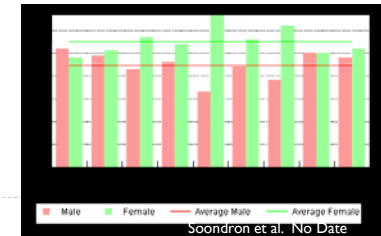


## Biological Data – Length Frequency Sampling

## Introduction

- ▶ **Biological data**
  - ▶ Sex
  - ▶ Length
  - ▶ Weight
  - ▶ Age structure
- ▶ **Stock assessment needs:**
  - ▶ Age composition of population
  - ▶ Length to age ratio
  - ▶ Spawning population
  - ▶ Sex ratios



## Objectives

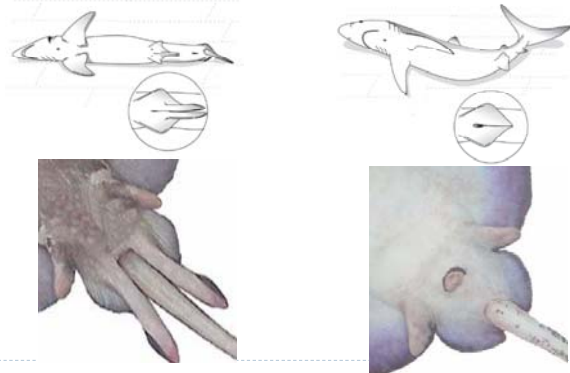
- ▶ Explain how length frequency data are utilized.
- ▶ List the 2 most common measurement types
- ▶ Describe the primary measurements for various fish and invertebrates
- ▶ Describe the primary differences between male & female fish, crab and shrimp
- ▶ Demonstrate your ability to complete the Fish/Invertebrate Length Frequency Form

## Selecting individuals to measure

- ▶ **Species** – depends on assignment
  - ▶ E.g., Butternose (*Galeoides decadactylus*) – 10/haul
  - ▶ *Arius* spp. (catfish) – 3/haul
- ▶ **Individuals** – random sample from catch composition
  - ▶ Unsorted vs. sorted samples
- ▶ Record damaged individuals as length = 0

### Determining gender - fish

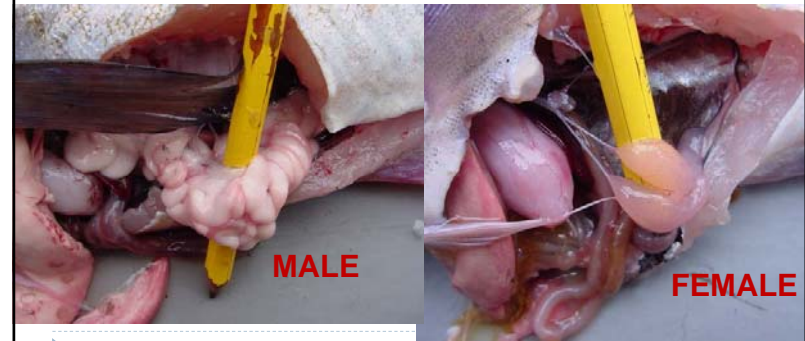
- ▶ **External vs internal**



▶ Drawings: Brogan et al. (2006); Photos: Alaska Fisheries Science Center (2009)

### Determining gender - fish

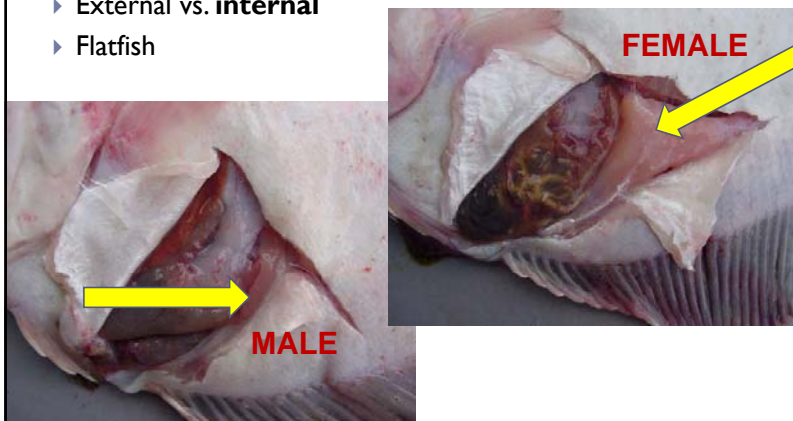
- ▶ External vs. **internal**
- ▶ Round fish



