
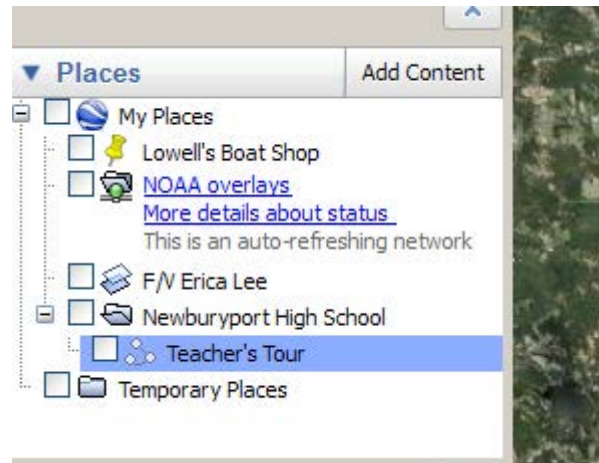


<b>Topic/Lesson:</b>	<b>Marine Migratory Species</b>
<b>Subject:</b>	Migration patterns
<b>Author:</b>	Rob Yeomans
<b>Time Duration:</b>	One 90 minute block or two 45 minute periods
<b>Overview:</b>	Students will research the migratory pattern of a marine organism of their choice from a list provided. The students will then construct a Google Earth tour that will illustrate and describe the organisms spawning area, adult area, environmental conditions in each area and human hazards along their path. Students will then compare their migratory species to that of their classmates.
<b>Objectives:</b>	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>• Research a migratory marine species.</li> <li>• Utilize Google Earth software to produce a migratory tour.</li> <li>• Compare and contrast their migratory species with that of their classmates.</li> </ul>
<b>Materials:</b>	<ul style="list-style-type: none"> <li>• Lap tops with Google Earth free software</li> <li>• Website that students may upload and download files (Blackboard, Moodle, Wiki, Blog, etc)</li> <li>• List of migratory species (all should focus on the Atlantic Ocean unless noted) <ol style="list-style-type: none"> <li>1. Atlantic sturgeon</li> <li>2. Shortnose sturgeon</li> <li>3. Striped bass</li> <li>4. American eel</li> <li>5. Alewife and blueback herring</li> <li>6. Atlantic salmon</li> <li>7. Bull shark</li> <li>8. American shad</li> <li>9. Humpback whale</li> <li>10. North Atlantic right whale</li> <li>11. Atlantic bluefin tuna</li> <li>12. Swordfish</li> <li>13. Basking shark</li> <li>14. Loggerhead turtle</li> <li>15. Atlantic white sided dolphin</li> <li>16. Grey seal</li> </ol> </li> </ul>

	<p>17. Harbor seal  18. Wilson’s storm petrel  19. Red knot  20. American lobster</p>
<p><b>Procedures:</b></p>	<p><b>Last 20 minutes of class</b></p> <p>Students are asked what migration is, why organisms migrate and what are some examples from the marine world. Teacher should write the students’ organisms on the board. When finished, teacher should add the others so there is a list long enough for one organism per student. Students should choose an organism from the list and research its:</p> <ul style="list-style-type: none"> <li>• Migration pattern</li> <li>• Reasons for migration</li> <li>• Environment and season in each area migrated too</li> <li>• Actions and behaviors taken in each area migrated too</li> <li>• Human and natural hazards during the migration</li> <li>• Two digital pictures of their organism</li> <li>• Bio of their organism including habitat, diet, behaviors, predators, population size and human use/ecological importance</li> </ul> <p><b>Day of class</b></p> <p>Using a computer projector, teacher should project the Google Earth software and describe to the students how to create a Google Tour.</p> <p><b>To set up and create a path.</b></p> <ol style="list-style-type: none"> <li>1) Zoom in on your school.</li> <li>2) Click “Add” and add a folder. Name your folder the name of your school. It will appear in the left hand vertical tool bar.</li> <li>3) Click “add a path” in the top horizontal tool bar</li> </ol> <div style="text-align: center;"> <p><b>Add Path</b></p>  </div> <ol style="list-style-type: none"> <li>4) A window will appear.</li> <li>5) Name your path “Teacher’s Tour.” Your tour should be in the folder you named in procedure #2 as pictured on the next page.</li> </ol>



- 6) Show how the line color and altitude can be changed and type in a description.
- 7) **Do not click “OK” until you have finished your path!**
- 8) Using the target cursor, click a starting point on the school’s parking lot.
- 9) Then click around the school building. Keeping the points you click in the path to a minimum will result in a better tour.
- 10) When finished with your path, click “OK” in the window.

