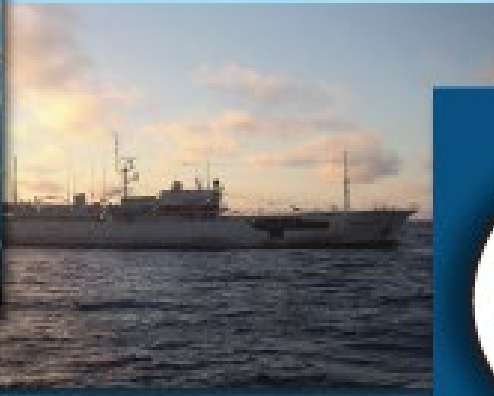


Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



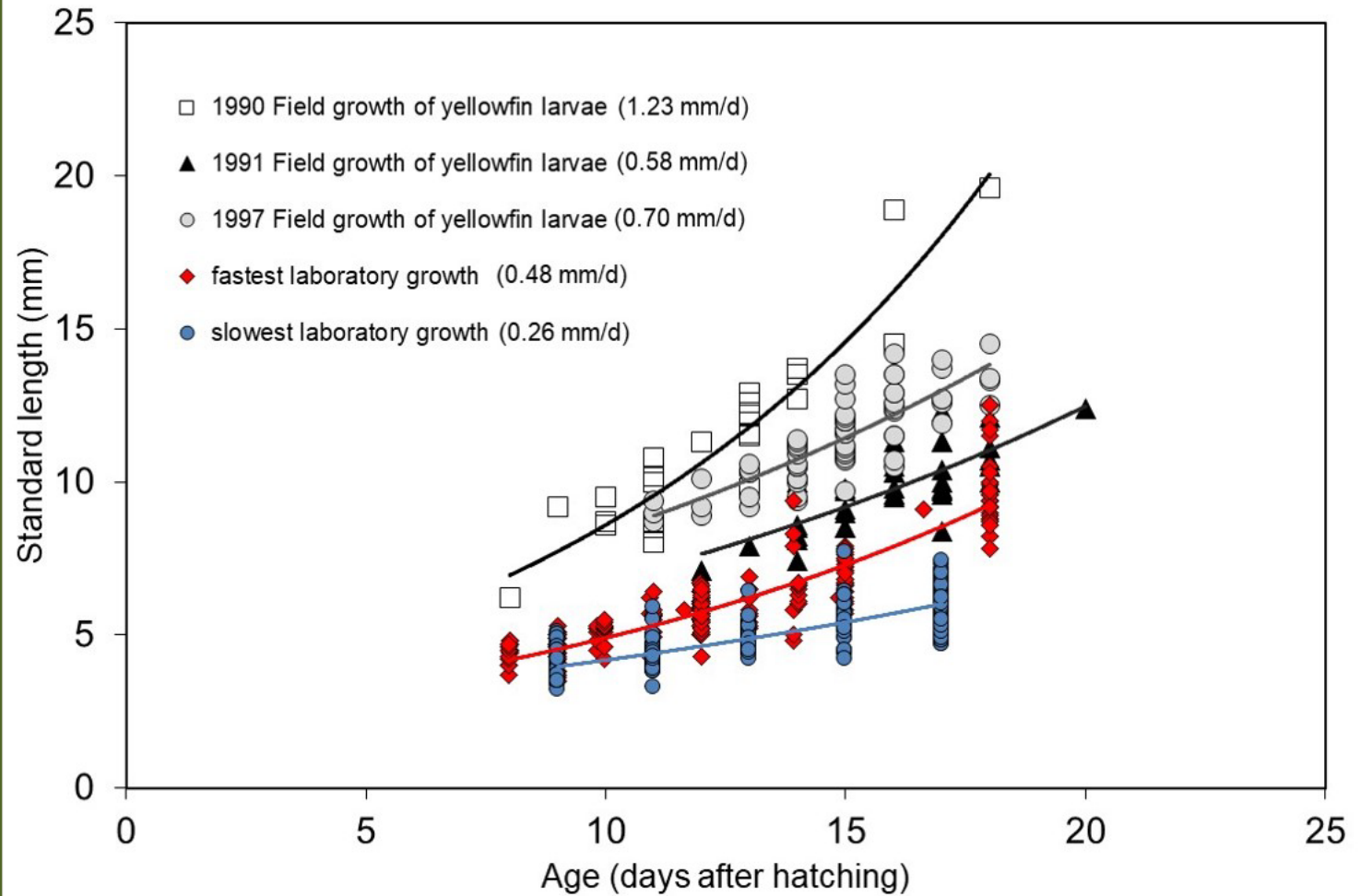
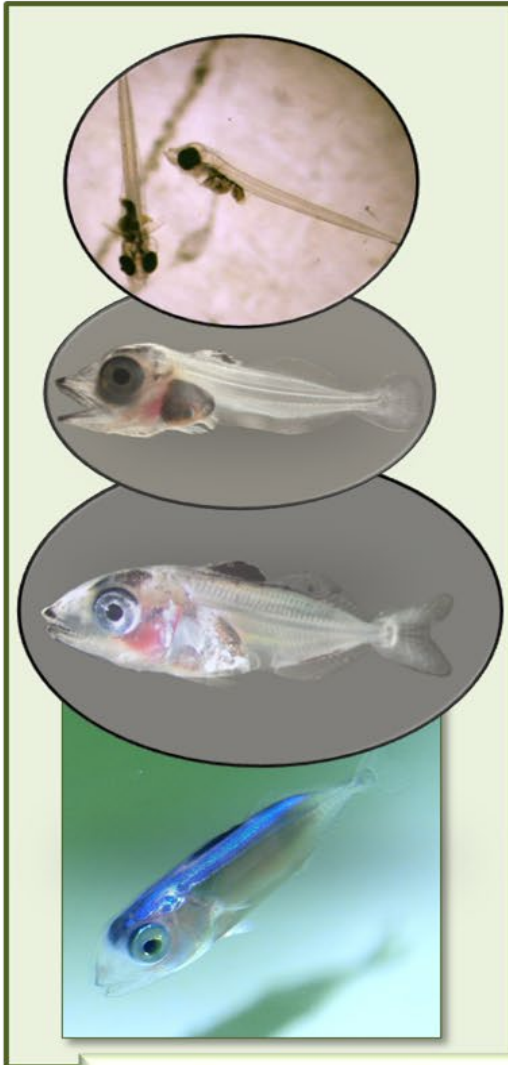
REVIEW OF RESEARCH AT THE ACHOTINES LABORATORY (SAC-13-13)

