

Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission

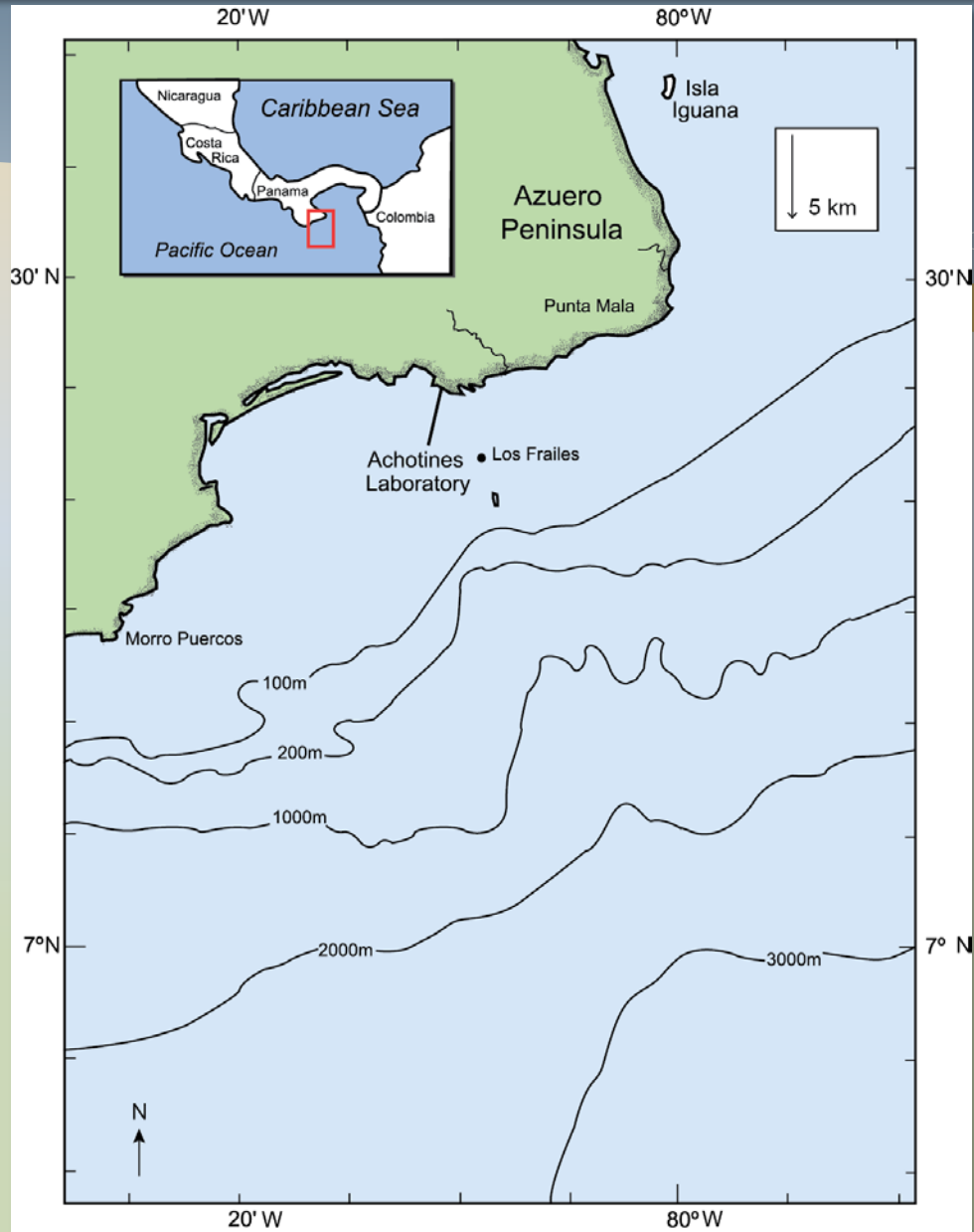
Achotines Laboratory: Review of research



SAC-08-09c – Background Document
Achotines Website: www.iattc.org

Daniel Margulies, Vernon P. Scholey, Jeanne B. Wexler, and Maria S. Stein

Location of Achotines Laboratory



Research on yellowfin tuna (1996 to present)



