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Nonnative Species Update: Distributions and Control Efforts

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Presentation Outline

- Current aquatic nonnative species list
- Existing and anticipated control efforts
- Risk

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Species List

- *Myxobolus cerabralis* (Whirling Disease)
- Mussels
- Crayfish
- Fish parasites:
  Asian fish tapeworm, anchor worm
- Fish

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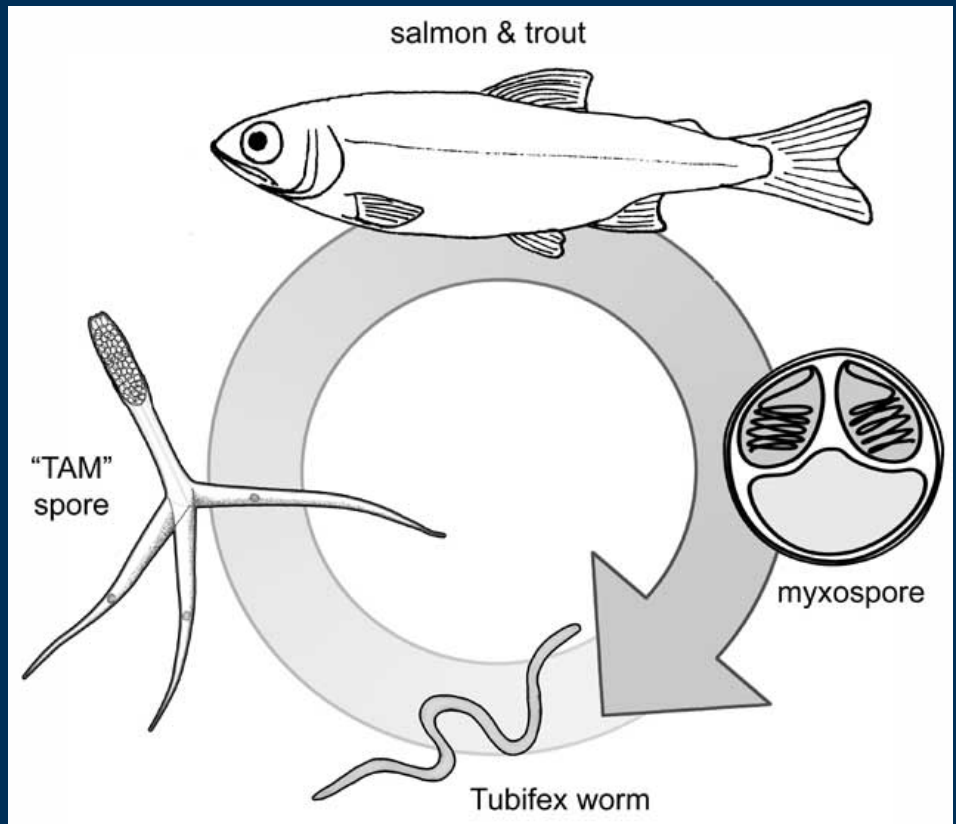
Whirling Disease - Description
Myxobolus cerabralis

- Disease of **rainbow trout** and other **salmonids**
- Infects head and spinal cartilage of fish
- Multiple host life history



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Whirling Disease Foundation

Whirling Disease – Local History

- Arizona Game and Fish Dept. sampling Lees Ferry regularly since 1999 for whirling disease
- Positive samples were returned in June 2007 (first from AZ public waters)
- Very low level of infection observed at Lees Ferry
- Not a threat to native fishes of Grand Canyon

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Whirling Disease - Control

- AZGFD sampling and testing will continue, at least twice annually
- AZGFD conducted training in August ’07 – GCMRC attended
- GCMRC will support collection efforts with sampling for tubifex worms (intermediate host)
- AZGFD has established wash stations at Lees Ferry area shops and motels

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Mussels - Description

- Zebra and quagga mussels (*Dreissena* species)
- Eurasian native species
- Widespread (and economically important) especially in eastern North America

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Mussels - Description

Figure 1: Quagga mussels (*Dreissena bugensis*, top row) and zebra mussels (*Dreissena polymorpha*, bottom row). Photograph courtesy of the National Oceanic and Atmospheric Administration, Great Lakes Environmental Research Laboratory.

