FOOD WEBS IN URBAN FISH 'COMMUNITIES' FROM THE SALT RIVER PROJECT CANALS

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INTRODUCTION

Urban fish communities are established in a myriad of ways, not least of which is that associated with water delivery to populated areas. In Arizona, much of our water is delivered by Salt River Project canals (Fig. 1). It is well known that these canals house many species of fish, form the source waters, and from bizarre introductions by the general population. Given that many, if not most, of the bodies of water within Arizona are highly altered in some way by human activities, understanding the fish communities that persist within these artificial waterways is fundamental to a larger understanding of the region's aquatic ecosystems. As a first look at the canal community, we used stable isotope analysis for detecting long-term diet signatures. We compare our findings with studies of other modified and restored fish communities in Arizona.

PRIMARY QUESTIONS

(1) Is the isotopic diet signature the same in the canals as in other systems, particularly for native species?

(2) Is there a difference in dietary diversity and food chaing length among systems?

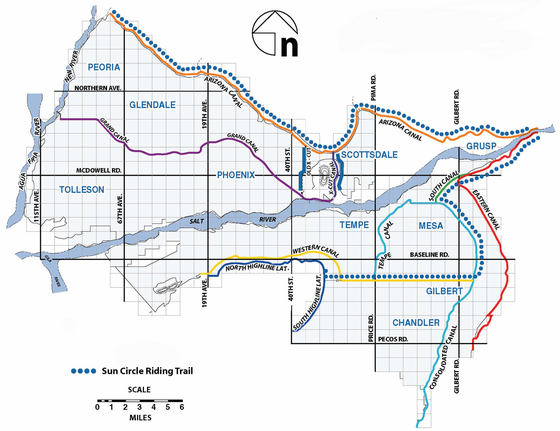


Figure 1. Salt River Project's irrigation service territory. The different canals are indicated by solid lines, and are labelled. Dotted line indicates the Sun Circle riding trail. Image courtesy of SRP.

METHODS

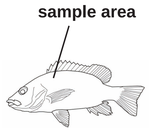
- Fish samples were collected January 2011 from SRP canals during planned 'drain downs'.

- Fishes were identified to species (Flg. 2), and frozen.

- For stable isotope analysis, tissues were collected from the white muscle mass on the dorsal surface of the fish

- Tissue samples were oven dried, ground finely via mortar and pestle, subsampled to < 0.002g, and placed in tin capsules for analysis which was performed at the Goldwater Environmental Laboratory (GEL) on a PE2400 CHN Elemental Analyzer (http://sharedresources.asu.edu/resources/17).

- We compared our findings with data from Marks et al. (2009)* who quantified food webs



*Marks, J.C., G.A. Haden, M. Oneill, and C. Pace. 2009. Effects of flow restoration and exotic species removal on recovery of native fish: lessons from a dam decommissioning. Restoration Ecology. 1-10.

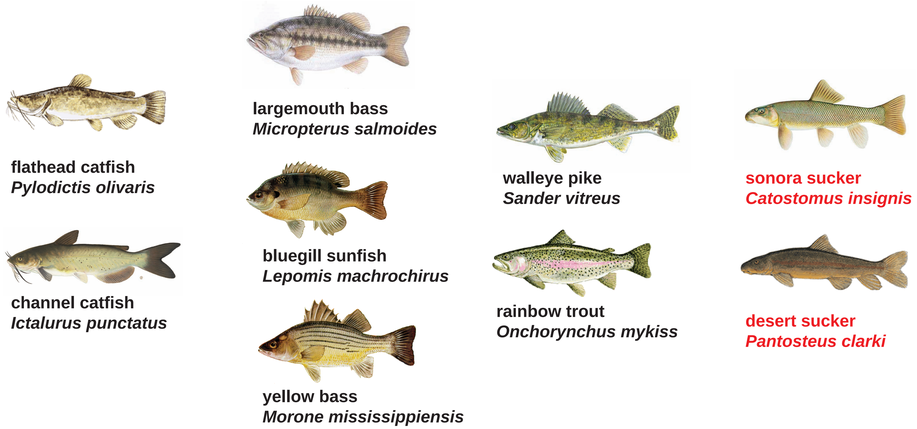
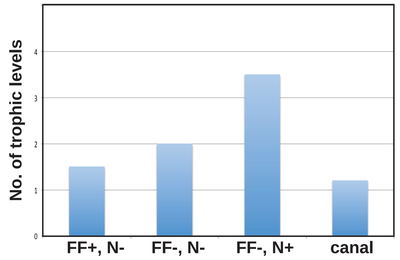


Figure 2. Fishes captured and sampled during the January 2011 SRP drain down. Species native to Arizona are indicated by red text. All other species are considered invasive and were introduced to Arizona.

Is there a difference in food chain length or dietary diversity?

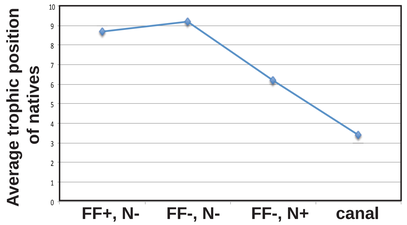


- The number of tropic levels in the canal system, which has high flow, but also non-natives, is lower than is typical of other Arizona bodies of water that have been studied.

- These same findings suggest a lower diversity of isotopic signatures among canal species than reported for those same waterways.

Fig. 3. Bars indicate the number of trophic levels in each system studied: full flows (FF+), diverted flows (FF-), non-natives absent (N-), non-natives present (N+) and the canal system, which contained both natives and non-natives. Data for the first three bars are from Marks et al. (2009). Descriptions of those systems can be found in that publication.

Are trophic levels preserved across systems?



- The average trophic position of native fishes decreases with the presence of non-natives, with the lowest trophic position being in the canals.

Fig. 4. Points indicate the average trophic position of the native species included in each body of water: full flows (FF+), diverted flows (FF-), non-natives absent (N-), non-natives present (N+) and the canal system, which contained both natives and non-natives. Dara as in Fig. 3.

ACKNOWLEDGEMENTS

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