Where in the World

Grade Level: 5-8

Subject Areas: science, math, geography, computer science.

Duration:
Preparation - 10 minutes
Activity - 50 minutes

Setting:
classroom

Group Size:
any

Materials:
- copies of "Stopover Locations" data sheets - one per student or group of students
- copies of "Sandy and Bailey Travel Log" - one per student or group of students
- Computers with access to Google Earth
- Access to a printer

Skills Used:
mapping, technology (GIS, GPS, internet), Interpreting.

Vocabulary:
GIS, GPS, transmitters, migration, Satellite imagery

Project BEAK Links:
- Adaptations - Migration

OBJECTIVES
- Students learn to use on-line, satellite imagery applications to explore the earth.
- Students learn map reading and navigation and how to visually represent data.
- Students annotate locations and share with others.
- Students will use geographically-referenced information created by others to create maps.
- Students will become familiar with avian research and migration.

Nebraska State Science Standards
4.2.1, 4.4.1, 4.4.3, 8.2.1 8.4.3, 8.4.4, 8.4.5, 8.7.4

BACKGROUND

The long-billed curlew, Numenius americanu, is the largest North American shorebird and one of only 9 species of grassland birds considered endemic (confined, only occurring in) to the Great Plains.

The Numenius name was given to curlews because their long, curved bill resembles the new crescent moon; the Greek word noumenios means "of the new moon."

Long-billed curlew populations have significantly decreased over the past 150 years initially due market hunting and more recently due to habitat loss. Biologists do not have a good handle on the current population size.

During the breeding season, long-billed curlews use short-mixed grass prairie (grassland) habitats with flat to slightly rolling topography. Specifically in Nebraska, the curlews nest in the Sandhills region of the state. In the winter, curlews often use wet pasture habitats, wet mudflats, and intertidal habitats.

Long-billed Curlews are migratory shorebirds spending only a small portion of the year in Nebraska, mostly during late-spring to early-summer. Since we do not know much about where Nebraska curlews go when they leave our fine state, researchers set out to discover just where the curlews stop during migration and where they spend the winter months.

Conserving grassland habitat of the curlews breeding area in Nebraska is an extremely important tactic, but finding out what types if habitats and where the curlews spend the rest of their annual migration cycle is just as crucial to conservation of these interesting birds.

Satellite transmitters are a powerful technology that uses Global Positioning System (GPS) to track migratory birds. Not long ago the large size and heavy weight of the transmitters prevented them from being used on birds. The transmitters would inhibit the bird from flying normally. Now, because new technology has allowed satellite transmitter's size and weight to be significancy reduced, they can be attached to larger birds such as geese, cranes and large shorebirds-like curlews.

During the breeding season of 2009, researchers placed tiny transmitters on two adult female curlews in the Nebraska Sandhills. One curlew is named "Sandy" and the other is "Bailey". The transmitters do not affect the curlews flying ability.

Check out the YouTube video of a Nebraska

long-billed curlew by visiting:
http://www.youtube.com/watch?v=ez0v9VuS1Ww

Once the transmitters are attached, they deliver geographic location data to a special computer program via satellite. The location data is then transferred into latitudinal and longitudinal numbers, which are provided in the spreadsheet contained in this activity (see page 3).

Google Earth is a free, downloadable application that works as a browser for all sorts of information on Earth. It uses satellite imagery to grab, spin, pan, tilt and zoom down to any place on Earth. Students can explore every corner of the globe, measure distances, create their own virtual tours, and share their tours with others. You can also create and download layers of information and view them in geographic context.

To download Google Earth, visit: http://earth.google.com

ACTIVITY: PART 1

1. Download and open a free application of Google Earth onto computer.
2. In the "fly to" area on Google Earth, have students enter the first Latitude and Longitude data point for Bailey from the "Stopover Locations" data sheet located at the end of this activity.
3. Click on the "find" icon (the little magnifying glass). Google Earth will automatically fly to and pin point the location.
4. On the top menu, click on the pin tack button to "create placemark". Name your location Bailey #1.
5. Continue this sequence until all the data points (latitude and longitude) have been plotted for Bailey.
6. Next, plot the data points for Sandy.

ACTIVITY: PART 2

Once the data points have been plotted for both birds on separate maps, have students use the ruler option and measure the total distance that each bird traveled. Record the distance on the "Sandy and Bailey Travel Log" sheet.

Students can also determine the average distance that each bird traveled given the number of days in route.

Have students complete the "Sandy and Bailey Travel Log" sheet.

EXTENSIONS

- Have students research Sandy and Bailey's wintering grounds. Describe what the wintering areas look like? What is the weather like when Sandy and Bailey are there?

- Discuss with students some of the hazards that birds like Sandy and Bailey face during migration.

ASSESSMENT

- Have students print-out the map they created using Google Earth. Grade for accuracy.

- Have students create a journal for Sandy and Bailey describing what they saw, did, and ate during their journey south.