RESEARCH ON REDUCING BYCATCH

2005 – Sorting Grids

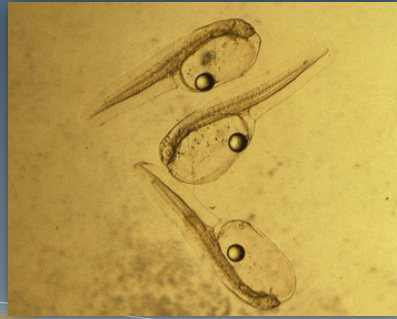
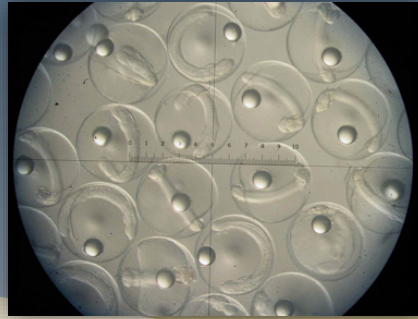


2016 – Acoustic Trials



2016 - FADs



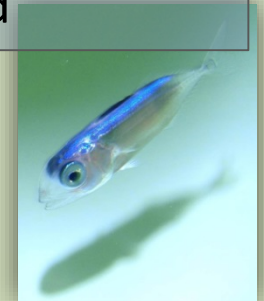


Achotines Laboratory : Yellowfin Research Program

Studies of yellowfin tuna: 21 years of research have yielded important findings related to spawning, growth and genetics of adult yellowfin and key factors affecting survival in prerecruit stages

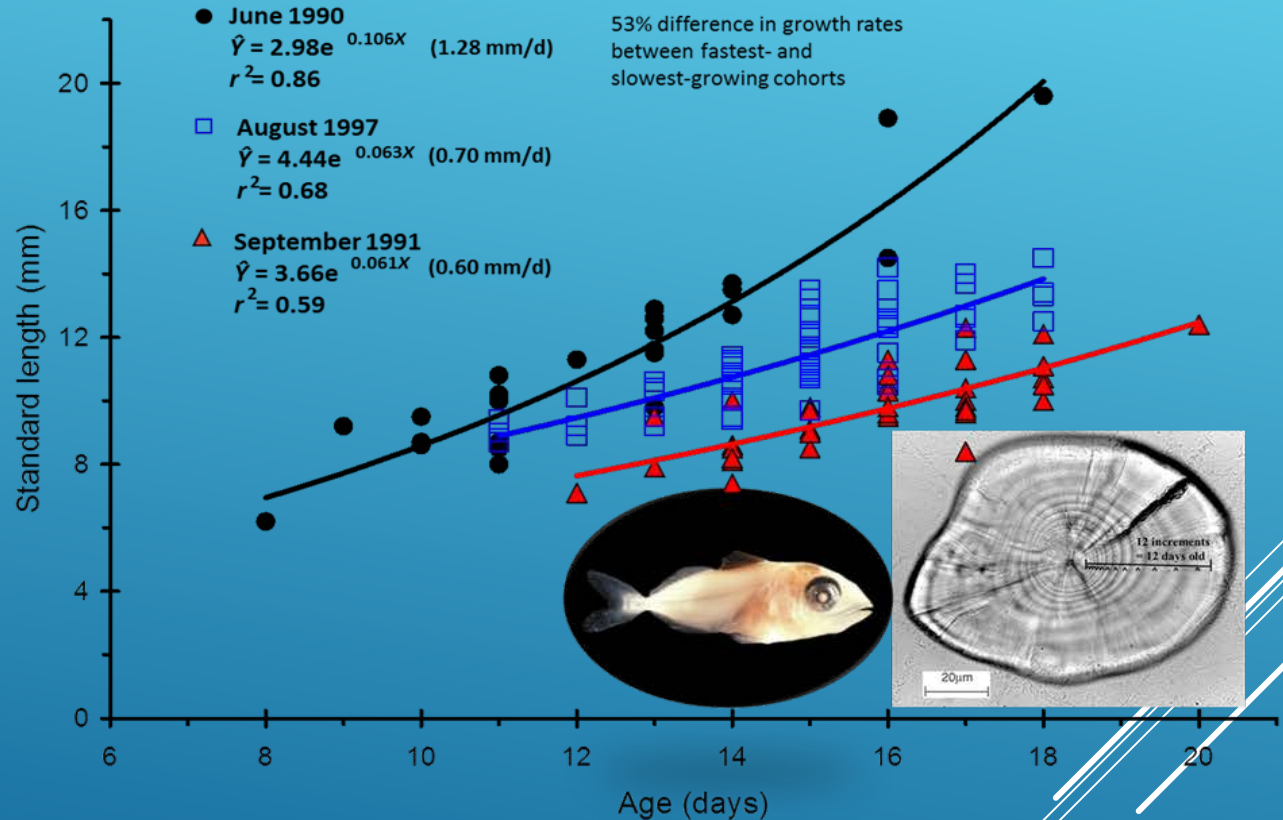
Potential tools for use in stock assessment

