Diets & Dangers

Activity Presentation

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Marine Mammal Characteristics

- Endothermic
  - Warm-blooded
- Live Birth
- Breath with lungs
- Feed Young with Milk
- Have Hair*
- Live in the ocean**

*Some only have hair at birth (example: dolphins)

** A few species live in fresh water

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Marine Mammals

- Order Cetacea (89 species)
  - > Suborder Mysticeti (baleen whales)
  - > Suborder Odontoceti (toothed whales)
- Order Carnivora (35 species)
  - > Suborder Pinnipedia (flipper footed)
  - > Suborder Fissipedia (paw footed)
- Order Sirenia (4 species)
  - > Manatees and Dugongs

Over 100 species in the world!

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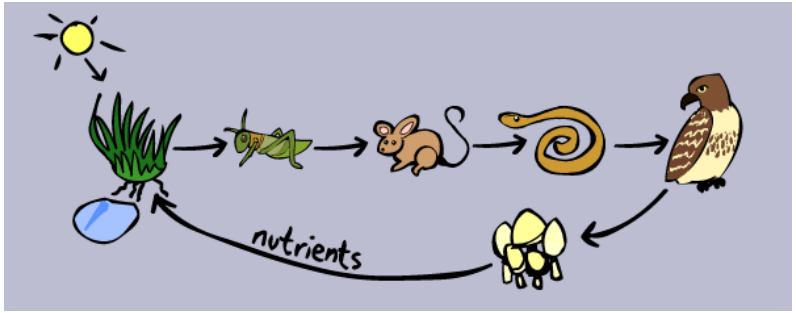
Food Chain & Web Review

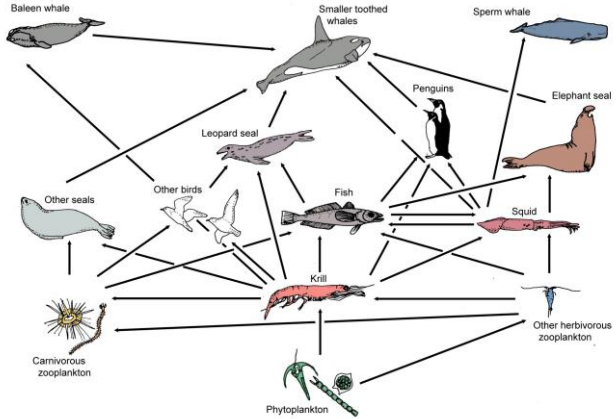
Food Chain

- A simple and linear progression of energy passed to the next trophic level when an organism is eaten



