U. S. Fish & Wildlife Service – Southwest Region

Propagation Program Establishment at the San Marcos Aquatic Resources Center

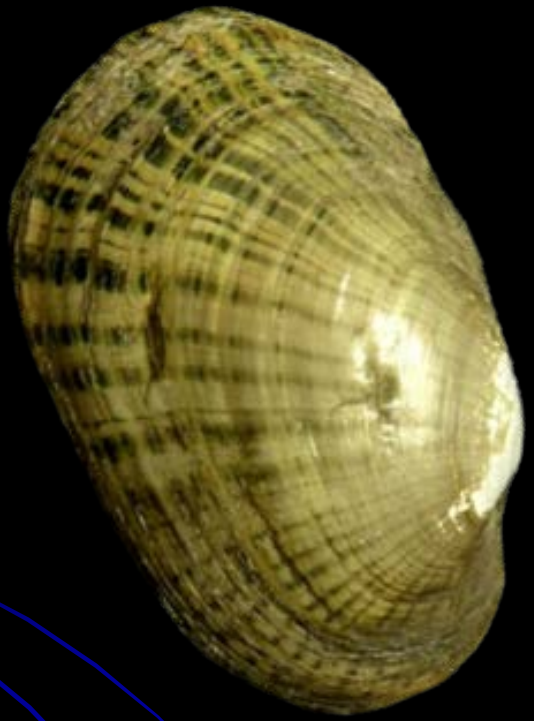
Joshua Abel

Who We Are


San Marcos
Aquatic Resources Center
U.S. Fish and Wildlife Service
Department of the Interior
Texas Fish and Wildlife Conservation Office