- Larval or juvenile growth indices
- Analysis of windspeed vs. recruitment
- Early life history of yellowfin vs. Pacific bluefin
- Impact of climate change on yellowfin spawning and early life stages
- Juvenile studies now possible with fish that are 1-6 months old



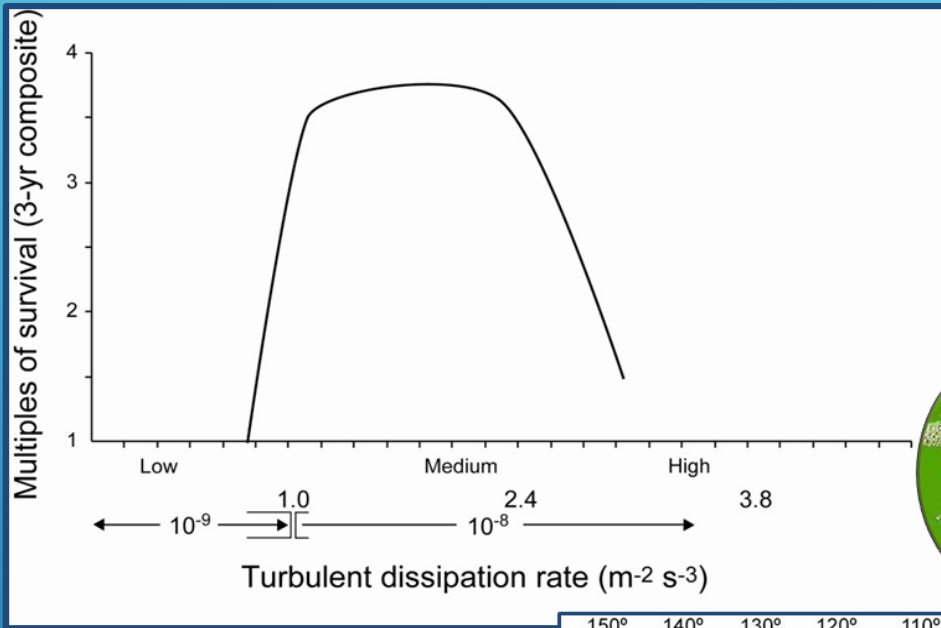
GROWTH STUDIES

In-situ growth rates from otolith ageing of yellowfin tuna larvae caught in the Panama Bight

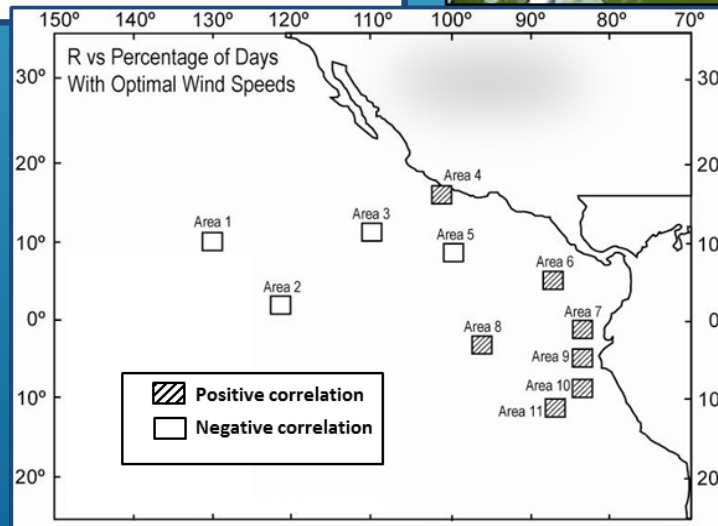


Development and growth of yellowfin tuna larvae (photos: first feeding 4-day old larvae, 15-day old flexion larva, 25-day old transforming larva, 30-day old juvenile)

WIND AND MICROTURBULENCE EFFECTS ON LARVAL SURVIVAL



Optimal Windspeed Estimate:
2.0 – 4.5 m/sec



Comparative Studies of the Reproductive Biology and Early Life History of Yellowfin (*Thunnus albacares*) and Pacific Bluefin Tuna (*Thunnus orientalis*) Applications to Tuna Resource Management and Aquaculture Development

SCIENCE AND TECHNOLOGY RESEARCH PARTNERSHIP FOR SUSTAINABLE DEVELOPMENT
(SATREPS)



