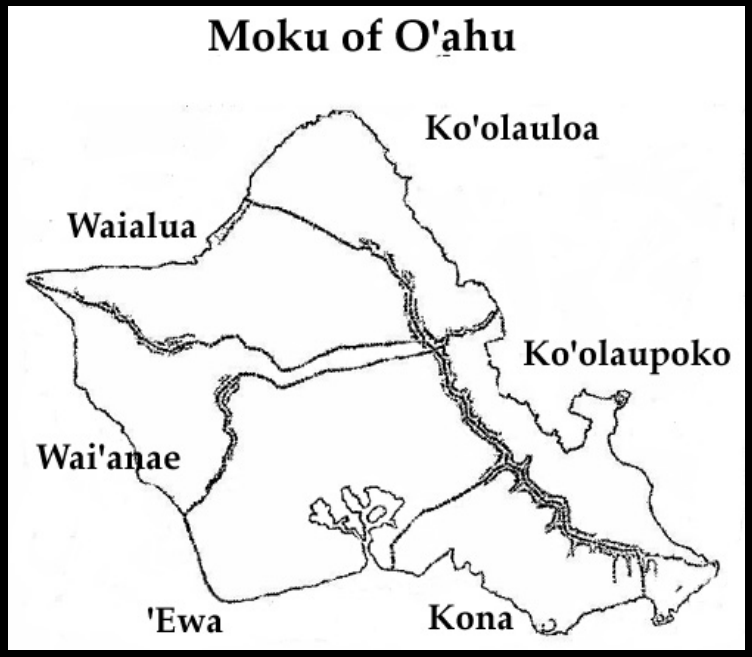
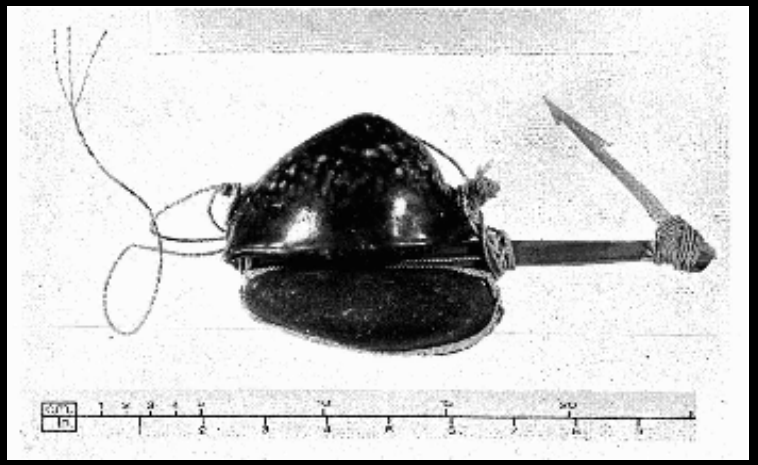
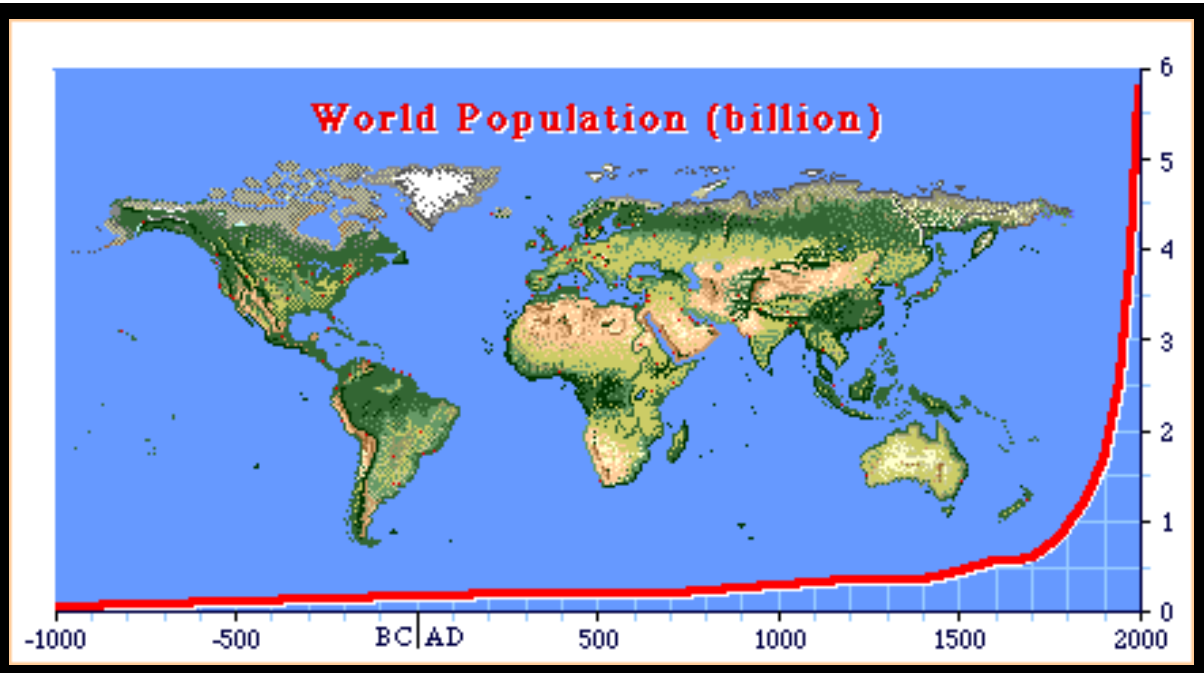
History of fisheries

Local History and Traditions







U.S. Department of Commerce

United States Census Bureau

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U.S. and World Population Clock

Note: The Population Clock is consistent with 2010 Census data and the most recent national population estimates.

