

aquatic

Invasive and Other Non-Native Species of the Lees Ferry Reach of the Colorado River



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Executive Order 13751 (Dec 5, 2016)

Safeguarding the Nation From the Impacts of Invasive Species

(e) ‘**Invasive species**’ means, with regard to a particular ecosystem, a non-native organism whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health.

Invasive VS. Non-Native/Exotic (NPS MP2006)

- Native Species are everything that has or will occur by natural processes
- Non-native or Exotic species are everything else (and all GMOs)
- Invasive Species are the unwanted or harmful Exotic Species



Flannelmouth Sucker

Native



Rainbow Trout

Introduced & Managed as Sport Fish

Not Native / Not Invasive



Green Sunfish

Smallmouth Bass



Brown Trout



Walleye

Invasive

NPS Maintenance of Non Native Species

Exotic or Introduced species can be maintained in a park if they are:

- Closely related to an extirpated species, when the native species can't survive, or
- Used to control another exotic species, or
- Needed to meet a desired condition for a (assuming it won't spread!)
 - cultural landscape, or
 - historic resource, or
 - Intensive visitor experience
- Used for temporary erosion control, or
- Directed by law (enabling legislation etc.)



Paraphrased from NPS Management Policies 2006 (4.4.4)

Sources of River Aquatic Invasive Species



- Lake Powell
 - Wide range of non-native warm water fish present
 - New exotic additions possible (grass carp, burbot, rusty crayfish, etc.)
 - Many species (including fish) can pass through the dam with some rate of survival
- River Users
 - Too few water resource users clean, drain, and dry (possible source of Didymo & New Zealand mud snails)
- GRCA
 - Brown Trout
- Lake Mead
 - No dam for invasives to negotiate, raft traffic may also transport

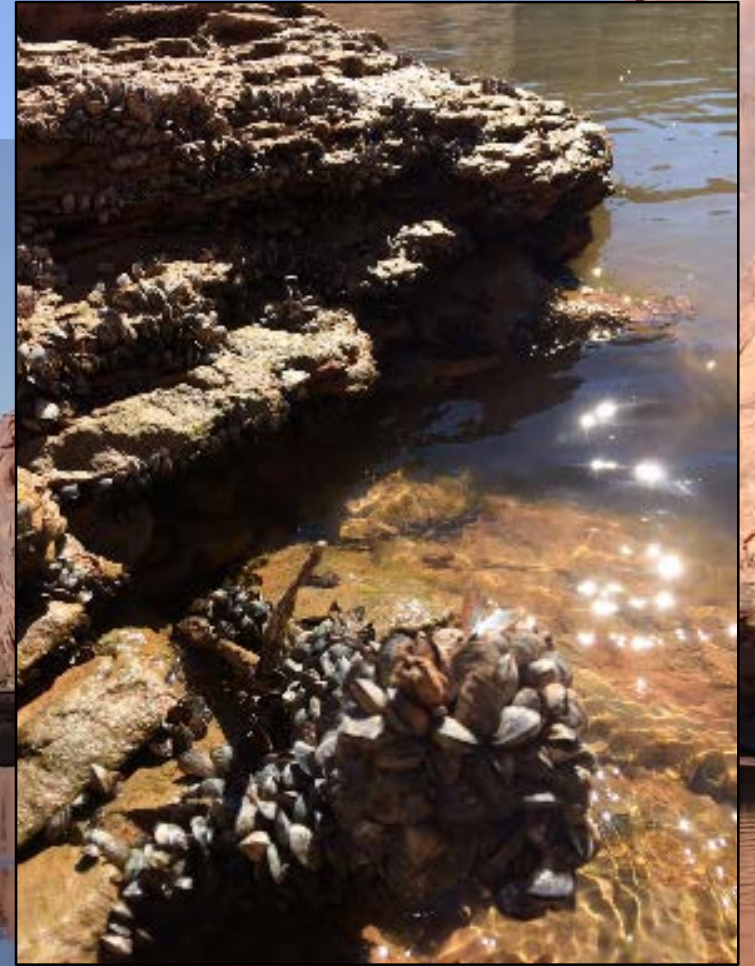
Overview of Top Invasives

- Quagga Mussels
- New Zealand Mudsnail
- Whirling Disease
- Didymo/Rock Snot
- Cold Water Invasive Fish
- Warm & Cool Water Invasive Fish
 - Smallmouth Bass
 - Walleye
 - Striped Bass
 - Green Sunfish