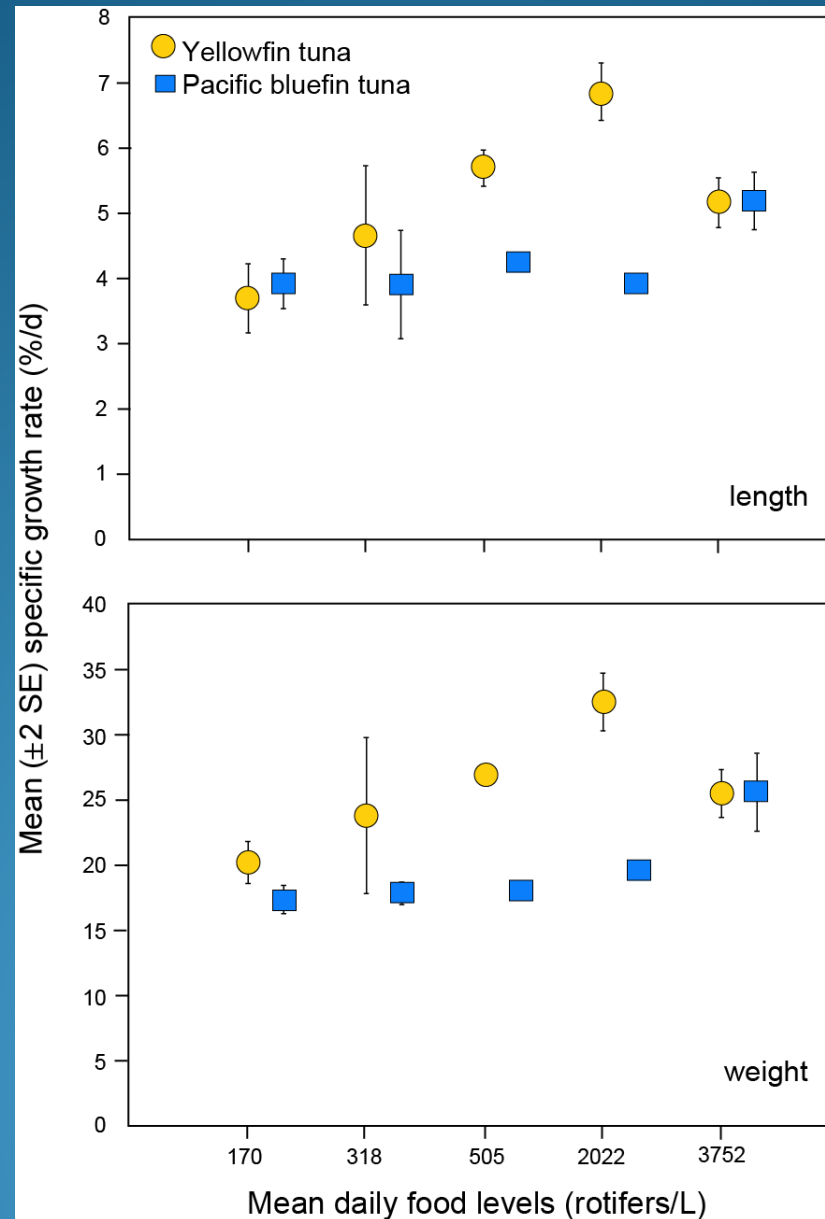
KINDAI UNIVERSITY FISHERIES LABORATORIES,
OSHIMA BRANCH, JAPAN



ACHOTINES LABORATORY, REPUBLIC OF PANAMA,
INTER-AMERICAN TROPICAL TUNA COMMISSION

1. Growth and survival studies at multiple background prey levels
2. Starvation durations
3. Feeding dynamics and prey selectivity
4. Juvenile rearing and sea-cage culture of yellowfin tuna to recruitment size