Daniel Margulies, Vernon Scholey, Yole Buchalla, Susana Cusatti, Jeanne Wexler

13^a Reunión del Comité Científico Asesor - 16-20 de mayo de 2022 (por videoconferencia)
13th Meeting of the Scientific Advisory Committee - 16-20 May 2022 (by videoconference)

Outline

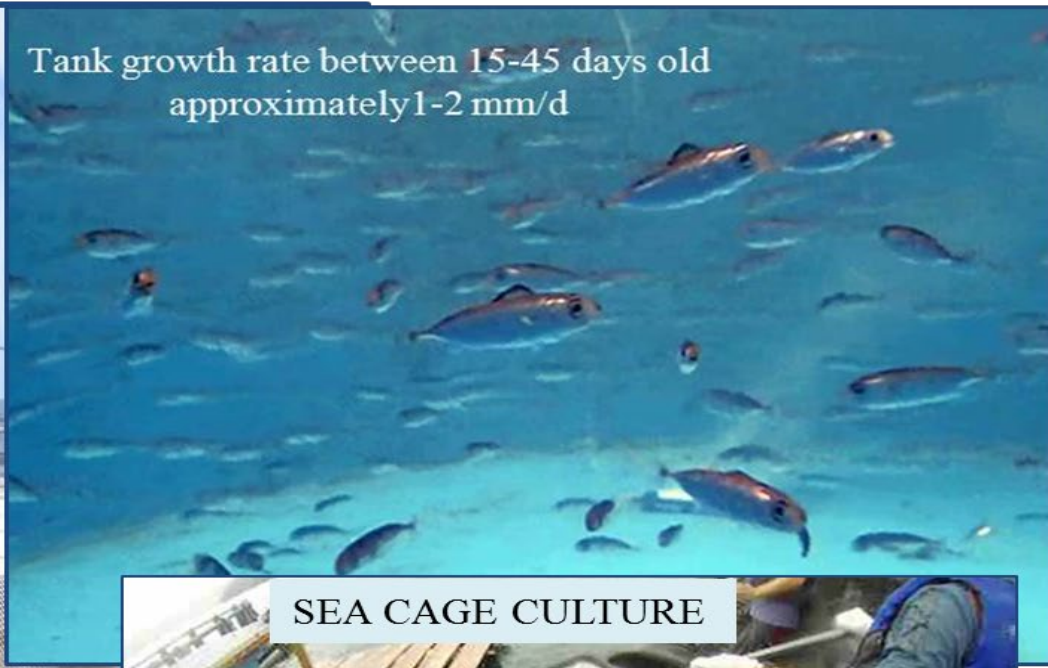
- Current Research on Pre-Recruit Life Stages
 - Growth Studies : Larval Growth of YFT (Goal of Larval Growth Index to Forecast Recruitment)
 - Early Juvenile Studies of YFT : Growth Dynamics/ Density-Dependence In Growth From 1-6 mo of age
 - Comparative Studies of YFT and PBF Early Life Histories: Comparisons to Spawning Patterns
 - Climate Change Studies : Ocean Acidification Effects on YFT – Experimental Results & Modeling
- Bycatch Reduction Research Supported at the Ashotines Laboratory
- Future Directions