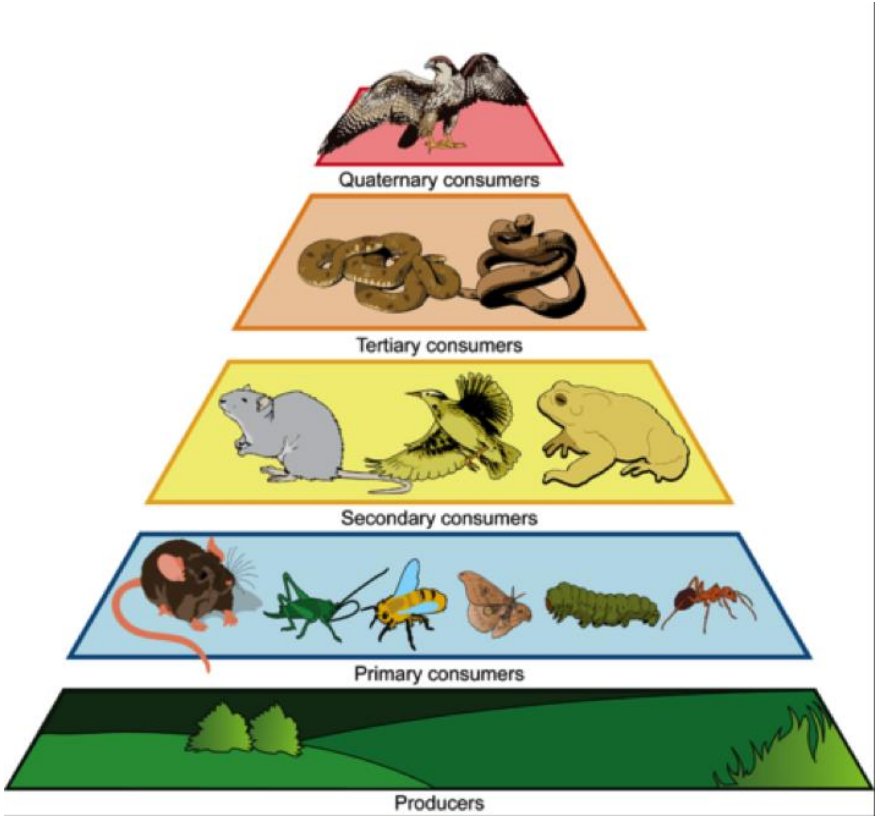
Food Web

- A more complex system when many food chains are interdependent and interrelated



Trophic Levels

- The position an organism occupies with in its food chain
- Energy passes from one level to the next
  - > **Producer**
  - > **Primary Consumer**
  - > **Secondary Consumer**
  - > **Tertiary Consumer**



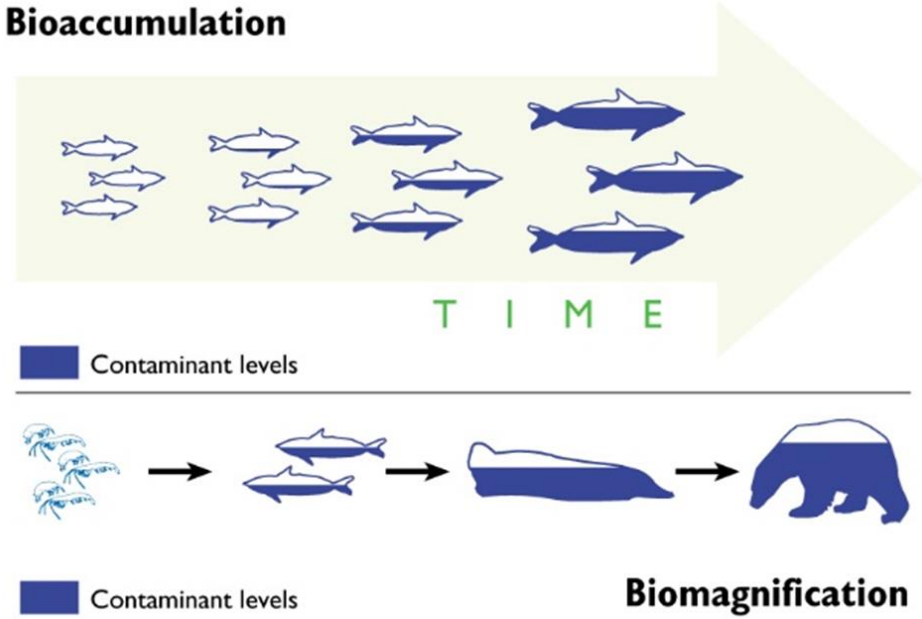
Bioaccumulation and Biomagnification

Bioaccumulation

- An individual animal whose pollutant concentration increases over time.

Biomagnification

- Pollutants magnify in strength as they are passed up the food chain.
- Therefore, the apex or top, predator of the food chain carries the heaviest toxin load.



