

# The Exotic Fresh Water Fish Community of Several Puerto Rico Reservoirs: Similarity Patterns and Recreational Opportunities

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## Objective

To compare the exotic freshwater fish community and determine similarity patterns among several reservoirs.

## Methods

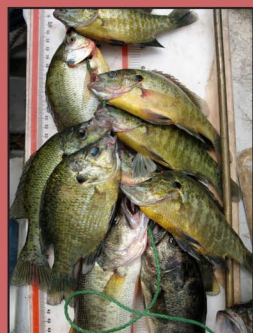
### Sampling

Boat mounted electrofishing  
Twice per year (Jan-Jun / Jul-Dec) in five reservoirs.



### Eleven fish species

- |  |   |
|--|---|
| Largemouth bass ( <i>Micropterus salmoides</i> ) | Armored catfish ( <i>Pterygoplichthys</i> spp.)       |
| Peacock bass ( <i>Cichla ocellaris</i> )         | Red devil ( <i>Amphilophus</i> spp.)                  |
| Redear sunfish ( <i>Lepomis microlophus</i> )    | Tilapia rendalli ( <i>Tilapia rendalli</i> )          |
| Bluegill sunfish ( <i>Lepomis macrochirus</i> )  | Blue tilapia ( <i>Oreochromis aureus</i> )            |
| Redbreast sunfish ( <i>Lepomis auritus</i> )     | Mozambique tilapia ( <i>Oreochromis mossambicus</i> ) |
| Channel catfish ( <i>Ictalurus punctatus</i> )   |   |

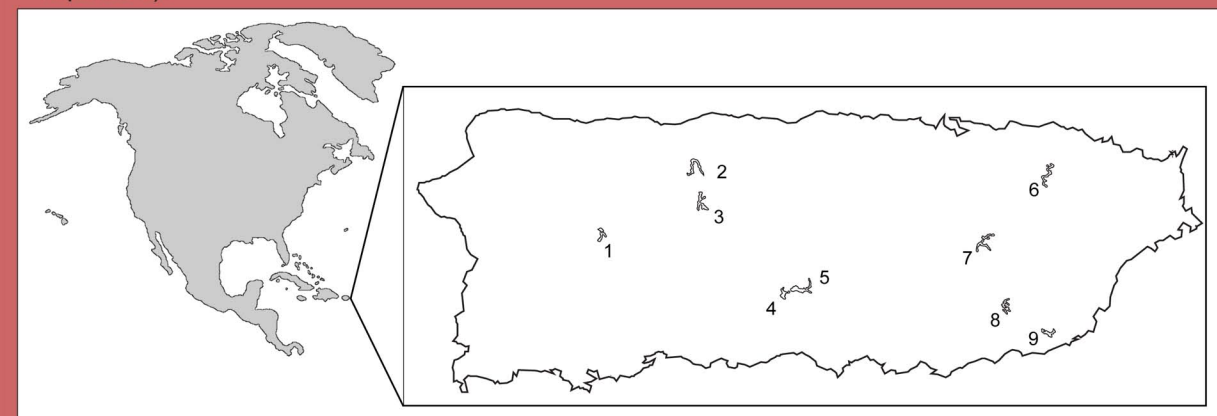


## Analysis

We used Bray-Curtis ordination to determine the similarity of the exotic freshwater fish communities among several reservoirs. Ordination is a multivariate approach used principally for exploratory analyses in community ecology. Bray Curtis in particular, is a distance based technique that arranges samples using a distance matrix. Thus, similarity equals proximity. Three years of data were analyzed.

## Study Sites

Five reservoirs sampled per year (9 distinct reservoirs in total, since some were repeated).



Map of Puerto Rico identifying the following reservoirs: 1-Guayo (118 ha), 2-Dos Bocas (254 ha), 3-Caonillas (280 ha), 4-Guayabal (131 ha), 5-Toa Vaca (342 ha), 6-Loiza (388 ha), 7-Cidra (171 ha), 8-Carite (133 ha), 9-Patillas (137 ha)