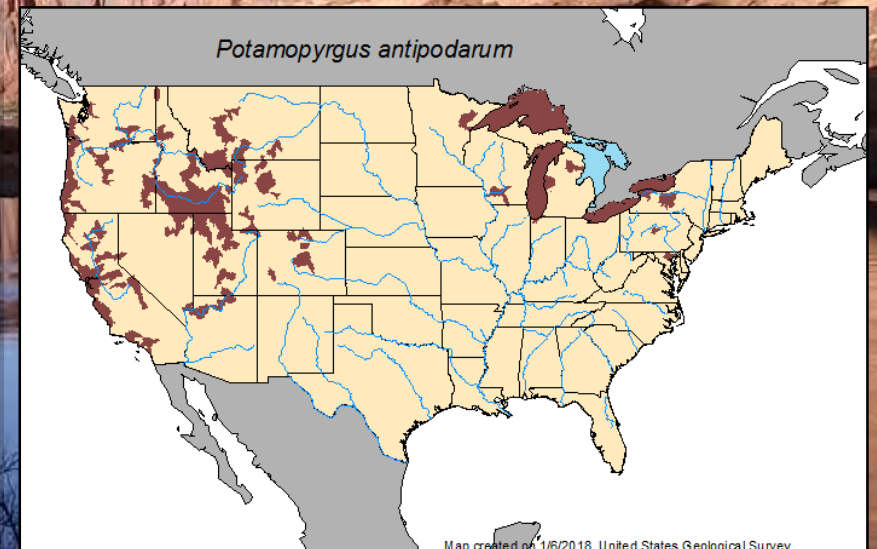
Quagga Mussels (*Dreissena bugensis*)

- Introduced into Lake Powell in 2012
- Ecological effects of the lake/river unknown
- Planktonic and microscopic larval stage
- High priority → STATE LAWS, DOI INITIATIVE
CLEAN, DRAIN, DRY Quarantines
Moored vessel movement paperwork
- No management options identified

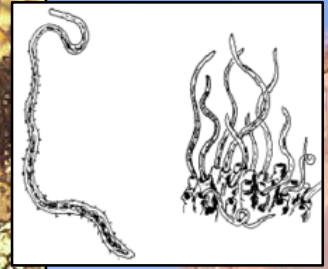


New Zealand Mudsnail (*Potamopyrgus antipodarum*)

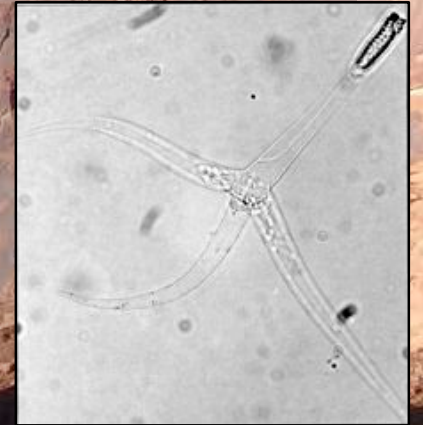
- Present since ~1995, identified in 2002
- Can reach huge densities, cover substrate
- Impacts expected, but not demonstrated
- Parthenogenic (all genetically identical)
- Has operculum
 - Can close off shell and retain moisture
 - Survives well out of water & during treatments
- Spread primarily on boots and waders



Whirling Disease *(Myxobolus cerebralis)*



- Parasite on trout – causes deformities and neurological damage
- Needs secondary host (tubificid worm)
- Detected in 2007 – again (and worse) in 2012
- No Deformities Reported in LF Reach
- Spread in mud on boots and waders
or in live fish or fish parts



Rock Snot (Didymo?)