Growth of bluefin and yellowfin tuna larvae at different food levels





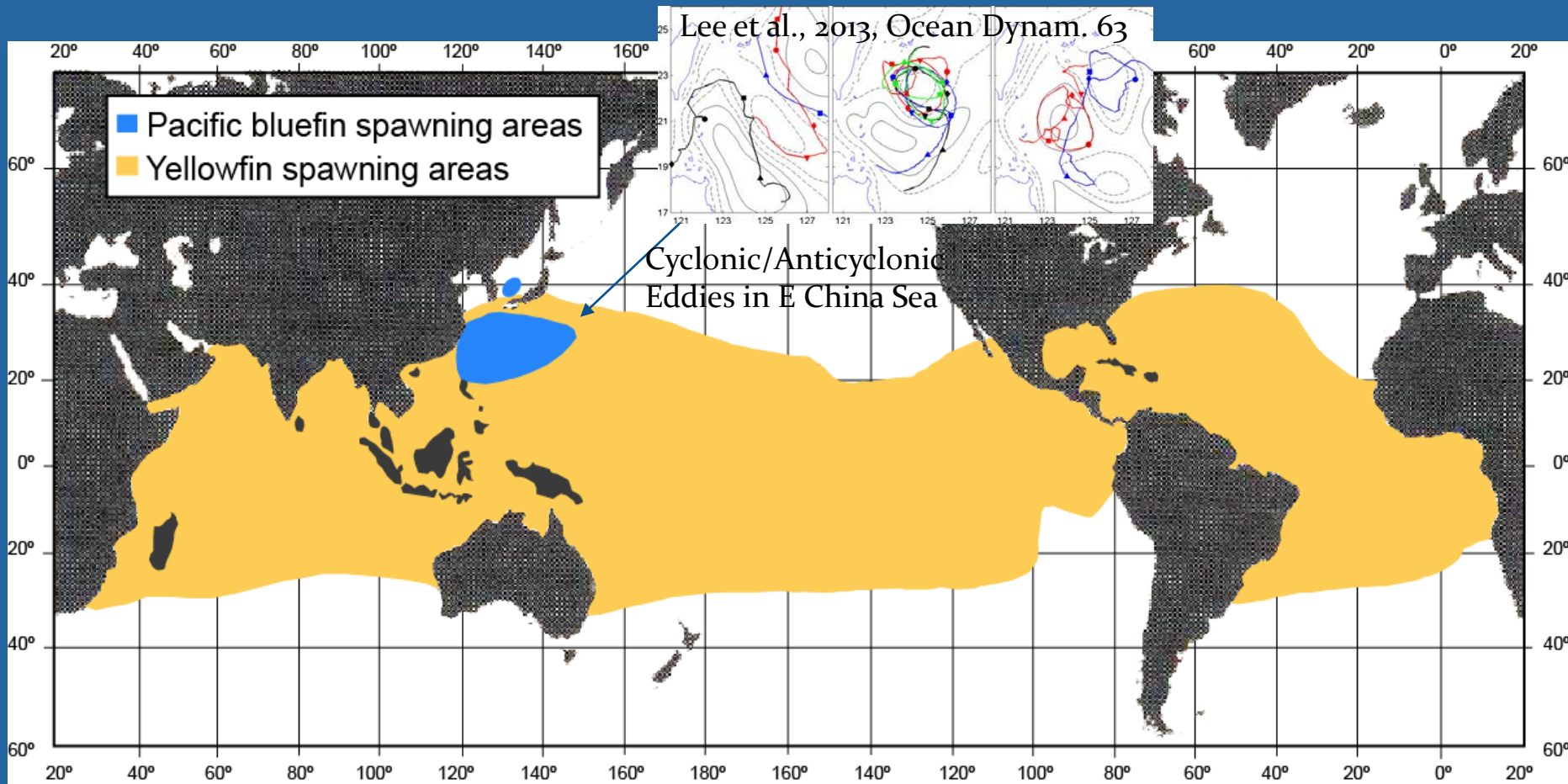
Pacific bluefin tuna
(*Thunnus orientalis*)



Yellowfin tuna
(*Thunnus albacares*)

