5 GYRES INSTITUTE

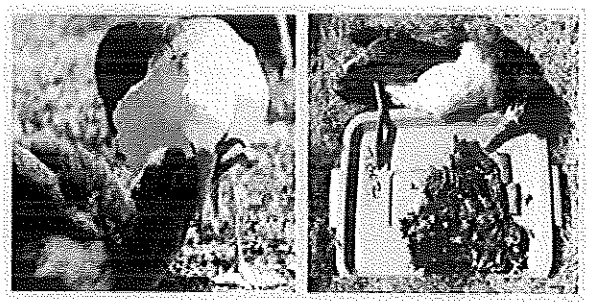
Lesson Seven: Perils of Plastic

How does plastic pollution interfere with an organism's ability to obtain and eat food?
Why does plastic pollution cause an ecosystem to change over time?

Objective: Analyze and interpret data in order to explain how plastic can cause changes to the types and sizes of populations within marine ecosystems. Identify possible sources of plastic pollution and explain the effects plastic can have on marine life.

Introduction: We've been studying plastic pollution in the ocean, and have learned that some animals mistake plastic for food. What can we do to find out how much plastic animals ***Ingest*** (eat) and how this affects them?

Seabirds that feed by diving in the ocean for food (dippers) or search on the ocean surface (scavengers), such as Laysan albatross, often mistake plastic pieces for food and then feed the plastic to their chicks by **regurgitating** what they eat into the chick's mouth.



A Laysan Albatross feeds its chick on Kure Atoll, in the Northwest Hawaiian Islands, and the stomach contents of an albatross chick found dead on Kure Atoll. The weight of its stomach was 370 grams, of which 270 grams were plastic

Albatross parents take turns flying thousands of miles to gather squid, fish eggs and fish for their chicks. Large albatross cannot dive far underwater, so most of their food comes from the sea surface. Chicks stay at the nest waiting for their meals. As the chicks grow, they begin testing their wings and are finally ready to take off to sea and fend for themselves. Before they leave the nest, or **fledge**, the chicks regurgitate a mass of undigested material from their stomach, which is called a **bolus**.

Unfortunately, the chicks often consume too much plastic before they are able to regurgitate a bolus. Often, they die because the plastic they ingested makes them feel full, so they are unable to eat the actual food they need to grow and survive.

Seabirds are ecological indicators in marine ecosystems. Researching their diet can show changes in the amount and distribution of prey within and around oceans. By studying the contents of boluses, scientists can learn not only about seabird diets, but also about human impacts on marine ecosystems.

Activity 1 Bolus Dissection

Materials

- Bolus
- Tweezers
- 2 Plates

Directions

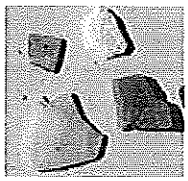
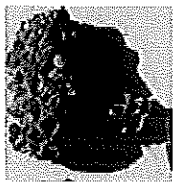
1. Form into partners or groups.
2. Carefully pour the bolus contents onto a paper plate.
3. Use the tweezers to pick up one item and place it on the empty plate.
4. Use the identification table on the following page.
5. Record your findings on the chart below.

Type of food	Prey Items (Squid beaks...)	Plastic Items (Fragments, Foam, Rubber, Lines...)	Other Items (Seeds, Rocks, Wood, etc.)
Number			

Important Notes

- The brown "flakes" that you see throughout the bolus are organic matter in the seabird's stomach and do not need to be separated onto the plate. Many of the sharp pieces are squid beaks and can be identified as "prey" items.
- To clean up, carefully pour the contents of both plates back into the container, so the materials can be collected and reused.