ADDITIONAL RESOURCES: WEBSITES

- For more details about Sandy and Bailey's stay in Nebraska and their trip to their wintering grounds, visit: http://birdsnebraska.org/

- Google Earth Tip Sheet
http://serc.carleton.edu/files/sp/library/google_earth/examples/google-earth-tip-sheet.v2.pdf

- Global Earth Community: Find and Share Virtual Tours
http://bbs.keyhole.com/entrance.php

- Juicy Geography
http://www.juicygeography.co.uk/googleearth.htm

- Geospatial21: Geographic Information Systems
http://www.geospatial21.org/

- The History and Application of GIS in Education
http://spatialnews.geocomm.com/features/historygisedu/

PERMISSIONS & CREDITS

2009 Stopover Locations: Sandy

Date	Time	Latitude	Longitude
June 3	9:21	41.635	-102.444
June 4	17:55	41.679	-102.456
June 5	23:09	41.688	-102.367
June 6	0:55	41.678	-102.381
June 7	4:40	41.636	-102.455
June 8	12:50	41.688	-102.397
June 9	22:26	41.669	-102.360
June 10	2:57	41.677	-102.395
June 11	4:58	41.682	-102.388
June 12	17:46	41.684	-102.381
June 13	20:44	42.036	-102.806
June 14	0:59	42.026	-102.748
June 15	11:09	41.991	-102.180
June 16	20:13	41.838	-102.232
June 17	22:31	41.914	-102.464
June 18	3:12	41.911	-102.513
June 19	9:56	41.798	-102.235
June 19	11:13	41.809	-102.219
June 20	17:26	41.836	-102.266
June 21	21:03	41.840	-102.277
June 22	1:05	41.854	-102.313
June 23	4:37	41.796	-102.288
June 24	16:02	41.940	-102.323
June 25	23:30	41.930	-102.306
June 26	0:18	41.922	-102.360
June 27	4:42	41.950	-102.367
June 28	18:00	35.447	-101.311
June 30	1:11	35.477	-101.289
July 1	4:46	35.436	-101264

Date	Time	Latitude	Longitude
July 3	21:53	24.955	-97.781
July 4	3:34	24.963	-97.785
July 5	4:53	24.969	-97.789
July 6	15:13	24.957	-97.783
July 7	21:58	24.962	-97.774
July 8	3:50	24.964	-97.803
July 9	8:08	24.968	-97.784
July 10	13:23	24.965	-97.780
July 11	22:03	24.962	-97.786
July 12	2:29	24.989	-97.816
July 13	5:06	24.965	-97.794
July 14	15:25	24.974	-97.777
July 15	22:07	24.962	-97.807
July 16	2:47	24.964	-97.770
July 17	8:24	24.967	-97.785
July 18	13:28	24.965	-97.781
July 19	22:11	24.966	-97.792
July 20	2:23	24.958	-97.773
July 21	7:42	24.973	-97.791
July 22	15:39	24.969	-97.778
July 23	22:15	24.982	-97.754
July 24	2:31	24.975	-97.760
July 25	8:41	24.966	-97.780
July 26	15:47	24.971	-97.782
July 27	21:18	24.980	-97.817

2009 Stopover Locations: Bailey

Date	Time	Latitude	Longitude
June 3	4:02	41.69	-102.371
June 4	12:12	41.683	-102.404
June 5	20:28	41.678	-102.383
June 6	0:50	41.814	-102.388
June 7	4:08	41.691	-102.377
June 8	18:17	41.701	-102.439
June 9	22:26	41.743	-102.353
June 10	0:06	41.689	-102.336
June 11	4:15	41.689	-102.381
June 12	12:21	41.678	-102.367
June 13	20:44	41.665	-102.449
June 14	0:58	41.67	-102.399
June 15	4:22	41.683	-102.384
June 16	12:25	41.681	-102.429
June 17	21:43	41.681	-102.419
June 18	0:12	41.681	-102.364
June 19	4:28	39.604	-100.38
June 20	12:30	36.645	-97.441
June 21	21:00	36.685	-97.587
June 22	1:04	36.691	-97.575
June 23	4:33	36.333	-97.566
June 24	12:36	27.939	-97.987
June 25	21:44	26.175	-97.29
June 26	1:58	26.212	-97.446
June 27	4:36	25.79	-97.262
June 28	12:40	25.786	-97.272
June 29	21:49	25.782	-97.27
June 30	1:07	25.793	-97.266
July 1	4:38	25.788	-97.261
July 2	12:45	25.804	-97.29

Date	Time	Latitude	Longitude
July 3	21:54	25.78	-97.296
July 4	3:35	25.78	-97.301
July 5	4:49	25.78	-97.321
July 6	15:12	25.806	-97.293
July 7	21:59	25.789	-97.31
July 8	3:42	25.782	-97.298
July 9	4:59	25.766	-97.293
July 10	12:51	25.665	-97.355
July 11	20:47	25.705	-97.207
July 12	0:25	25.709	-97.218
July 13	7:27	25.696	-97.232
July 14	12:56	25.66	-97.244
July 15	22:06	25.648	-97.299
July 16	2:16	25.657	-97.247
July 17	8:25	25.66	-97.24
July 18	13:26	25.658	-97.29
July 19	21:01	25.655	-97.304
July 20	2:26	25.657	-97.259
July 21	7:44	25.67	-97.252
July 22	14:50	25.601	-97.32
July 23	22:16	25.648	-97.289
July 24	2:30	25.645	-97.262
July 25	8:39	25.666	-97.258
July 26	13:33	25.655	-97.299
July 27	22:18	25.669	-97.26

Sandy and Bailey Travel Log

1. Which bird, Sandy or Bailey, traveled farther?

2. What was Sandy's average flight distance each day? What was Bailey's?

3. Did Sandy or Bailey ever fly "backwards"? What are some possible reasons for a bird to fly "backwards" during their migration?

4. List three possible hazards Sandy and Bailey could have faced on their migration.

5. What major city is closest to Sandy and Bailey's starting point? Their ending point?

6. How many times did Sandy stop-over in a spot for more than one day? Bailey?