Development and growth of yellowfin tuna larvae (photos: first feeding 4-day old larvae, 15-day old flexion larva, 25-day old transforming larva, 30-day old juvenile)

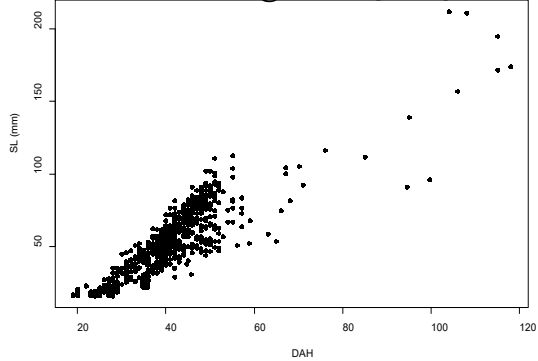
Juvenile Yellowfin Studies

2015: World-first transfer of juveniles from land based tank to sea cage
- Collaboration with Kindai Univ



Tank growth rate between 15-45 days old approximately 1-2 mm/d

Growth in length (0.5 – 4 mo)



Juveniles Reared to 28 cm



SEA CAGE CULTURE

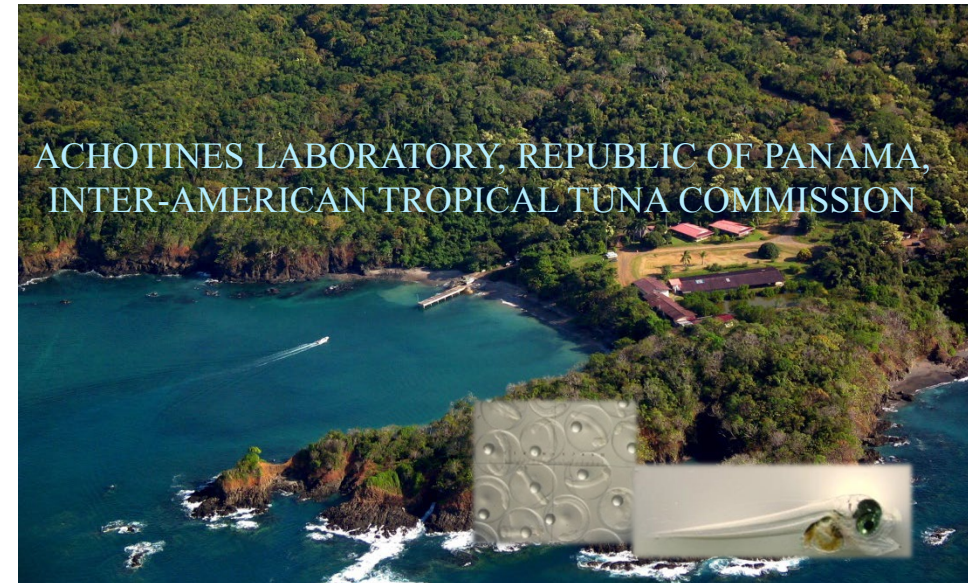


15 cm
2.5 months of age

2019-2022: Studies of Density-Dependent Growth

Comparative Studies of Yellowfin and Pacific Bluefin ELH

SCIENCE AND TECHNOLOGY RESEARCH PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT (SATREPS)