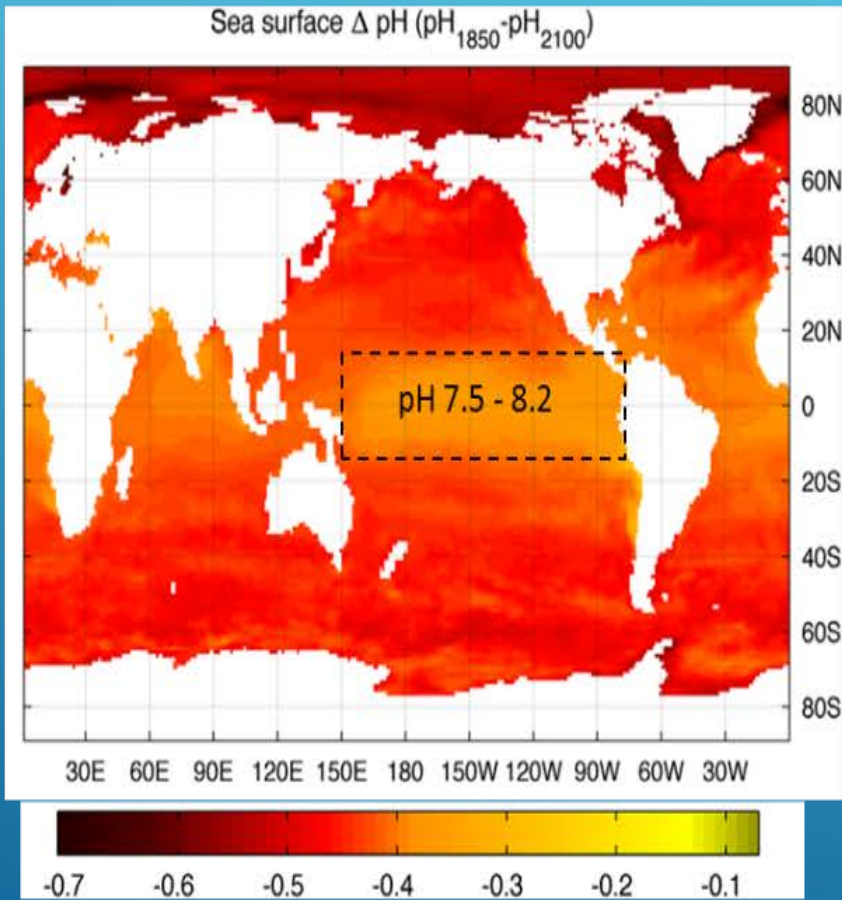
- Slightly larger at egg, yolk sac, and first-feeding larval stages
 - Longer duration until starvation at the first-feeding stage at similar water temperatures
 - **Slower growth and lower survival under low food conditions, require relatively high prey levels during the first week of feeding**
- Slightly 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**

SPAWNING DISTRIBUTION OF PACIFIC BLUEFIN AND YELLOWFIN TUNAS



YFT Larvae: Lottery Pattern of Spawning Under Variable Larval Trophic Conditions
PBF Larvae: Require Match to Concentrated Prey in Mesoscale Fronts and Eddies

