed at key mix points to deliver molluscicide to the Snake River.

Downstream movement will distribute molluscicide throughout target area for the full duration of 96 hours.

How copper treatment areas will take place.

- Special consideration is taken into account for those areas that have deeper pools of standing water.
- As Copper moves down stream additional watercraft support will be utilized to treat these standing pools to maintain 1 ppm rate.

SePRO

Specimen Labe

Natrix®

For the control of mollusks in still or flowing aquatic sites including: golf course p ornamental ponds, fish ponds, irrigation and fire ponds and aquaculture including fis shrimp; fresh water lakes, ponds, and fish hatcheries; potable water reservoirs; and cro non-crop irrigation and drainage systems (canals, laterals and ditches) and chemi systems.

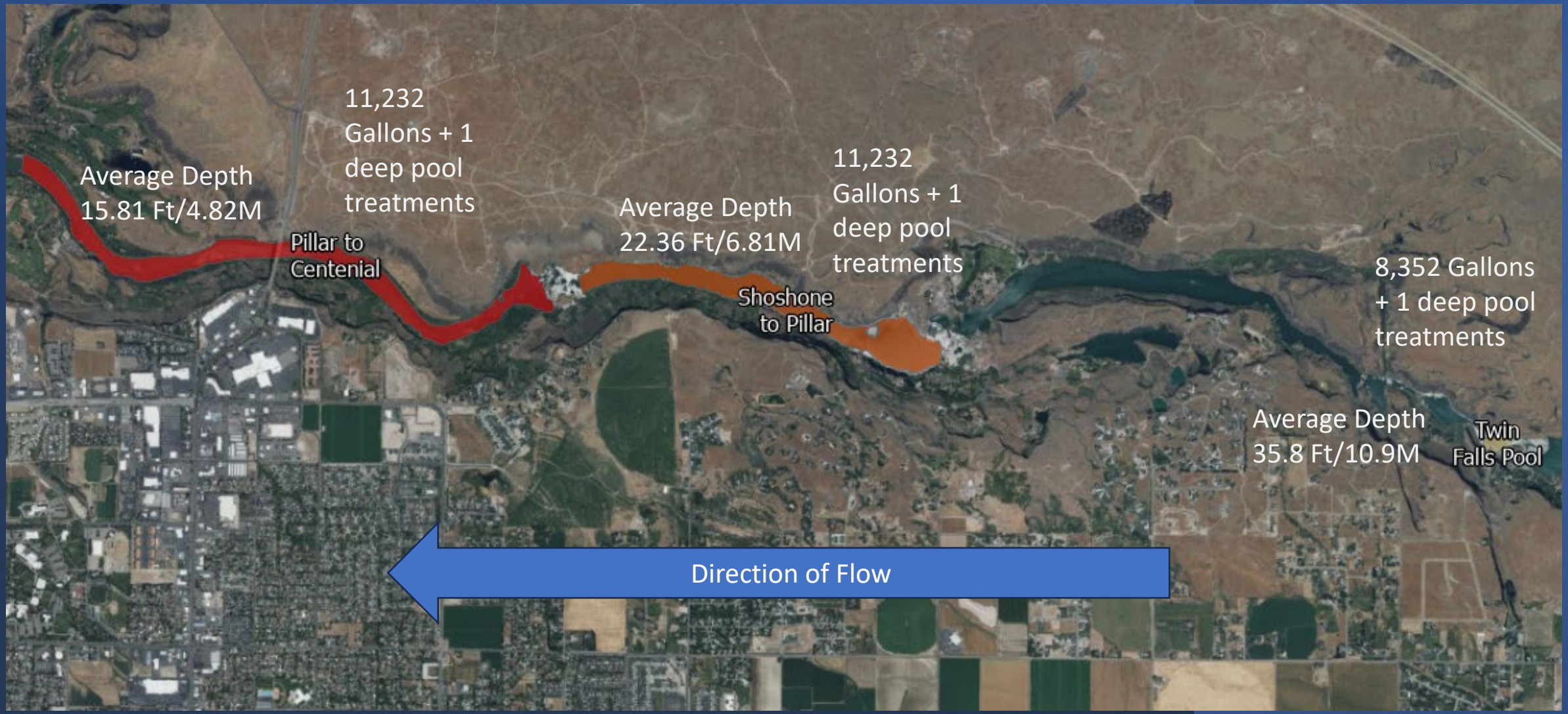
Active Ingredient	
Copper Ethanolamine Complex† (Mixed CAS#'s 82027-59-6 & 14215-52-2).....	28.2%
Other Ingredients.....	71.8%
TOTAL.....	100.0%

†Metallic copper equivalent = 9.1%

KEEP OUT OF REACH OF CHILDREN

WARNING / AVISO

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle.
do not understand the label, find someone to explain it to you in detail.)


