



Intersex condition of largemouth bass (*Micropterus salmoides*) in an effluent dominated river



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INTRODUCTION

The intersex condition of freshwater fishes in effluent waterways across the United States has been widely documented^{1,2}. We examined the effect of wastewater on the intersex condition of largemouth bass (*Micropterus salmoides*) in the effluent-dominated urban headwaters of the Santa Ana River.

In this study we:

1. Quantify the intersex condition of largemouth bass along a spatial gradient below the two major wastewater outflows in the Santa Ana River
2. Use a linear model to analyze the relationship between distance from wastewater outflow sites and the proportion of intersex largemouth bass

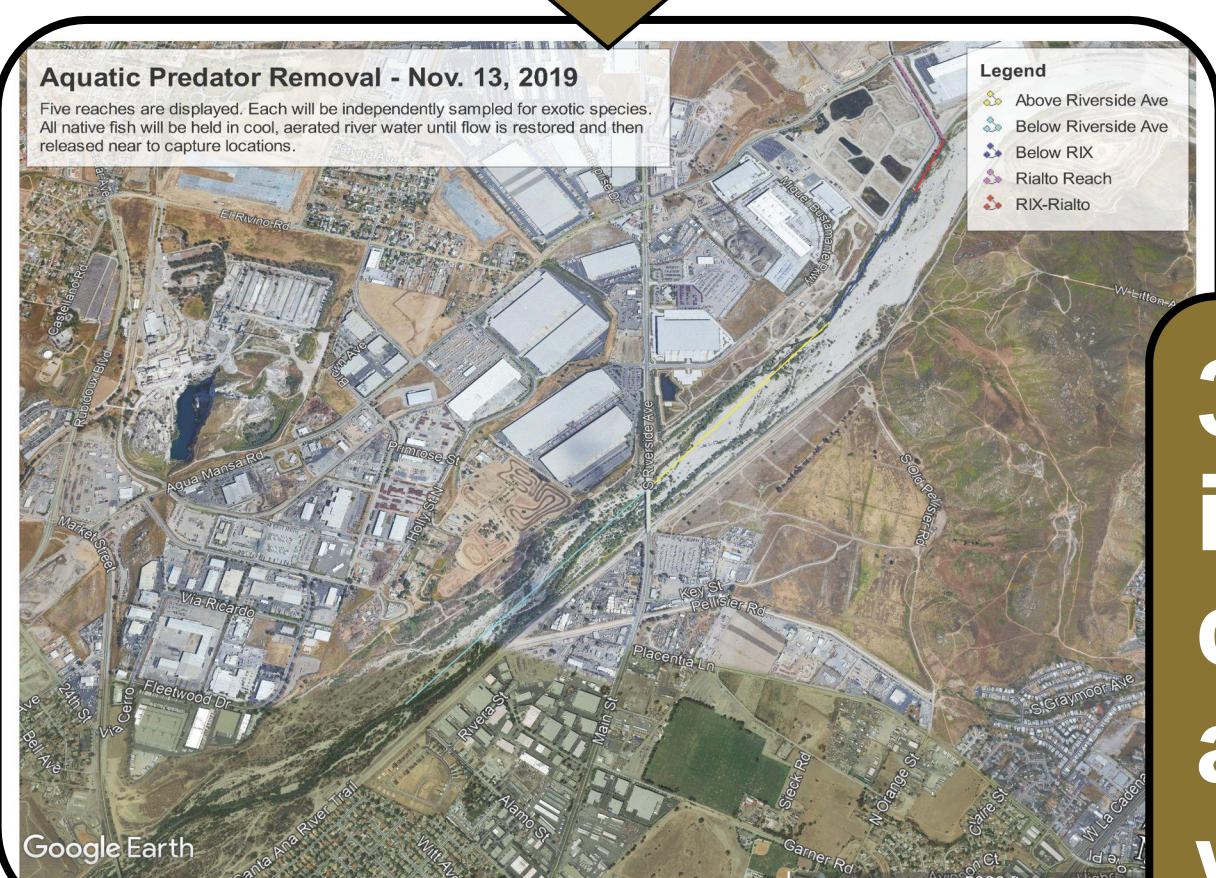
METHODS



1. Data were used from a 2019 invasive removal event conducted externally



2. Largemouth bass were dissected and sexed based on presence of testes and / or ovaries



3. Proportion of intersex fish were correlated with reach and distance from wastewater outflow

Invasive largemouth bass are changing sex in the Santa Ana River

This is related to **wastewater outflow**: as distance from outflow point increases, proportion of intersex largemouth bass decreases

DISCUSSION

- There is a relationship between distance from wastewater outflow and proportion of intersex largemouth bass
- Further research will include:
 - Water sampling for estrogenically active compounds (EAC)
 - In situ measurement of EAC in invasive and native fish tissues
 - Increased sampling for largemouth bass to increase sample size
 - Conduct cell assays that measure EAC across trophic levels- benthic macroinvertebrates, etc.

