**Objectives:**

SWBAT

* Explain a variety of different nonverbal methods that animals use to communicate
* Explain what bioluminescence is and provide examples of animals that use it

**Materials:**

* Flashlights
  + 1 for each person (including teachers & parents) + a few extra to handle duds & breaks
* Whistles (for instructors)
* Bases with animal names on them. See #5 below for possible animal names to use.

**Vocabulary:**

* Nonverbal Communication – Sending & receiving messages without words.
* Bioluminescence - the emission of light by a living organism (as opposed to *triboluminescence*, where light is produced by material being ripped apart, scratched, crushed, or rubbed)

**Lesson Sequence:**

1. (10 minutes) Group discussion:
   * Talk about animal communication, guiding the conversation towards nonverbal communication. Explain that the game we’re going to play is a simulation of how fireflies communicate (using bioluminescence). Explain what bioluminescence is, and ask students for other possible examples of creature that use bioluminescence. Possible examples include:
     + Glow worms
     + Jellyfish
     + Anglerfish
     + Some species of Octopus
     + Coral
     + fireflies
     + Some species of fungus
2. (10 minutes) Rules & Setup of the game:
   * Explain the first rule: The sound of your whistle means to regroup & get quiet.
   * Explain to the students that they will each need to select a partner, and will be given 3 minutes to develop a silent signal & master locating each other with it.
   * Hand out the flashlights and allow students to create their signals. Facilitate groupings to make sure all students have a group. A group of 3 might be necessary.
   * Blow the whistle, signifying that they are to regroup and get quiet.
   * Whole group: Explain that the pairs will have to locate each other, do a happy dance, then proceed with the objective of finding all the bases in the field. They should remember the animal names from the bases for later discussion (and as proof that they found the base).
     + Emphasize that there are too many bases and not enough time for groups to find them while together. Instead, they should split up, find the bases, then reconnect using their signals.
   * Pairs are then split up and sent to opposite ends of the field. At the end of the field, are the lights are turned off, turned on, and students are shuffled.
   * Students are spread out as far as possible, and when both groups are ready they begin *walking* across the field, attempting to locate their partner using only their flashlight signals. Game on.
3. (10 minutes) Students run the simulation: they are to find each other, then as many bases as possible, then each other again.
4. Whistle the students back in & collect all flashlights.
5. Time permitting, discuss the simulation and communication methods of the animals from the bases. Here are some possible discussion questions:
   * Was it easy or hard to communicate using only the flashlights?
   * How many people ‘gave up’ and made some noise to be recognizable (laughing counts!)?
   * What animals were listed on the bases? Talk about what each animal does that is unique to its species. Cliff notes are below:
     + *White-Tailed Deer: Lifts its tail (revealing the white) to alert other deer of danger*
     + *Bower Bird: Males construct an archway to impress the females*
     + *Ants – sign language: rubbing antennae & legs together (also, use of pheromones)*
     + *Honey Bee – Does an awesome bee dance*
     + *Firefly – uses bioluminescence*
     + *Beaver – slaps its tail against the water to warn others of danger*
     + *Red Slider Turtle – Shakes its front feet to get the female’s attention (spirit fingers!)*
     + *Wolves – Ears & tails are used to show happiness/sadness/alertness (Also, eye contact)*