Average Depth
15.81 Ft/4.82M
11,232
Gallons + 1
deep pool
treatments
Pillar to
Centenial
Average Depth
22.36 Ft/6.81M
11,232
Gallons + 1
deep pool
treatments
Shoshone
to Pillar
8,352 Gallons
+ 1 deep pool
treatments
Average Depth
35.8 Ft/10.9M
Twin
Falls Pool
Direction of Flow

Shoshone to Pillar Falls

- 91.65 Surface Acres
- Staging sites
  - Shoshone Falls Power House Intake
  - Shoshone Falls Park


WARNING
STAY BACK 300 FEET

Suspect Area of Adult Mussels

Challenges

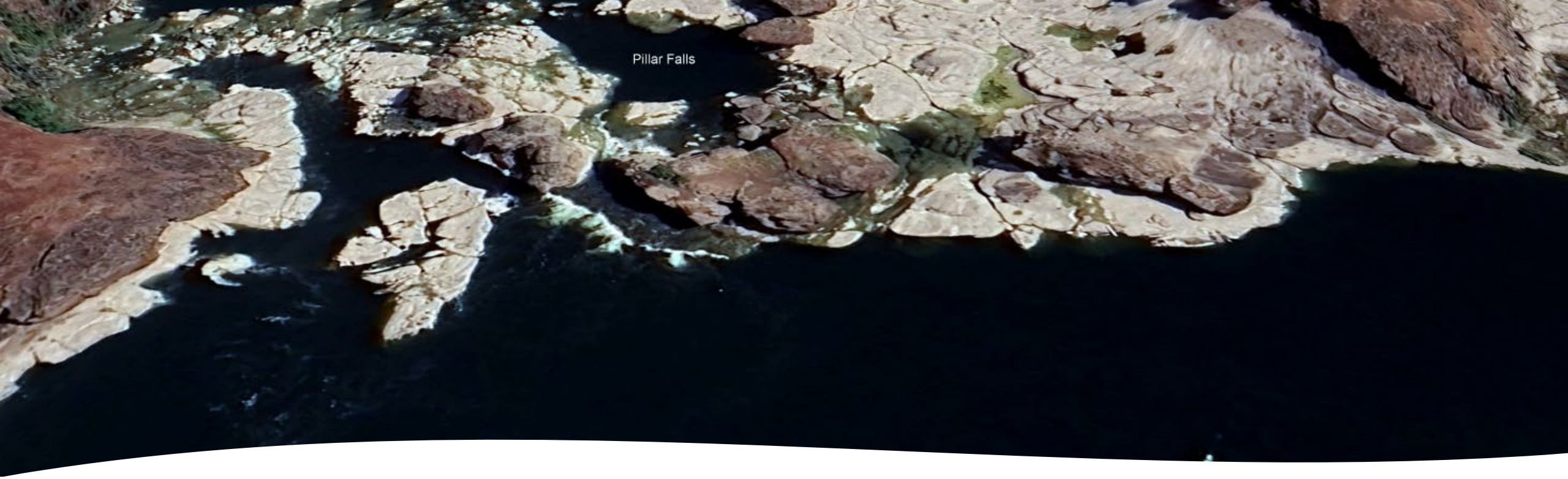
- No access to boat ramp
- Ability to get chemical to potential mix site
- Potential to get small tender boat
- CFS will be remeasured 48 hours prior to treatment
- Area of highest need for successful treatment

Pillar to Shoshone Treatment Plan

- Day 1 –
  - Stage product near access road to Shoshone Dam and prep site for mix sit location.
  - Stage deep pool product at Shoshone Park with gravity hose set up to have product delivered to loading site for tender boat/application boat.
  - Set empty tote with float meter for delivery of product at infestation site and side stream inflow.
- Day 2 – 5
  - Apply molluscicide and monitor treatment progress to ensure accurate 1 ppm application.
- Day 6 – 7
  - Monitor results and allow time for reset for treatment 2.
- Day 8– 12
  - Second application of molluscicide to Pilar to Shoshone and Twin Falls deep pool treatment.
- Day 13
  - Remove all treatment application equipment and supplies.

