

## Photo Description



This brown pelican stands on a wooden post near water, showing off its most amazing feature - a huge pouch attached to its long beak. The bird has gray-brown feathers covering its large body and a yellowish-white head with bright eyes. Its enormous bill and stretchy pouch make it perfectly designed for catching fish in coastal waters.

## Scientific Phenomena

The anchoring phenomenon here is structural adaptation for feeding. This pelican's oversized bill and expandable throat pouch represent millions of years of evolution shaping body parts for specific survival functions. The pouch can hold up to 3 gallons of water and fish, while the long bill allows precise diving and scooping. This demonstrates how organisms develop specialized structures that increase their chances of obtaining food and surviving in their environment.

## Core Science Concepts

1. Structural Adaptations: Physical body parts that help organisms survive, like the pelican's specialized beak and pouch for fishing
2. Form and Function Relationship: How the shape and size of body parts directly relate to their job (long bill for reaching, stretchy pouch for storage)
3. Behavioral Adaptations: Actions that help survival, such as diving techniques and feeding strategies
4. Habitat Requirements: Pelicans need coastal environments with abundant fish populations and suitable nesting sites

### Pedagogical Tip:

Use the "I Notice, I Wonder, It Reminds Me Of" thinking routine when students first observe the image. This helps them make connections between the pelican's features and other animals they know while generating authentic questions for investigation.

### UDL Suggestions:

Provide multiple ways for students to explore adaptations: tactile models of different bird beaks, videos showing feeding behaviors, and hands-on experiments testing how different "beak" tools work with various "food" items to support diverse learning needs.

## Zoom In / Zoom Out

1. Zoom In: At the cellular level, the pelican's pouch contains specialized elastic fibers and muscle tissues that allow it to stretch dramatically. The bird's digestive system produces powerful enzymes to break down whole fish, including scales and bones.

2. Zoom Out: Pelicans play a crucial role in marine food webs as top predators, helping control fish populations. Their presence indicates healthy coastal ecosystems, and they serve as important indicators of ocean pollution levels since toxins concentrate in their tissues.

### Discussion Questions

1. How does the pelican's beak and pouch design help it survive better than a bird with a small, thin beak? (Bloom's: Analyze | DOK: 2)
2. What would happen to the coastal ecosystem if pelicans disappeared, and why? (Bloom's: Evaluate | DOK: 3)
3. Compare and contrast how a pelican's feeding adaptations differ from those of other water birds like ducks or herons. (Bloom's: Analyze | DOK: 2)
4. Design an investigation to test which beak shape works best for catching different types of food items. (Bloom's: Create | DOK: 3)

### Potential Student Misconceptions

1. Misconception: "Pelicans store food in their pouches like a refrigerator"  
Reality: The pouch is used to catch fish and drain water immediately; pelicans swallow their food right away rather than storing it.
2. Misconception: "All birds with long beaks eat the same things"  
Reality: Different beak shapes serve different purposes - pelicans scoop fish, hummingbirds reach nectar, and woodpeckers drill into bark.
3. Misconception: "Adaptations happen quickly when animals need them"  
Reality: Adaptations develop over thousands of generations through natural selection, not during an individual animal's lifetime.

### Cross-Curricular Ideas

1. Math - Measurement & Data: Have students measure and compare the beak lengths of different bird species using rulers and create bar graphs showing their findings. They can calculate how many times longer a pelican's beak is compared to a robin's beak, practicing multiplication and division skills while learning about adaptation diversity.
2. ELA - Informative Writing: Students write detailed "How-To" guides explaining how a pelican catches fish, using sequence words (first, next, then, finally) and descriptive language. They can also read and compare different texts about pelicans, identifying key details and main ideas across multiple sources.
3. Social Studies - Human-Animal Relationships: Explore how coastal communities depend on healthy pelican populations and ocean ecosystems. Students can research how pollution affects pelicans and create awareness campaigns about protecting coastal habitats, connecting local environmental issues to global conservation efforts.
4. Art - Nature Sketching & Design: Students create detailed scientific drawings of the pelican, focusing on accurate proportions and labeling key adaptations. They can also design their own imaginary bird by combining features from different real birds to solve a specific feeding problem, blending art with engineering thinking.

### STEM Career Connection

1. **Ornithologist (Bird Scientist):** Ornithologists are scientists who study birds - how they look, behave, and survive in different environments. They observe birds in nature, take measurements, collect data, and help protect endangered bird species. Some ornithologists work in the field watching pelicans, while others work in museums or universities teaching others about birds. Average Salary: \$65,000 - \$75,000 per year
2. **Wildlife Biologist:** Wildlife biologists study how animals interact with each other and their environments, focusing on keeping ecosystems healthy. They might track pelican populations, study how coastal development affects their food sources, or work on breeding programs for endangered birds. Their work helps protect nature for future generations. Average Salary: \$68,000 - \$78,000 per year
3. **Environmental Engineer:** Environmental engineers solve problems that affect wildlife and natural spaces, like designing better coastal restoration projects or creating cleaner water systems for fish that pelicans eat. They use science and technology to make sure humans and animals can live together healthily. Average Salary: \$80,000 - \$95,000 per year

### NGSS Connections

- Performance Expectation: 5-LS2-1 - Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment
- Disciplinary Core Ideas:
  - LS1.A - Structure and Function
  - LS2.A - Interdependent Relationships in Ecosystems
  - LS4.C - Adaptation
- Crosscutting Concepts:
  - Structure and Function
  - Systems and System Models

### Science Vocabulary

- \* **Adaptation:** A special body part or behavior that helps an animal survive in its environment.
- \* **Structural adaptation:** A physical feature of an organism's body that helps it survive.
- \* **Predator:** An animal that hunts and eats other animals for food.
- \* **Ecosystem:** All the living and non-living things in an area that interact with each other.
- \* **Evolution:** The process by which living things change over very long periods of time.
- \* **Habitat:** The natural home where an organism lives and finds everything it needs to survive.

### External Resources

- Children's Books:
- Beaks! by Sneed B. Collard III
  - What Do You Do With a Tail Like This? by Steve Jenkins
  - A Seed Is Sleepy by Dianna Hutts Aston