1. Comparative growth and survival studies at multiple background prey levels
2. Comparison of larval starvation rates
3. Comparison of larval feeding dynamics and prey selectivity
4. World-first juvenile rearing and sea-cage culture of yellowfin tuna to recruitment size



Comparative Larval Traits

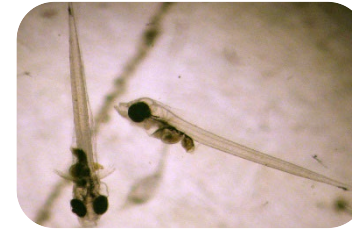


Pacific bluefin tuna (*Thunnus orientalis*)

- **Slightly larger** at egg, yolk sac, and first-feeding larval stages

Longer duration until starvation at the first-feeding stage at similar water temperatures

Slower growth and lower survival under low food conditions, require relatively high prey levels during the first week of feeding

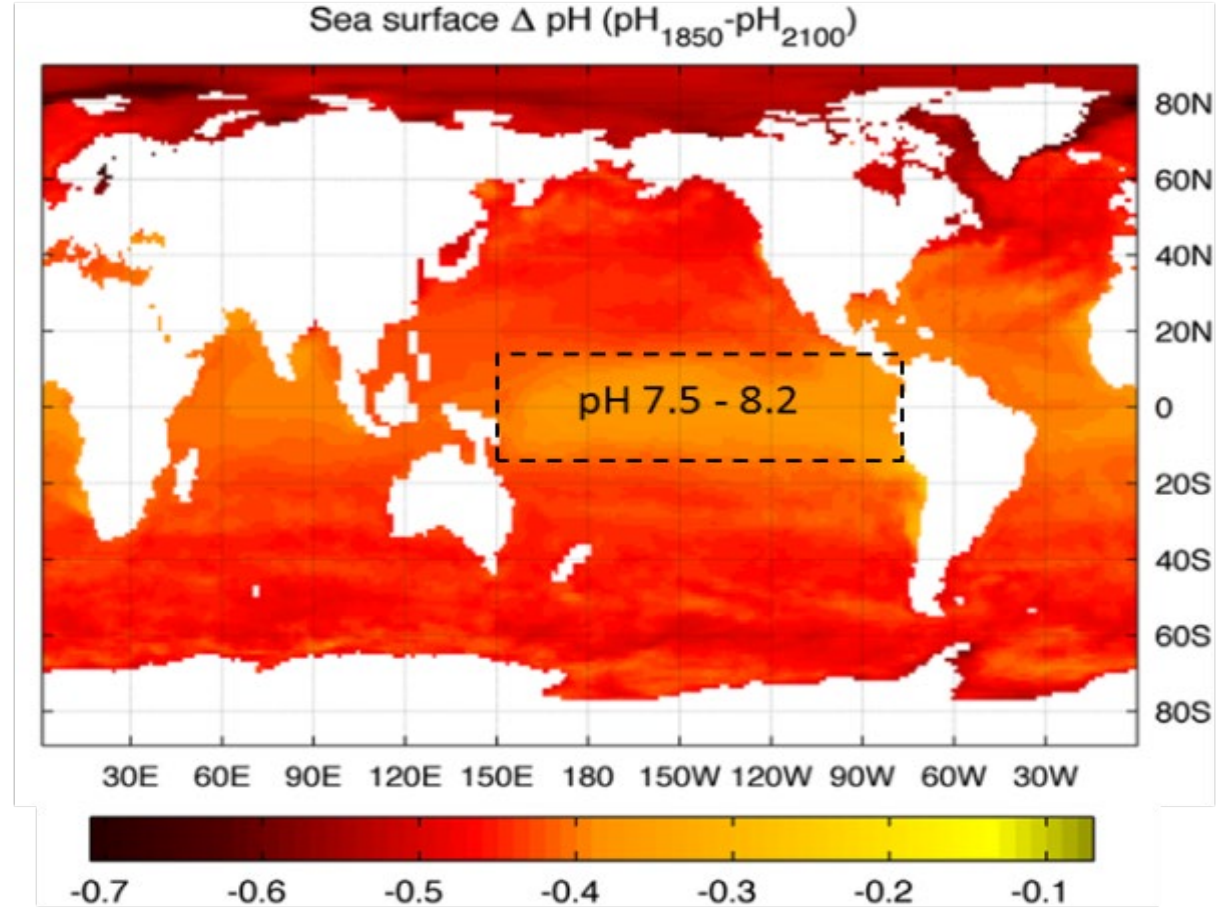


Yellowfin tuna (*Thunnus albacares*)

- **Slightly smaller** at egg, yolk sac, and first-feeding larval stages

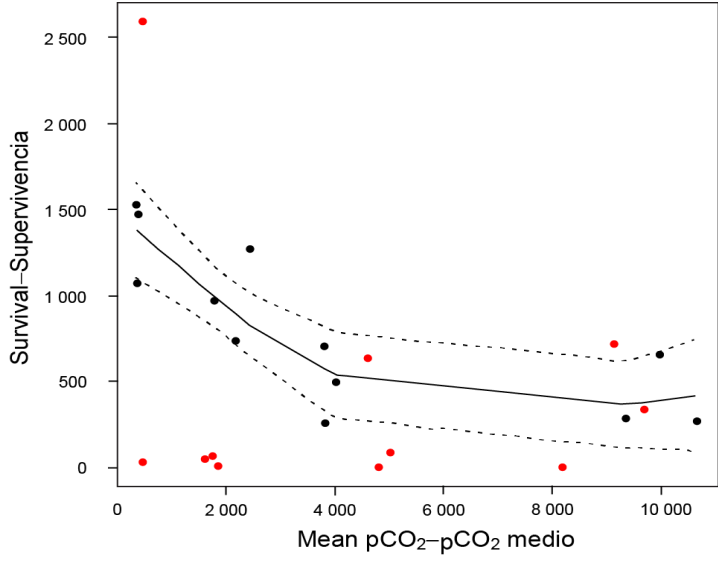
Shorter duration until starvation at the first-feeding stage at similar water temperatures

Faster growth and higher survival under low food conditions, can survive under variable prey conditions during the first week of feeding

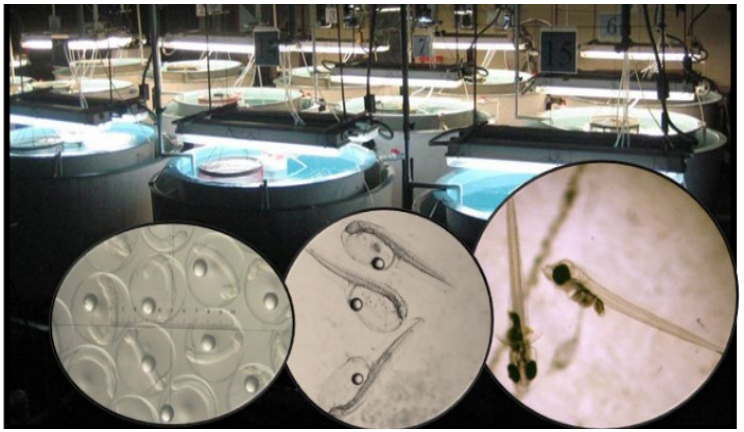
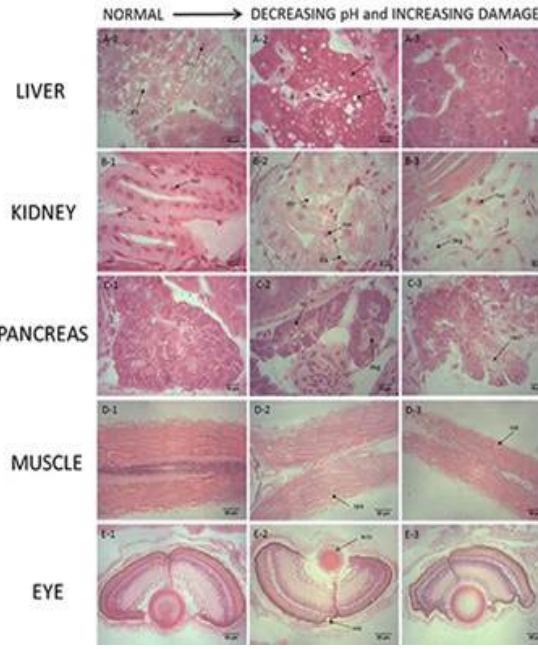