Pillar Falls to Centennial

- 118.23 Surface Acres
- Staging sites
  - Centennial Park



Pillar Falls Mix Site

- On Site evaluation occurred on Tuesday 9/26 to determine best placement of metered delivery totes.

Pillar to Centennial Treatment Plan

- Day 1 –
  - Stage product at Centennial Park
  - Stage deep pool product at Centennial Park for use on application boat.
  - Set empty tote with float meter for delivery of product at infestation site at side stream inflow.
- Day 2 – 5
  - Apply molluscicide and monitor treatment progress to ensure accurate 1 ppm application.
- Day 6
  - Remove all treatment application equipment and supplies.

Twin Falls Deep Pool

- 3.78 Surface Acres
- Staging site at Twin Falls Power Plant

Twin Falls Deep Pool Treatment Plan

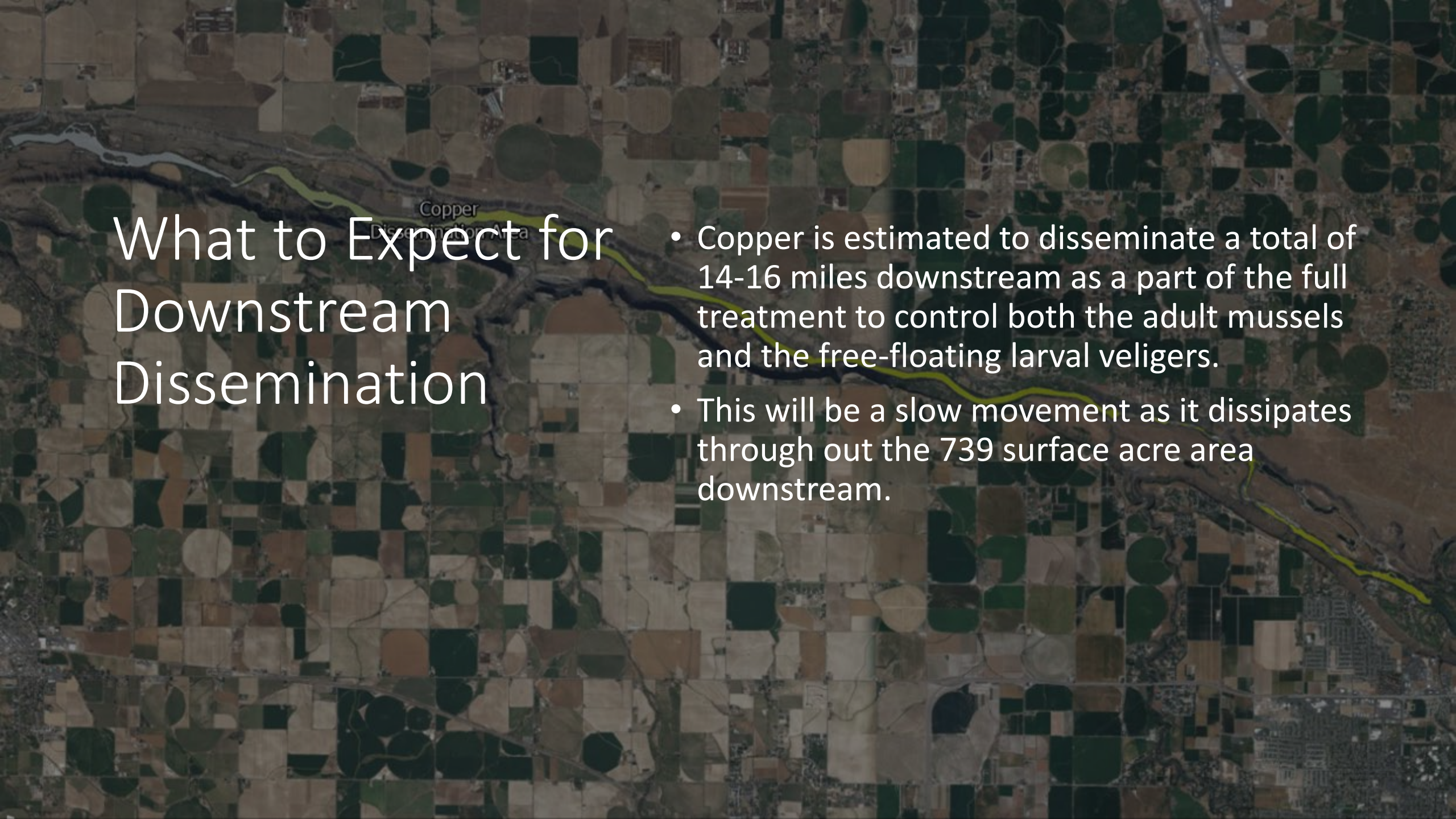
- Day 7 –
  - Stage product at Twin Fall Hydro Power Plant
  - Set empty tote with float meter for delivery of product at Twin Falls Hydro Intake.
- Day 8 – 12
  - Apply molluscicide and monitor treatment progress to ensure accurate 1 ppm application.
- Day 13
  - Remove all treatment application equipment and supplies.