**You can zoom into the area of your tour to add the following. All should appear on the vertical tool bar on Google Earth under your folder and path named “Teacher’s Tour.”**

#### **Thumbtacks**

- 1) Click on the thumbtack (add placemarks).
- 2) Name the thumbtack. Click on the little thumbtack icon that is to the right of where you entered the name to choose different styles of thumbtacks.
- 3) Left click and hold on the actual thumbtack and move it to where you would like it.
- 4) When finished, click “OK” in the new placemark window.

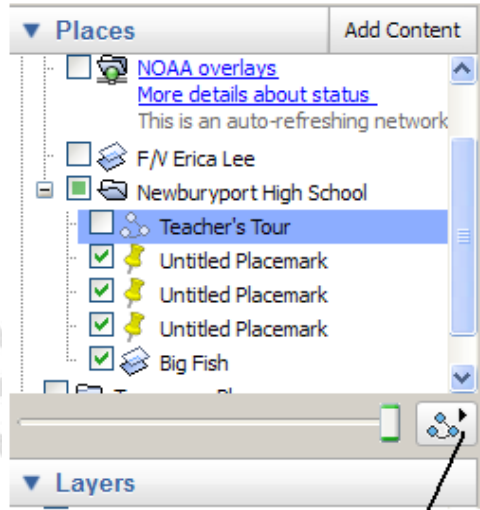
#### **Images**

- 1) To add a picture, right click over the name of your tour (Teacher’s Tour) from the vertical tool bar, mouse over “Add” and select “Image overlay.”
- 2) Name the picture. Click “browse” to choose a saved picture.
- 3) Once chosen, manipulate the picture on the earth to

increase/decrease size, orientation, placement and opaqueness. When completed, click “OK” on the window.

### To play your Tour

- 1) When finished, click on the tour in the left hand column.
- 2) Mouse over the icon in the picture below to run your tour.



Click here to play tour

- 3) To change the speed, angle and altitude of your view during the tour, click on “Tools,” then “Options,” then “Touring.”
- 4) Then, manipulate the camera tilt angle, camera range and camera speed.
- 5) When finished, entire folder can be saved, emailed or uploaded to a student server.

### Students are to:

Create a Google Earth Tour of the migration pattern of their marine species. They should include:

- The biology of their organism in the **path's description**
- Complete paths from one area of their migration route to the other and back again.
- Thumbtacks (2) with distances from one area to the next
- Thumbtacks with reasons for moving to each area in their migration route (one thumbtack for each area)
- Thumbtacks (3 or 4) that explain the environmental conditions and seasons the organisms are in at each migratory area.

	<ul style="list-style-type: none"> <li>• Minimum of two pictures of their organism along the way</li> <li>• Pictures and thumbtacks of human or natural hazards along the way (minimum of 3)</li> </ul> <p>Students are to use the laptops in class to begin working on their tours. Teacher should be available to answer questions. Students should work on this until the end of class. If they do not finish, let them work on it during the next class or for homework if they choose.</p>
<b>Conclusion:</b>	<p>When completed, students should upload all of their tours to the common website. For homework, students should look at all the tours and find:</p> <ul style="list-style-type: none"> <li>• The organism with the longest migration route</li> <li>• A catadromous species</li> <li>• An anadromous species</li> <li>• An oceanodromous species</li> <li>• List of 6 different human hazards encountered during migration</li> <li>• Compare the migration route of a fish, mammal and bird (could add invertebrate if you add in either horseshoe crab or lobster).</li> <li>• Identify an organism that comes in contact with the most human hazards.</li> <li>• Identify an organism with a migration pattern that is most similar to the Atlantic sturgeon.</li> <li>• Identify an organism with a migration pattern that is opposite of the Atlantic sturgeon.</li> </ul> <p>Students should bring their findings to the next class for a brief discussion.</p>
<b>Massachusetts Frameworks:</b>	<p><b>Biology</b></p> <p>6.1 Explain how birth, death, immigration and emigration influence population size.</p> <p>6.2 Analyze changes in population size and biodiversity (speciation and extinction) that result from the following: natural causes, changes in climate, human activity and the introduction of invasive, non-native species.</p> <p><b>Technology Literacy</b></p> <p>1.32 Identify technology tools (e.g., authoring tools) that can be used to create a multimedia product.</p> <p>1.33 Use a variety of applications to plan, create and edit multimedia products (e.g., slide presentations, videos, animations, simulations, podcasts).</p>

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|  | <p>1.34 Link information residing in different applications (e.g., linking a chart in a word-processor document to the spreadsheet where it was created).</p> <p>1.35 Identify career options in multimedia and software development.</p> |
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