- Maybe native
- From North America and Europe (widely spread in 1800s)
 - First problems reported in the 1990s (not here)
- Responds to Phosphorus
 - Absorbs P through stalk
 - Stalk elongates in low P
 - Quagga mussels can accelerate P cycling (Great Lakes)
- Patchy and transient in Lees Ferry Reach
- Rock Snot reported on the courtesy dock was *Cymbella*



Boot and Wader Cleaning

- Many invasive species are spread on boots and waders
- Facilities exists at the fish cleaning station
 - Poorly used location – few know it exists
 - Consists of a small sign and a hose with running water
- New boot/wader cleaning stations are coming
 - Up to seven are approved
 - Convenient locations
 - Better messaging



Trout → Rainbow vs. Brown



Comprehensive Fisheries Management Plan

RBT and HBC can peacefully coexist – no need for the traditional battles

With a healthy population structure few RBT go downstream (small HBC threat)

- BT don't mind the cloudy water as much as RBT (more likely to go downstream)
- BT eat more fish than RBT (potentially more impactful to HBC)
- BT can disrupt RBT populations (BT don't fit; they may destroy the only thing that does (RBT))

BT are exotic, likely to spread, and to cause harm

BT are invasive!

Ich muss
ich sein!

A brown trout is shown swimming towards the left. A green speech bubble points to it from the text 'Ich muss ich sein!'. The background is a river flowing through a canyon with red rock walls.

I gotta be me!
(in German)

A blue speech bubble points upwards to the green one from the text 'I gotta be me! (in German)'. The background is the same river and canyon scene.

Other Invasive Fish

Smallmouth Bass



Great concern to fisheries biologists, exist in Lake Powell, worse than GSF

Walleye



They are in the Lees Ferry Reach but not taking off for unknown reasons

Striped Bass



Exist in Lake Powell, seen in the Lower Slough and caught in Lees Ferry Reach

What else? Everything that has or will get introduced into the upper basin has potential to be invasive.



