

SCHOOLING BEHAVIOR IN RIO GRANDE SILVERY MINNOW: Implications for management

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Understanding a fish's behavior is critical for management:

- **Where it lives.**
- **What it eats.**
- **What eats it.**
- **Interactions with conspecifics.**
- **Interactions with other species.**
- **Reproductive behavior.**

Field studies to learn these behaviors can be difficult

If the species is endangered it can be more difficult due to rarity.

Lab studies can be misleading

Aquaria, tanks, small raceways, and production ponds are artificial environments and behaviors in these small stressful environments will be altered by the systems.

Management based on these behaviors could be ineffective.

Conservation aquaculture is the future for aquaculture assisted-fisheries because it produces semi-wild fish



A purpose-built conservation aquaculture facility provides a valuable bonus

**The ability to observe natural
behaviors, and the ability to
observe behavioral responses to
controlled changes in the system.**

***You can observe a lot by
watching.***

Yogi Berra

Behavioral observations of Rio Grande Silvery Minnow in the naturalized conservation mesocosm, the refugium

- Hutson, Toya, and Tave. 2018. *Ecohydrology* 11(5):e1964.
- Tave, Toya, and Hutson. 2018. *Croatian Journal of Fisheries* 76:7-26.

Schooling behavior

The most obvious behavior.

Schooling starts early



Schooling is life-long behavior





School on the move



Schools of adults moved with water inundating floodplains



Implications for management

- 1. Sampling fish in river to estimate population.**

Schooling produces contiguous spatial distribution

- **Block sampling program needed.**
- **Randomly placed fixed sampling locations produce underestimations due to school movement.**

Implications for management

2. Feeding hatchery fish could
increase mortality of wild fish.

**Feeding fish increases
aggressive behavior**

Schooling is a balance between repelling and attracting behaviors

**If fed hatchery fish mix with wild fish,
the school will be less cohesive and
more dispersed, increasing
vulnerability to predation.**

Implications for management

3. **Spawning likely a schooling activity.**

To improve recruitment the effect of schooling during spawning should be studied

- **School size needed for effective reproduction.**
- **Many smaller HR floodplains might be more effective than fewer larger ones.**

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