

# **A Primer on Captive Maintenance Concepts for Goodeid Conservation**

**John Lyons**

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# Two Goals of Captive Maintenance:

- Ensure survival of the species
- Maintain variation within the species
- ***Variation*** – differences, often adaptive, among populations and individuals in attributes such as genetics, shape, color, behavior, reproduction, environmental preferences and tolerances, etc.

# Species Made Up of Populations:

- **Population** – *a group of organisms that live in the same area and have the potential to interbreed over the long term*
- **“Evolutionarily Significant Units” (ESU’s)** – *discrete, non-intermixing populations with unique and genetically determined attributes that are potentially adaptive*

# Two Forms of Variation to Maintain:

- **Among ESU's** – *different ESU's have different attributes; each needs to be conserved intact*
- **Within ESU's** – *each individual in an ESU has a unique combination of attributes, and the range of different attributes and combinations needs to be conserved*

# Goodeid Species and ESU's

- 39 Goodeid Species – e.g., *Zoogoneticus tequila*, *Xenophorus captivus*  
(15% extinct, 53% endangered, 8% secure)
- 78 Goodeid ESU's – e.g., *Zoogoneticus tequila* – Teuchitlán; *Xenophorus captivus* – Pánuco, *X. captivus* – Illescas, *X. captivus* – Venados; 1 to 8 ESU's per species  
(17% extinct, 53% endangered, 6% secure)

# Conserving Among-ESU Variation

- **Know and Track the ESU of your fish -**  
Use ESU List. Label tanks. Document spawnings. Track exchanges. Commit to long-term maintenance.
- **Avoid “Outbreeding” & Homogenization**  
Don’t mix ESU’s; keep them separate.  
Set up and operate fish room to avoid accidents and catastrophes

# Conserving Within-ESU Variation: 1

## Avoid Inbreeding and Genetic Drift:

- 1) Start with as many *unrelated* individuals as possible.
- 2) Keep large numbers of fish per ESU (*100's if possible*)
- 3) Introduce new captive or wild individuals whenever practical (e.g., exchange with others who keep this ESU)

# Conserving Within-ESU Variation: 2

## Avoid Artificial Selection:

1) Don't try to modify strain to "improve" color, shape, size, growth, etc. Try to maintain "wild type". Cull only deformed or non-viable individuals.

2) Provide "natural" habitat conditions & foods for your fish as much as possible

# Captive Maintenance DO's:

- **DO** commit to maintaining specific ESU's
- **DO** know and document your ESU's
- **DO** start with large numbers of unrelated fish
- **DO** maintain large numbers of unrelated fish
- **DO** interject "new blood" whenever possible
- **DO** operate your fish room to avoid accidents
- **DO** keep fish under "natural" conditions

# Captive Maintenance DON'T's:

- **DON'T** intentionally mix different ESU's
- **DON'T** accidentally mix different ESU's
- **DON'T** select for or against particular traits
- **DON'T** try to do it alone! Support and participate in networks to maintain specific ESU's. Exchange information and fish often.

# *You* Can Make a Difference...

- Goodeids are in serious trouble
- Captive maintenance is essential
- Formal conservation is insufficient
- Hobbyists are the last line of defense

**...Accept the challenge to maintain  
Goodeid ESU's**