Nonnative Species Update: Distributions and Control Efforts

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U.S. Department of the Interior
U.S. Geological Survey
Presentation Outline

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

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

*Myxobolus cerabralis*

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

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

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
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
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
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
## Fish Parasites - Occurrence

<table>
<thead>
<tr>
<th>Species</th>
<th>Overall Parasite Prevalence</th>
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<tbody>
<tr>
<td>Plains killifish</td>
<td>0.75</td>
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<tr>
<td>(n = 4)</td>
<td></td>
</tr>
<tr>
<td>Channel catfish</td>
<td>0.65</td>
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<tr>
<td>(n = 20)</td>
<td></td>
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<tr>
<td>Humpback chub</td>
<td>0.58</td>
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<tr>
<td>(n = 24)</td>
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<tr>
<td>Speckled dace</td>
<td>0.27</td>
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<tr>
<td>(n = 176)</td>
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</tbody>
</table>

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")
Fish Parasites

- Draft report recommends 5-year survey repeat interval
- AZGFD experimenting with treatment methods for tapeworm
Nonnative Fishes of Grand Canyon

- **Found in**
  - Mainstem Colorado River
  - Little Colorado River + watershed
  - Other tributaries

- **Sources**
  - Resident mainstem populations
  - Tributaries
  - Reservoirs
Nonnative Fishes

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

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

- Continuing monitoring
  - GCMRC, AZGFD, USFWS

- Short term plan
  - GCMRC – draft plan and workshop October 2007

- Long term plan
  - GCMRC
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
Electrofishing Species Composition in the LCR Removal Reach

- Humpback Chub
- Flannelmouth Sucker
- Bluehead Sucker
- Speckled Dace
- Cyprinids
- Centrarchids
- Black Bullhead
- Channel Catfish
- Brown Trout
- Rainbow Trout

Preliminary data subject to review

Electrofishing Catch by Species in the LCR Removal Reach

- Humpback Chub
- Flannelmouth Sucker
- Bluehead Sucker
- Speckled Dace
- Cyprinids
- Centrarchids
- Black Bullhead
- Channel Catfish
- Brown Trout
- Rainbow Trout

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
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