Sea surface changes in pH from 1850 to 2100

Larval Survival vs. Acidification



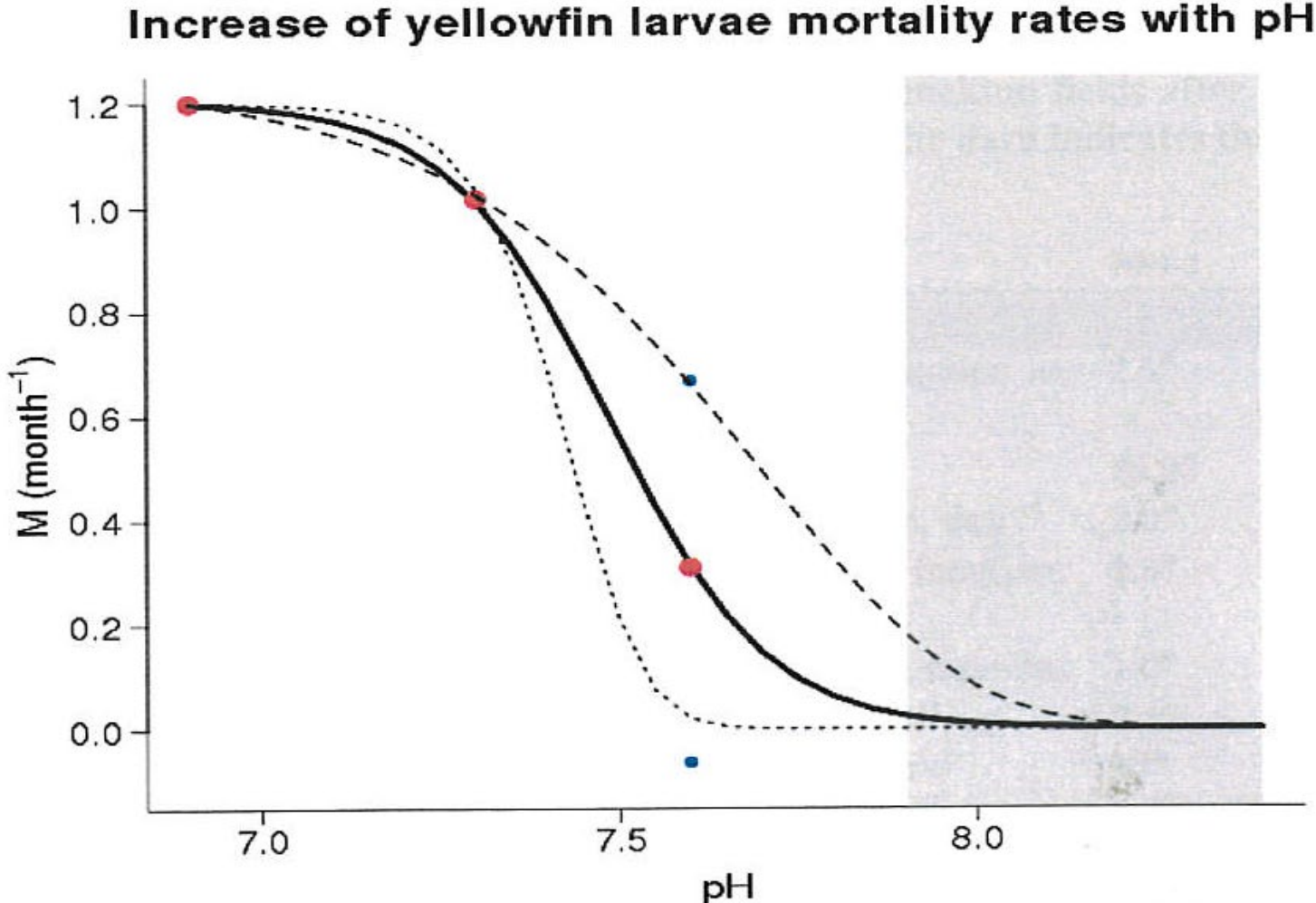
Organ Damage From Acidification



2015-2016: Two publications, OA effects on Survival/Growth & Organ Health
 2021-2022: Ongoing analysis, otoliths and genetics + modeling