Marine Mammal Feeding Types

Carnivores

- **Animals that eat meat**
- Most marine mammals are carnivorous
- Example: Humpback Whale

Herbivores

- **Animals that eat plants**
- Only 2 families:

  Manatees

  Dugongs

Omnivores

- **Animals that can eat meat and plants**
- There isn't a specific marine mammal labeled as an omnivore as the majority are carnivores

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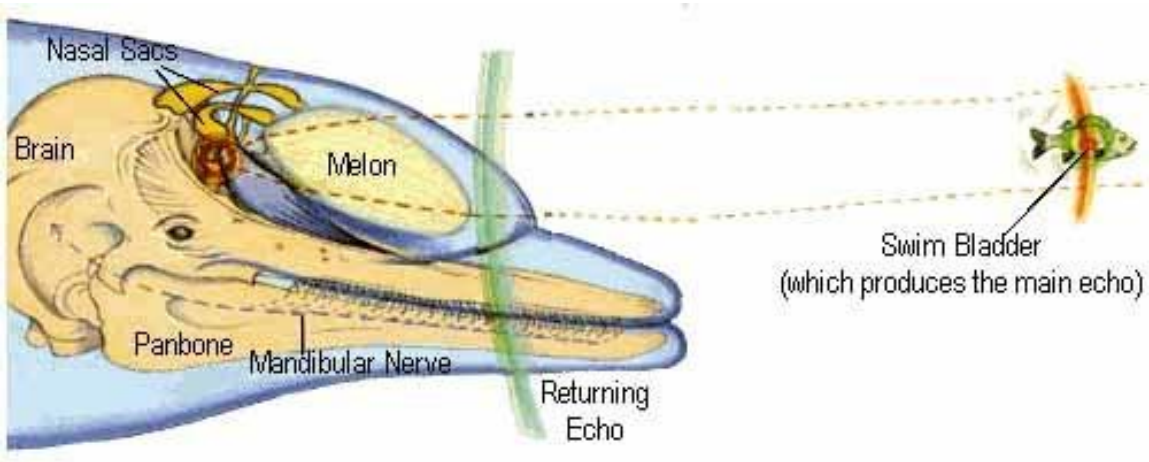
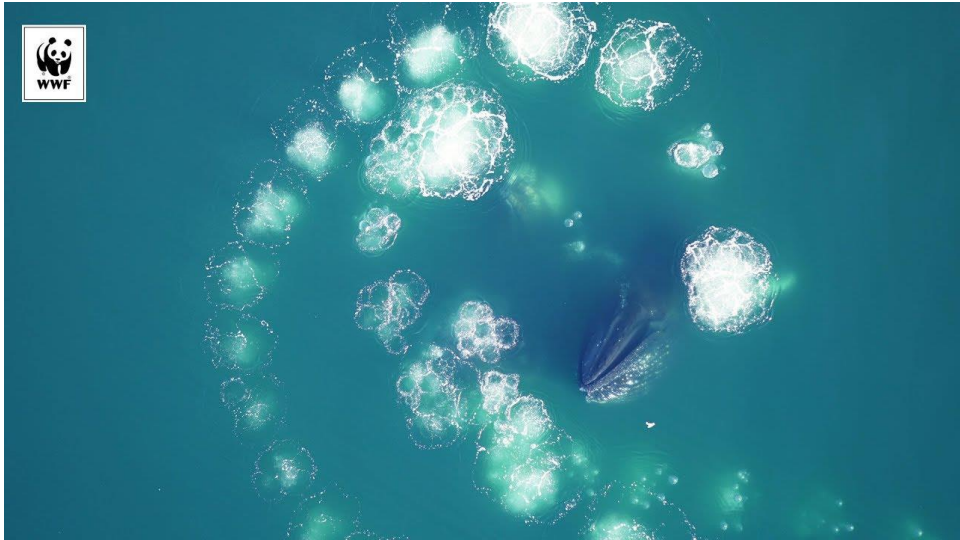
Feeding Techniques

- Toothed whales (Odontoceti)
  - **Echolocation:** sound waves that ‘echo’ off of prey items
  - Uses the melon to send waves and the lower jaw bone to receive these waves
  - Helps locate prey



Feeding Techniques

- Baleen whales (Mysticeti)
  - **Filter feeding:** whale takes large gulp of water then strain out the water to keep plankton
  - **Bubble netting:** group hunting strategy where some whales blow bubbles to scare fish into a tight ball. Once in a tight ball, whales will gulp as many as possible