Already this millennium → Gizzard shad, Grass carp, Bullfrogs, Quagga

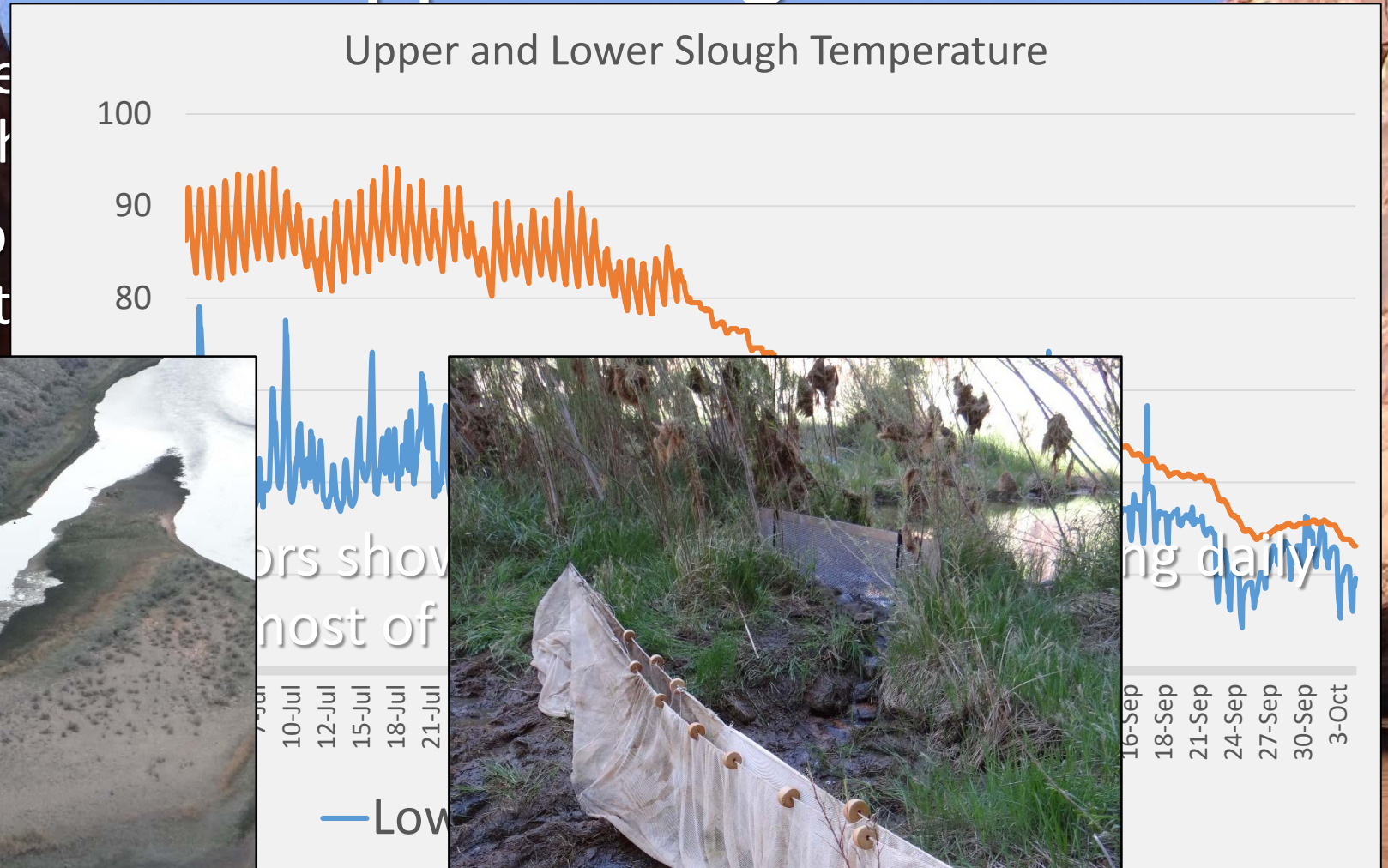
Green Sunfish

- From Lake Powell, reproduce in Upper Slough (-12m)
- Could impact HBC if washed down in HFE
- Rotenone, Ammonia x2, Exclusion, Plastic Treatment
- The upper slough is currently GSF Free! Barriers are in place.
- Expanded Non-native Aquatic Species Management Plan - TOOLS



Lessons Learned from Upper Slough 2015-17

- 2015 – There was a large when first discovered. Th
- 2016 – GSF were able to outlet (no 2015 HFE) – it
- 2016 far. C
- 2017 temp

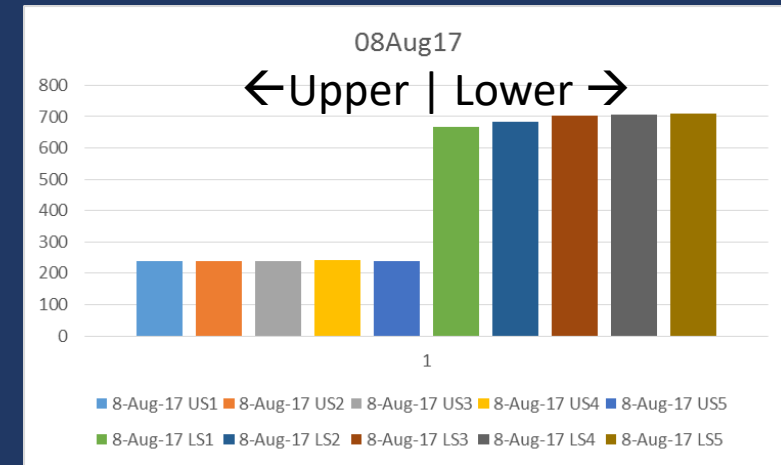
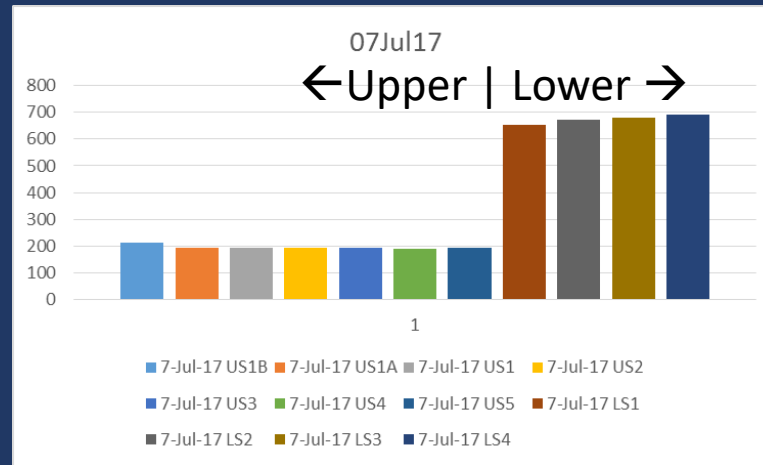
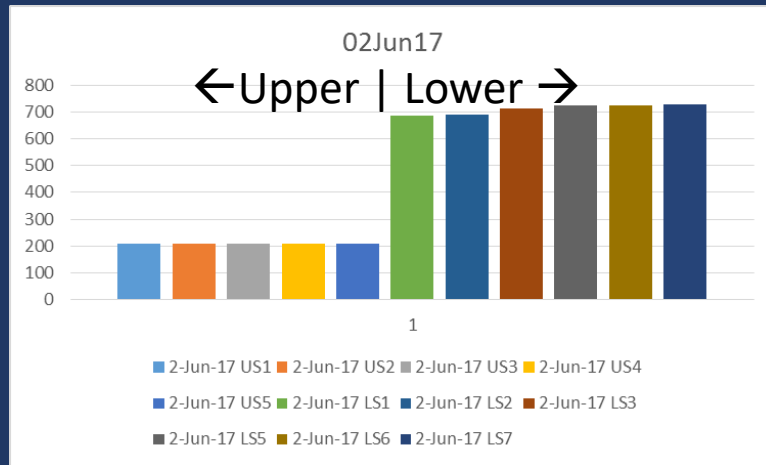