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GCMRC risk assessment:
http://pubs.usgs.gov/of/2007/1085/

Mussels – Local History

- Quagga mussels (*Drissenia sp.*) in Lakes Mead and Mohave for at least two years – now widespread
- One vessel brought from Lake Mead to Lake Powell detected with mussels in 2007
- Three larval mussels (veligers) detected from Wahweap arm of Lake Powell and above Glen Canyon Dam in July 2007

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Mussels - Control

- NPS leading multi-agency cooperative effort at Lake Powell to
  - Continue sampling to locate hot spots
  - Wash incoming vessels/equipment

- New York State Museum announcement: bacteria identified that control zebra and quagga mussels
  - Has hired commercial firm to mass produce

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Mussels - Risk

- TWG and AMWG passed motion advising Secretary make funds available to study and fight spread of mussels

- DOI August 2007 commitments:
  - Form nonnative task force
  - Mitigate current impacts
  - Monitor future risk assessments
  - Public outreach and education

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Mussels - Risk

- Lees Ferry reach appears **suitable** for establishment
  - **High density of mussels may increase food availability and benefit rainbow trout** – Nutrient-rich feces stimulate algal growth

- Colorado River below Lees Ferry appears **unsuitable**
  - **Turbulence** – rapids may kill many larvae
  - **High suspended sediment** and **low suspended organics**– makes filter-feeding difficult
  - **River bottom is sandy and unstable** – adult mussels will continually get buried or displaced

If densities are low, ecological impacts will be minimal

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Crayfish

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Oronectes rusticus: Carnegie Museum of Natural History Website

Crayfish – Potential Risks

- Grazing on submerged aquatic vegetation
- Eating invertebrates
- Eating fish eggs

- None of these impacts documented below Glen Canyon Dam

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Crayfish – Local History

- One dead and two live crayfish captured by GCMRC above Lees Ferry in 2007

- AZGFD + GCWC surveyed Lees Ferry reach in August; No crayfish found

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Crayfish - Control

- Introduced into Arizona in 1940s, AZGFD has adopted liberal harvest rules (w/ license) –
- No live transport
- Will be included in GCMRC nonnative aquatic species control plan

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Fish Parasites

- 2006 survey found 16 parasite species in 717 fish sampled; most common
  - Asian fish tapeworm – internal (found in 2 native, 3 nonnative fish)
  - Anchor worm – external

- Parasite species diversity
  - Native fishes: 7 species
  - Nonnative fishes: 14 species

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Fish Parasites - Occurrence

Species	Overall Parasite Prevalence
Plains killifish (n = 4)	0.75
Channel catfish (n = 20)	0.65
Humpback chub (n = 24)	0.58
Speckled dace (n = 176)	0.27

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Preliminary data, subject to review

Fish Parasites - Risk

- Infections are common
- No fish observed had significant lesions or pathologies
- Fish with higher infection rates may be lost at young age (not caught)
- Parasite infections could increase with warmer temperatures, might treat with cooler releases (“cold tap”)

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Fish Parasites

- Draft report recommends 5-year survey repeat interval
- AZGFD experimenting with treatment methods for tapeworm

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Nonnative Fishes of Grand Canyon

- Found in
  - Mainstem Colorado River
  - Little Colorado River + watershed
  - Other tributaries
- Sources
  - Resident mainstem populations
  - Tributaries
  - Reservoirs

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Nonnative Fishes

- Common
  - Red shiner
  - Common carp
  - Fathead minnow
  - Channel catfish
  - Bullhead sp. (LCR)
  - Rainbow trout
  - Brown trout
  - Plains killifish
  - Striped bass (lower)

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Nonnative Fishes

- Rare
  - Bullhead sp.
  - Green sunfish
  - Smallmouth bass
  - Largemouth bass
  - Striped bass
  - Walleye

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Nonnative Fishes - Control

- Continuing monitoring
  - GCMRC, AZGFD, USFWS
- Short term plan
  - GCMRC – draft plan and workshop October 2007
- Long term plan
  - GCMRC

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Nonnative Fishes - Control

- **Short – Term Control Plan**
  - **Goal: Increase ability to detect and respond to population expansions**
  - **Need: Warm water may encourage population expansions**
  - **Risk: Uncertainty regarding ability to respond**
  - **Plan Components:**
    - **Monitoring – especially spawning and recruitment**
    - **Methods – shocking, netting, angling**
    - **Reporting – researchers and public**