Jun 19, 2013 14:37 UTC (-10)

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U.S. Population

316,082,045

World Population

7,092,794,00[illegible]

COMPONENTS OF POPULATION CHANGE

14:37:45 UTC

- One birth every **8 seconds**
- One death every **12 seconds**
- One international migrant (net) every **44 seconds**
- Net gain of one person every **13 seconds**

TOP 10 MOST POPULOUS COUNTRIES

1. China	1,349,585,838	6. Pakistan	193,238,868
2. India	1,220,800,359	7. Nigeria	174,507,539
3. United States	316,668,567	8. Bangladesh	163,654,860
4. Indonesia	251,160,124	9. Russia	142,500,482
5. Brazil	201,009,622	10. Japan	127,253,075

Select a Date

The United States population on July 4, 2012 was: 313,933,954

Select a Date

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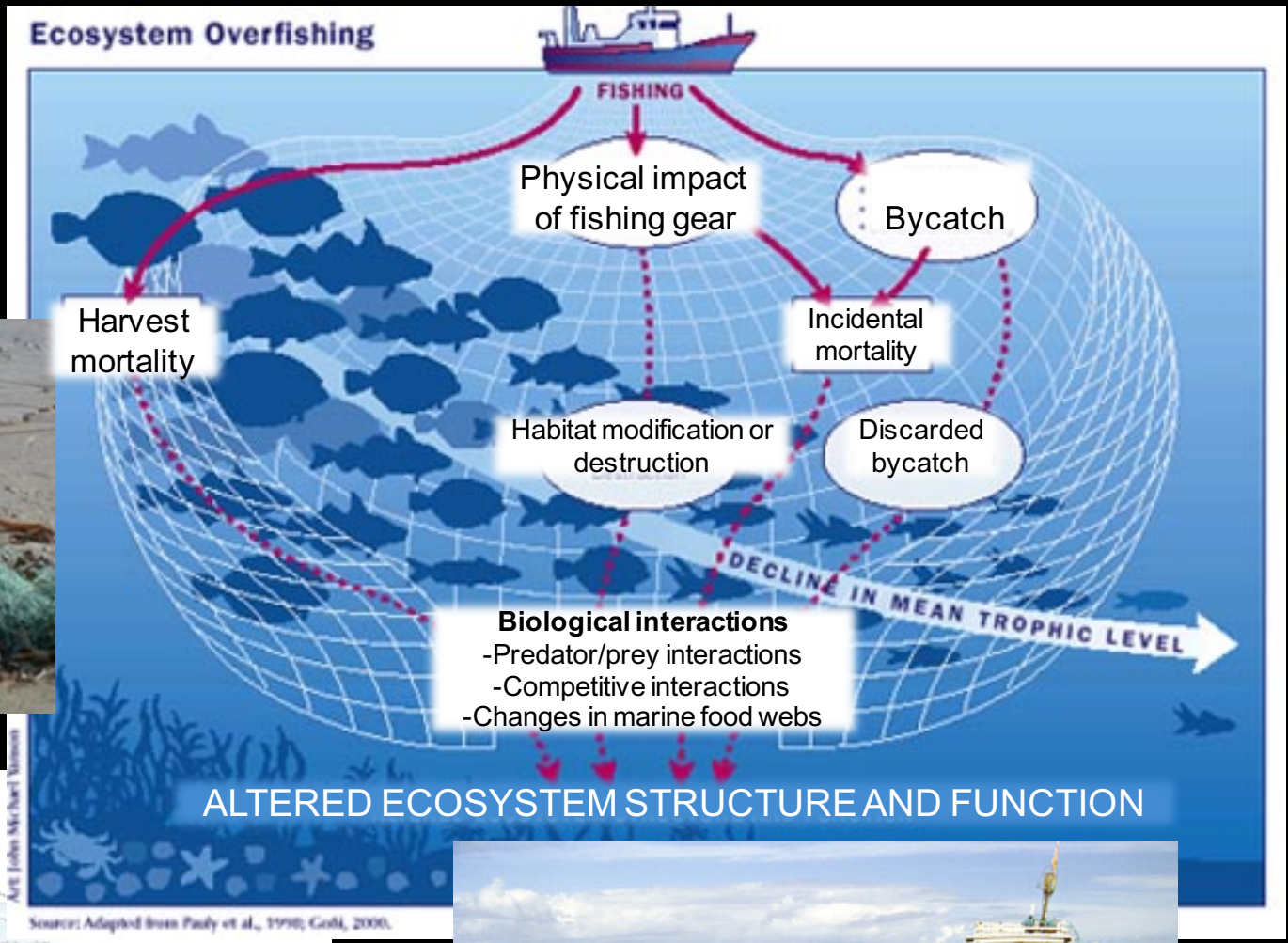
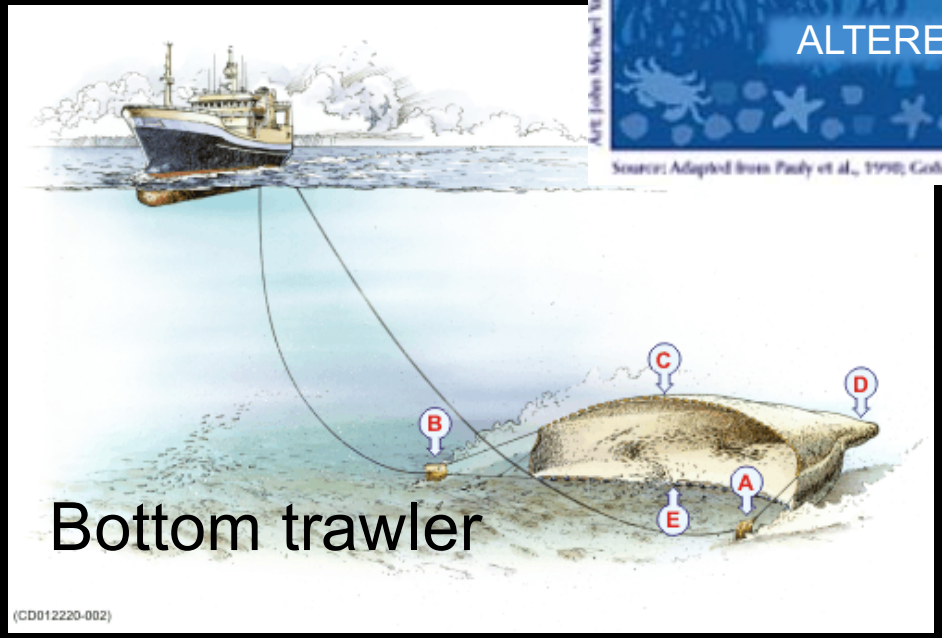
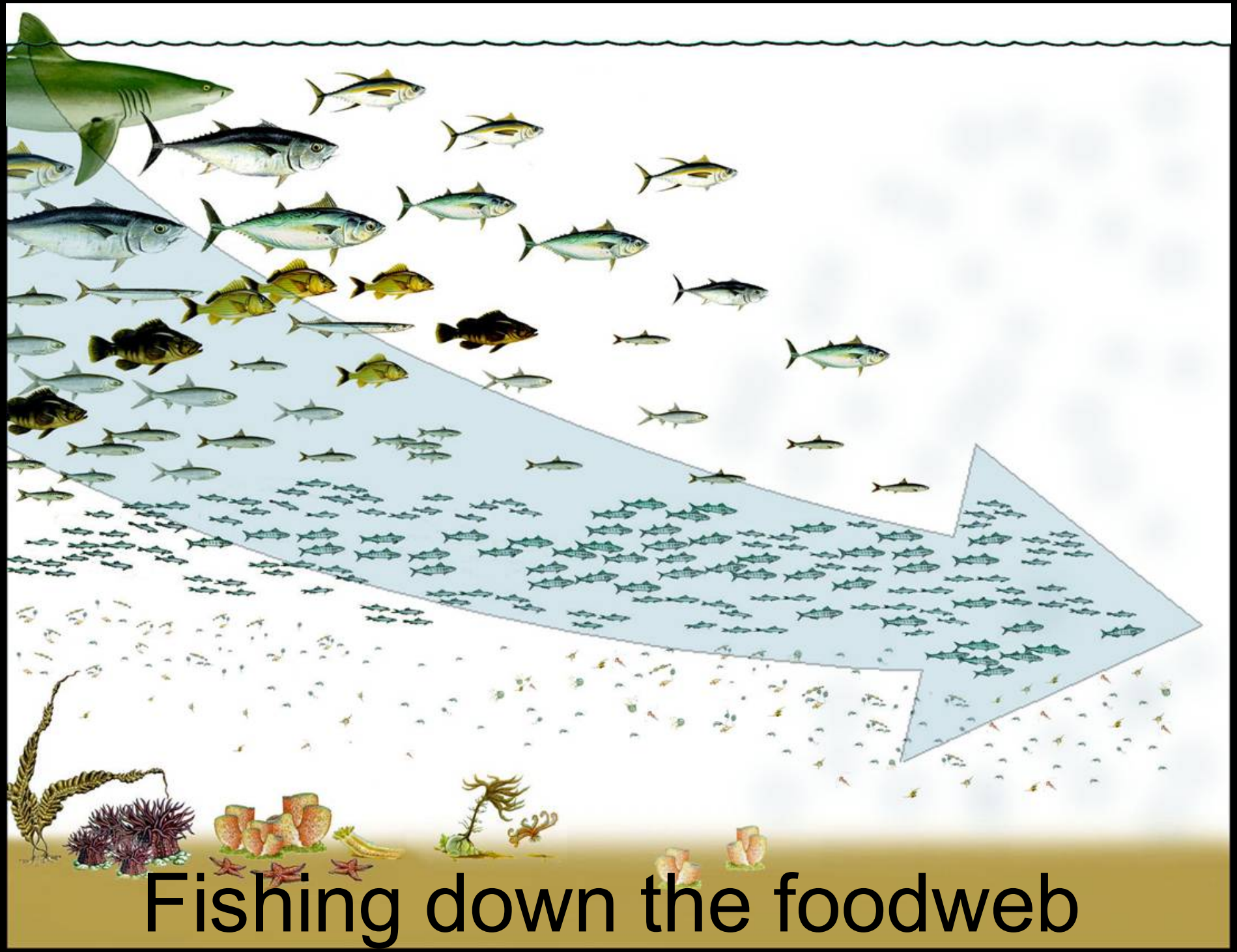
Finfish ***and*** Invertebrates