Effects of Ocean Acidification on YFT Larval Mortality



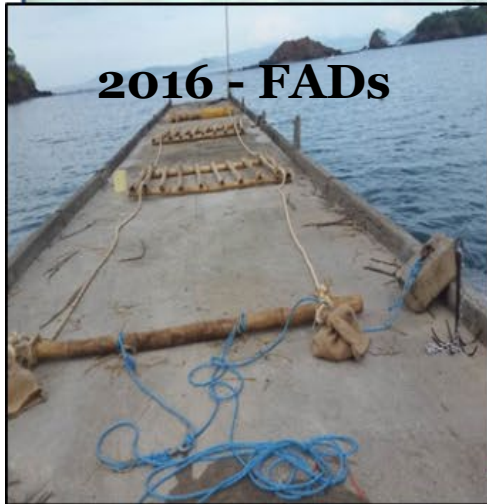
Key Questions From the Research:

- Can YFT adults adapt to increased acidification? **Unknown**
- Are resistant traits heritable? **Unknown**
- Is there a threshold pH level that could influence YFT recruitment? **pH 7.6 -7.5?**
- How does ocean warming interact with ocean acidification? **TBD**

From: Lehodey et al. 2017. WCPFC-SC13-2017/EB-WP-01 & Senina et al., 2018. Final Report CI-3, Common Oceans ABNJ Program ; *New: Nicol et al., 2022, **Ocean Futures For Pacific YFT Under Synergistic Effects of Ocean Warming and Acidification. *Frontiers in Mar. Sci.***

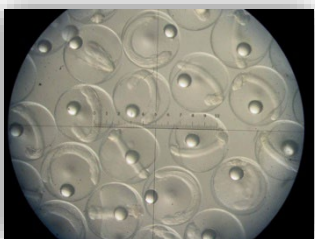


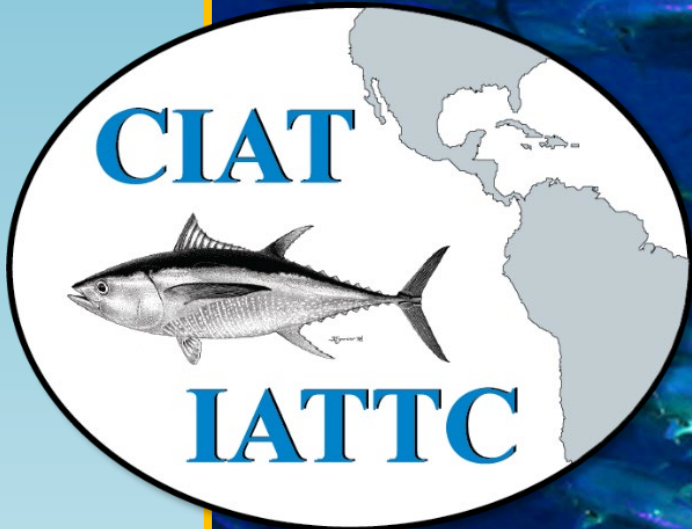
Research on Reducing Bycatch and FAD detection – Achotines Laboratory



Future Directions: A Long-Term Plan for Research at the Achatines Laboratory

- A long-term plan to strengthen and diversify research is under development
- Components of the plan include:
 - Identification of areas of research to be expanded and diversified
 - Improvements in infrastructure and identification of new sources of funding (SENACYT grant)
 - Staff internal review and external review of the plan and research programs of the Laboratory
 - A focus on strengthening links among pre-recruit research, stock assessment and management
 - Development of a program of great return value to the IATTC and the goals of Antigua Convention





Questions