Station Infrastructure

2017 Culture Efforts



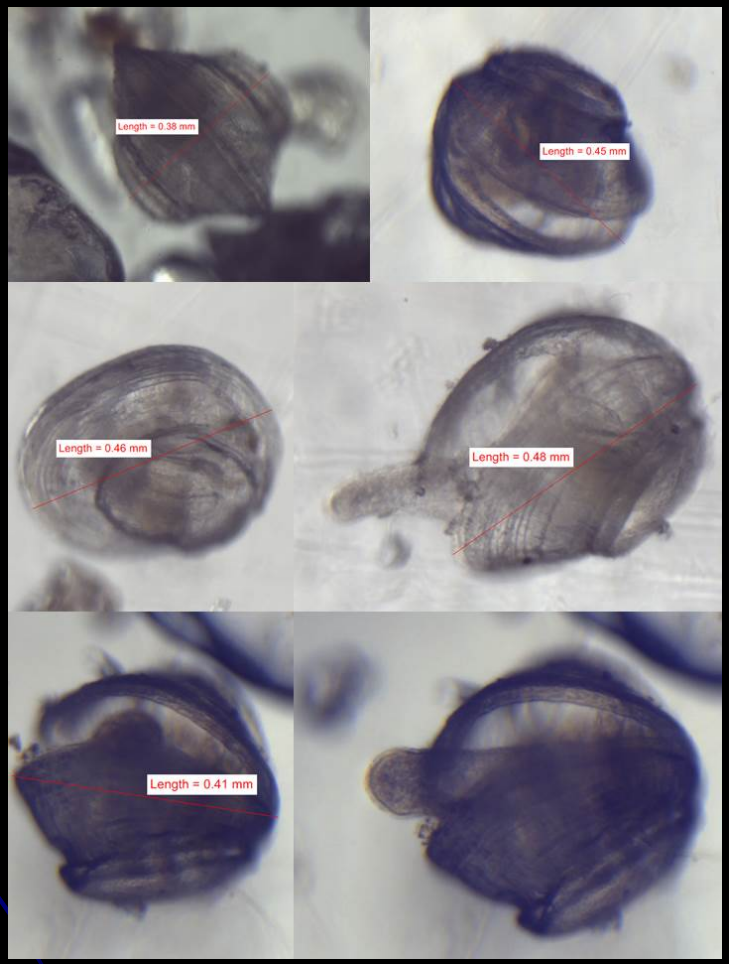
Texas fatmucket
Lampsilis bracteata

Texas hornshell
Popenaias popeii

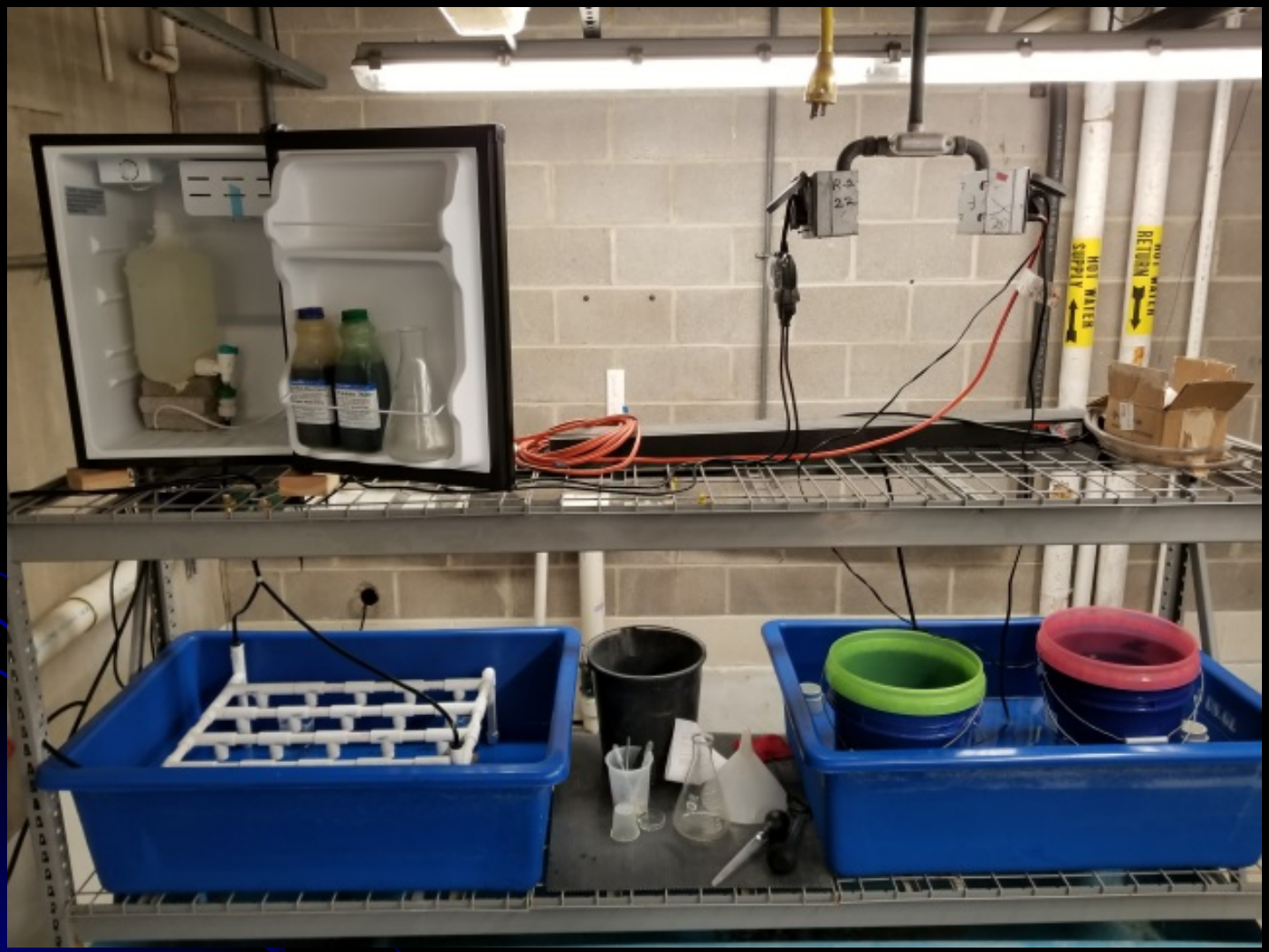
Adult Holding System

Host Fish Holding System

Juveniles


Length = 0.38 mm
Length = 0.45 mm
Length = 0.46 mm
Length = 0.48 mm
Length = 0.41 mm