Overfishing

When fishing activities reduce fish stocks below a sustainable level.

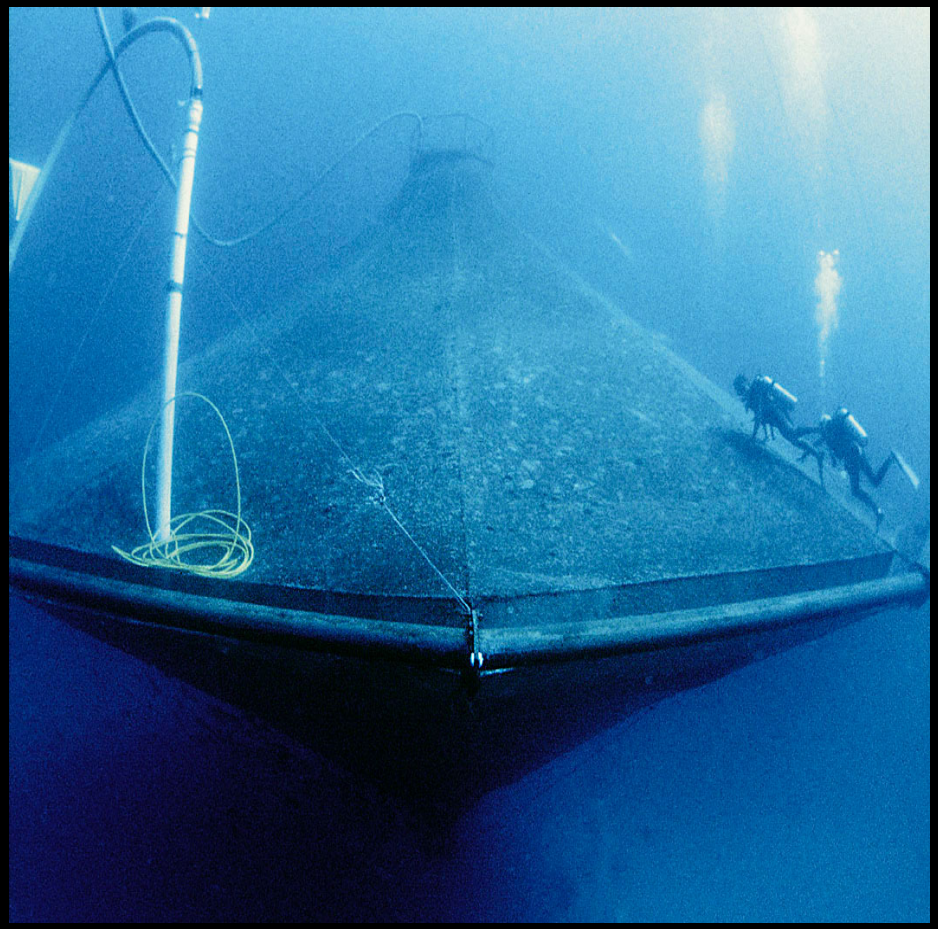





Fishing down the foodweb

There seem to be lots of problems…but are there any solutions?

ONE ALTERNATIVE:
AQUACULTURE or FISH FARMING



ADVANTAGES:

- Reduces pressure on natural populations
- Reduces bycatch
- Reliable food source

DISADVANTAGES:

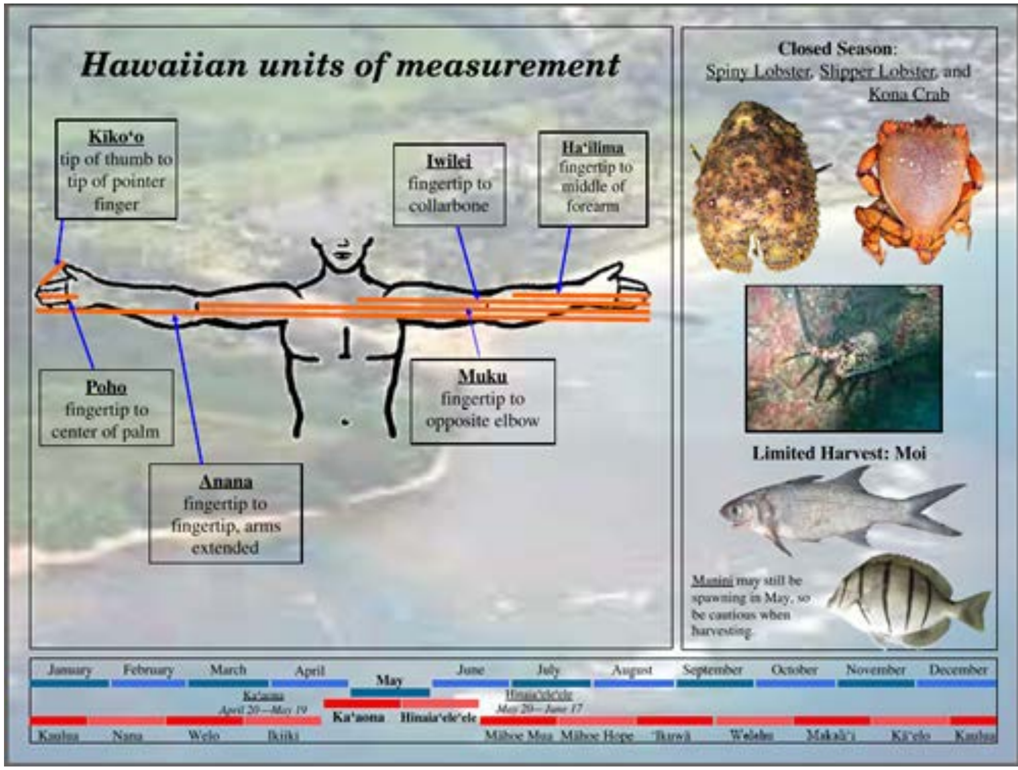
- Crowded cages can cause disease outbreaks
- Fish sewage and disease may escape and affect the environment
- Requires lots of research before fish can be raised and harvested