▶ Photo: AFSC 2009

### Determining gender - fish

- ▶ External vs. **internal**
- ▶ Flatfish



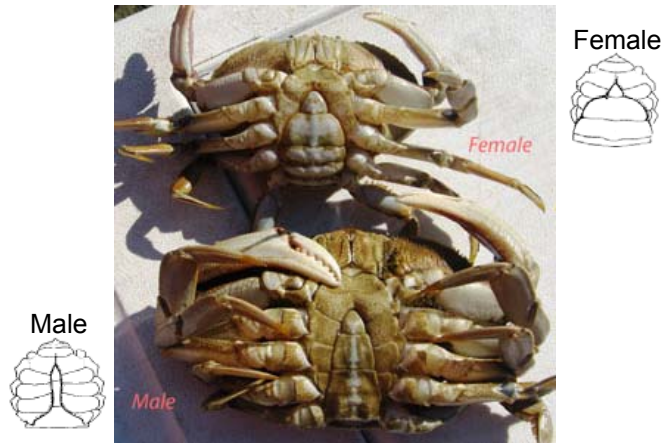
▶ Photo: AFSC 2009

### Determining gender – invertebrates - crab



▶

## Determining gender – invertebrates - crab



<http://www.dfw.state.or.us/mrp/shellfish/crab/research.asp>

## Measuring fish

- ▶ Longest longitudinal axis
- ▶ Straight vs curvilinear
- ▶ Most common – fork length & total length - more definitions in table 15-1
- ▶ Rounding – down to nearest whole cm (fish) or mm (invertebrates)

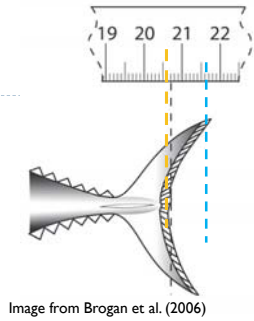


Image from Brogan et al. (2006)

Fork length = 20 cm

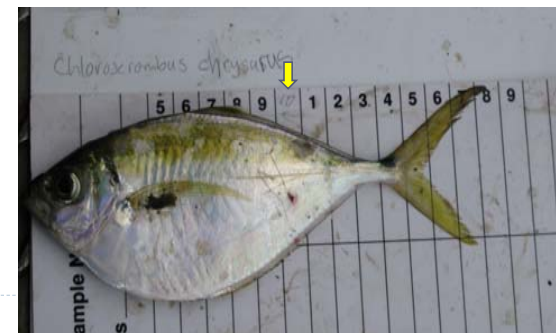
Total length = 21 cm

## Measuring fish

- ▶ Most common – fork length & total length
- ▶ More definitions in table 15-1
- ▶ Straight vs curvilinear
- ▶ Rounding – down to nearest whole centimeter (fish) or millimeter (invertebrates)
- ▶ Tips
  - ▶ Close mouth & straighten fish
  - ▶ Press snout against measuring board or other vertical surface
  - ▶ Take reading from directly above tail
  - ▶ If fish too long, take multiple measurements

## Measurement types - fish

- ▶ **Fork length** (code 01)- Snout tip to center of fork in caudal fin (straight).
- ▶ Typically taken on species with concave (forked) tails including bony fish & sharks with distinct fork



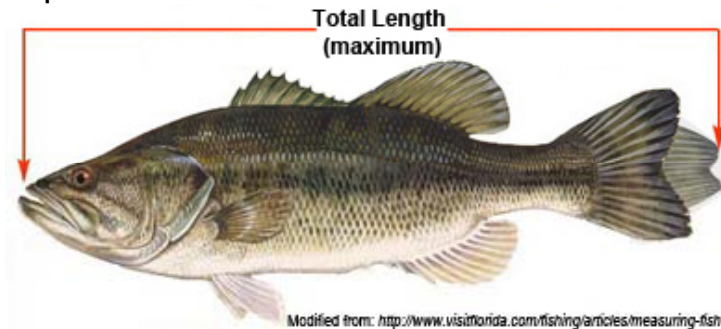
### Measurement types - fish

- ▶ **Total length** (code 02) – snout to tip of tail in its natural position
- ▶ Typical bony fish with straight or convex tails & most



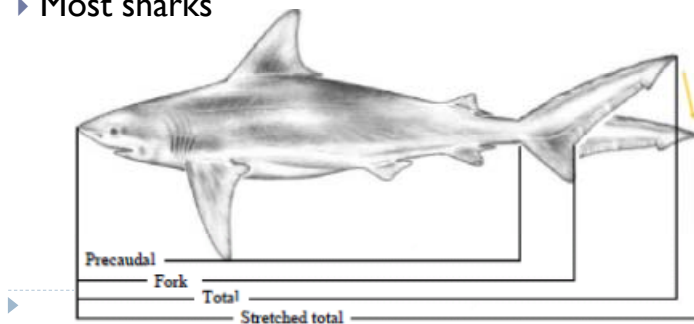
### Measurement types - fish

- ▶ **Maximum (stretched /pinched) total length** – snout to tip of tail flexed down to center line or pinched



### Measurement types - fish

- ▶ **Maximum (stretched /pinched) total length** (code 13) – snout to tip of tail flexed down to center line or pinched
- ▶ Most sharks

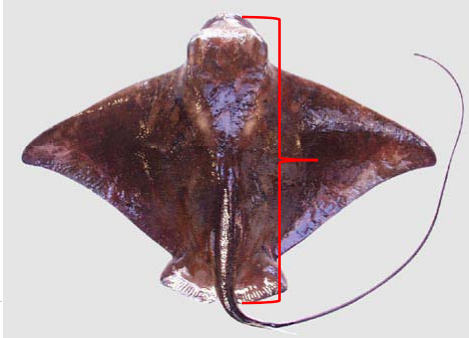


- ▶ What do you do if you get a fish without a tail?
- ▶ Record length as zero (0) next to appropriate sex.