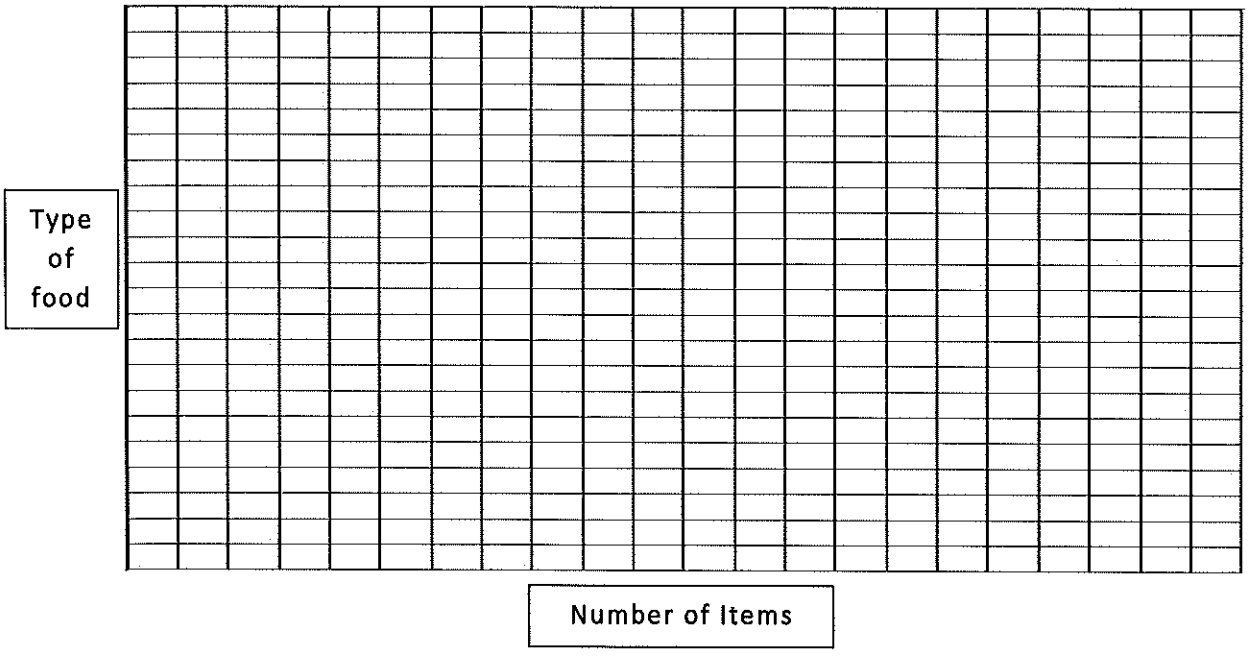
Bolus Contents Identification Table

Prey Items (Food)	Description	Picture
Squid Beaks	Hard upper and lower beaks of squid	
Non-Prey Items (Non-food)	**Description**	**Picture**
Plastic Fragments	Rigid and hard pieces in any shape, complete or broken (caps, broken bottles, toys)	
Plastic Foams	Compressible and aerated plastic in any shape (packing foam and rubber)	
Plastic Lines	This may include fishing line, rope, balloon strings, or other round single or multifilament line or rope	
Other: (Non-plastic and non-prey items)	Seeds, wood, pumice (type of rock), or other items that may float	

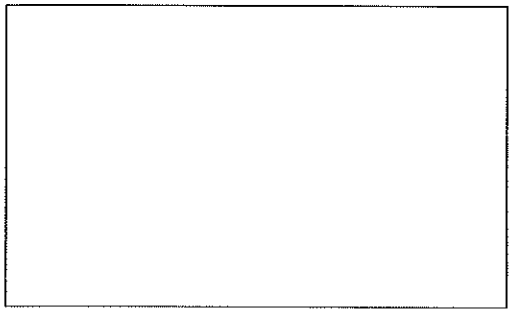
Activity 2 Bolus Analysis: Add your information to the class data table, then use the formula to calculate the percentage of prey vs. non-prey items. Finally, graph and chart your data.

Type of food	Prey Items (Squid beaks...)	Plastic Items (Fragments, Foam, Rubber, Lines...)	Other Items (Seeds, Rocks, Wood, etc.)
Number			
Class total			
Percent from Class totals $\frac{\#\ of\ each\ type}{total\ number\ of\ items}(*100)$			

Make a bar graph to reflect your class data table.



Make a pie chart in the space below showing the class percentages of prey vs. non-prey items.



What do you notice from the data about the amounts and percentages of prey and non-prey items that these birds eat?

What color plastics did you commonly find during this dissection? Why do you think these birds eat more of these colors?

What are effects might eating and storing plastic inside the stomach might have on a Laysan albatross or any seabird chick?

Can you tell where the plastic items originated?