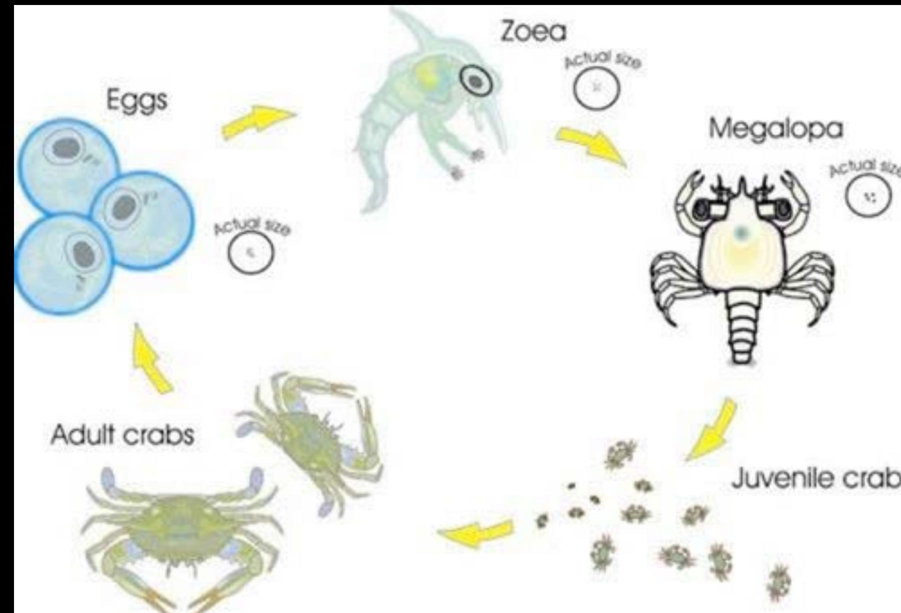
Hawaiian Fish Ponds: He‘eia

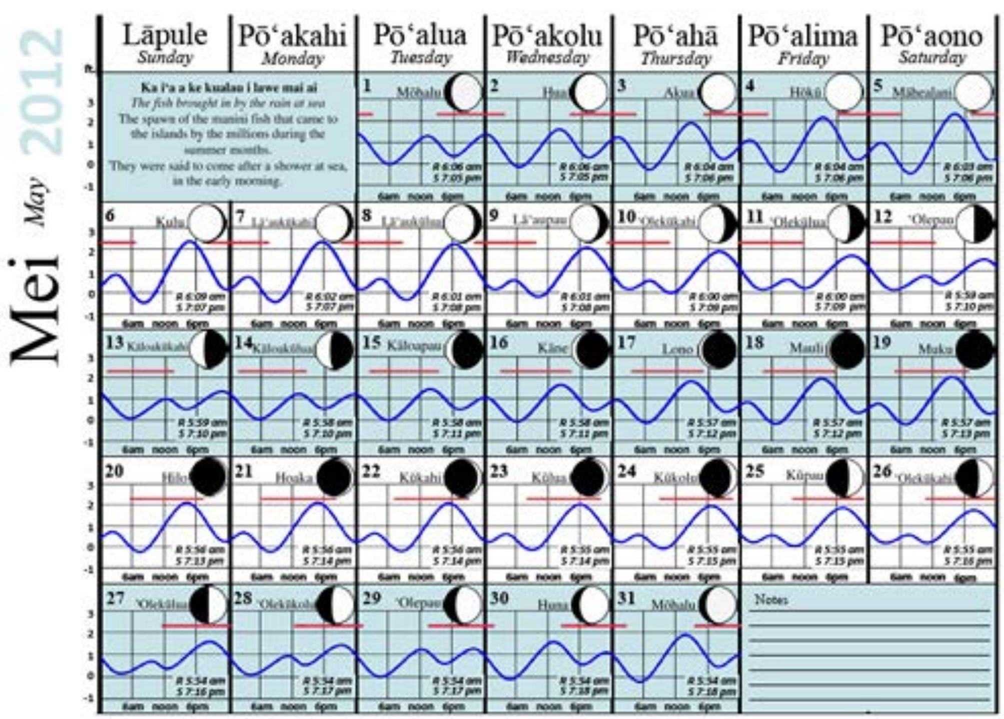
VIDEO

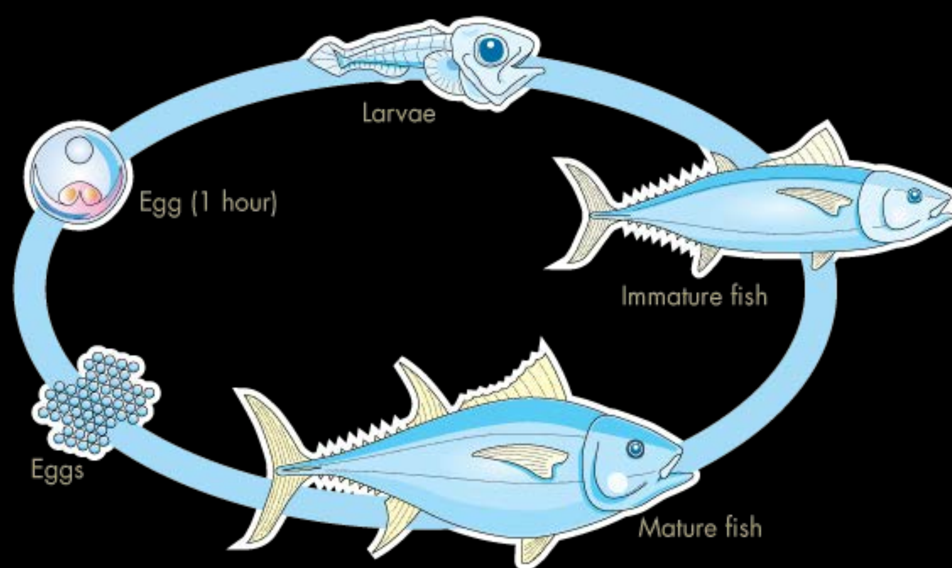
What do you know about fish spawning?

- Behavioral cues
- Environmental cues
- High mortality


Hawaiian units of measurement
Kīkoʻo
tip of thumb to tip of pointer finger
Iwilei
fingertip to collarbone
Haʻilima
fingertip to middle of forearm
Poho
fingertip to center of palm
Muku
fingertip to opposite elbow
Anana
fingertip to fingertip, arms extended
Closed Season:
Spiny Lobster, Slipper Lobster, and Kona Crab
Limited Harvest: Moi
Manini may still be spawning in May, so be cautious when harvesting.
January February March April May June July August September October November December
Kaʻaona Hinaiaʻeleʻele

