Synopsis of the Activity:
Use a variety of activities including video and hands on activities to learn about animal navigational systems. Activities will show the differences between humans and animals and we affect organisms. The main concept is that animals have many different ways of navigating and each animal has their own unique way of navigating. Also, seeing that humans affect animals navigational systems unintentionally.

Audience:
- Semi-captive audience: middle school age
- Up to 30 people
- Individual activities from this can be modified to show animal navigation in a tabletop setting. Age range will still be middle school and older

Activity (Learning) Goals OR Learning Objectives:
- Visitors will be able to identify different types of navigational systems that organisms use (chemical, visual, electrical, magnetic, etc).
- Visitors will be able to share personal experiences and relate to animal navigation
- Visitors will be able to realize science is happening around them and spark their interest to observe animals around them
- Visitors will see that humans have different navigational systems from other animals
- Visitors will see that humans affect organisms navigation systems unintentionally (attempts at conservation gone astray, using renewable energy of waves) and encourage further thought about conservation.

Materials:
- Compasses (1 compass for every group of 2)
- Video display equipment (computer and projector)
- http://education.nationalgeographic.com/education/activity/animal-navigation/?ar_a=1
- Prezi presentation
- Colored pencils
- Printer paper (1 piece per person)

Preparation and Set-up:
- Pull up Prezi and videos (found in National Geographic website) on video display equipment

Guiding Questions:
- If you want to go somewhere that you have never visited before, how do you find your way?
  - If you want to go somewhere that you have never visited before, how do you find your way?
Can animals use a GPS/phone navigation to navigate?

- If not how do animals get where they need to go?

- Why is it important to understand how animals navigate?
- What do [list of various navigational methods] have in common?
- While discussing specific species ask what navigational methods each species uses? Are some more difficult to navigate than others?
- Do humans have the same navigational methods as other animals?

**Activity Description:**

- **Activity 1: Navigational quiz (10min)**
  - Who uses each type of navigational system: 1) genetics; 2) mental maps/landmarks; 3) instinct; 4) sun and moon; 5) stars; 6) smell; 7) magnetic field; 8) communication and signaling among individuals; 9) ocean currents.
    - Human, wild animal or both
    - Discuss what each navigational system is (reference National Geographic lesson for description of each method)

- **Activity 2: Videos (15-20min)**
  - Show one to three of the videos about different animals navigation.
  - Ask which types of navigation the animals use and if we use the same types of navigation.

- **Activity 3: Mental Maps (15min)**
  - Both animals and humans use mental maps
  - Draw a map from memory of how to get somewhere you know well from your house
  - Include symbols and landmarks
  - Discuss what was easy/hard about making the map?
  - Compare everyone’s maps, would someone else be able to use your map?
  - Can you use a mental map to get somewhere very far away?

- **Activity 4: Compass demonstration (5-10min)**
  - Explain how to use a compass
  - Have participants find north with a compass
  - Have participants close their eyes and spin around a few times
  - With their eyes still closed see if they can locate north
  - When they can’t ask them why they couldn’t. (We can’t orient via the magnetic field we don’t even notice it!)
  - Discuss other animals that use magnetic field to navigate

- **Activity 5: Human Interference (10min)**
  - Show picture of wave-energy device: explain that it has bright lights on top, electrical pulses in the water and noise
  - Ask how it might affect sharks, bats/seabirds, and whales
  - Can humans have an impact on other animals navigation system?
  - Do we do it intentionally?
  - Why is it important to understand how animals navigate?

- **Activity 6: Classify organisms navigation systems (5-10min)**
Show pictures of each animal on Prezi and have participants guess what type of navigation systems the animals use.

Share antidotes about each animal:
- Bats use echolocation to fly through moving fans without getting hurt.
- Pigeons can use the magnetic field to know where they’re going and carry messages to far away places.
- Dogs can use smell to get home when they are miles from home.
- Rats will use mental maps when put in a maze repeatedly and are able to improve how quickly they go through mazes.

Assessment: How many navigational systems do you remember?
- Have the participants share as many navigational systems as they can remember.

**Teaching Strategies:**

- **Engagement: Activity 2 – Videos, Questions**
  - Ask participants how they get where they want to go.
  - Ask how they know where to go. (GPS usually the main answer)
  - Ask how do animals know where they need to go.

- **Exploration: Activity 4 – compass demonstration, Activity 3 – mental maps**

- **Explanation: Activity 1 – Navigational quiz**
  - Ask participants what they think each navigational system is and if that’s too difficult explain what it is and give a few examples and see if they can give some too.

- **Extension: Activity 5 – what might the wave-energy device affect organisms navigational systems**
  - Ask for other stories about animals being affected by humans.

- **Evaluation: Assessment – see if they are able to remember the navigational systems discussed in the lesson**

**Vocabulary:**

Navigation – to move in a logical way to a different place

**Science Content Background and Additional Resources:**

- [http://seagrant.oregonstate.edu/sites/default/files/sgpubs/onlinepubs/g14001.pdf](http://seagrant.oregonstate.edu/sites/default/files/sgpubs/onlinepubs/g14001.pdf)
- [http://education.nationalgeographic.com/education/activity/animal-navigation/?ar_a=1](http://education.nationalgeographic.com/education/activity/animal-navigation/?ar_a=1)
- [https://prezi.com/6uke0z3p3xkt/animal-navigation/](https://prezi.com/6uke0z3p3xkt/animal-navigation/)