Status of Tilapia and Sturgeon Research on the Big Island 2010/2011

Armando García and Kevin Hopkins
A partnership between
UH Sea Grant College Program and
UH-Hilo’s Pacific Aquaculture & Coastal Resources Center
Sturgeon Research 1995-2009

- Obtained permits, imported eggs from Russia and Europe
- Preliminary growth trials, demonstrated maturation and economic feasibility
- Conducted trainings
2010 – 2011 Research
Sturgeon Processing & Market Development

- HACCP certified processing
- Effect of size on fillet rates
- Smoked production yield
- Food shows and events (up to 700 people)
- Weekly special at local restaurant
Fish Weight (kg)
Sturgeon – Biological Studies

- Spring 2009 hatch
- Comparative growth
- Siberian vs. Russian
- Freshwater vs brackishwater (9 ppt) – one year only
- 19 °C, max density 20 kg/m³

<table>
<thead>
<tr>
<th>Age</th>
<th>Water</th>
<th>Siberian</th>
<th>Russian</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 yr</td>
<td>FW</td>
<td>0.9</td>
<td>1.7</td>
</tr>
<tr>
<td>2 yr</td>
<td>FW</td>
<td>3.0</td>
<td>7.3</td>
</tr>
<tr>
<td>2yr</td>
<td>BW</td>
<td>-</td>
<td>6.6</td>
</tr>
</tbody>
</table>
Future Sturgeon Work

- Maturation
- Spawning
- Caviar yield
- Extension
- Move to Restricted B
Tilapia permit – *O. niloticus*

- Currently on Restricted A (research & display only)
- Permit conditions required a comparison of *O. aureus* & *O. niloticus* growth rates in Hawaii
- Imported by Jim Szyper
- Study completed
- A request to move to Restricted B was submitted by ADP
Growth Comparison *O. aureus* & *O. niloticus*

- **Weight (g)**
- **Days**

- **O. aureus**
- **O. niloticus**
“Effects of prolactin and growth hormone on the branchial expression of ion transporters and Na\(^+\), K\(^+\)-ATPase isoforms in Nile tilapia (O. niloticus)”

**Investigators:**
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[NSF logo] IOB05-17769

[NIH logo] T32-MH020051-07
**Goal:** We aim to identify the endocrine mechanisms that underlie the divergent osmoregulatory capacities of con-generic tilapias

Mozambique tilapia = estuarine distribution
Nile tilapia = freshwater distribution

The pituitary hormone, prolactin, regulates the expression of ion pumps/transporters in the gill that allow *O. mossambicus* to survive in freshwater (Breves et al., 2010; Tipsmark et al., 2011).

**Mozambique tilapia** (*O. mossambicus*)

Growth hormone is not required for the expression of ion pumps/transporters that allow *O. mossambicus* to tolerate seawater (Breves et al., 2010).

**Nile tilapia** (*Oreochromis niloticus*)

There are no studies to date that make direct links between prolactin and growth hormone and ion pumps/transporters in *O. niloticus*.

1) By understanding how the endocrine system has evolved in parallel with salinity tolerance in tilapias, we can identify the mechanisms that underlie euryhalinity in fishes.

2) These mechanisms reveal patterns of physiological evolution as well as inform our efforts to improve rearing strategies.
Fenced quarantine area for *O. niloticus*

Controlled environment chambers for physiology & nutrition research
Aquaponics

- International Workshop
  – Summer 2010
- School Systems
- Portable display system
Aquaponics

- Research systems
  - Replicate – 4 x 8 ft beds
  - Lo’i
  - Ebb and Flow
  - Flooded
  - Spray
Foreground
Simple 300 gal system

Background
Lo‘i supplied from fish tank

Ebb and Flow System
Future tilapia R&D

- Produce and distribute pure *O. niloticus* fingerlings
- Growth trials with algae used for biofuels and their byproducts
Questions?