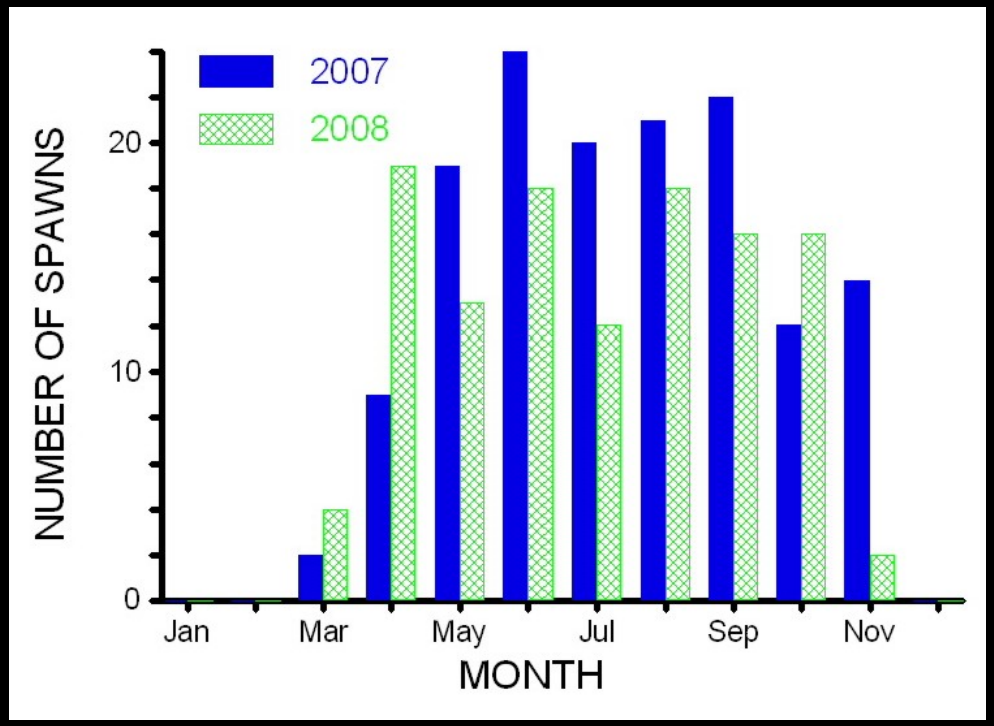

Eggs
Actual size
Zoea
Actual size
Megalopa
Actual size
Juvenile crabs
Adult crabs


Mei May 2012
Lāpule Sunday
Pōʻakahi Monday
Pōʻalua Tuesday
Pōʻakolu Wednesday
Pōʻahā Thursday
Pōʻalima Friday
Pōʻaono Saturday
Ka iʻa a ke kualau i lawe mai ai
The fish brought in by the rain at sea
The spawn of the manini fish that came to the islands by the millions during the summer months.
They were said to come after a shower at sea, in the early morning.
Notes