Feeding Techniques

- Seals/Sea Lions/Walruses (Pinnipeds)
  - Use sensitive whiskers, streamline body and flippers to hunt fish
- Sea Otters (Fissipeds)
  - Hunt for sea urchins
- Polar Bears (Fissipeds)
  - Use strong sense of smell to locate seals

Feeding Techniques

- Manatees/Dugongs (Sirenians)
  - Graze on sea vegetation
  - Can eat >1,000lbs in 24 hours

Dangers to Marine Mammals

- Marine debris
  - **Trash, fishing line, rope**
- Entanglement
  - **Fishing line, rope, netting**
- Chemical pollutants
  - **Runoff, chemical spills**
- Humans
  - **Harassment (feeding, touching, bringing boats close)**

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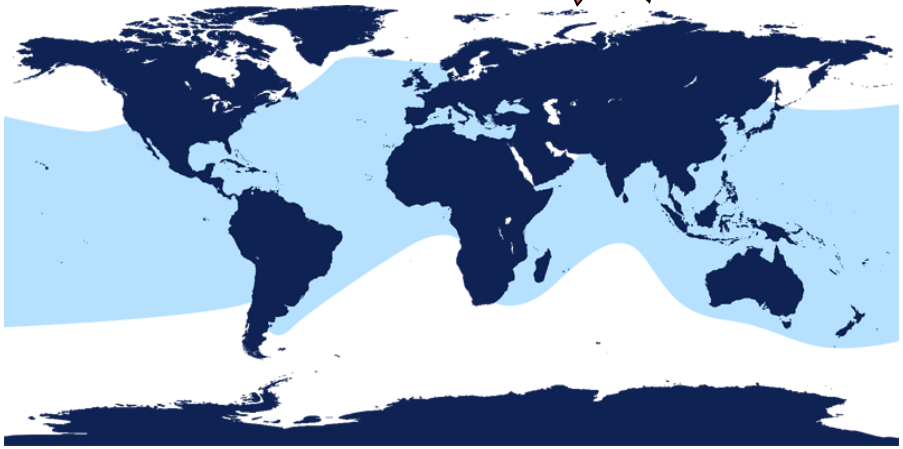
Bottlenose Dolphins

- Order Cetacea
  - Suborder Odontoceti
- Most common dolphin species off the East coast of US
- Worldwide distribution in tropical & subtropical water
- Hunt using echolocation
- Have 80-100 sharp cone-shaped teeth
- Mostly feed on fish

Activity Focus Animal!