Targeted downstream copper downstream treatment area.

No additional introduction of copper, however letting it free flow to dissipate gradually with the intent of providing a lethal dose for any present free-floating veligers.

Due to the downstream movement, ISDA staff has pre-surveyed this area looking for points of concern at direct water exchange at downstream aquaculture sites, stock water, or irrigation intakes for the potential needed use of activated charcoal waddles to protect points of concern.

What to Expect for Downstream Dissemination



- Copper is estimated to disseminate a total of 14-16 miles downstream as a part of the full treatment to control both the adult mussels and the free-floating larval veligers.
- This will be a slow movement as it dissipates through out the 739 surface acre area downstream.

How will the copper “break down” as it moves downstream.


Dilution from spring/stream and irrigation return.
The water volume increases from 380 CFS at the highest point of treatment area to 2,010 CFS by the time it reaches the 16-mile dissemination point at Highway 46 Bridge.
The copper is expected to be diluted by more than 70% by stream/spring input dilution by the Highway 46 Bridge.
Sub-Surface Springs

Plants and Algae

- As copper moves downstream through heavy algae or macrophyte populations it is expected that by 9.5 miles (Pigeon Cove) that an additional 5-15% will be broken down through sorption into organic matter.

Inorganic Matter Sorption & Complexation

- Suspended sediment can rapidly sorb copper.
- Sand and silt can bind copper though not very much.
- At most it is anticipated that ~2% of bio available copper may be removed through matter sorption.

- PH and alkalinity can contribute to shift to inorganic complexes that would be non-toxic.
  - Potassium
  - Sodium
  - These can compete with binding sites of copper on some fish species due to water hardness.
- It is anticipated that due to the PH and water hardness an additional 5-10% would be broken down through this loss process in the dissemination area.

Total loss or “breakdown” of copper in the dissemination area.

- Low end estimates are 82% breakdown or 0.12 ppm
- High end estimates are 97% breakdown or 0.10 ppm

By the end of the 16-mile, Highway 46 Bridge, that bioavailable copper will fall below expected thresholds.

- ISDA will actively monitor, through sampling, to track the progression breakdown of the copper in the dissemination area, to ensure accuracy.

Quagga Mussel Treatment Schedule

Phase 1	Phase 2
October 3, 2023, treatment will start on Centennial Park to Pillar Falls area and Pillar Falls to Shoshone Falls area.	October 9, 2023, treatment will start on Pillar Falls to Shoshone Falls Area and Twin Falls deep pool area.
96 hour, 1 ppm treatment will continue until Saturday October 7, 2023.	96-hour, 1 ppm treatment will continue until Friday October 13, 2023.
Clean up of supplies/equipment on Centennial to Pillar Falls area will initiate at the close of the 96-hour treatment on October 7, 2023, and be completed by October 8, 2024.	Clean up of all supplies/equipment on Pillar Falls to Shoshone and Twin Falls deep pool area will initiate at the close of the 96-hour treatment on October 13, 2023, and be completed by October 14, 2024.

Treatment Notifications

- Worker Protection Standard bilingual warning signage is posted along the river in the impacted treatment area.

- State and federal land managers with property along the river are assisting with notification
- Reader boards
- Paid advertisements (radio, Facebook, Instagram and Nextdoor)
- Coordination with HOAs with private docks.
- Door-knocking to stakeholders with water-front access.
- Public Treatment Town Hall Briefing

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