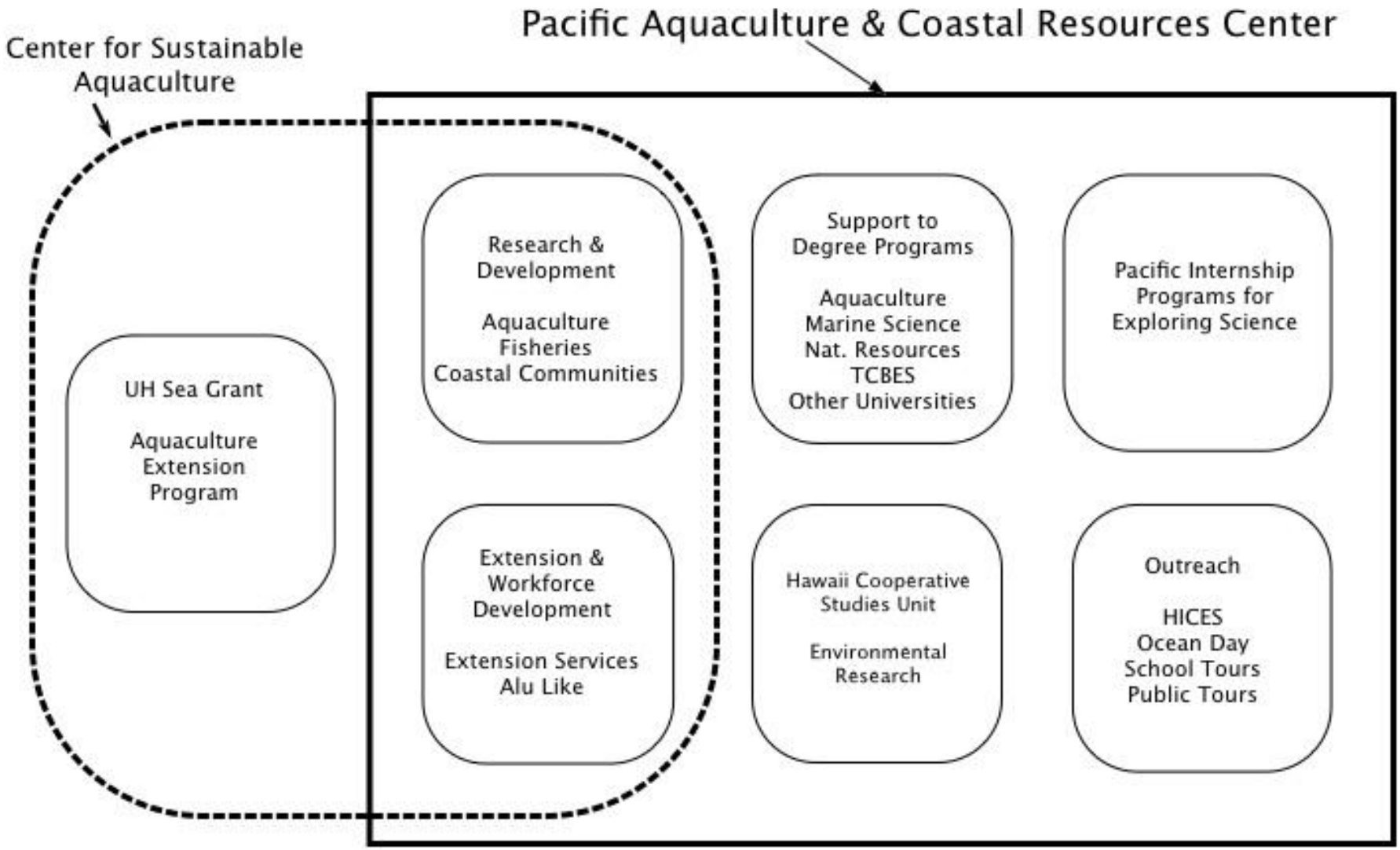
# Status of Tilapia and Sturgeon Research on the Big Island 2010/2011

Armando García and Kevin Hopkins

University of Hawai'i Hilo

# Center for Sustainable Aquaculture

A partnership between
UH Sea Grant College Program and
UH-Hilo's Pacific Aquaculture & Coastal Resources Center


Center for Sustainable Aquaculture
Pacific Aquaculture & Coastal Resources Center
UH Sea Grant
Aquaculture Extension Program
Research & Development
Aquaculture
Fisheries
Coastal Communities
Support to Degree Programs
Aquaculture
Marine Science
Nat. Resources
TCBES
Other Universities
Pacific Internship Programs for Exploring Science
Extension & Workforce Development
Extension Services
Alu Like
Hawaii Cooperative Studies Unit
Environmental Research
Outreach
HICES
Ocean Day
School Tours
Public Tours