Juvenile Culture



Pulsed Flow-through

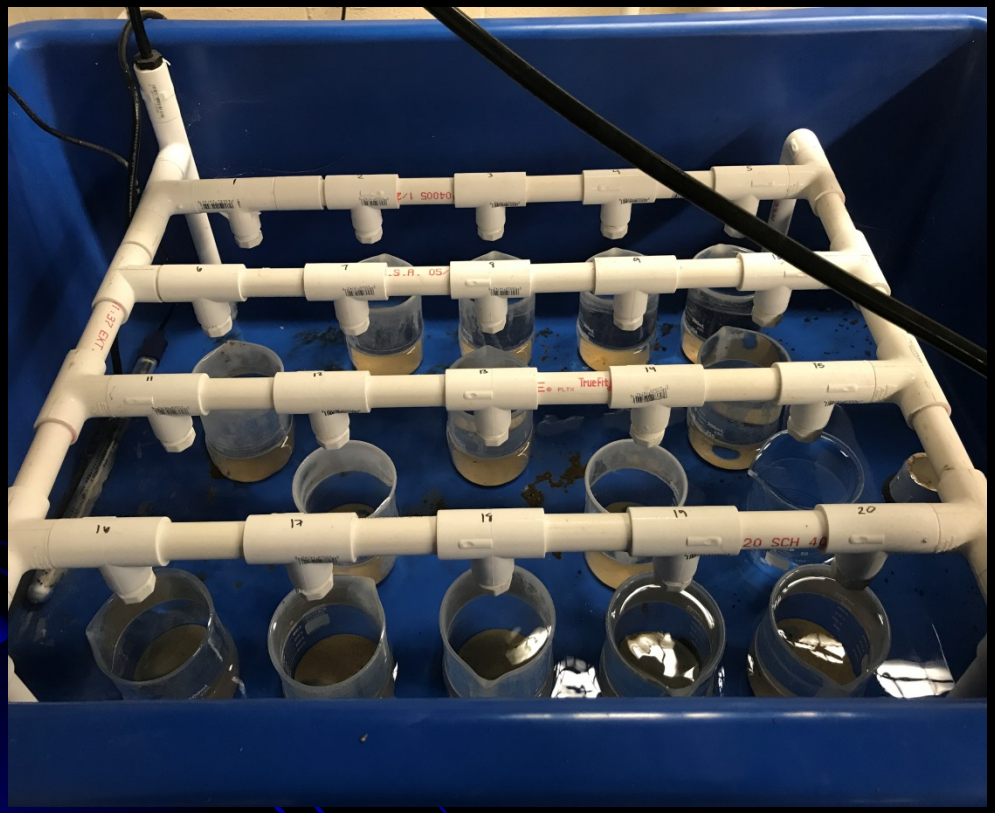
Mucket Buckets

Mucket Buckets

Advantages –
inexpensive, compact, simple design

Disadvantages –
labor intensive, inconsistent, operates poorly in hard water (Edwards Aquifer well water)

Pulsed Flow-through System



- **Advantages – consistent, not labor intensive, works with hard water**
- **Disadvantages – complicated design, larger footprint**

Lessons Learned

- Edwards Aquifer temperatures are too low for successful glochidia transformation and juvenile growth.

- Edwards Aquifer water chemistry alone is not conducive to high juvenile survival.