Lessons Learned

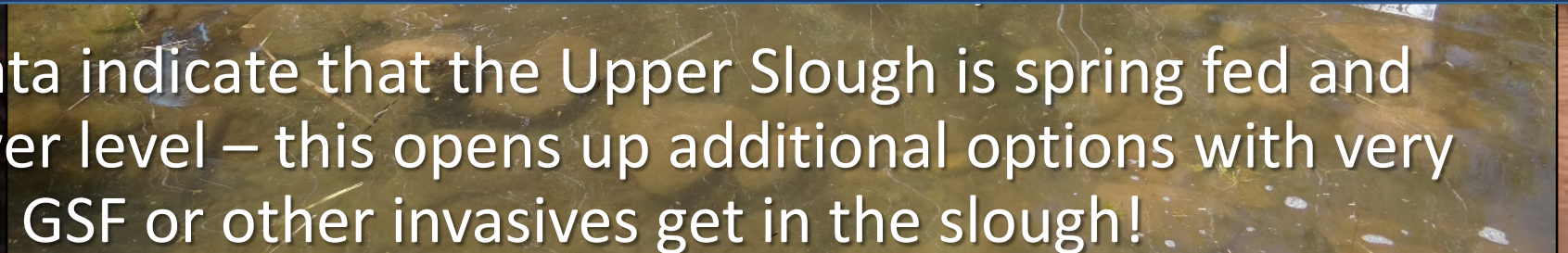
- 2015 – There was a large tree when first discovered



Conductivity in Upper and Lower Slough



- Water conductivity data indicate that the Upper Slough is spring fed and perched above the river level – this opens up additional options with very low take of life should GSF or other invasives get in the slough!

