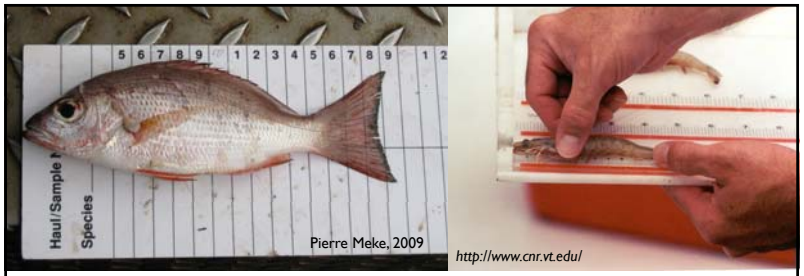
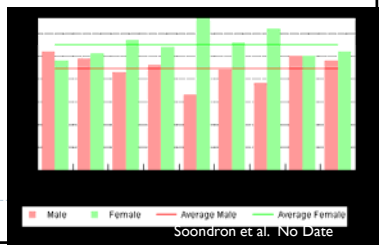


Biological Data – Length Frequency Sampling

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 most common measurement types
- Describe which measurements should be made 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

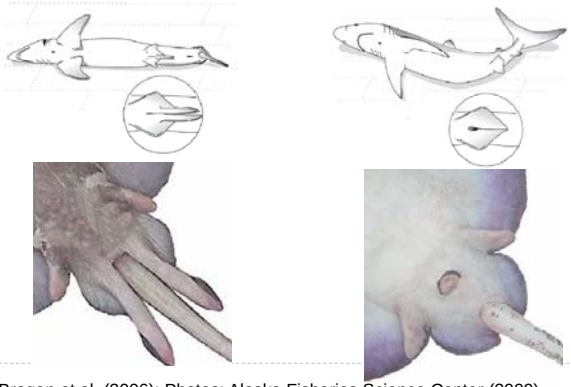
Selecting individuals to measure

- Species – depends on assignment
  - Species A – 10/haul
- Individuals – random sample from catch composition
  - Unsorted vs. sorted samples
- Record damaged individuals as length = 0