Bottlenose dolphin's worldwide range (light blue) from Voices in the Sea

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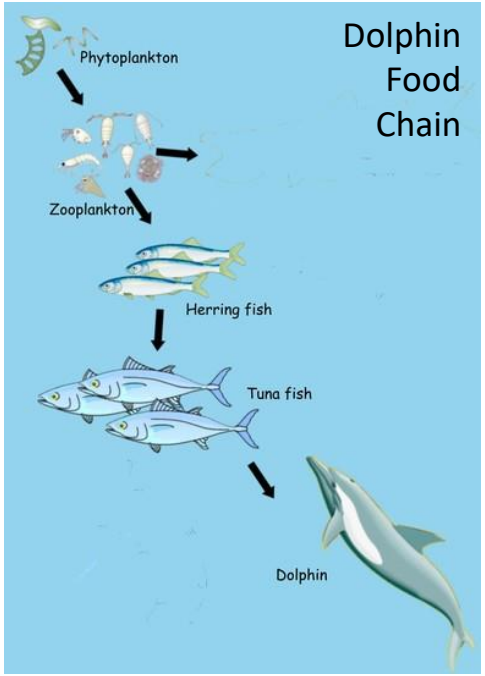
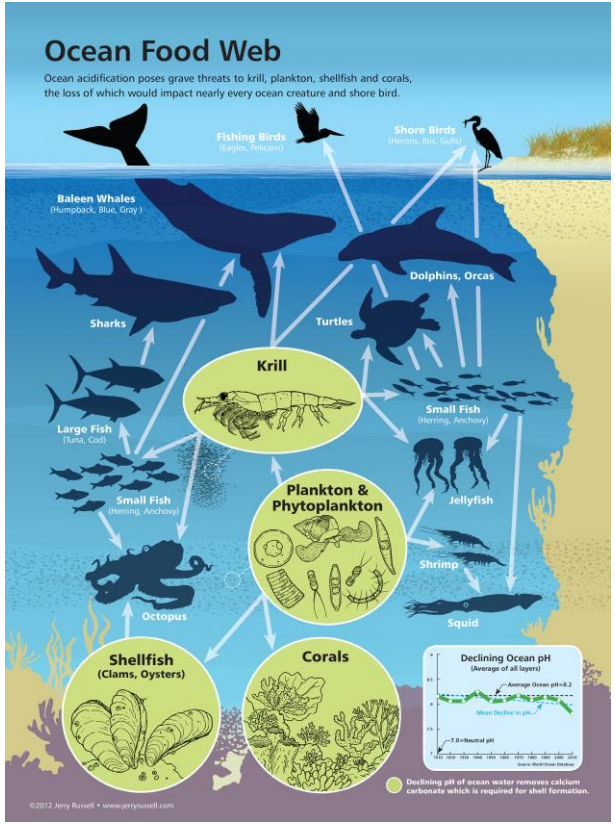
Bottlenose Dolphins

- How do they fit in marine food chains and webs?

This image shows dolphins strand feeding. A method where they chase their fish onto the beach and then follow them onshore to grab them with their sharp teeth. Method only seen in few areas of South Carolina.

Bottlenose Dolphins





Bottlenose dolphins are apex consumers at the top of their food chain.

Toxins and Dolphins

- Runoff - toxic chemicals enter ocean from streams and rivers after it rains
  - **Come from farms, factories, businesses, homes and roads**
- Toxin builds up inside the dolphin (bioaccumulation)
- Toxin increases up the food chain → dolphins are apex consumers (biomagnification)
- This activity will focus on toxin levels within a dolphin's food chain

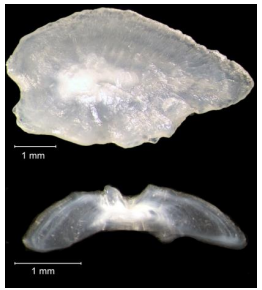
Bottlenose Dolphins

- How do we know what they eat?

Observation & Stomach Contents

- Scientists will observe animal behavior to learn about their prey items as well as study stomach contents

- Stomach Contents:
  - **Beaks: mouth parts from a cephalopod (octopus/squid)**
  - **Otoliths: ear stones from bony fish, can be used to identify fish species**



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Journal Prompt:

- Why is it important to understand what marine mammals eat?

- Write answer on your Diets and Dangers Worksheet.

Investigation into the Bottlenose Dolphin Diet

GROUP WORK

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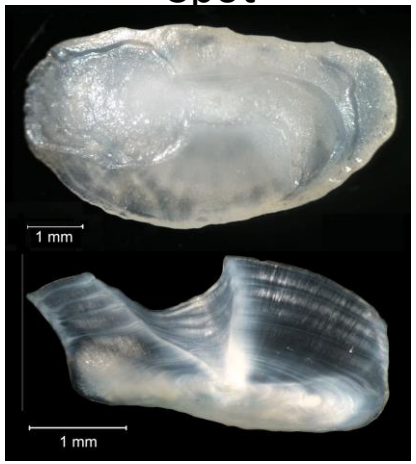
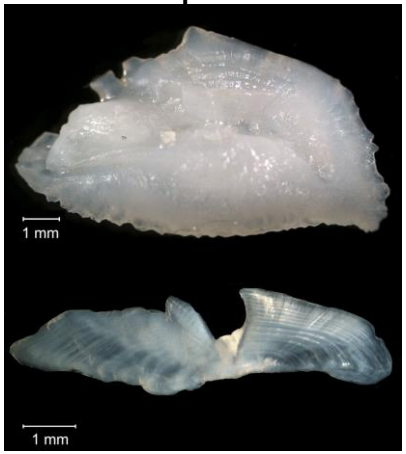
Use this otolith guide to identify which fish species your dolphin last ate.