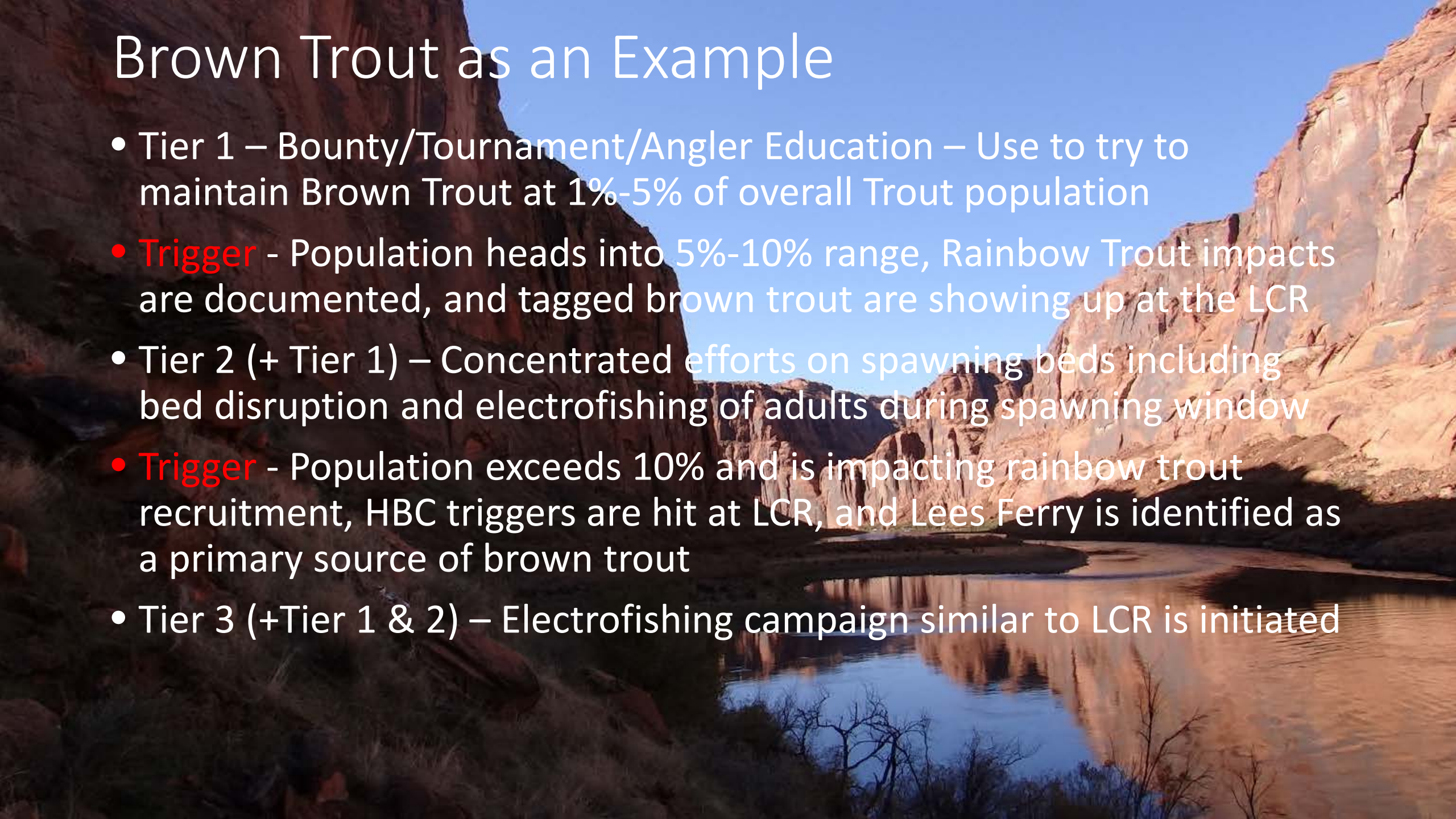


Expanded NNAS Plan/EA – Tiered Approach

- Defines Triggers when NPS would go from Tier 1 to 2 to 3
- Truly Adaptive Management
- Allows NPS to address a number of concerns from the Tribes and Public Scoping
- This is ALL DRAFT and Examples do not include all Tools