Determining gender - fish

- External vs internal

Male Female



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

Determining gender - fish

- External vs internal

Male Female

Photo: D. Itano in McAuliffel et al. 2007

Determining gender - fish

- Round fish

Photo: AFSC 2009

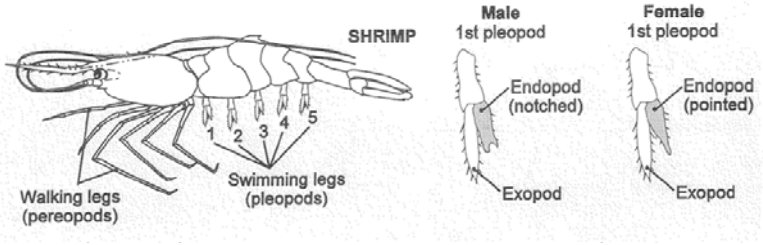
Determining gender - fish

- Round fish
- Flatfish

Photo: AFSC 2009

Determining gender - invertebrates

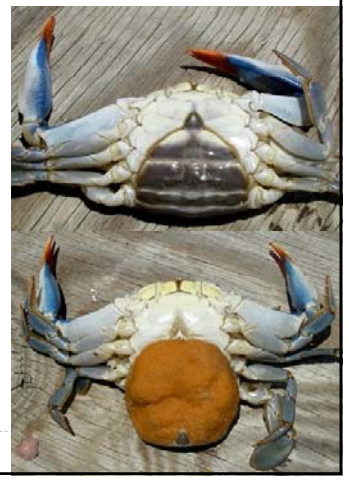
- Shrimp



Determining gender – invertebrates - crab

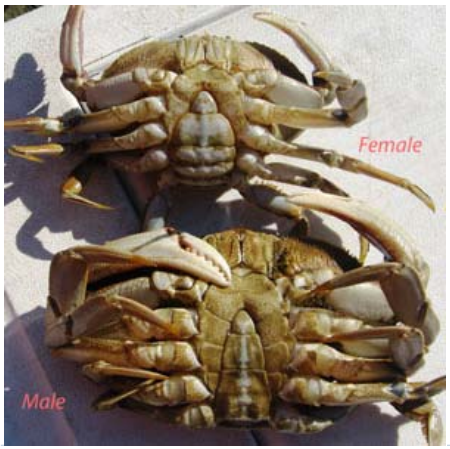
Male

Female



Determining gender – invertebrates - crab

Male

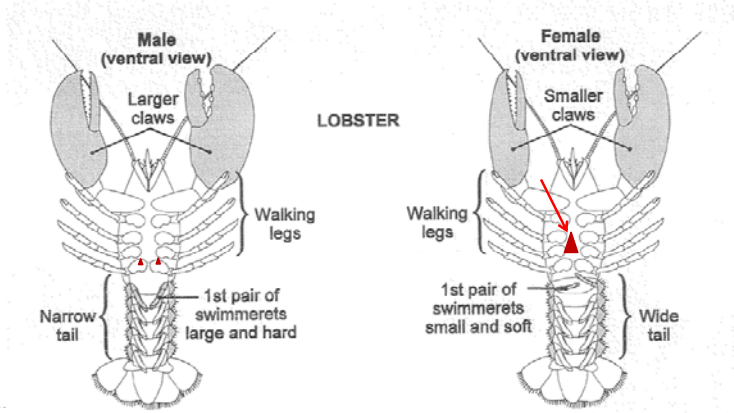


Female

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

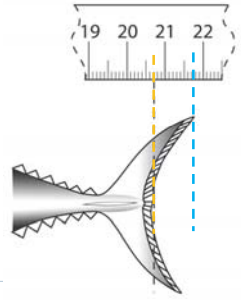
Determining gender - invertebrates

- Lobster



Measuring fish

- Most common – fork length & total length
- More definitions in table 11-1
- Straight vs curvilinear
- Rounding – down to nearest whole cm (fish) or mm (invertebrates)



Fork length = 20 cm

Total length = 21 cm

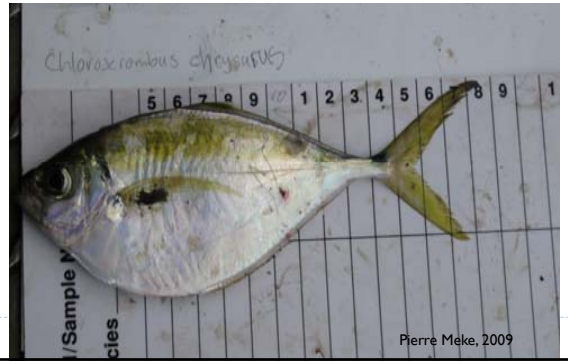
Image from Brogan et al. (2006)

Measuring fish

- Most common – fork length & total length
- More definitions in table 11-1
- 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 - Snout tip to center of fork in caudal fin (straight).
- Typically taken on species with concave (forked) tails



