

# LET'S WING IT !! - Teacher's Page

## Objective:

Students will compare and identify the different types of flight feathers that make up a bird's wing.

## Materials Needed:

- Let's Wing It !! student worksheet printed on heavy stock paper.
- Glue sticks or tape
- Scissors

## Background:

Feathers, an adaptation of reptilian scales, can be found only on birds. Feathers range in size from 1/20<sup>th</sup> of an inch on a bird's eyelid to five-foot tail feathers on a male peacock. Feathers typically comprise 15-20% of the entire weight of the bird, and range in number from 1,000 to 25,000. Feathers perform a variety of functions, such as flight, regulation of body temperature, protection, color, attraction of mates and differentiation of species.

There are three main types of feathers. The contour feather, colored and patterned to contribute to the bird's appearance. The flight feather (a subset of the contour feather) has a hollow, central tube, known as a shaft (or quill or rachis), running the length of the feather, and a broad, flat vane on either side. The vanes consist of a network of barbs (resembling skinny hairs coming off the shaft) and barbules, small hooks that "seal" the feather like a "zip-lock" bag. Down feathers have a very short shaft and non-interlocking barbs create dead air space for insulation.

Feathers do not grow evenly on the body. Rather they sprout from areas of the skin called feather tracts. The feather, composed of keratin (the basis for hair and scales as well), emerges from a tiny growth pit in the skin called a follicle. *Source: Pennsylvania Songbirds curriculum.*

Flight feathers are arranged to make up the bird's wing and help it fly. The primary feathers are long, narrow and found at the end of the wing. The primary feathers have a shaft that runs up the middle of the feather that the feather vane is attached to. Primary feathers usually have one vane that is narrower than the other. The narrow vane indicates the leading edge of the wing. This feature can be used to determine which side of the bird's body the feather comes from.

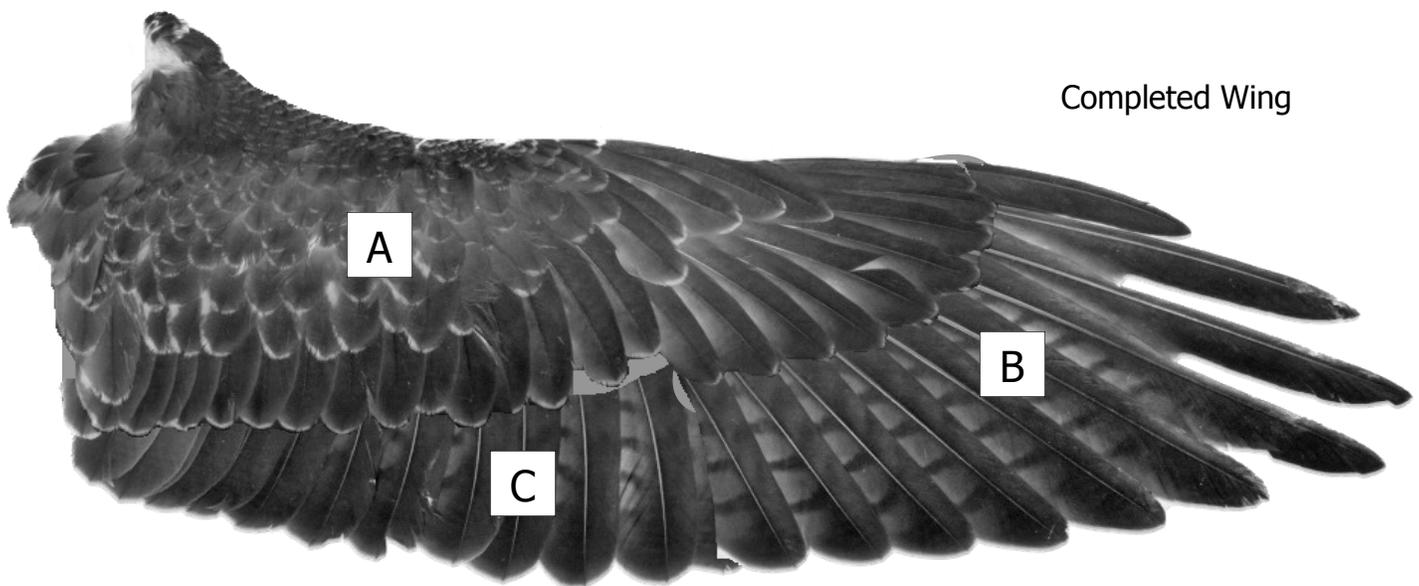
The secondary feathers are found behind the primaries, closer to the bird's body and are usually shorter and rounded at the end. Secondary feathers are usually more curved than primary feathers and the vanes are usually of equal size along the quill as well. The covert feathers partially cover both the primaries and secondaries and are much smaller and rounder in shape. The purpose of the coverts is to provide insulation and shape to the bird's wings.

The shape of each type of feather and the air flowing over and under each wing helps to enable the bird to get "lift" during flight. When not flying, the wings fold neatly against the bird's body and are hardly noticeable.

Special Note: Since many wild birds and bird parts are protected under the Federal Migratory Bird Treaty Act, it is illegal to gather feathers without the appropriate permit. Schools and some other educational organizations can obtain state and federal salvage permits. State permits can be obtained by contacting the Pennsylvania Game Commission. Applications for a state permit are available through your region office. Go to [www.pgc.state.pa.us](http://www.pgc.state.pa.us) and click on "About Us" and select the region office for your area. Salvage permits for schools are free. Federal permits can be obtained by calling the U. S. Fish and Wildlife Service at (413)253-8643. Federal permits have a cost associated with them. To possess feathers, nests or parts of any migratory species including songbirds, raptors and waterfowl, you must possess both state and federal permits. Domestic feathers can be purchased at craft stores or poultry farms and you would not need a special permit to possess them.

### Activities:

Explain to the students that they are going to examine three groups of flight feathers on a bird's wing and learn what those feathers are used for. The students should work individually on this activity. Pass out the student worksheet and make sure that each student has a pair of scissors and access to glue sticks or scotch tape. The worksheet is self explanatory. After they cut out the wing parts, they should try and arrange the three pieces on top of each other to make a complete wing. Students should glue or tape the sections together. Next, they should cut out the three small boxes with the feather groups defined on them and glue or tape them to the appropriate part on the back of their wing. By doing this they could hold the wing up to show someone and then they could easily tell them what the three groups are and their purpose.



### PDE Standards:

This activity relates to the following Pennsylvania Department of Education's Environment and Ecology Standards:

- 4.1.4 A (Assessment Anchor S 4.B.1) Structure and function of organisms.
- 4.1.7 D Explain how an adaptation is inherited, structure, function, or behavior that helps an organism survive and reproduce.