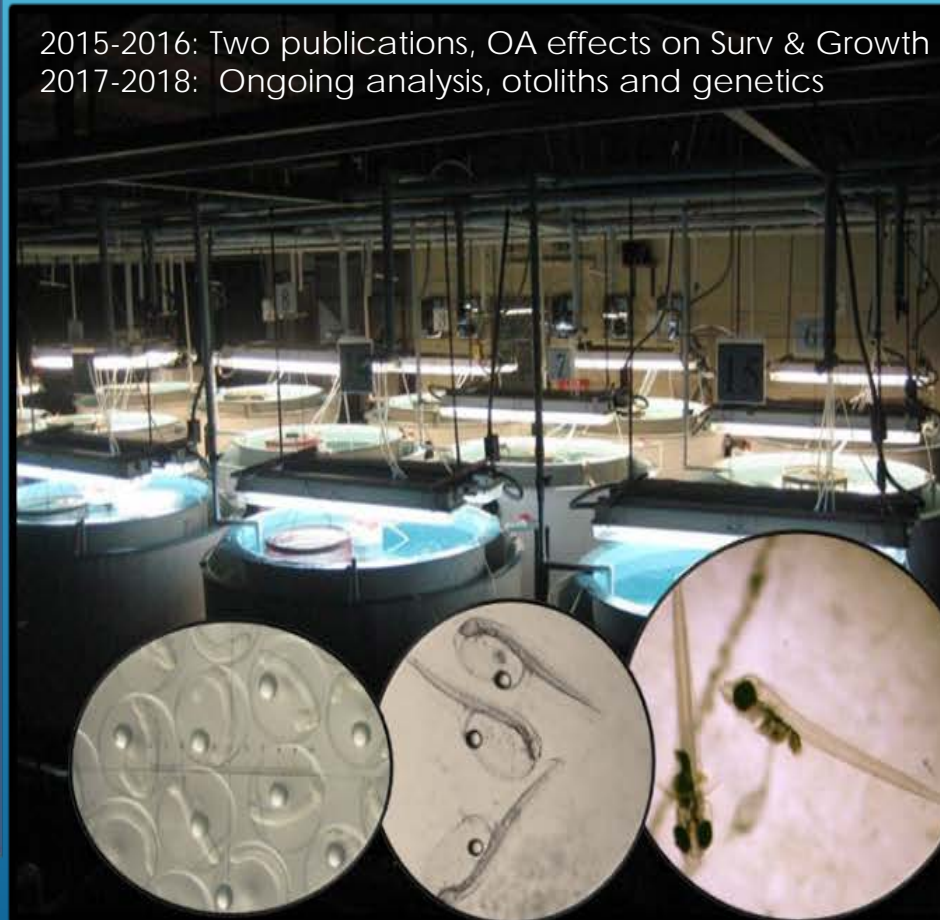
CLIMATE CHANGE STUDIES



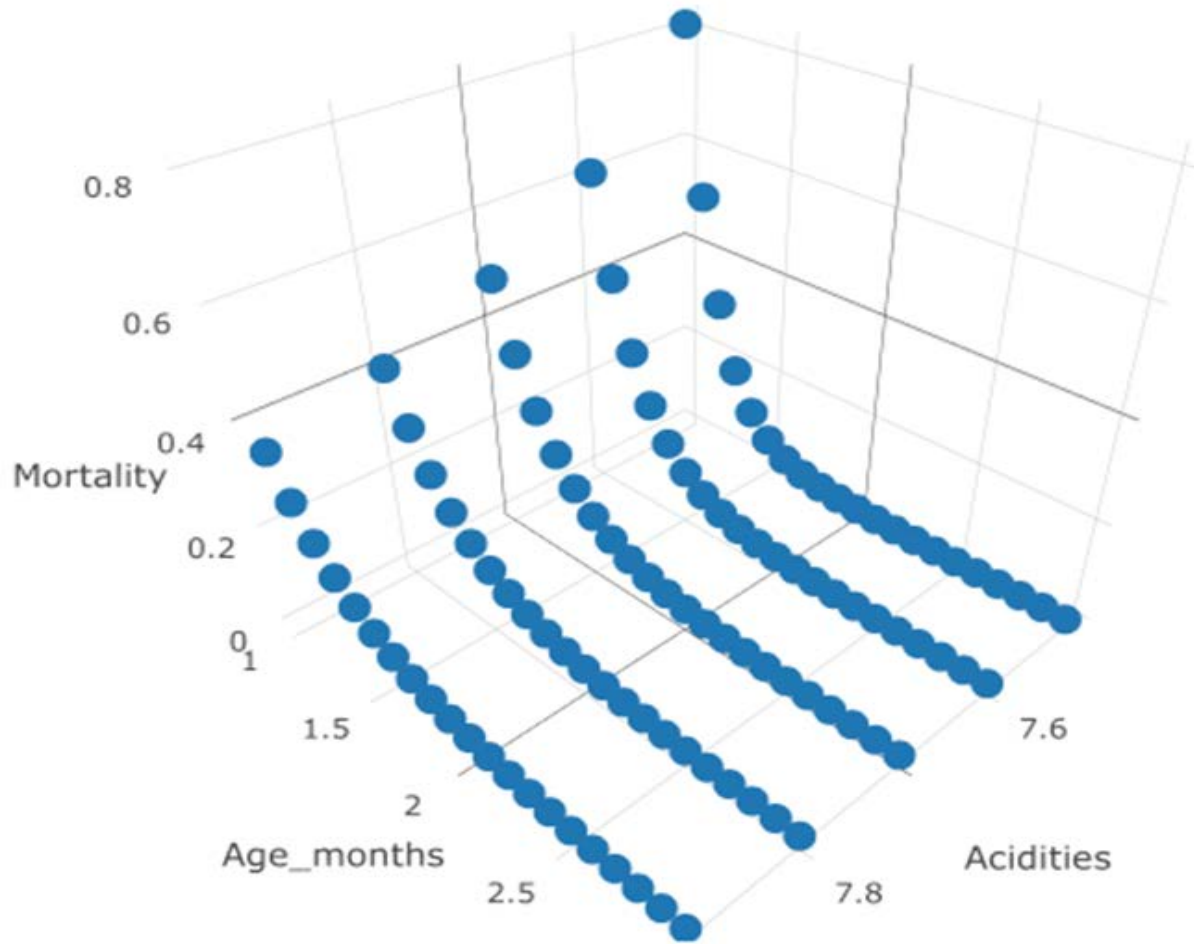
Sea surface changes in pH from 1850 to 2100

