

**Current Levels of Threats from Non-Native Aquatic Species
in Glen Canyon National Recreation Area and Grand Canyon
National Park – An Update to Appendix F from the
Expanded Non-Native Aquatic Species Management Plan
Environmental Assessment**

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Outline

- Why assess threat levels?
 - Implications of threat level to management
- Process for updates
- 2021 changes and updates by species
- Future and ongoing research highlights

Why assess threat levels?

From NPS Comprehensive Fisheries Management Plan (2013):

- Consistent with NPS Director's Order-12, for emergencies including:
 - discovery of expansion in distribution or abundance of existing **high-risk** non-native species, particularly in sensitive areas for native fish (e.g., Havasu Creek or Little Colorado River Inflow areas); or
 - new detection of a rapidly spreading aquatic invasive species or non-native fish species the Superintendent could approve a temporary, short-term, targeted removal effort to treat known occurrences of the new threat using mechanical methods including angling, electro-fishing, and passive (i.e., trap nets) or active (e.g., seining) netting. Simultaneously, additional planning and compliance would be considered if necessary.

From the NPS Expanded Non-native Aquatic Species Management Plan (2019):

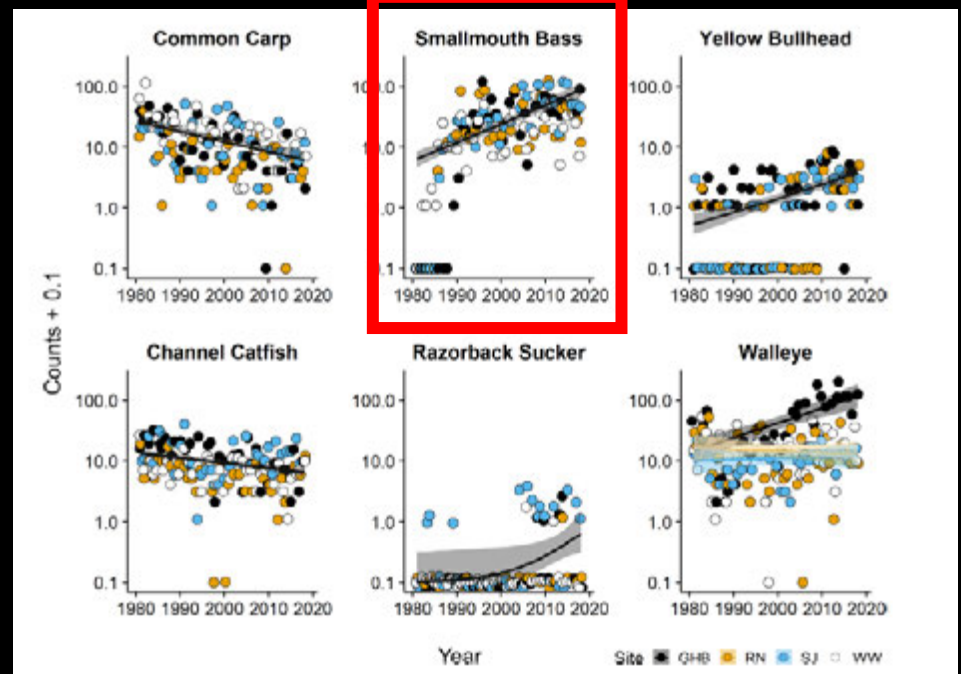
- The Proposed Action considers the risk or threat associated with potentially harmful non-native species as defined in Section 1.2 and as listed in Appendix F, Table F-1.
- Example: Mechanical Disruption of Early Life Stage Habitats (Action M1; Tier 2). This Tier 2 action would use ongoing and new technologies to limit the success of spawning of **high** to **very high** risk species in known or suspected spawning beds.

Process for Threat Level Updates

- 2021 Update:
 - Literature review:
 - Changes in distribution or abundance
 - Additional published research related to negative effects at different scales:
 - Individual level – piscivory, competition
 - Population level – demographic rates, distribution/abundance, etc.
 - Invasiveness – potential to become important threat (life history, etc.)
 - Peer review:
 - GCMRC, AZGFD, BOR, FWS, NPS
 - Revised based on additional information (GCMRC, AZGFD)
 - Distributed to stakeholders