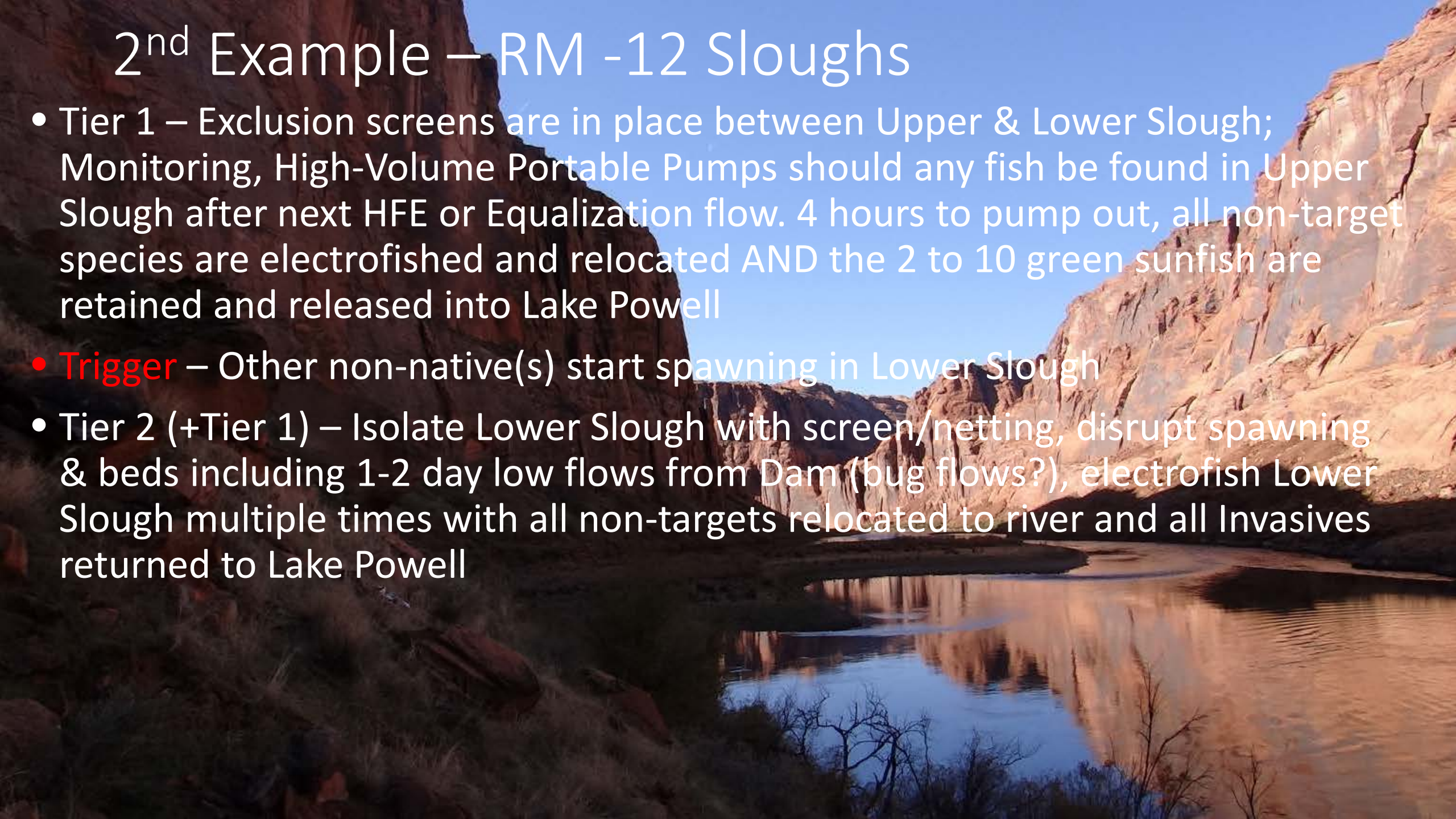
Brown Trout as an Example

- Tier 1 – Bounty/Tournament/Angler Education – Use to try to maintain Brown Trout at 1%-5% of overall Trout population
- **Trigger** - Population heads into 5%-10% range, Rainbow Trout impacts are documented, and tagged brown trout are showing up at the LCR
- Tier 2 (+ Tier 1) – Concentrated efforts on spawning beds including bed disruption and electrofishing of adults during spawning window
- **Trigger** - Population exceeds 10% and is impacting rainbow trout recruitment, HBC triggers are hit at LCR, and Lees Ferry is identified as a primary source of brown trout
- Tier 3 (+Tier 1 & 2) – Electrofishing campaign similar to LCR is initiated



2nd Example – RM -12 Sloughs

- Tier 1 – Exclusion screens are in place between Upper & Lower Slough; Monitoring, High-Volume Portable Pumps should any fish be found in Upper Slough after next HFE or Equalization flow. 4 hours to pump out, all non-target species are electrofished and relocated AND the 2 to 10 green sunfish are retained and released into Lake Powell
- **Trigger** – Other non-native(s) start spawning in Lower Slough
- Tier 2 (+Tier 1) – Isolate Lower Slough with screen/netting, disrupt spawning & beds including 1-2 day low flows from Dam (bug flows?), electrofish Lower Slough multiple times with all non-targets relocated to river and all Invasives returned to Lake Powell



2nd Example Continued – RM -12 Sloughs

- **Trigger** – Invasive numbers continue to increase over summer OR the Lower Slough becomes a “Hot Spot” for Smallmouth Bass spawning in spite of Tier 1 & 2
- Tier 3 (+ Tier 1 & 2) – Rotenone Treatment is necessary for **NEW** Invasive. **Longer Term** - Do Intensive Tier 2 for coldwater species like Walleye and N. Pike – year-round exclusion screens, extensive monitoring, electrofishing and removal back to Lake Powell, periodic rotenone treatments on years when spawning is just not stopped
- Channelization from River thru both sloughs for cold water delivery **ONLY** works for Smallmouth Bass and Green Sunfish and involves moving an estimated 600 to 1,400 cubic yards (60 to 140 dump truck loads) of material

Thank you!



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December 23, 1889