Ocean acidification trials with yellowfin eggs and larvae

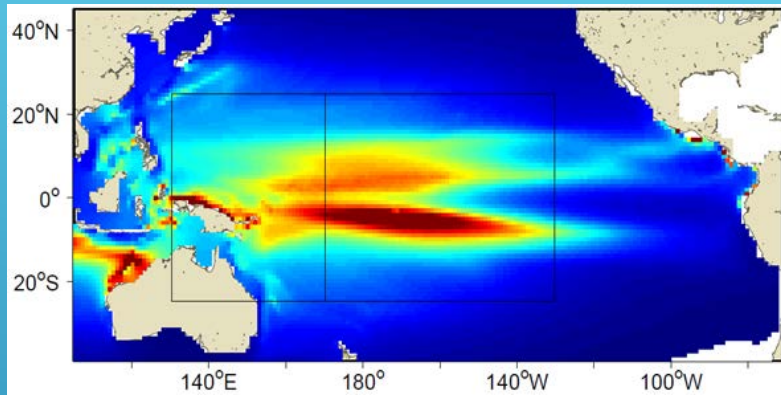
2015-2016: Two publications, OA effects on Surv & Growth
2017-2018: Ongoing analysis, otoliths and genetics



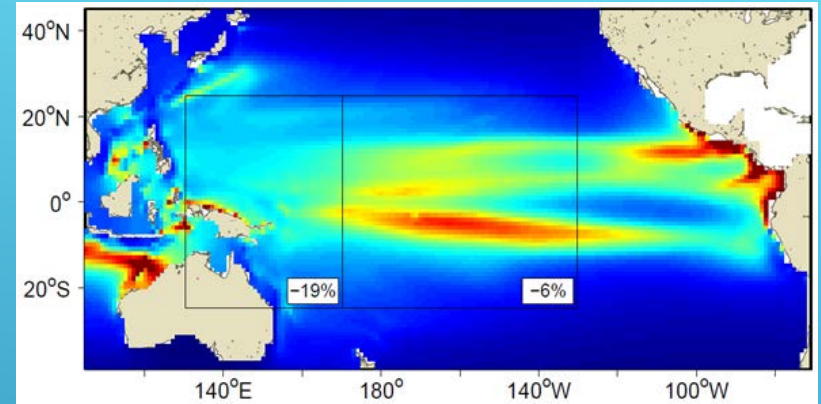
OA Workshop Estimate: Larval YFT Daily Mortality vs. Ocean pH vs. Larval Age



Yellowfin Distribution : 2005
(Lehodey et al. 2016)



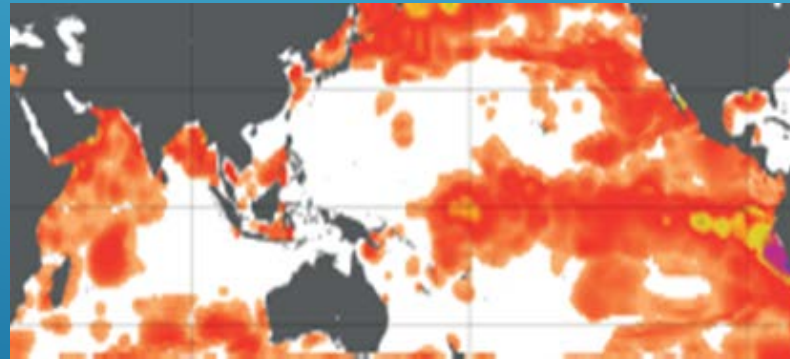
Yellowfin Distribution: 2050
(Lehodey et al. 2016)



Associated Topics of Study:

- Ocean warming
- Oxygen depletion

Ocean Acidification Hotspots : 2050 – 2100 (McNeil and Sasse 2016)



- SEAPODYM Predictions of Yellowfin Distributions in Pacific from 2005-2050 (Top)
- Prediction of Ocean Acidification Hotspots in the Pacific from 2050-2100 (Bottom)

JUVENILE YELLOWFIN STUDIES



2017-2018: Joint Studies With U Miami

Yale University



Environmental
Leadership &
Training Initiative



Yale University



Environmental
Leadership &
Training Initiative



Mangrove Ecosystem Protection



Watershed Restoration

An aerial photograph showing a coastal area with rolling green hills on the left and a blue body of water on the right. The hills are densely forested and have a wavy, undulating appearance. The water is a deep blue, with white surf visible where waves are breaking against the shore. A small peninsula or island is visible in the lower center of the image, with a line pointing to it from the text 'Achotines Intake'.

ELTI-Achotines Laboratory Association:

- 3-Year Agreement
- Local Contract Management in Panama
- Good Stewardship of Forest and Watershed
- Protection of Achotines Water Quality
- Ca. 30-35% of Annual Funding to Achotines
- No Impact on Achotines Tuna Research

○ Achotines Intake