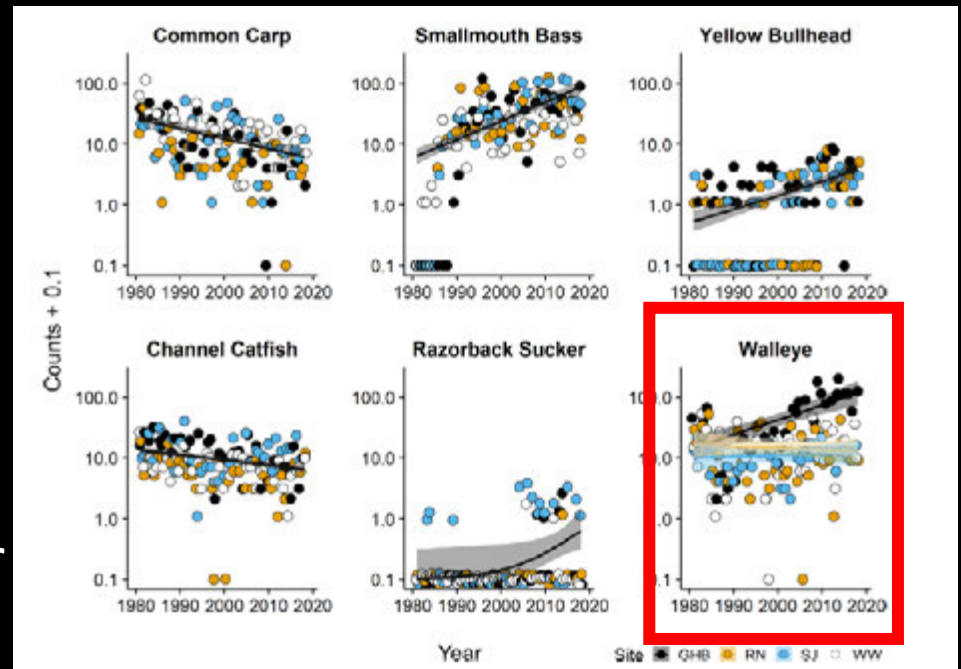
Updates – Smallmouth Bass

- Threat level:
 - No change
 - “Very High”
- Update:
 - Increased abundance in Lake Powell (Pennock & Gido 2021)



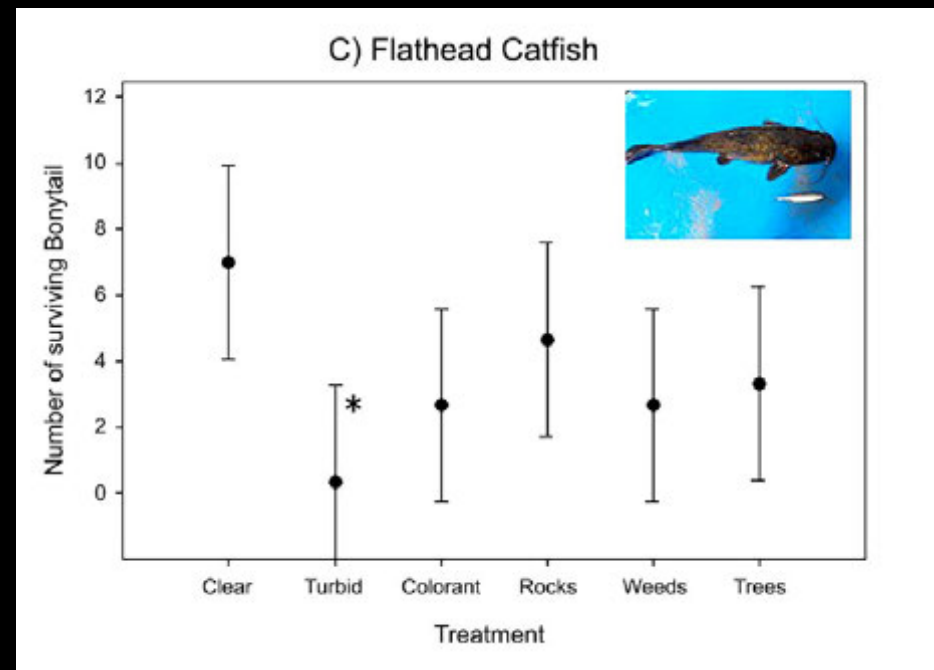
Updates – Walleye

- Threat level:
 - No change
 - “Very High”
- Update:
 - Increased abundance in Lake Powell (Pennock & Gido 2021)
 - Closer to Colorado River inflow in Lake Powell