2018 Mussel Culture and Planned Research

Texas fatmucket
Lampsilis bracteata

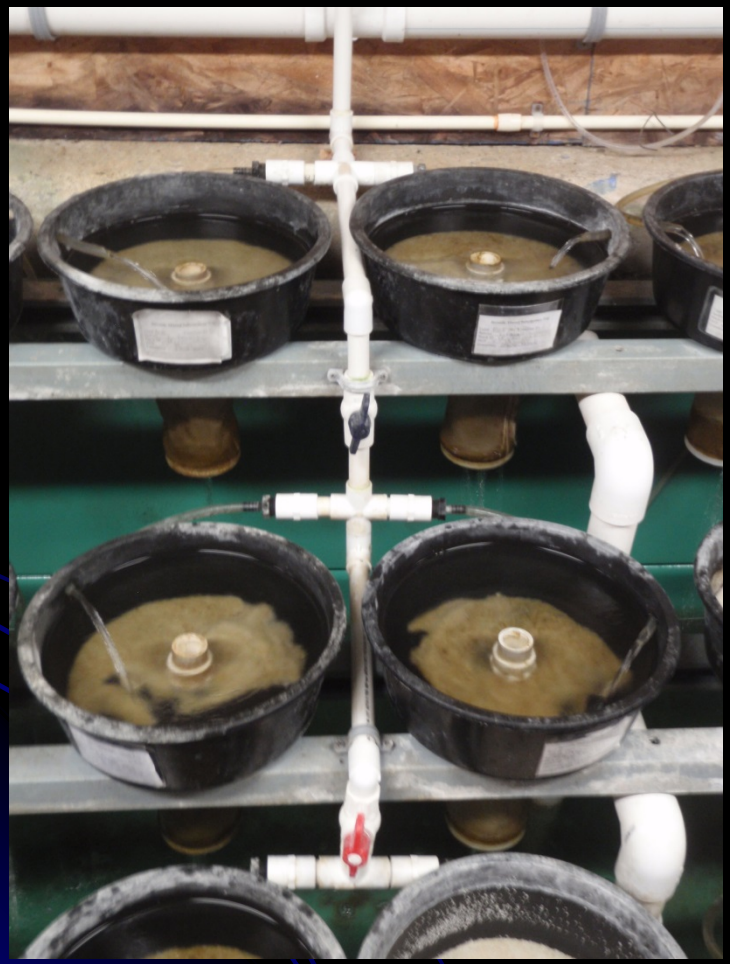
Texas pimpleback
Quadrula petrina

Smooth pimpleback
Quadrula houstonensis

Texas fawnsfoot
Truncilla macrodon

False Spike
Fusconaia mitchelli

Dog Dishes



Upwellers

Floating Baskets

Pictured: Rachel Mair at Harrison Lake NFH

Host Fish Studies

- Host fish are unknown for the false spike and Texas fawnsfoot
- A suite of fish will be inoculated with glochidia, and transformation success will be monitored.

Upcoming Research

Determining proximate factor of spawning in the wild

- Mussels will be housed in testing system that controls water temperature, flow rate and photoperiod.
- Spawning will be determined using non destructive gamete sampling and monitoring closed circuit video system

Upcoming Research

Genetic comparison between cultured mussels fertilized in the wild and in the hatchery

- Dependent upon successful captive spawning
- Ideally multiple captive generations could be tested

Upcoming Research

Validating Bioelectrical Impedance as a method for assessing mussel health

- Bioelectrical impedance is used by physicians to measure body fat percentage
- Method can also non-lethally determined lipid stores, protein content, moisture, ash, etc. when paired with proximate analysis
- Method has been successfully validated using juvenile salmonids

Acknowledgments

- Texas Comptrollers Office
- Texas State University
- The Nature Conservancy
- Texas Parks and Wildlife
- Jennifer Morton, TAMU
- Tom Miller, Laredo Community College
- Dan Trujillo, NM Dept. of Game and Fish
- Alex Sierra and Milo Gibson
- Uvalde and Inks Dam National Fish Hatcheries
- Bio-west, Inc.

INKS DAM NATIONAL FISH HATCHERY

Scott Walker
Assistant Project Leader - IDNFH

Inks Dam

- **Constructed from 1936 to 1938 and forms Inks Lake, one of the seven Texas Highland Lakes.**

Inks Dam National Fish Hatchery

- Built between 1938 and 1940
- Cooperative effort between Lower Colorado River Authority, U.S. Bureau of Fisheries and the National Youth Commission.
- Original mission:
  - Provide fish for the Highland Lakes.
- Current mission:
  - Tribal Trust responsibilities in Region 2
  - T/E refugia and propagation
  - Education and Outreach

Freshwater Mussels

Cooperative Project with:

- **U.S. Fish and Wildlife Service**
  - **Inks Dam NFH**
  - **San Marcos Aquatic Resources Center**
  - **Uvalde NFH**
- **Texas Comptrollers Office**
- **Texas Parks and Wildlife Department**
- **Texas State University**
- **Auburn University**
- **Bio-West**

Freshwater Mussels

- **Texas Fatmucket (*Lampsiilis bracteata*)**
- **False Spike (*Fusconaia mitchelli*)**
- **Smooth Pimpleback (*Quadrula houstonensis)***
- **Texas Pimpleback (*Quadrula petrina)***
- **Texas Fawnsfoot (*Truncilla macrodon)*.**

Texas Fatmucket
(Lampsilis bracteata)

Smooth Pimpleback
(Quadrula houstonensis)

Texas Pimpleback
(Quadrula petrina)

Llano River Collection

- Mussels collected from Llano River in Mason County, TX.
- 10 Texas Fatmuckets collected during 4 trips.
- 14 Texas Pimplebacks collected during 4 trips.
- Take 10% of mussels found.

Colorado River Collection

- Mussels collected from Colorado River in Colorado County, TX.
- 12 Smooth Pimplebacks collected during 1 trip.
- 11 Texas Pimplebacks collected during 1 trip.