ACKNOWLEDGEMENTS

We thank the Riverside Corona Resource Conservation District and the San Bernardino Valley Municipal Water District for coordinating the invasive fish removal and providing the largemouth bass samples.

LITERATURE CITED

1. Fritts, M. W., Deboer, J. A., Fritts, A. K., Kellock, K. A., Bringolf, R. B., & Casper, A. F. (2016). Survey of intersex occurrence in largemouth bass (*Micropterus salmoides*) from the upper Illinois River Waterway. *The American Midland Naturalist*, 176(1), 158-165.
2. Kellock, K. A., Trushel, B. E., Ely, P. C., Jennings, C. A., & Bringolf, R. B. (2014). Survey of intersex largemouth bass from impoundments in Georgia USA. *Transactions of the American Fisheries Society*, 143(3), 565-572.

RESULTS

Figure 1: Proportion of intersex largemouth bass per reach. Reach 1 is closest to the wastewater outflow site.

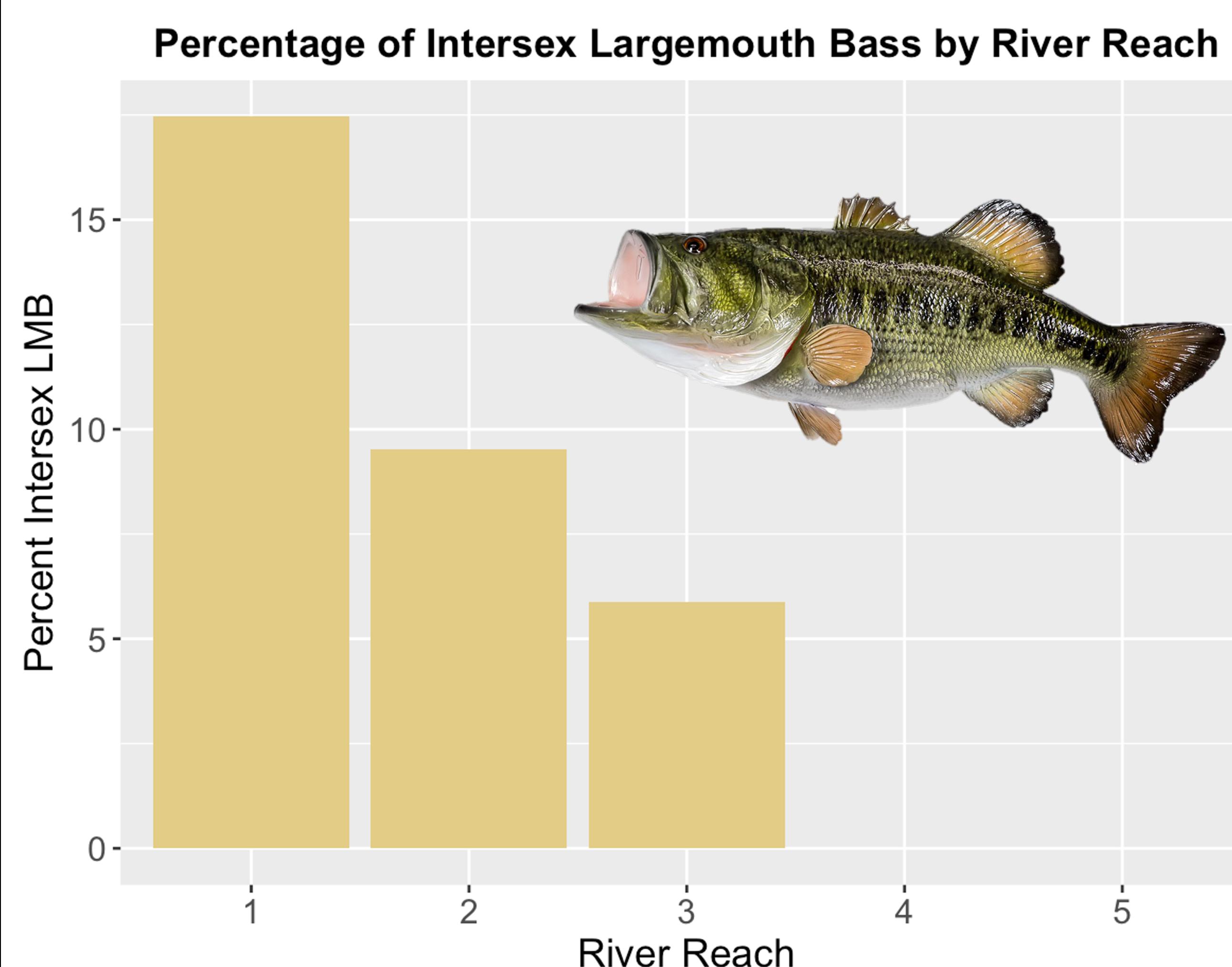
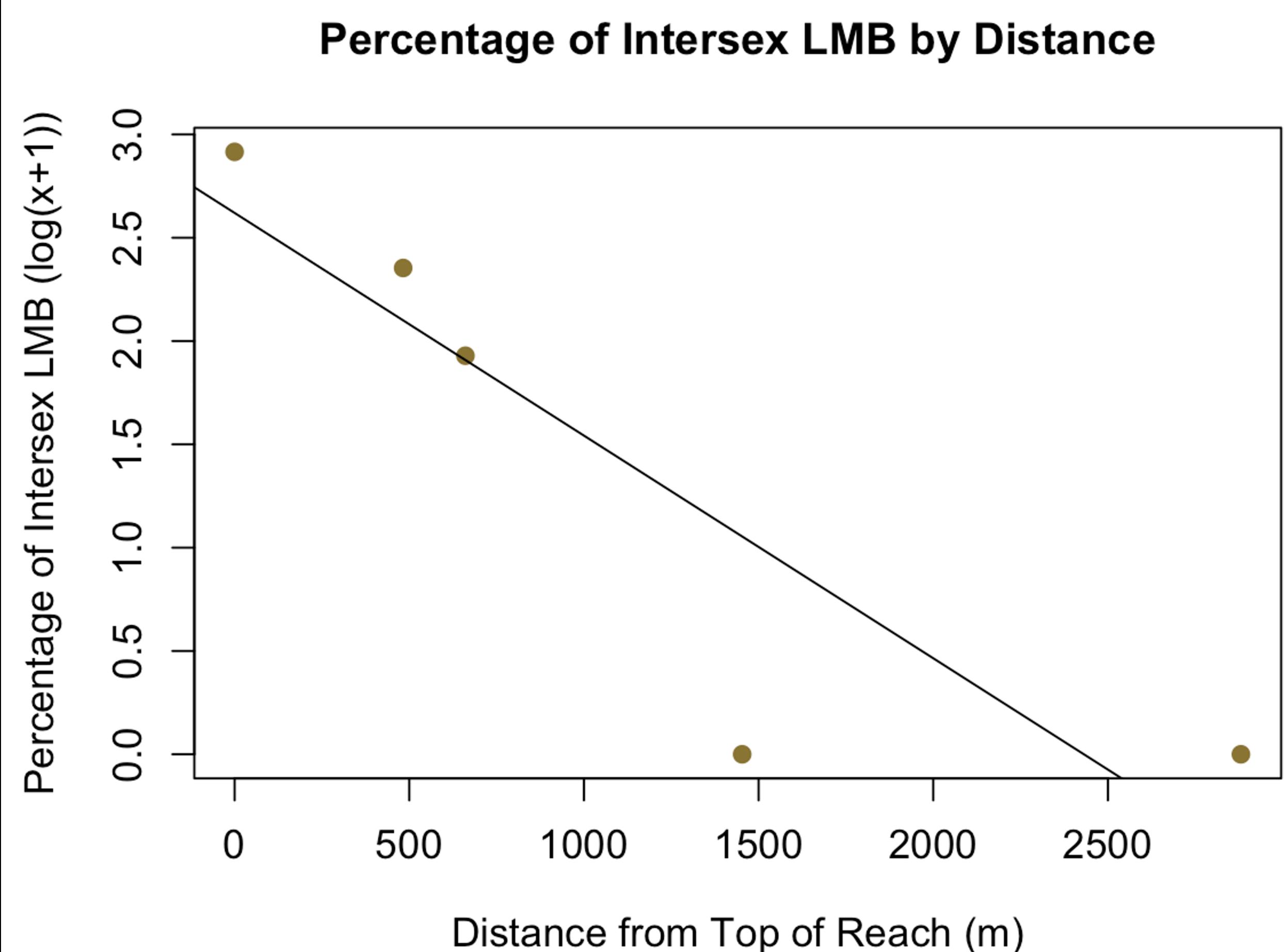


Figure 2: Distance from wastewater outflow site is significantly correlated with proportion of intersex largemouth bass



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