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
- Round fish

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

Determining gender – invertebrates - crab

- External vs. internal
- Flatfish

Photo: AFSC 2009
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)

Fork length = 20 cm
Total length = 21 cm

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

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**

- **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
- Most sharks

**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 14) – 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


- Image: ACCSP - Atlantic Coastal Cooperative Statistics Program

Measurement types - Invertebrates

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

http://www.stac.noaa.gov
http://www.digsfish.com/crustaceans.html
Measurement types - Invertebrates

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

http://www.dfg.ca.gov/delta/mittencrab/crab_sexing.asp
http://www.dfw.state.or.us/mrp/shellfish/crab/research.asp

Maturity field

- Blank – fish & male inverts
- Female crab / lobster
  - 1-no eggs visible
  - 2-eggs visible (no eyes)
  - 3-eggs visible (eyes visible)
  - 4-eggs visible (eyes unknown)

http://www.crustaforum.com/board/forum.php
Activity

- Groups of 3
- Each packet of ~80 “fish” has information on the species, length type, and target number of fish to measure
- Do not write on the “fish”
- Each “fish” has a sex recorded on it [♀=female or ♂=male]
- Make a sampling plan before making any measurements
- Measure a subsample of fish according to your plan
- Complete Fish/Invertebrate Length Frequency form and questions on the handout
- 15 minutes (homework)

Summary

- How are length frequency data utilized?
- What are the most common measurement types for
  - bony fish with a round tail?
  - crab?
  - skates/rays (not Myliobatoidei)?
  - Sharks without distinct fork
- What are the primary differences between male & female fish

Photos:
http://www.suite101.com/
http://www.ehow.com/
Summary

How would you record the maturity of these gravid crab?

Images: http://iyb2010singapore.blogspot.com/

References