Holding Broodstock

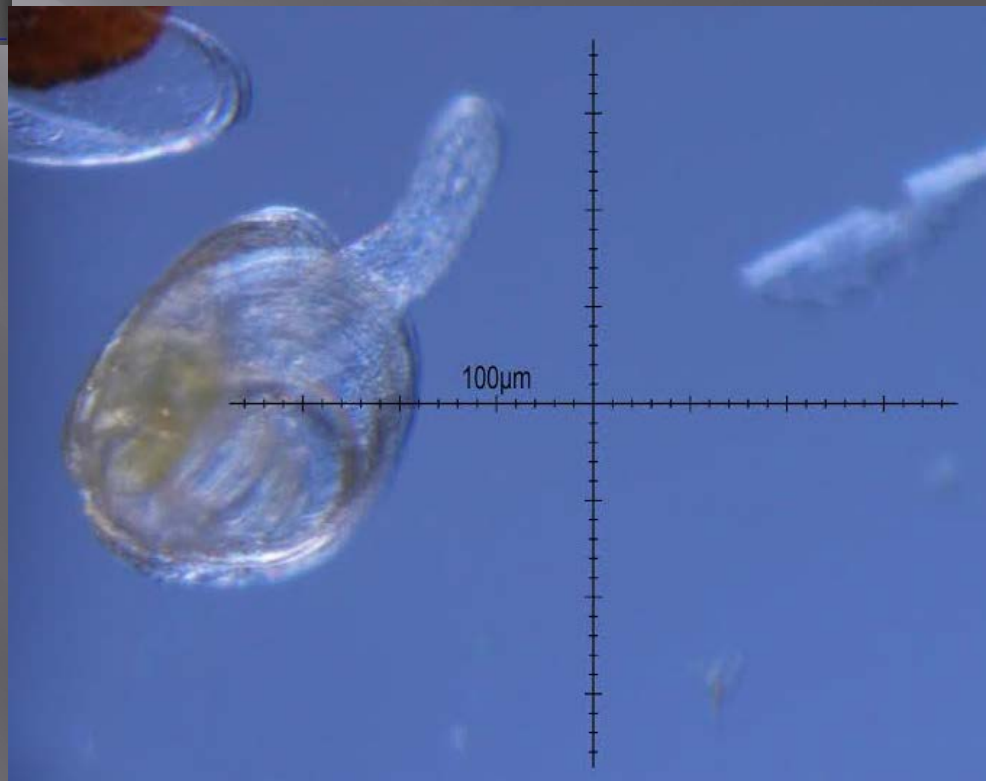
- Currently have 6 outdoor tanks with flow-through lake water to hold freshwater mussels.
- Short term goal (1st year) is to see if they can survive without supplemental feed.

Infesting Host Fish

- 18 Bluegill sunfish, 9 tanks, 2 fish per tank
- 18 Green sunfish, 9 tanks, 2 fish per tank
- Glochidia extracted from 2 female Texas Fatmuckets

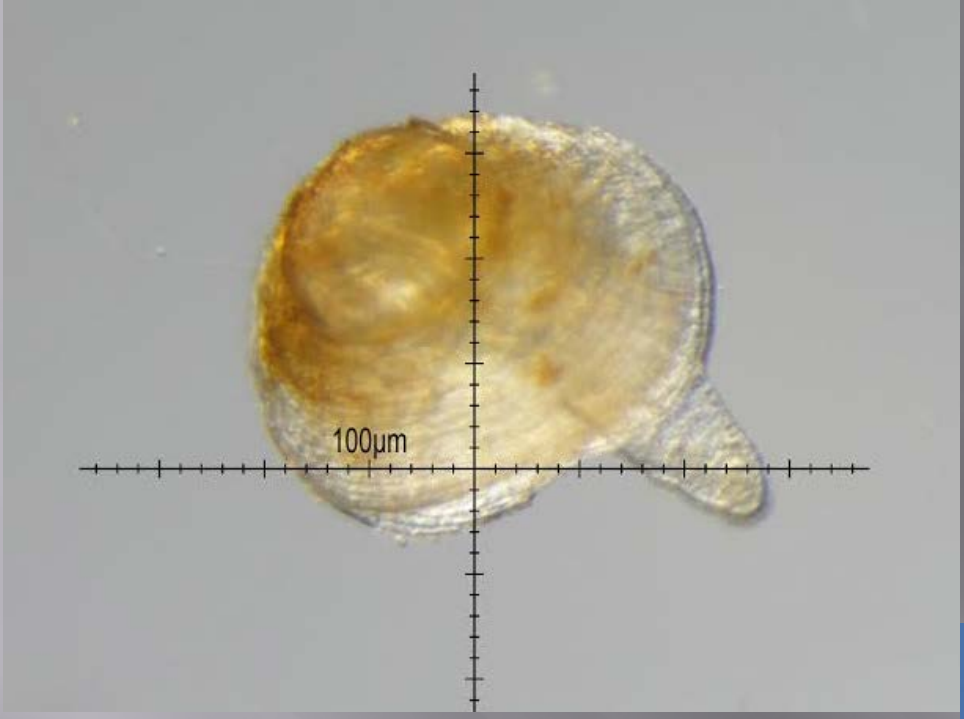
- Green Sunfish gill sample with encapsulated glochidia approximately 1 hour after infestation.

