

Bird Feather & Wing Workshop

1. While birds are one of the most visible of the animal groups, naturally their feathers are one of the most common items that they leave behind as proof of their existence. So, let's start with the basic structure of a feather. Use your computer to define and identify these four parts of a feather. Then draw a sketch of a feather and label these parts.
 - a. Quill/Calamus: **The lower end of the feather that is a horn-like shaft**
 - b. Shaft/Rachis: **Provides the structural strength of the feather to the tip**
 - c. Vane: **Stiff, flat and interconnected part of the feather.**
 - d. Barbs: **Wispy branches or the hooks on the vanes that connect the vanes.**

(Sketch of a feather)

2. Birds can have six different types of feathers. The type of feather also determines the purpose of the feather. Not every feather is designed for flight, nor is every feather designed for insulation. Below are the six different types of feathers. Use your computer to learn about each feather type and what they provide.
 - a. Down Feathers: **Do not have, closest to the body, traps in heat.**
 - b. Vanned Feathers: **Wing and tail feathers used in flight, stiff.**
 - c. Contour Feathers: **Feathers that overlap, create the outer surface of the body and protects it from the elements and provides aerodynamics.**
 - d. Semi-Plume Feather: **Under the contour feather and creates the insulation structure for the bird.**
 - e. Bristle Feather: **Found on the head and protects the eyes and face of the birds.**
 - f. Filoplume Feather: **Acts like whiskers and used to sense the position of the other feathers.**
3. In your life, you have most likely played with a vanned wing feather. Pulling the barbs apart and then stroking the feather to reconnect the barbs. If you have access to a feather, go ahead and experiment. Birds care for their feathers through preening. They use their bill to rearrange feathers that become twisted or out of place or slide their bill along the feather to reconnect the barbs. Why must a bird take such good care of its feathers?

Feathers are not alive. Once they fully develop, the feather no longer is maintained by the bird's internal body systems. Preening repairs the wear to the feathers and preserves the aerodynamics of the vane feathers for flight and maintains the contour feathers so that they continue to protect the body from the elements.

3b. What effect can pollutants such as oil have on bird feathers? Search the internet about oil spills and bird issues.

Oil and pollutants that interfere with the barbs of feathers destroys the protective barriers the feather create to trap air between the feathers and skin. This can cause the birds to drown or go into hypothermia. The oil also disrupts the aerodynamics of the flight feathers and inhibit the bird from flying so they are unable to escape the area.

4. The vanned feathers are located on the bird's wings and tails. The wing is divided like your arm into three regions: the primaries, the secondaries, and the tertials. Search and explore the structure of a bird's wing online. Draw your own sketch of a wing and identify the three regions? What are the three equivalent parts when comparing your arm to the wing?

(sketch of wing)

- a. Primaries – Feathers would attach to the “hand”
 - b. Secondaries – Feathers would attach to the “forearm”
 - c. Tertials – Feathers would attach to the “upper arm”
5. Feathers from these three regions have different characteristics. If you did not look closely before. Look at the shapes of the feathers from each of the three sections of the wing. What differences exist between the primary, secondary and tertial feathers?
 - a. Primaries – Slender, unequal sides with leading edge being thinner, the shaft of the feather may be arched.
 - b. Secondaries – The vanes are more even on both sides of the shaft. The shaft is bent to one side.
 - c. Tertials – vanes typically equal in length and overall oval shape, shaft is basically straight.
 6. Tail feathers can be very different in size and shape. But, there is one basic common feature. Try looking online at different tail feather, as well as the picture below. Can you see it and what is it?



Typically, straight and strong for the entire length, except for tip fairly even on both sides of the shaft. Kind of like a Tertial feather but longer and narrower.

7. A bird's tail helps tell you about the bird's flight behavior. Stiff, strong tails can indicate that the bird props against trees as a fulcrum. Rounded tails aid in flight maneuvers. Short tails can mean that the bird usually flies only short distances. Feel free to read about each of the bird species below. What assumptions can you make about each species when you look at their tails?



Great Horned Owl – Wide rounded tail, slower than Cooper's Hawk but quick to turn and maneuver.



White-breasted Nuthatch – Blocky tail, hugs trees as it gleans insects, and quick short flights.



Northern Flicker – Flicker is a woodpecker, stiff tail, can use as a fulcrum on tree while it drills and catches insects.



Cooper's Hawk – Round tip, quick flight maneuvers, keeps tail folded until it needs to maneuver.

8. In general, birds with long pointed wings fly longer distances and live in more open areas. The aerodynamics of long narrow wings enable birds to glide further by catching and using air currents for the long-distance flights. Birds with short, rounded wings flap more and live in more wooded areas. Short rounded wings are better for maneuvering but have to flap more for powered flight. What assumptions can you make about the following wings in regard to flight, migration, and habitat?



Petrel – Ocean flyer, glides long distance with air currents over ocean waters.



Screech Owl – **Wooded habitat, short flights, quick turns.**

9. Since feathers are not maintained by body nutrients, they require replacement when they are damaged or too worn. Sometimes this replacement occurs when a single feather needs to be replaced on a wing or tail feathers. Sometimes a bird goes through this process to replace all of its feather. This process of losing and replacing feathers has a special name. Do you know it? **Molting.**

Why might a bird replace all of its feathers? **To generate and then to replace breeding plumage. Growth, juvenile to adult plumage.**

What are some species that have two distinct plumages? **Goldfinch, several duck species, shorebird species, etc.**

10. Feathers are often found while walking around outside and when least expected. How and when the feather(s) is/are found is often a clue as to what happened to the bird. Search the following: “Feathers on ground.” What are some of the explanations that you can create to explain why these feathers were found?
- a. Wing feathers are the most commonly found one at a time as the birds replace one feather at a time on the wing.**
 - b. Down feathers. Nestlings first develop down feather while in the nest. Once their flight feathers have grown, down feathers are shed and can fall from the nest.**
 - c. Kill site – All types of feathers may be found, since predators often pluck them out so as not to eat them and feathers are also lost upon the predator’s impact.**

If additional help is needed, please email Tsheppard@co.hunterdon.nj.us.