PHYSICS AND BIRD BEHAVIOR

SHADOW SPEAK

INTRODUCTION

In this set of modules, students from ages 8 through 18 see birds as microcosms of nature. In particular they see the principles of physics brought to life by different species.

Based extensively on modules developed by Cornell University's Laboratory of Ornithology, and supplemented by Craig Perdue, Ph.D., these modules give students insight, competence, and, more than anything, the inspiration to move forward fostered by an interdisciplinary and integrated view of nature.

Students see the principles of physics brought to life by different species of birds

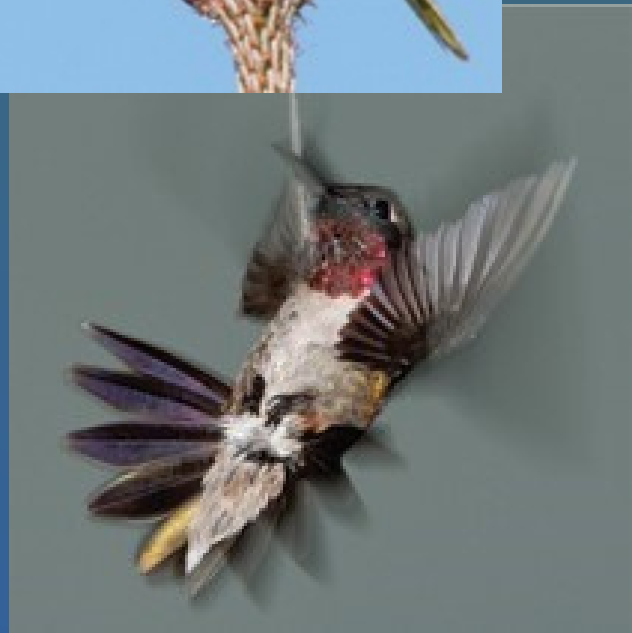
INFORMATION

Fees per class:
$75 for ages 8 - 10;
$150 for ages 1 1 - 14;
$200 for ages 15 - 1 8.

Maximum number of students per class: 15.

Program length: varies from 45 minutes to 90 minutes

Shadow Speak aims to make these trainings as accessible as possible, so groups with limited resources may request a fee waiver.



AGES 8-10

Bird Beaks:

Students will describe how beaks are like simple machines and be able to describe what a particular bird eats by looking at its beak.
Key terms: biological traits, simple machines

Flight and Feathers:

Students will understand how lift works in bird flight, and how different wing shapes and structures affect the way a bird flies.
Key terms: lift, gravity, drag, camouflage

Physical Adaptations:

Students will identify the basic features, traits, and behaviors of birds that help them survive by adaptation.
Key terms: adaptation, biological traits and features

AGES 11-14

Looking At Sound:

By listening to the songs and calls of fifteen species of birds, students will examine how their characteristics can be represented objectively. Students will be able to use their analyses to describe bird sounds physically, and to use them to identify several bird species.

Students will further be able to describe the ways in which the songs and calls of birds are propagated, and how they are affected and shaped by ecology.

Key terms: bird songs and syllables, sound energy, wave propagation, spectragrams, tone, pitch, frequency, identifying birds by ear, ecology.

AGES 15 -ADULT

Light and Feather Color:

Behavioral Objectives:

- Relate visible colors to their wavelengths on the electromagnetic spectrum.
- Empirically determine the difference between pigment and structurally produced feather colors, and describe the relationships between physics, biology, and chemistry that produce common feather colors.
- Relate nanoscale physical processes to human-observable interactions between light and reflecting surfaces.
- Be able to describe wave behavior at boundaries, and how constructive and destructive interference play a role in iridescence.

Tweeters and Woofers:

Behavioral Objectives:

- Apply knowledge of how sound travels as a longitudinal wave, involving compressions and rarefactions of air molecules.
- Be able to describe how frequency is related to body size, and gain experience using the wave-frequency relationship.
- Compare similarities and differences between animal sound production and speaker sound production focusing on the concept of an acoustic dipole.
- Investigate the effect of destructive interference in a real-world situation, and be able to describe strategies for minimizing it.