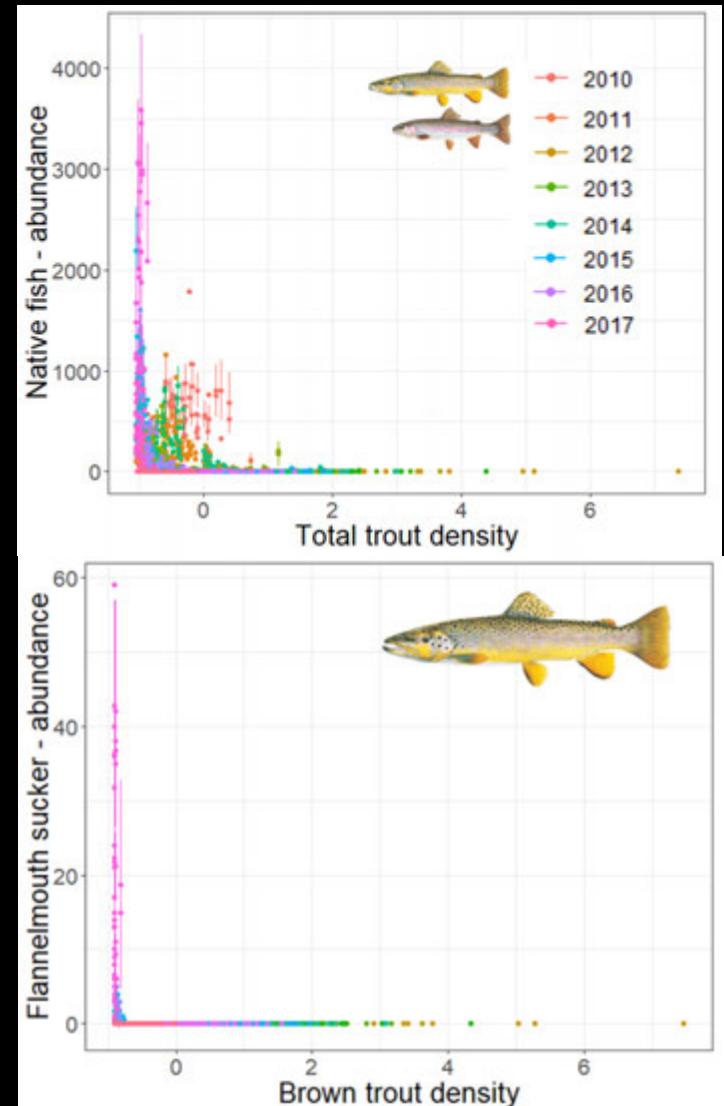
Updates – Flathead Catfish

- New addition
- Threat level:
 - “Very High”
- Background:
 - Not present in directly connected waters
 - High piscivory- turbid water (Ward & Vaage 2018)
 - Reduce native fish distribution (Whitney et al. 2014)
 - Limited by cool temperatures



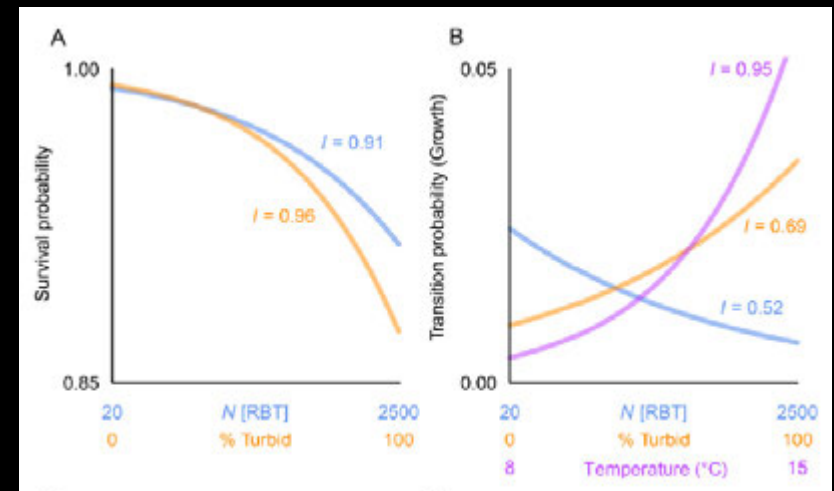
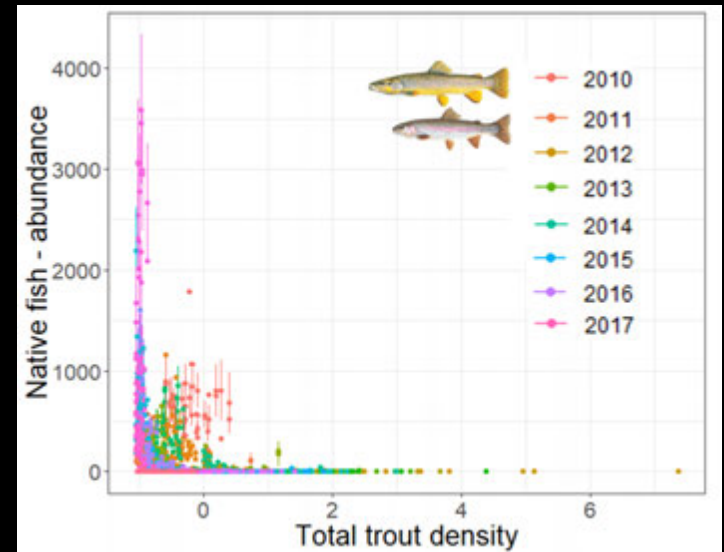
Updates – Brown Trout