- Time from drop-off = 23 days
- Length = ~ 300 µ
- Z-hab water temperature maintained at 24 ºC



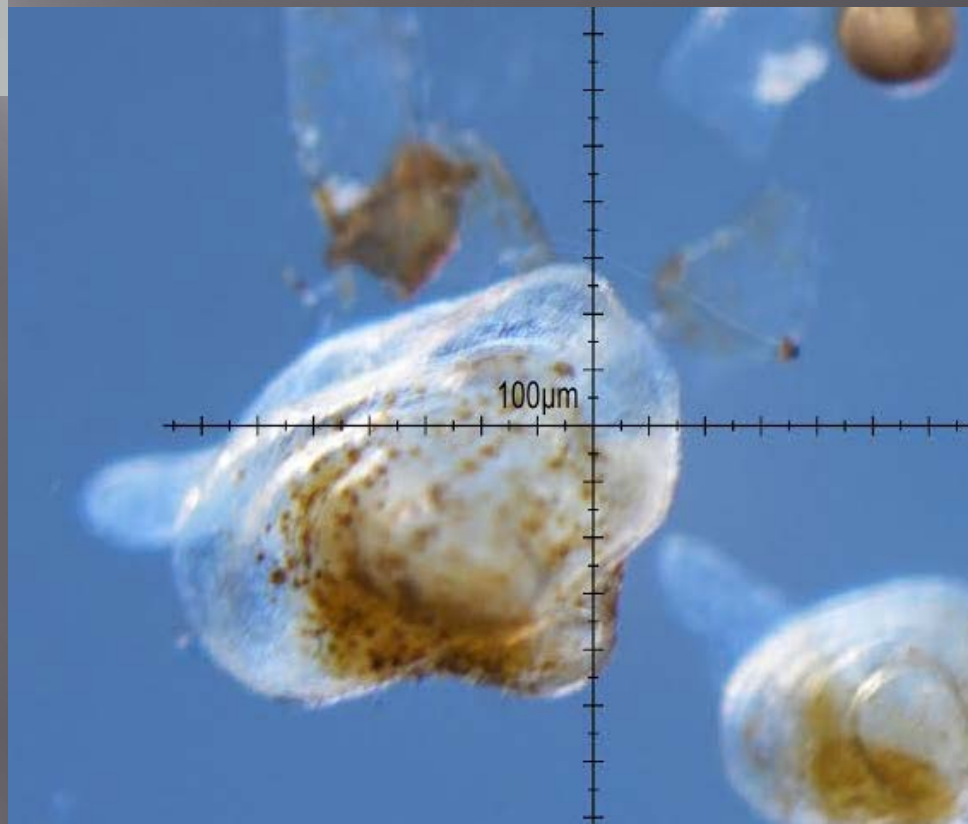
Culture System

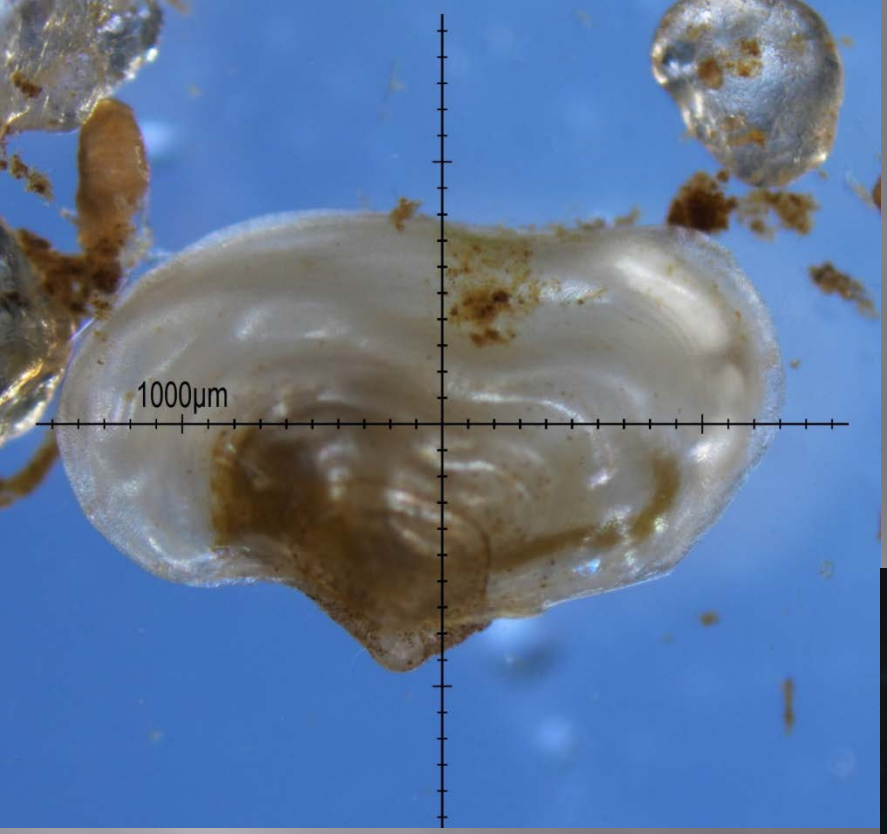
- Flow-through design.