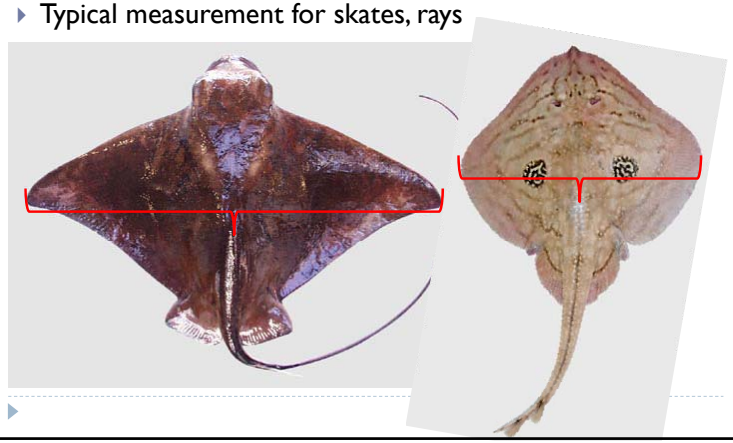
Pierre Meke, 2009

Measurement types - fish

- Total length – snout to tip of tail
- Typical for convex tails

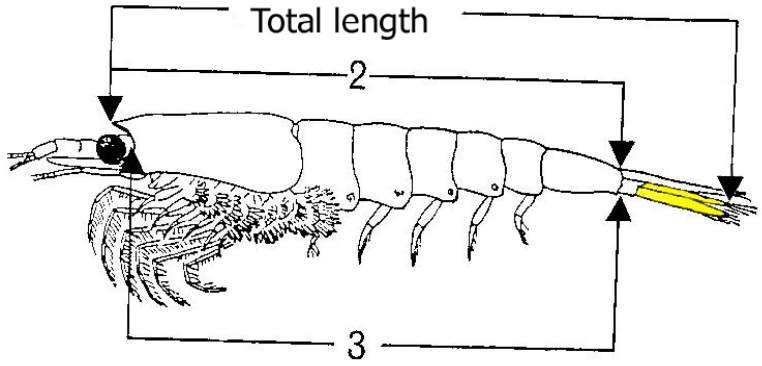
Measurement types - fish

- Disc width – distance between opposite wing tips
- Typical measurement for skates, rays



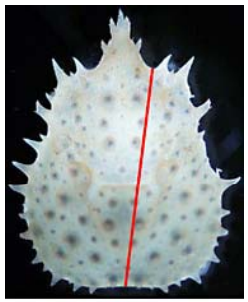
Measurement types - Invertebrates

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



Measurement types - Invertebrates

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



http://www.afsc.noaa.gov

http://www.digsfish.com/crustaceans.html

Measurement types - Invertebrates

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

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

http://www.dfg.ca.gov/delta/mittencrab/crab_sexing.asp

Length form

Fish / Invertebrate Length Frequencies

Page ____ of ____

Observer code	Vessel code	Trip ID	Date (dd/mm/yy)	Haul

Species Name	Code	Sex	Mat.	LType	KPC	Length	Count	Length	Count	Length	Count	Length	Count	Length	Count

Comments:

Sex:
M - Male
F - Female
I - Indeterminate
U - Unknown

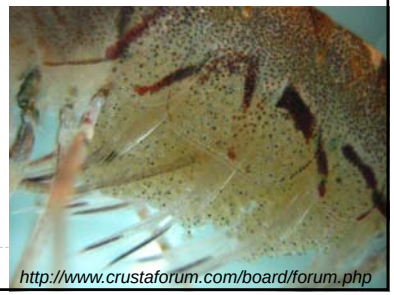
Common length types:

01 - Fork	11 - Disc width
02 - Total	34 - Carapace length (lobster)
03 - Standard	37 - Carapace length (crab)
05 - Lower jaw to fork	38 - Carapace width (crab)

Version 1.0 6/2010

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

Length form

Fish / Invertebrate Length Frequencies

Page ____ of ____

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Length form

Fish / Invertebrate Length Frequencies

Page ____ of ____

Observer code	Vessel code	Trip ID	Date (dd/mm/yy)	Haul

Species Name	Code	Sex	Mat.	LType	KPC	Length	Count	Length	Count	Length	Count	Length	Count	Length	Count

Comments:

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Common length types:

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Version 1.0 6/2010

Activity

- Groups of 2 or 3
- Each packet of ~80 "fish" has information on the species, length type, and target number of fish to measure
- Each "fish" has a sex recorded on it
- 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
- 10 minutes

Summary

- How are length frequency data utilized?
- What are the most common measurement types for fish? For crab? For skates/rays?
- Describe the primary differences between male & female fish
- How can you tell a male crab from a female crab?
- How would you record the maturity of a gravid crab showing eyes?

Activity - Fish/Invertebrate Length Frequency Sample

Names:

Observer code: A732; Vessel code: LIB732; Trip 91; Date: May 1, 2011; haul 3

Which species did you measure?

What was the population for your length frequency sample?

How many fish were you targeting to measure?

How did you select individual fish?

How would you describe your sampling frame (spatial, temporal, other)?

Describe any factors that may have affected your random sample:

Fish / Invertebrate Length Frequencies

Observer code	Vessel code	Trip ID	Date (dd/mm/yy)	Haul

Species Name	Code	Sex	Mat.	LType	KPC	Length	Count	Length	Count	Length	Count	Length	Count	Length	Count

Comments:

Sex:

M - Male

F - Female

I - Indeterminate

U - Unknown

Common length types:

01 - Fork	11 - Disc width
02 - Total	34 - Carapace length (lobster)
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Fish / Invertebrate Length Frequencies

Species Name	Code	Sex	Mat.	LType	KPC	Length	Count	Length	Count	Length	Count	Length	Count	Length	Count

Fish / Invertebrate Length Frequencies