- Threat level:
 - Unchanged
 - “Very High”
- Update:
 - Additional literature (Healy et al. 2020)
 - Threat to GLCA rainbow trout- predation, competition



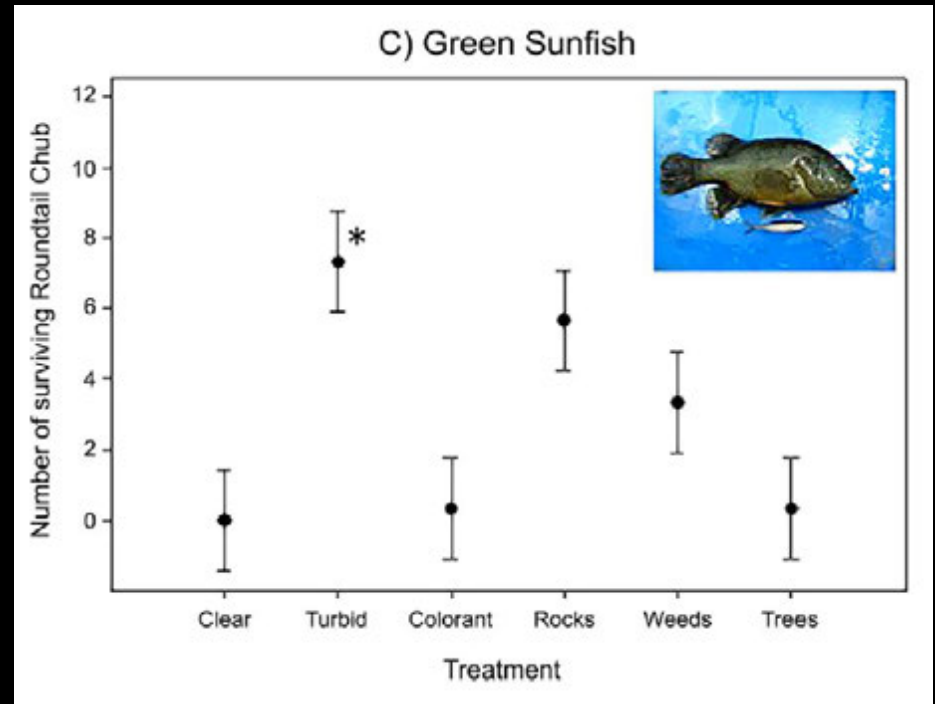
Updates – Rainbow Trout

- New addition (GRCA)
- Threat level:
 - “High”
- Background:
 - Additional literature (Healy et al. 2020, Yackulic et al. 2018)
 - Threat to native fish, humpback chub survival, growth



Updates – Green Sunfish

- Threat level:
 - Increase
 - “High”
- Background:
 - Additional literature (Ward & Vaage 2018)
 - Condition-dependent, drought/climate change expansion (Rogosch and Olden 2020)



Future Updates - Further Research

- Didymo occurrence
- Crayfish distribution updated; impacts?
- Invasive mollusks
- Egg & larval native fish consumption by common carp (D. Ward, GCMRC)
- Plains killifish & humpback chub recruitment
- Brown trout & rainbow trout recruitment (C. Yackulic, others, GCMR)
- Rainbow trout & translocated humpback chub vital rates (Healy and others – in review)

References

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