Lower Colorado River Multi-Species Conservation Program

Characterization of Zooplankton Communities in Off-Channel Native Fish Habitats
Overview

- Purpose
- Methods
- Results
- Discussion
- Limitations
- Ongoing and Future Work
- Future Considerations
Purpose

• Identify seasonal relative abundance and diversity of the zooplankton community in off-channel native fish habitats of the LCR.

• Identify specific zooplankters that maximize RASU survival from past studies and determine the potential for propagating those desired food items using controlled experiments.

• Determine dynamics of 1° productivity in off-channel habitats and what environmental conditions best suit RASU development.
Methods

• Wisconsin-style plankton net (64µm).
• Sample transferred to 250mL amber bottle and preserved in Lugol’s iodine solution (0.3mL:100mL).
• Water quality profiles (Surface-every 1m-Bottom).
• Samples analyzed by BSA Environmental Services, Inc.
Results

• Seasonal fluctuations observed.

• Mean zooplankton biomass (µg d.w./L) variable.

• Floyd Lamb City Park largest sized zooplankton community.

• Zooplankton groups dominated different sites.

**Sources:**
- Keratella spp: 0.15 - 0.25 mm
- Cyclopoid spp: 0.2 - 2 mm
- Daphnia spp: 2 - 3 mm
- Bosmina spp: <0.3 - 0.5 mm

**Notes:**
- Rotifer
- Copepod
- Daphnia (Cladoceran)
- Other Cladoceran

**Balancing Resource Needs**

[Images of Keratella, Cyclopoid, Daphnia, and Bosmina with size specifications.]
Yuma Cove Backwater (Lake Mohave)


Daphnia | Other Cladocerans | Copepods | Rotifers | Other

Balancing Resource Needs
Yuma Cove Backwater (Lake Mohave)
Zooplankton Biomass (ug/L)

Mean Total Biomass
Mean # Individual Organisms


Daphnia Other Cladocerans Copepods Rotifers Other Average Zooplankter Biomass
Office Cove
Zooplankton Biomass (ug/L)

Mean Total Biomass
Mean # Individual Organisms


Daphnia Other Cladocerans Copepods Rotifers Other

Average Zooplankter Biomass

Balancing Resource Needs
Achii Hanyo (A1)
Zooplankton Biomass (ug/L)


Daphnia  Other Cladocerans  Copepods  Rotifers  Other  Average Zooplankter Biomass

Balancing Resource Needs
Imperial NWR (I1)
Zooplankton Biomass (ug/L)

Mean Total Biomass
Mean # Individual Organisms

Nov. 08 Jan. 09 May. 09 Jul. 09 Oct. 09 Jan. 10 Apr. 10 Jul. 10 Oct. 10 Jan. 11 Apr. 11 Jul. 11

Daphnia Other Cladocerans Copepods Rotifers Other Average Zooplankter Biomass

Balancing Resource Needs
Discussion

- Three years of quarterly sampling show highly variable trends in zooplankton composition across sites.

- Seasonal spikes in larger zooplankters observed in April sampling events.

- Floyd Lamb highly productive compared to all other sites for cladocerans.
Discussion

• Larval RASU showed positive selection for *Bosmina* in Yuma Cove Backwater (L. Mohave) and negative selection for copepods in the 1980s (Marsh & Langhorst 1988).

• Recent trend shows copepod dominance, although a cyclical shift may be occurring in this backwater to cladocerans.
  – *Bosmina* not detected in these samples, mainly non-*Daphnia* cladocerans.
Discussion

• Miller & Evans (1965) found RASU may feed primarily by taste owing to dominant gustatory centers and small size of the optic lobes.

• Zaret & Kerfoot (1975) argued the conspicuous eye of *Bosmina* cause fish to feed based on visual cues.
Limitations

• Single tow from each pond not adequate in representation of the zooplankton community.
• Hydrology a limiting factor when attempting to mimic community at Floyd Lamb?
• Effects of fertilization needs more study.
• Role of phytoplankton community interactions not known at present.
• Environmental variability in $1^\text{o}$ productivity regardless of management interventions must be taken into account.
Ongoing and Future Work

• Evaluation of enhancement of food resources in five Lake Mohave backwaters (9 Mile area) using experimental fertilization techniques.
  – Five experimental backwaters now sampled monthly.
    • N9Mile – Willow – NV Egg – NV Larvae – Control
• Additional sample sites added:
  – Beal Lake (3) -- Beal Slough (2) -- Big Bend Conservation Area (1) -- Cibola High Levee (1).
• Concurrent phytoplankton sampling has begun at several sites.
Future Considerations

1. Potential to enhance off-channel habitats with desirable zooplankton species for the enhancement of RASU grow-out phases?

2. Reduce number of sampling sites and intensify sampling effort at more productive/diverse sites?

3. Revisit L. Mohave spawning area zooplankton density assessment conducted by Golden & Holden (2001)?
References