- 9 – 12” diameter, 5 quart plastic pans.
- 200 ml’s of #20 grade silica sand.
- ~250 metamorphosed juveniles per pan.



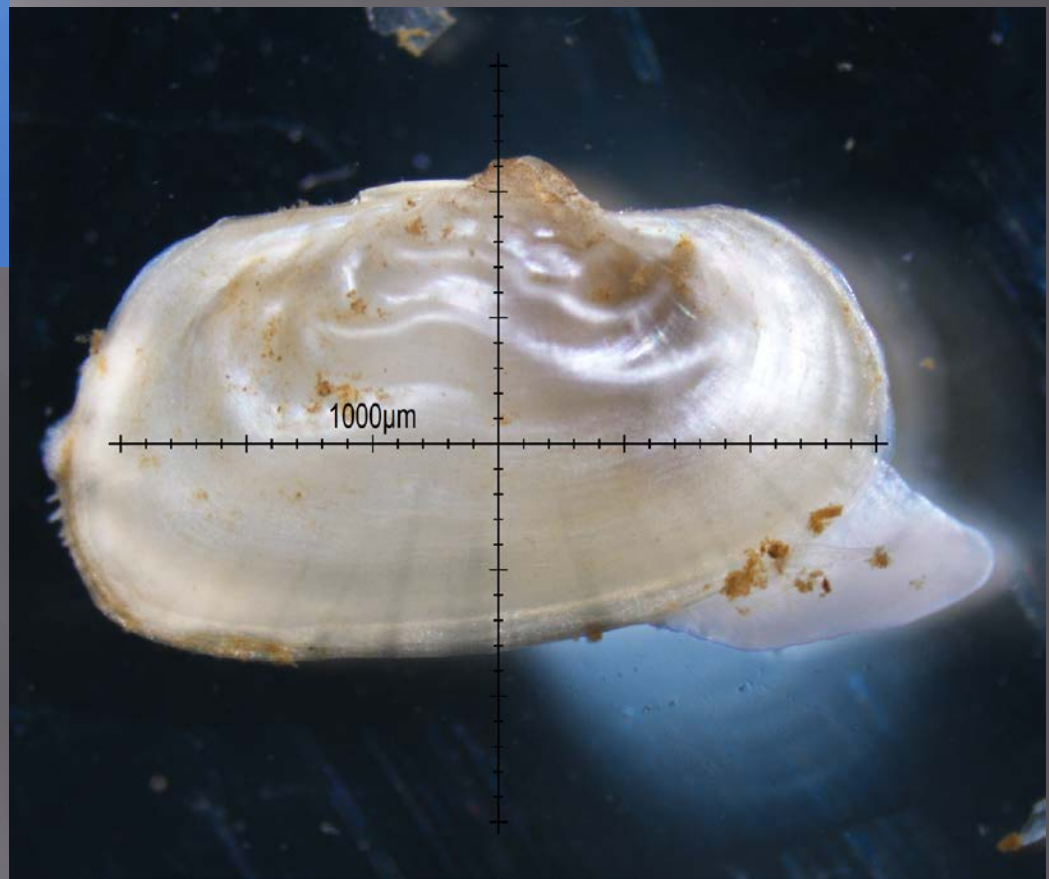
- Time from drop-off = 29 days
- Length = ~ 400 µ