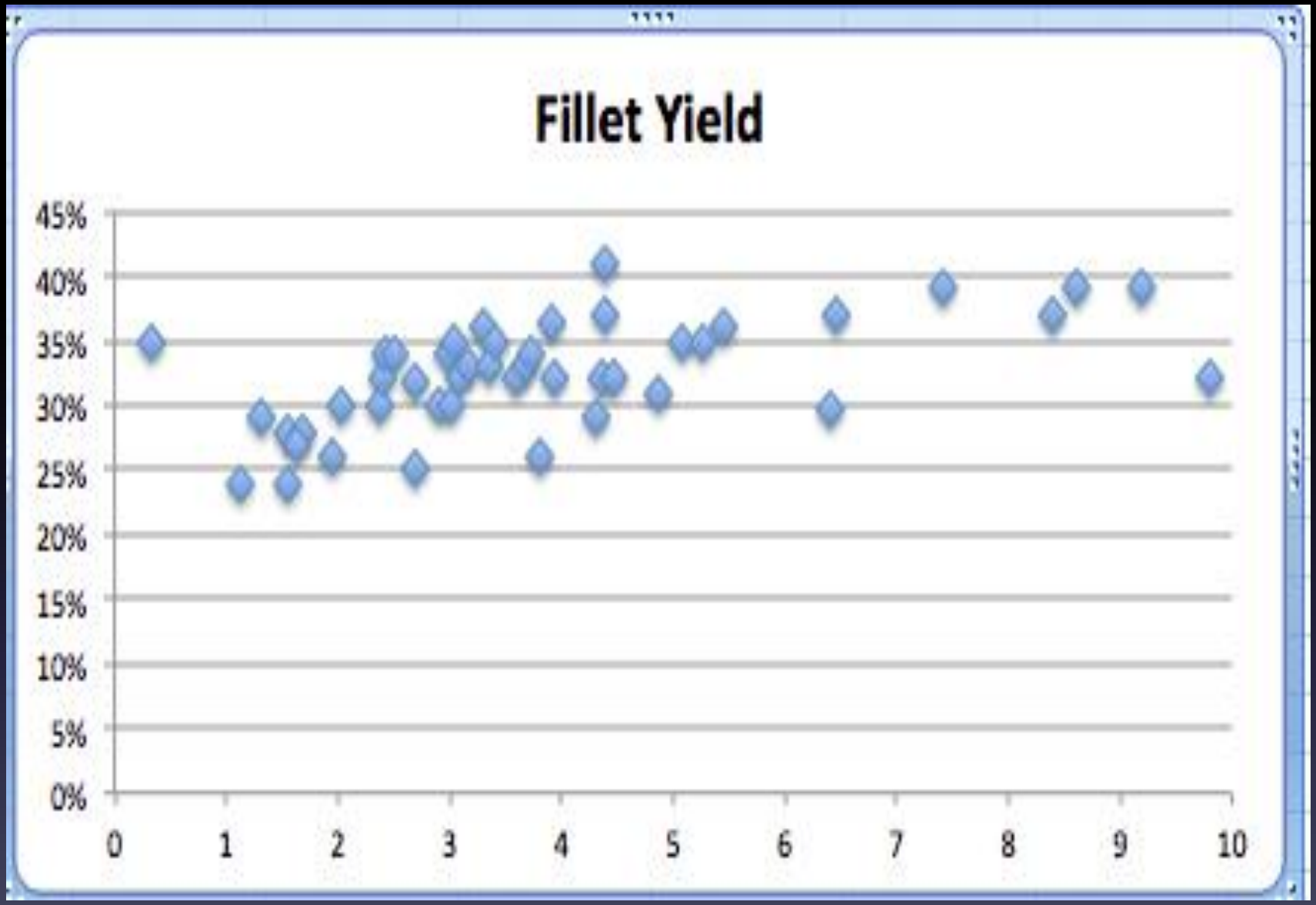
# Sturgeon Research 1995-2009

- 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/m$^3$

Average Weight (kg)

| Age | Water | Siberian | Russian |
|---|---|---|---|
| 1 yr | FW | 0.9 | 1.7 |
| 2 yr | FW | 3.0 | 7.3 |
| 2yr | BW | - | 6.6 |