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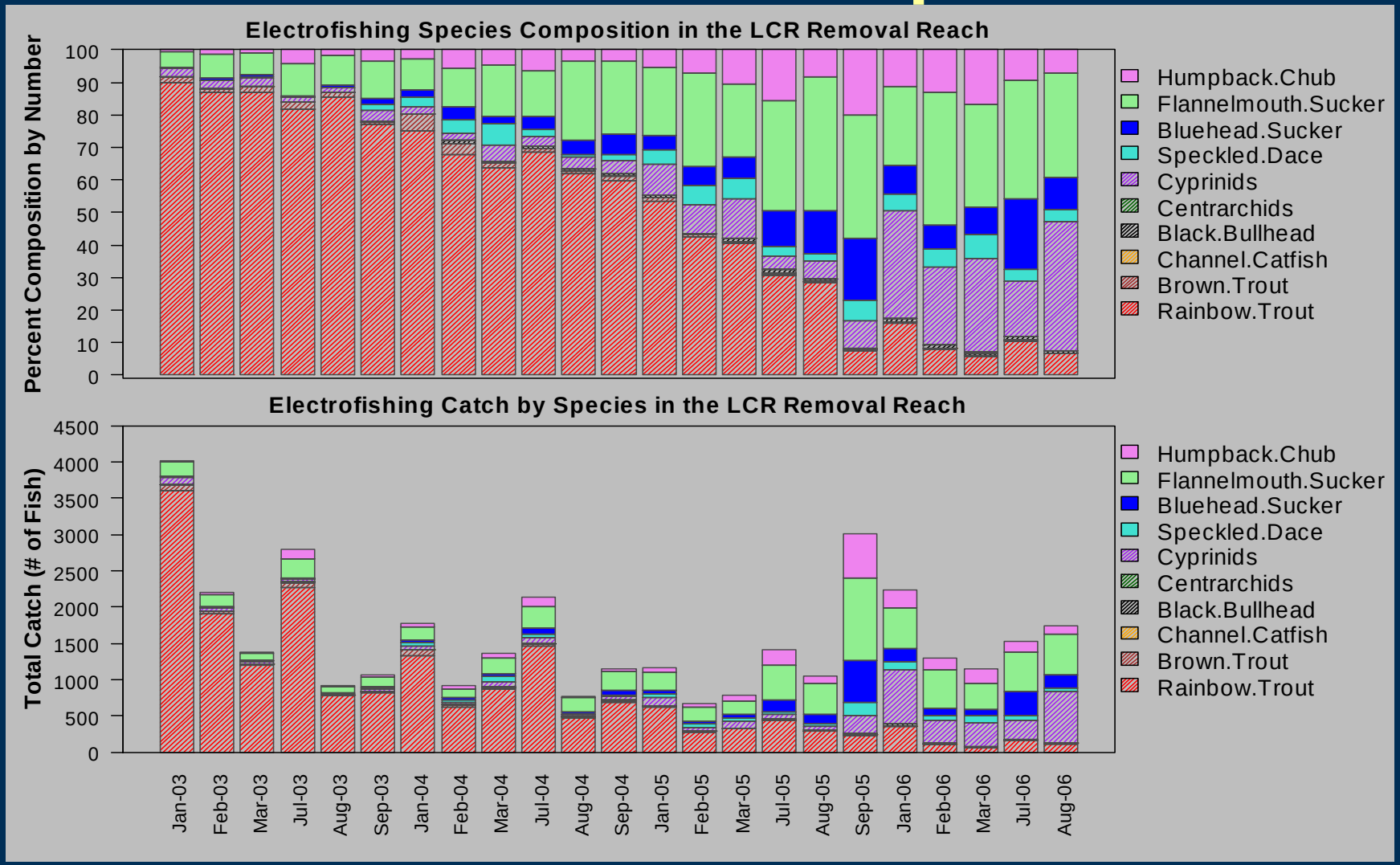
Mechanical Removal – Update - #s



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Shaded bars = Nonnatives; Open bars = Natives

Preliminary data subject to review

Nonnative Fishes Control Planning

- GCMRC Developing Long – Term Plan

- Identify:
  - Species posing greatest risk to natives
  - Control methods for populations posing risk

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Nonnative Fishes Control Planning

- Long – Term Plan Components
  - Environmental tolerance and life history review
  - Define control measures, anticipated effectiveness
    - Non-flow (removal)
    - Flow (“cold tap”, BHBF)
  - Identify negative interactions and/or habitat overlap
  - Use bioenergetics modeling to inform risk assessment

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