- Time from drop-off = 44 days
- Length = ~ 600 µ



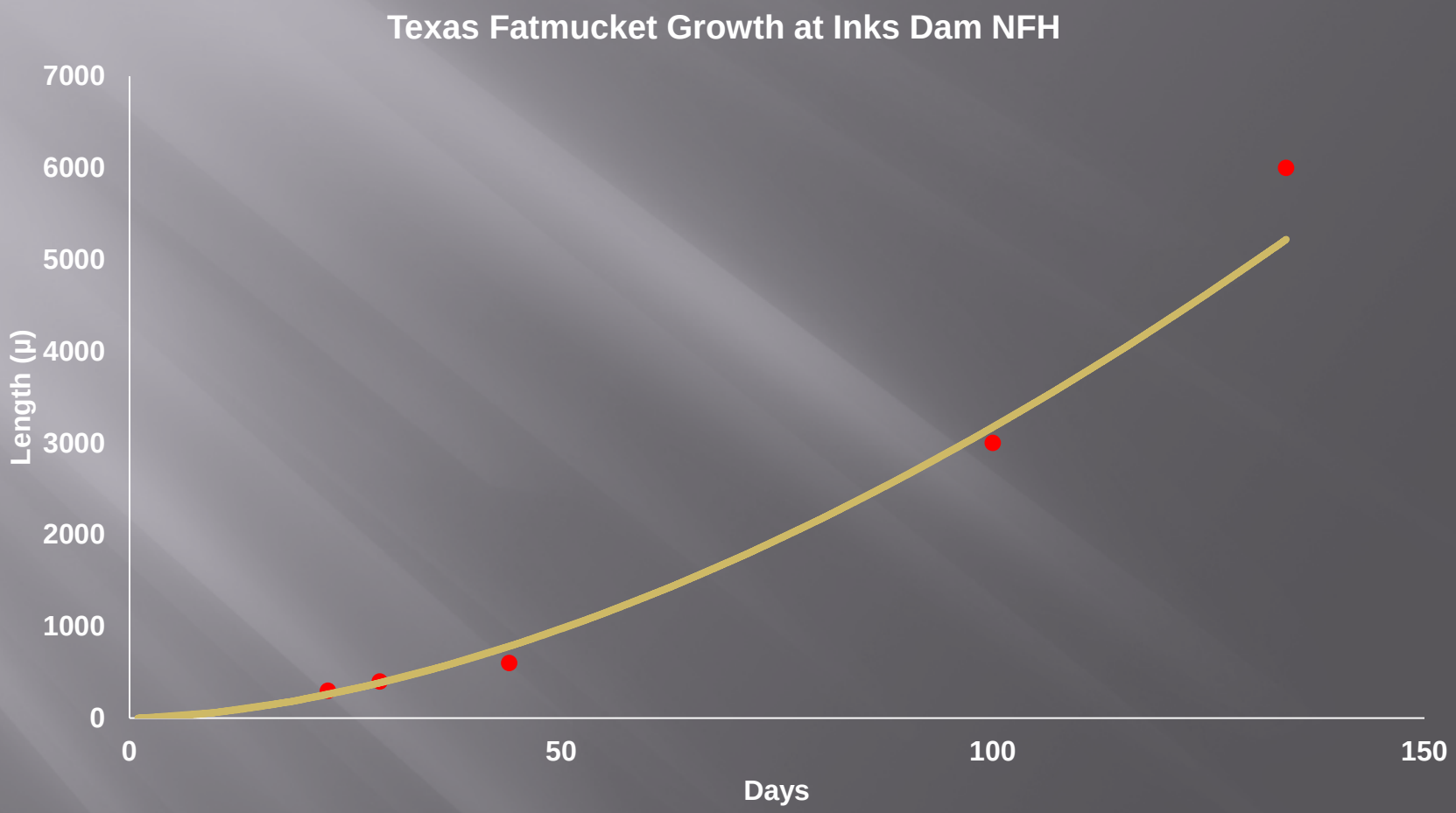


- Time from drop-off = 100 days
- Length = ~ 3,000 µ



- Time from drop-off = 134 days
- Length = ~ 6,000 µ

Growth


Texas Fatmucket Growth at Inks Dam NFH
7000
6000
5000
4000
3000
2000
1000
0
Length (µ)
0
50
100
150
Days

Questions?