## Results

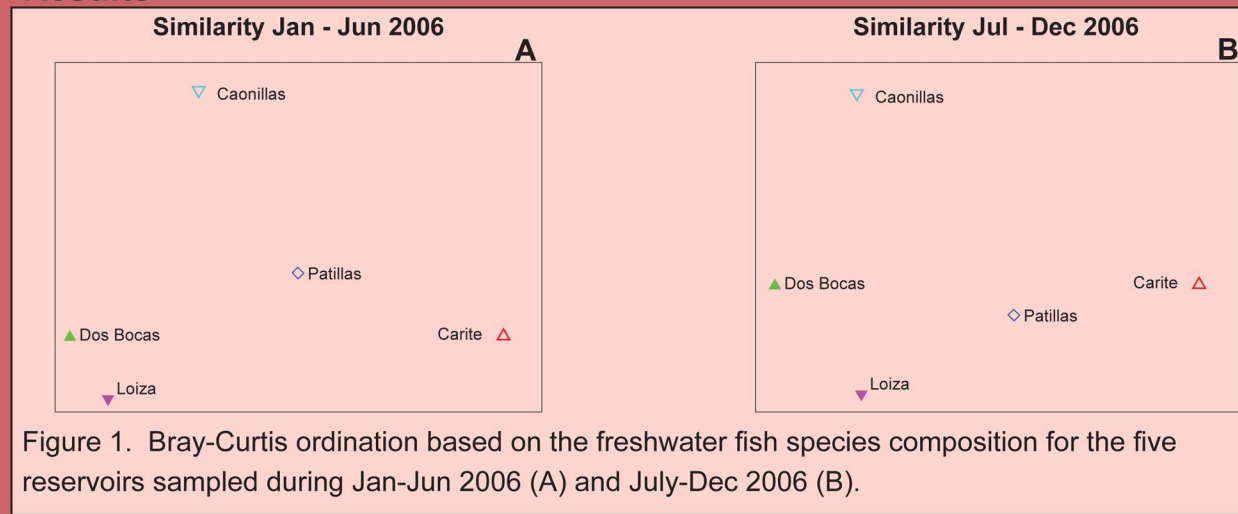


Figure 1. Bray-Curtis ordination based on the freshwater fish species composition for the five reservoirs sampled during Jan-Jun 2006 (A) and July-Dec 2006 (B).

In general, the exotic freshwater fish species composition was markedly different between reservoirs except for two sites (Loiza and Dos Bocas). However, these two reservoirs were more similar during the Jan-Jun sampling period (A).

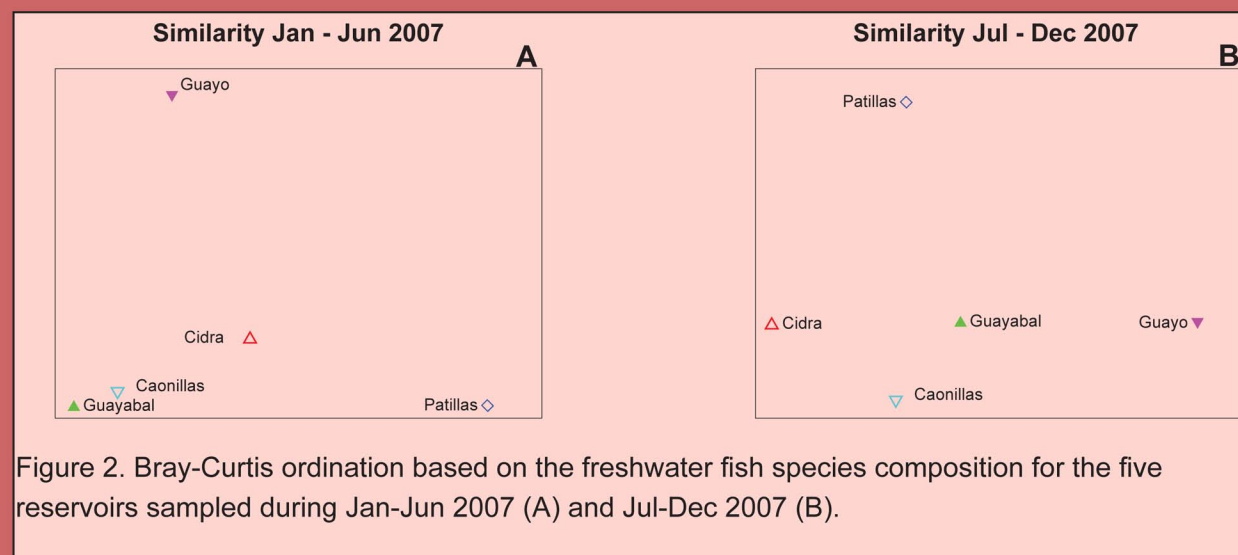


Figure 2. Bray-Curtis ordination based on the freshwater fish species composition for the five reservoirs sampled during Jan-Jun 2007 (A) and Jul-Dec 2007 (B).