Larvae
Egg (1 hour)
Immature fish
Eggs
Mature fish

Coconut Island Research

Raising ʻŌpakapaka

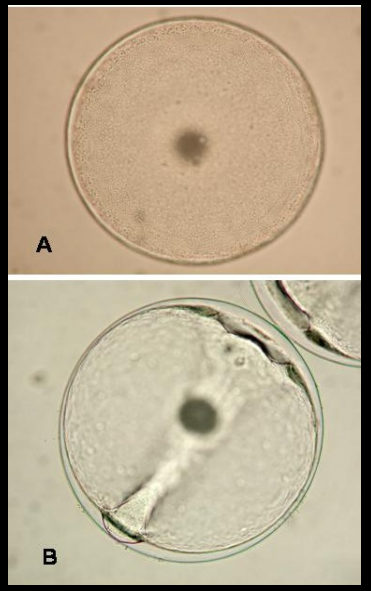


Today's Activities

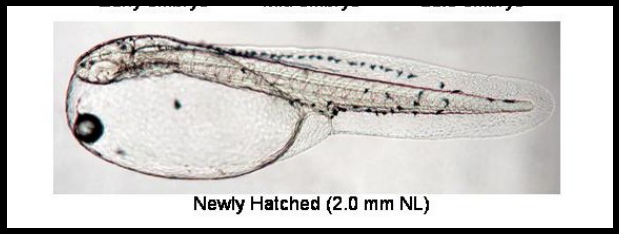
1. Collect spawn from ʻŌpakapaka pens

2. Quantify the number of eggs

3. Separate eggs from debris

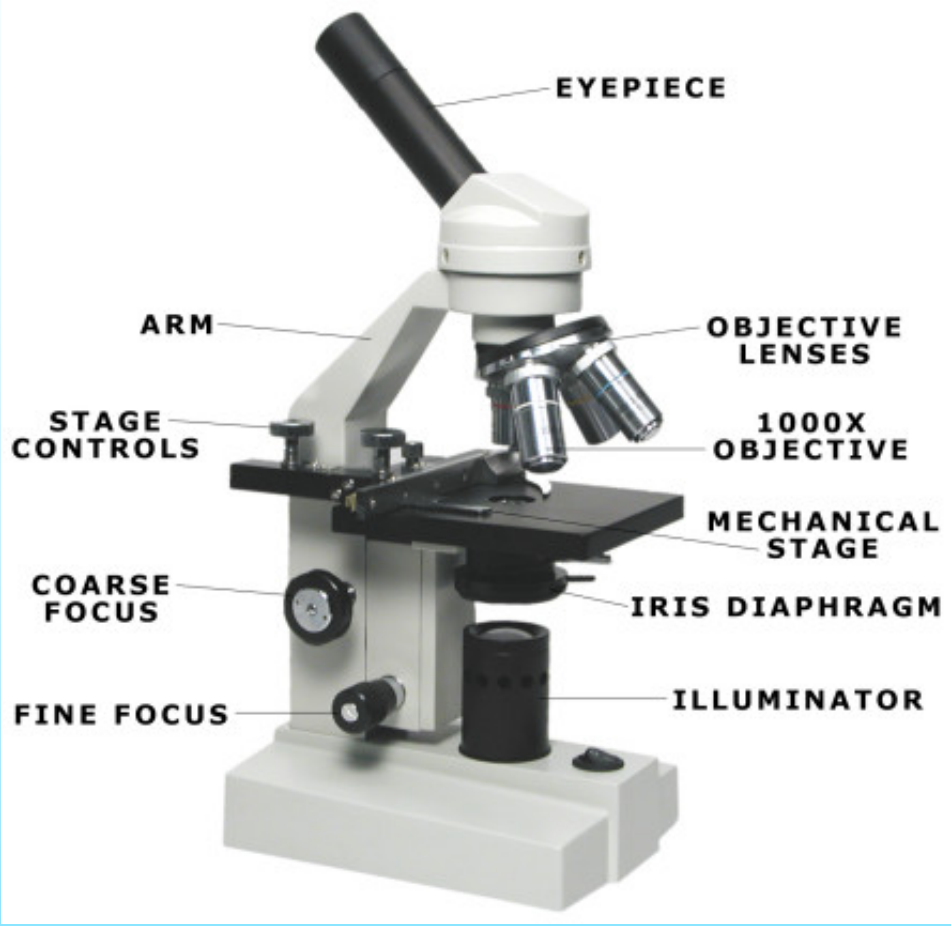


4. Determine percent fertilization



5. Estimate time of spawning and hatching

COMPOUND MICROSCOPES



Task 2: Quantifying the number of eggs

1. Place aerator into bucket
2. Use glass pipette to mix first, and then transfer 10mL from bucket into petri dish
3. Draw a grid and use magnifying glass + light to count eggs in 10mL
4. Calculate how many eggs are in 10L (multiply your count by 1000)
5. Take the average among all students in your group and report to instructors

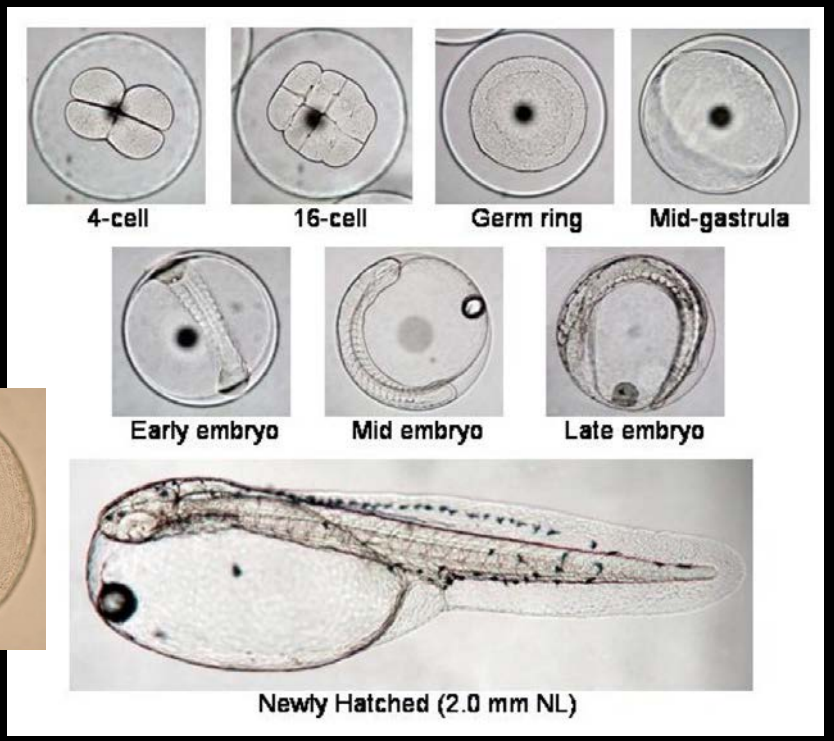
Task 3: Separating eggs from debris

1. Turn off aerator
2. Use 1000mL glass beaker to remove 700mL from bucket FROM SURFACE
3. Add 300mL of tap water
4. Wait approximately 5 minutes for debris to surface
5. Use glass pipette to remove debris
6. Add Salt until the salinity matches the salinity of ocean water (USE REFRACTOMETER)
7. Wait approximately 5 minutes for eggs to surface
8. Use glass pipette to collect 10mL from the beaker (and as many eggs as possible) and transfer to little petri dish

1. Wait approximately 5 minutes for eggs to surface
2. Use glass pipette to collect 10mL from the beaker (and as many eggs as possible) and transfer to little petri dish

Task 4: Determine percent fertilization

1. Use bulb pipette to transfer ~20 eggs from the beaker to a depression slide (watch demo)
2. Use compound microscope to how many eggs are fertilized
3. Calculate percent fertilization
4. Report findings to instructors



Task 5: Estimate time to spawning and time to hatching

1. Use Figure 10 to determine developmental stage of the eggs
2. Use Table in Appendix to calculate data and time of spawning and date and time of hatching
3. Report findings to instructors

CLEAN UP

- Wash all lab materials in the sinks
  - Clean pipettes by sucking up fresh water twice and rinse the outside.
- Use sink sponges to wipe down tables, then use blue/yellow rags and cleaner spray
- Sweep floors
- Place chairs on top of table

- Dry microscope slides and cover slips
- Dump water back in the ocean

RESULTS

- How many eggs did each group find?
- What percentage of the eggs was fertilized?
- What time did the spawning event occur?
- When can the eggs be expected to hatch?