



PROJECT BIRDWING

BIRD FLIGHT & WING TYPE



1. PRE VISIT - TEACHER LED - 4TH GRADE - 45-60 mins



2. SITE VISIT



3. POST VISIT

OVERVIEW & THEME

By analyzing and comparing four different wing types, students will identify how wing adaptations impact a bird's flight. In small groups, students will build a model of a specific bird that can be found at the Jamaica Bay Wildlife Refuge, focusing on aerodynamics, wing-type and coloration. Taking this knowledge to the Jamaica Bay Wildlife Refuge, students will test their bird models in a virtual exploration of relevant habitats.

DESCRIPTION

This is the lesson that will be led by the teacher in the classroom. This lesson should occur before the site- visit lesson: **Observing Flight, Migration, & Habitat**; and followed by the post-visit lesson: **Field Guide**. To schedule your visit, please fill out a reservation form by visiting the Gateway Education website and email it to gate_education@nps.gov.

LAYOUT/OUTLINE

- **OPENING QUESTION:** What kind of bird do you want to fly like? - 3 min.
- **VIDEO:** A soaring eagle - 2 min.
- **WING TYPE SLIDESHOW:** similarities and differences - 10 min.
- **PROJECT:** Bird design and construction - 30 min.
- **MAPS:** Subway map and JBWR map - 5 min.

ESSENTIAL QUESTIONS

- What adaptations enable birds to fly?
- What are the four main wing types, and how do they impact a bird's flight
- How does the ability to fly help a bird survive in its habitat?
- What is the purpose of spaces like the Jamaica bay Wildlife Refuge?

TEACHER PREP:

- Review provided slideshow
- Review delivered kits and materials
- Build a bird model to show as an example

MATERIALS:

- Bird-model templates
- Scissors
- Glue sticks
- Slideshow

LESSON

OPENING DISCUSSION: exploration phase to develop intrinsic motivation - 5min.

- Have you ever wanted to fly? What kind of bird do you want to fly like? This opener acts as an opportunity for students to make personal connections with the idea of flying.
- What would you need to be able to fly? How do birds fly? Guide discussion to flight adaptations.
 - Wings - To catch the air like a kite or sail
 - Feathers - the structure of each feather is specially designed to make the wing more aerodynamic, and must be in proper order.
- Have students ever seen a bird rearranging its feathers using its beak? This is to be sure the filaments are connected to catch air!
 - Strength - the bird must be able to support twice their body weight when they flap to create proper lift
 - Hollow bones - this makes the bird lightweight
 - Aerodynamic - the shape of the bird and shape of the bird wing allows it to move smoothly through the air
- **Example video:** A camera was attached to the back of an eagle as it soared over a canyon:
<https://www.youtube.com/watch?v=G3QrhdfLCO8>



WING TYPE DISCUSSION:

Different kinds of wings can do different kinds of things.

- Flight helps birds to find food, find a mate, avoid predators and migrate long distances for food and breeding. But not all birds fly in the same way; and their different wing adaptation allows them to be successful finding their ideal habitat and meal (seeds, insects, rabbits, fish, etc.).
- When you see birds flying you can see them **hovering, flapping, soaring, taking off, and landing**. These different behaviors are supported by the shape of the wing helping the birds to be fast, use less energy or have high maneuverability.
- **At least one model from each category of wing should be constructed for students to compare. All of the birds listed below can be found at the Jamaica Bay Wildlife Refuge, and will likely be seen on the field trip.**

MALLARD DUCK, TREE SWALLOW

GLIDING: Very long wings in comparison to the bird body. The tips of the wings are rounded for speed. These birds are often found in places that are wide open with lots of wind. Gliding is a great adaptation for birds to conserve energy while in the air. Gliding requires no use of energy but does slowly move a bird downward, requiring an occasional flap simply to stay aloft or take landing

HERRING GULL, LAUGHING GULL

SOARING: These wings are also good for catching wind because of their width, but these wings are not nearly as long as the gliding birds, making them much easier to flap (aka take off). The slotted feathers at the end create less drag, making it easier for bird to maneuver. Birds that soar find air currents that lift them up and allow them to stay in the air without flapping.

SNOWY EGRET, OSPREY

ELLIPTICAL: These short wings are also good for rapid takeoff and have slotted end feathers to maneuver in tight spaces, like in between tree branches. These birds use a lot of energy when they fly.

NORTHERN ROBIN, STARLING, MOCKINGBIRD

HIGH SPEED: This bird thrives in open habitat, and is an effective migrator. Their wings are built for speed. Teacher can test student understanding by having students describe how this bird might fly based on what they learned from the previous wings.

BIRD MODEL PROJECT:

- Students will be either be assigned or choose their birdwing model template
- Once this choice has been made, each student will watch instructional video explain how to construct their bird wing model and attempt themselves!
- There is an opportunity to **check for understanding** by having students determine the kind of wing adaptation fits their bird model and what that wing adaptation means for the bird's flight. These models will be discussed and tested during your video field trip with a ranger!



VOCABULARY/KEY WORDS

- **Aerodynamic:** a shape that allows air to move past smoothly
- **Adaptation:** a quality of a plant or animal that helps it to survive in its environment
- **Habitat:** a natural home or environment for plants, animals and other organisms
- **National:** relating to an entire nation; country
- **Wildlife Refuge:** a safe space; area protecting habitats for plants and animals



RESOURCES

- **The magic of bird flight by David Lentin:** <https://www.youtube.com/watch?v=pl1hGNmbg2Q>
- **How birds fly (animated):** <https://www.youtube.com/watch?v=3So7OMwNgy8>
- **All about birds:** <https://www.allaboutbirds.org>
- **Wing basics:** http://www.pelagicos.net/MARS4040_6040/labs/Mars4040_6040_Fa16_Lab_WingMorphology.pdf
- **Bird morphology:** <https://cpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/7/3643/files/2013/09/Bird-Morphology-z1vqh2.pdf>
- **Soaring:** <https://www.ornithopter.org/birdflight/soar.shtml>
- **Gliding:** <https://www.ornithopter.org/birdflight/glide.shtml>

CHECK FOR UNDERSTANDING

- In the slideshow there is an opportunity to review wing type functions. Students use their fingers to hold up the correct answer.
- After students choose or are assigned their template, the educator will have students explain how their specific bird flies based on the silhouette and/or the images presented in the slideshow.
- The overall model will also help to determine student understanding and investment.