### Measurement types - fish

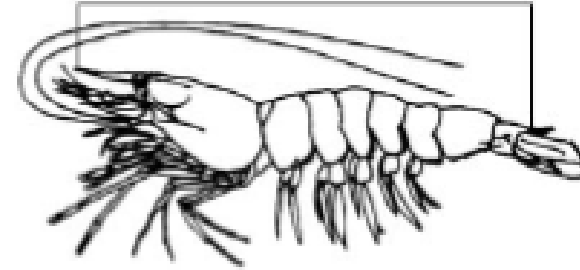
- ▶ **Disc length (pelvic)** (code I4) –Tip of the snout to the posterior edge of the pelvic fins
- ▶ Typical measurement for Myliobatoidei



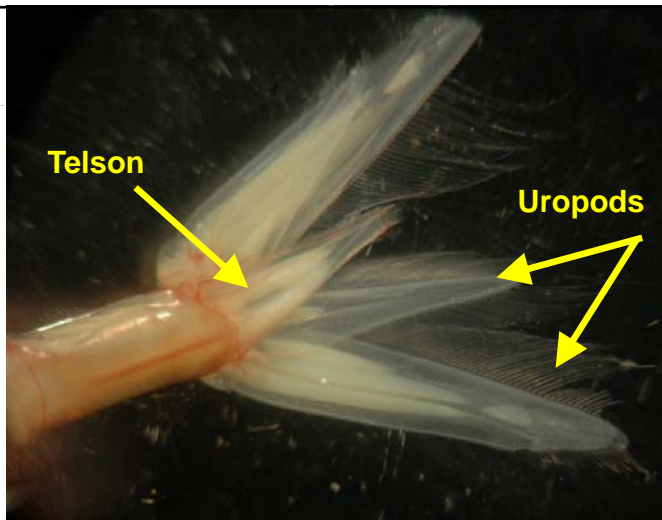
### Measurement types - Invertebrates

- ▶ Most common – **total length**, carapace length & carapace width

Total length (code 31)



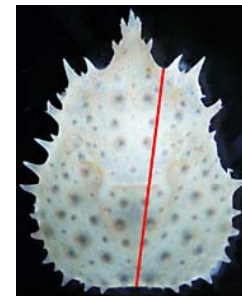
▶ Image: ACCSP - Atlantic Coastal Cooperative Statistics Program



[http://www.wallawalla.edu/academics/departments/biology/rosario/inverts/Arthropoda/Crustacea/Malacostraca/Eumalacostraca/Eucarida/Decapoda/Dendrobranchiata/Bentheogennema\\_burkenroadi.html](http://www.wallawalla.edu/academics/departments/biology/rosario/inverts/Arthropoda/Crustacea/Malacostraca/Eumalacostraca/Eucarida/Decapoda/Dendrobranchiata/Bentheogennema_burkenroadi.html)

### Measurement types - Invertebrates

- ▶ Most common – total length, **carapace length** & carapace width



<http://www.afsc.noaa.gov>



<http://www.digfish.com/crustaceans.html>





## Summary

- ▶ How would you record the maturity of these gravid crab?



▶ Images: <http://iyb2010singapore.blogspot.com/>

## References

- ▶ AFSC. 2009. North Pacific Groundfish Observer Program, 2010 Observer Sampling Manual. North Pacific Groundfish Observer Program. Fisheries Monitoring and Assessment Division, Alaska Fisheries Science Center, 7600 Sand Point Way, NE, Seattle, WA 98115. Access at: <http://www.afsc.noaa.gov/FMA/document.htm>.
- ▶ Brogan, D., S. Fukofuka, and P. Sharples. 2006. Longline Observer Guide. Secretariat of the Pacific Community Oceanic Fisheries Programme, Noumea, New Caledonia.
- ▶ McAuliffe, J.A., D. G. Itano, and S. Arceneaux. 2007. Photographic identification guide for billfish, sharks, rays, tuna-like and non-tuna finfish taken in WCPO pelagic longline fisheries (v1). Report submitted to the Western and Central Pacific Fisheries Commission, Scientific Committee, Third Regular Session, 13-24 August 2007, Honolulu, USA, WCPFC-SC3-FT SWG/IP-6.
- ▶ S Soondron, A Venkatasami and A Sheik Mamode. No Date. Some results of the study on sexual maturity of *Lethrinus mahsena* from Saya de Malha Bank. Albion Fisheries Research Centre. <http://www.gov.mv/portal/sites/ncb/moa/farclamas99/s62.htm>
- ▶ Van Helvoort, G. 1986. Observer program operations manual. FAO Fisheries Technical Paper 275, FAO, Rome.