Overall, the exotic freshwater fish species composition in the reservoirs was not comparable excluding two sites that were very similar (Guayabal and Caonillas) during the Jan-Jun sampling period (A).

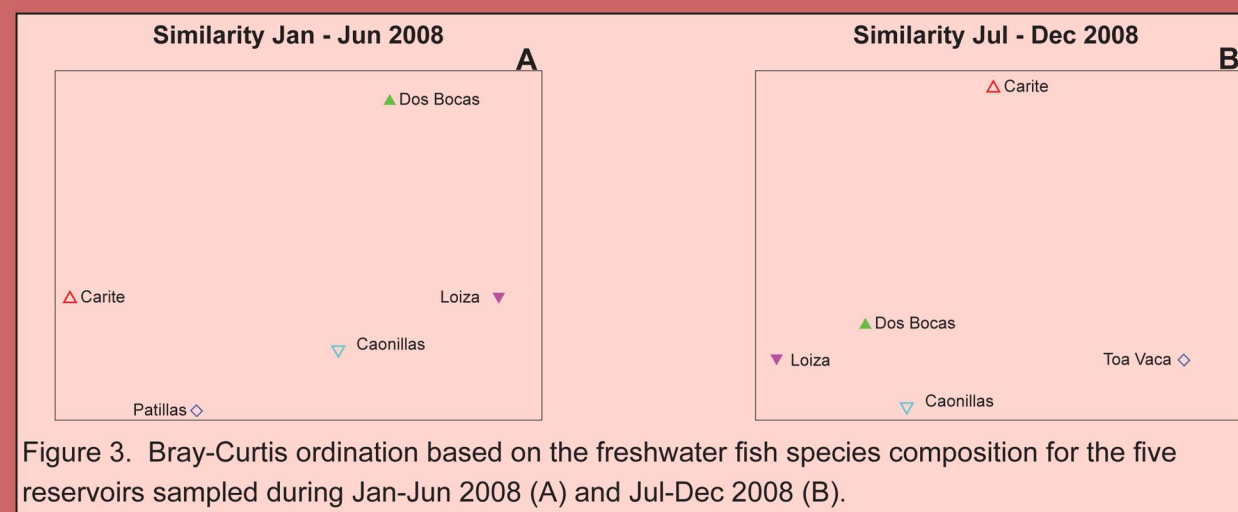
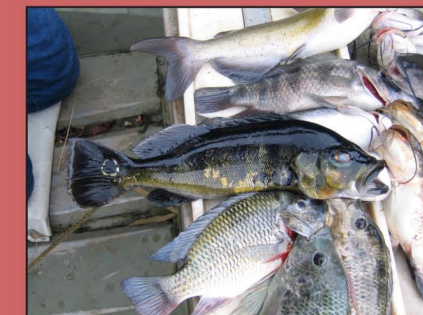


Figure 3. Bray-Curtis ordination based on the freshwater fish species composition for the five reservoirs sampled during Jan-Jun 2008 (A) and Jul-Dec 2008 (B).

Low similarity in the fish species composition was found during the Jan-Jun sampling period (A). Nevertheless, during the Jul-Dec sampling period (B) a larger resemblance was detected for three sites (Loiza, Dos Bocas and Caonillas). This could be in part due to the exclusive presence of the red devil and the high abundance of armored catfish in these three reservoirs.



## Conclusion

\* Each reservoir harbors a particular assemblage of exotic freshwater fish. Knowing these patterns is important since in Puerto Rico the freshwater sport fishery relies almost exclusively on introduced (exotic) fishes like the largemouth bass and butterfly peacock bass.

\* Among the recent invasive species coming from the aquarium trade and aquaculture, a few such as the red devil (*Amphilophus* spp.) and the jaguar guapote (*Parachromis managuensis*) are slowly being accepted by recreational anglers as legitimate sport fishes.

\* This information on the similarity of the exotic fish communities inhabiting Puerto Rico reservoirs can be used to help optimize reservoir management strategies, including focused educational campaigns to avoid additional unplanned species introductions.

\* The full impact of these unplanned introductions on the reservoir ecosystems remains to be determined.

## Acknowledgments

Puerto Rico Department of Natural and Environmental Resources  
US Fish and Wildlife Service - Sport Fish Restoration Program  
Center for Applied Tropical Ecology and Conservation - University of Puerto Rico