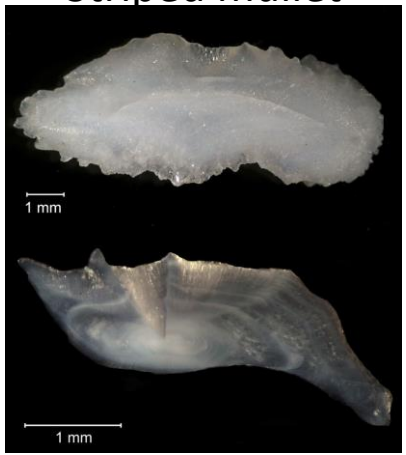
Spot



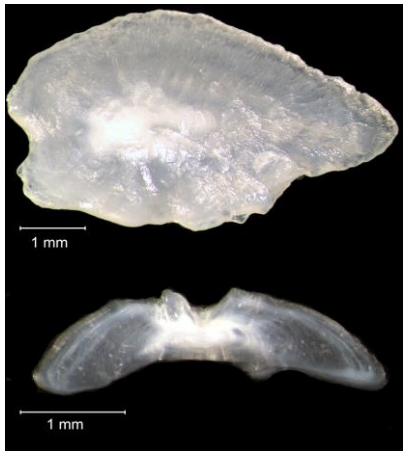
Sheepshead



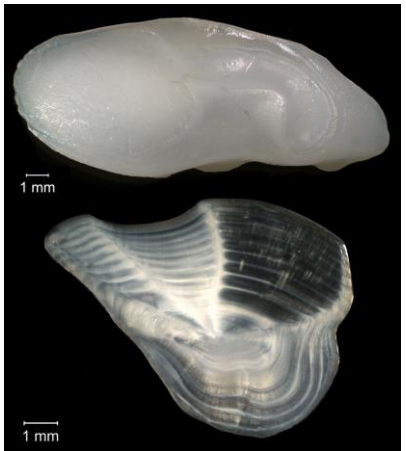
Striped mullet



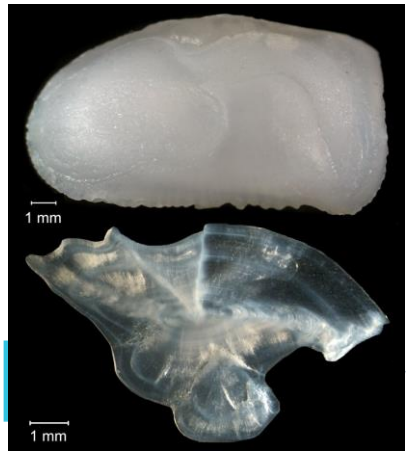
Summer flounder



Spotted seatrout



Red drum



Stop here to perform toxin demonstration per trophic level (#8-9 in procedures)

FOOD WEB DEMONSTRATION

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Journal Prompt:

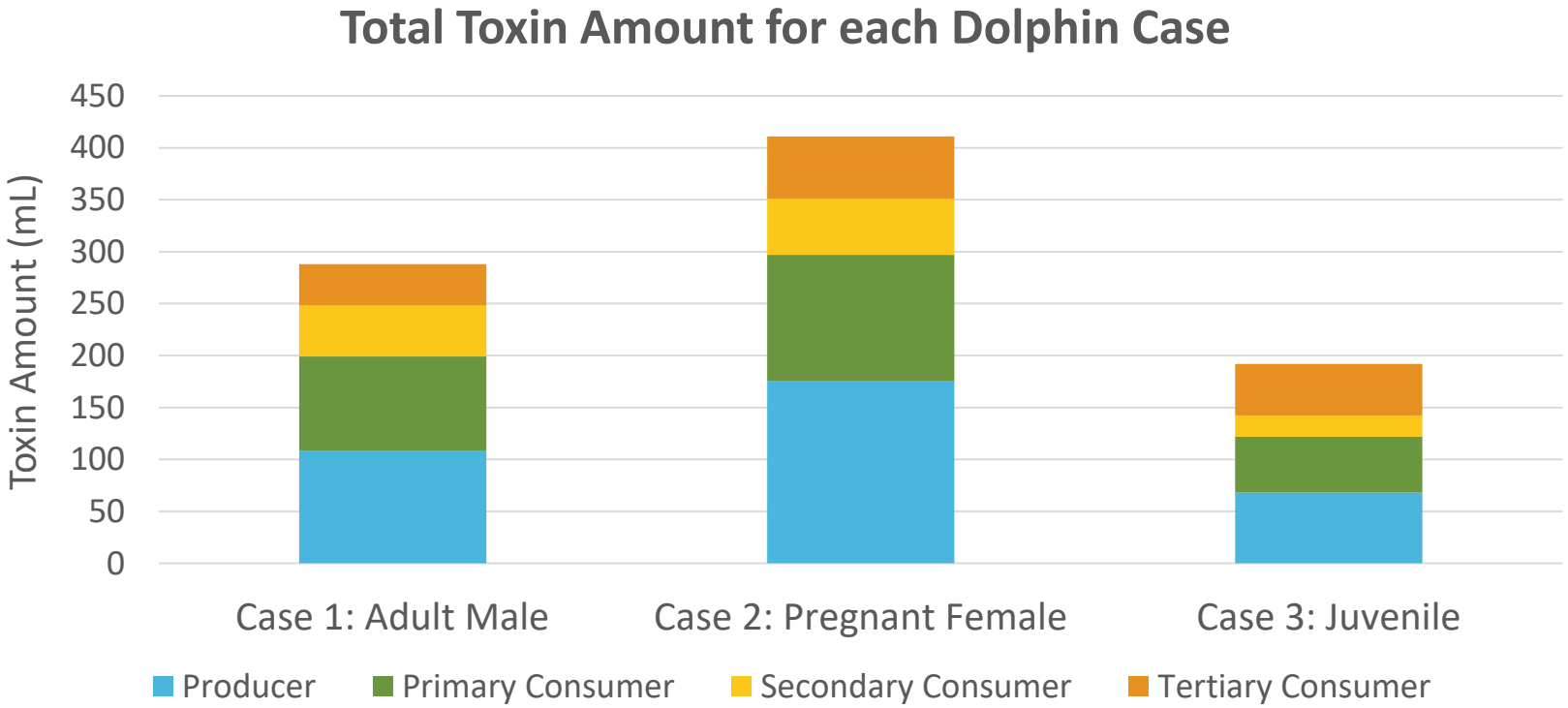
- What is bioaccumulation?
- What is biomagnification?
- What is the difference between these?
- Why do scientists need to understand animal diets and the potential dangers that affect the food web?

- Write your answer on your Diets and Dangers Worksheet.

Graphing Time

- Put together a class graph to show the total toxin amount per dolphin case
- Make sure to highlight the amount per trophic level (producer, primary, secondary, tertiary)
- See the example graph results on the next slide
  - **Teacher Warning – don't go to next slide until students turn in worksheet for grade!**

Example Class Graph



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Case Study Findings

Case 1: Adult Male

- Ate striped mullet and red drum
- Ate larger fish as seen by the number of prey in stomach contents
- Has high toxin level = biomagnification

Case 2: Pregnant Female

- Ate striped mullet, red drum and spot
- Ate larger fish as seen by the number of prey in stomach contents
- Eating more than male due to pregnancy
- Has very high toxin level = biomagnification

Case 3: Juvenile

- Ate striped mullet and spot
- Ate smaller fish as seen by fewer prey in stomach contents
- Lower toxin level compared to adult male and pregnant female = younger, will increase over time