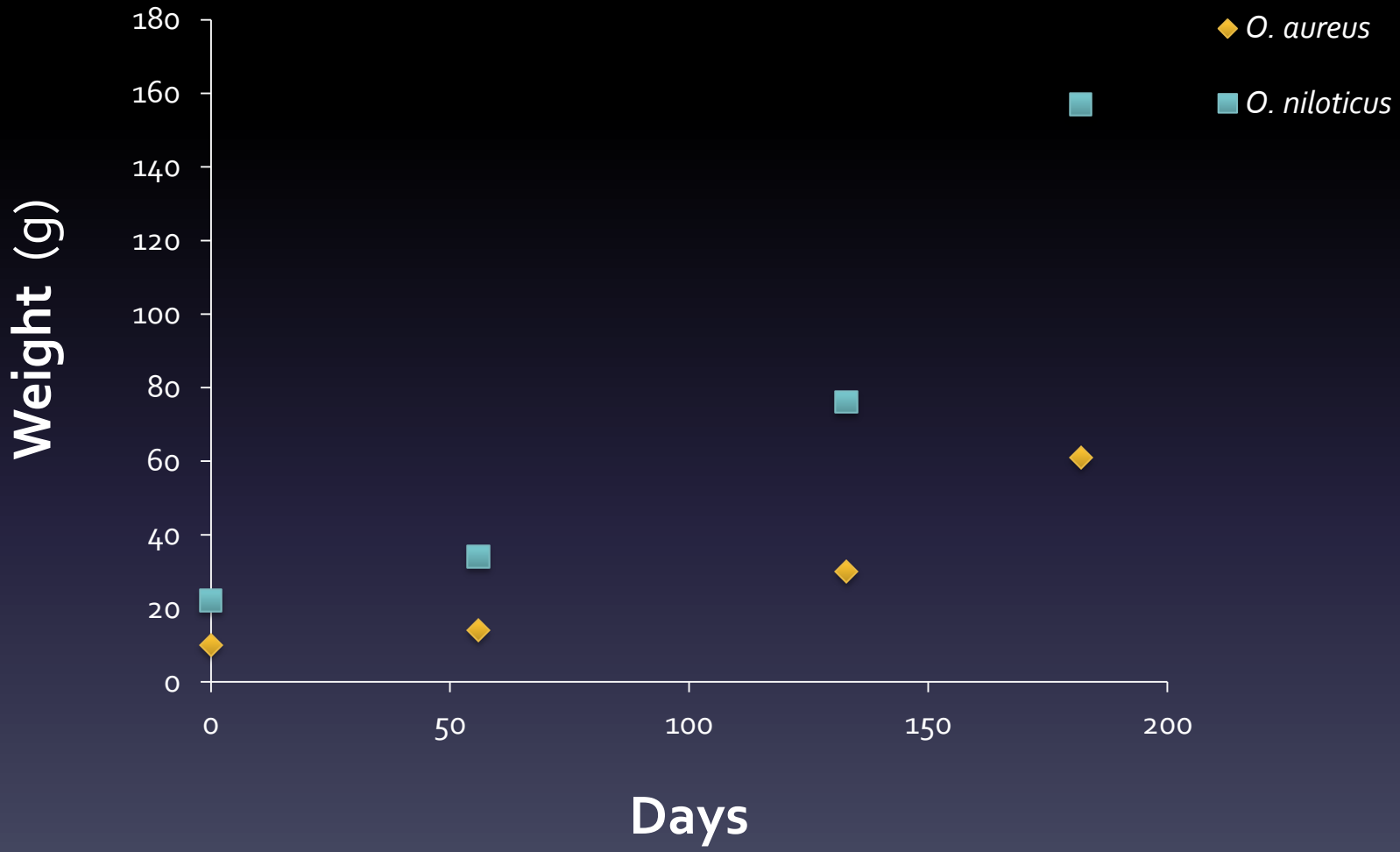
# Future Sturgeon Work

- 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*



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


***Investigators:***

**Jason Breves**, *Center for Neuroendocrine Studies, University of Massachusetts Amherst*

**Andre Seale**, *HIMB, University of Hawaii at Manoa*

**Darren Lerner**, *HIMB, University of Hawaii at Manoa*

**Kevin Hopkins**, *Pacific Aquaculture Resource Center, University of Hawaii at Hilo*

**Tetsuya Hirano**, *HIMB, University of Hawaii at Manoa*

**E. Gordon Grau**, *HIMB, University of Hawaii at Manoa*



***Funding Support:***

USDA 2008-35206-18785 2008-35206-18787

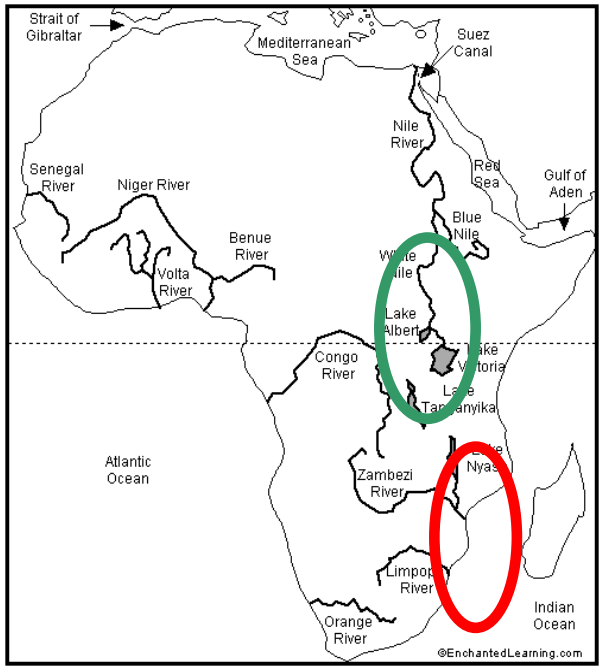
NSF IOB05-17769

NATIONAL INSTITUTES OF HEALTH 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




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

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

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).

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

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?