**TEACHER INTRODUCTION**

Welcome to the H2Know digital case study about algal blooms in Lake Erie. This case study is designed to take place over multiple class periods. This document outlines different timelines for completion with links to activities that may help students to better understand the complexity of HABs and the human activities that contribute to them.

You can find the H2Know case study at [H2Knowlearning.org](http://H2Knowlearning.org).

**Option 1: Most comprehensive – 4 days + assessment**

<table>
<thead>
<tr>
<th>Estimated Time</th>
<th>Activities &amp; Resources Outside H2Know</th>
<th>Activities within H2Know Case Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-3 Days Prior</td>
<td>Two to three days prior to beginning H2Know, students create their own algae bloom. This activity is designed to test the effects of temperature and nutrient levels on eutrophication and the development of algal blooms. • You can find instructions to this activity on the H2Know Resources page.</td>
<td>Complete the H2Know Case Study Introduction section  Pre-Test: Complete the pre-test using the H2Know function or create your own to distribute to the class  Location: H2Know Homepage</td>
</tr>
<tr>
<td>5 – 10 minutes</td>
<td>To get more information about HABs and eutrophication, students complete the e-learning course titled Water Quality located here: <a href="http://elearning.grownextgen.org/">http://elearning.grownextgen.org/</a>.  Suggestion: Assign the e-learning course as pre-homework, then lead an in-class discussion about possible impacts from other human activities.  Location: GrowNextGen.org</td>
<td>Watch introductory video from The Nature Conservancy regarding the Toledo water crisis.  Location: Section 01 – The Issue</td>
</tr>
<tr>
<td>10 minutes</td>
<td></td>
<td>Explore news reports from the 2014 water crisis to gain more context of the situation.  Location: Section 01 – The Issue</td>
</tr>
<tr>
<td>5 minutes</td>
<td></td>
<td>Watch interview with Doug Wagner, Water Treatment Superintendent at City of Oregon Water Plant  Location: Section 01 – The Issue</td>
</tr>
</tbody>
</table>

This document may be reproduced for educational purposes, but it may not be reposted or distributed without crediting H2Know.
<table>
<thead>
<tr>
<th>Activities within H2Know Case Study</th>
<th>Activities &amp; Resources Outside H2Know Case Study</th>
<th>Estimated Time</th>
</tr>
</thead>
</table>
| View the Lake Erie History presentation  
Location: Section 01 – The Issue | To learn more about the historical connection to the Canal, reference this article from The Toledo Blade.  
Location: The Toledo Blade  
(http://www.toledoblade.com/gallery/Toledo-Magazine-Still-Connected-to-Canal-History) | 5 – 10 minutes |
| Review: Complete the Section 1 Review individually or as a class, discussing the reflection questions | | 5 – 10 minutes |
| **Activities within H2Know Case Study** | **Activities & Resources Outside H2Know Case Study** | **Estimated Time** |
| Day 2 | | |
| Listen to the podcast interview with Dr. Justin Chaffin, PhD, OSU, Ohio Sea Grant, senior researcher, research coordinator, Stone Laboratory  
Location: Section 02 – The Science | | 10 – 15 minutes |
| Investigate the Lake Erie images and maps  
Location: Section 02 – The Science | | 5 – 10 minutes |
| Review: Complete the Section 2 Review individually or as a class, discussing the reflection questions | | 5 – 10 minutes |
| View the Watershed presentation  
Location: Section 03 – Watershed Dynamics | To better understand how to read topographic maps and determine the direction of water flow, view this video.  
Location: YouTube Video  
(https://youtu.be/XZTMyBMlIQo) | 5 minutes |
| Complete the Watershed Activity to determine the direction of water flow.  
Location: Section 03 – Watershed Dynamics | | 5 – 10 minutes |
| **Activities within H2Know Case Study** | **Activities & Resources Outside H2Know Case Study** | **Estimated Time** |
| Day 3 | | |
| View Introduction to 4Rs video to learn more about a topic that will be discussed throughout the section.  
Location: Section 04 – Research & Management | | 5 minutes |
| Analyze the visual aid for 4R Nutrient Stewardship  
Location: Section 04 – Research & Management | | 5 minutes |
| Watch the video interview with Logan Haake, farmer and Precision Ag Manager with Legacy Farmers Cooperative.  
Location: Section 04 – Research & Management | | 5 minutes |
<p>| Watch the video interview with Dr. Kevin King to learn more about watershed dynamics and theories. | | 5 – 6 minutes |</p>
<table>
<thead>
<tr>
<th>Activities within H2Know Case Study</th>
<th>Activities &amp; Resources Outside H2Know Case Study</th>
<th>Estimated Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Read the Consumers and Phosphorus article to learn more about phosphorus in consumer products. Location: Section 04 – Research &amp; Management</td>
<td>Explore other sources to learn more about consumers and phosphorus: Location: Various Links -Polluted Urban Runoff: A Source of Concern <a href="http://learningstore.uwex.edu/Assets/pdfs/GWQ020.pdf">http://learningstore.uwex.edu/Assets/pdfs/GWQ020.pdf</a> -Spring Lawn Care Tips That Are Useful All Year <a href="http://www.minnehahacreek.org/blog/spring-lawn-care-tips-are-useful-all-year">http://www.minnehahacreek.org/blog/spring-lawn-care-tips-are-useful-all-year</a></td>
<td>20 – 30 minutes</td>
</tr>
<tr>
<td>Review: Complete the Section 4 Review individually or as a class, discussing the reflection questions</td>
<td>5 – 10 minutes</td>
<td></td>
</tr>
<tr>
<td>Post-Test: Complete the post-test using the H2Know function or create your own to distribute to the class</td>
<td>5 – 10 minutes</td>
<td></td>
</tr>
<tr>
<td>Access the final activity, Evaluate Solutions. Location: Section 05 – Solutions &amp; Strategies</td>
<td>Assign the Evaluate Solutions activity, using the activity resource as a guide, and adding other directions to suit the needs of your class. Location: Section 05 – Solutions &amp; Strategies &amp; H2Know Resources Page</td>
<td>10 – 15 minutes + assignment completion</td>
</tr>
</tbody>
</table>
### Option 2: H2Know Digital Case Study Only – 2 days + assessment

<table>
<thead>
<tr>
<th>Day</th>
<th>Student Action</th>
<th>Instructor Action</th>
<th>Estimated Time</th>
</tr>
</thead>
</table>
| **Day 1**| Complete H2Know Case Study Introduction & Pre-Test questions  
Location: H2Know Homepage  
Navigate through Section 01 – The Issue. Using the site and narration prompts, view the embedded videos, read the news articles, and review the Lake Erie Overview presentation  
Location: Section 01 – The Issue  
Navigate through Section 02 – The Science. Listen to the podcast with researcher Dr. Justin Chaffin and view the Lake Erie images to learn more about the science of algal blooms.  
Location: Section 02 – The Science  
Navigate through Section 03 – Watershed Dynamics. View the watershed presentation and practice reading topographic maps.  
Location: Section 03 – Watershed Dynamics | **Student Action**  
Introduce the case study activity with students and set expectations for completion, pace, activities, assignments, etc. Provide any supplemental instructions.  
**Instructor Action**  
Guide students to digital case study: [H2Knowlearning.org](http://H2Knowlearning.org)  
Before beginning the case study, complete the knowledge check.  
You may choose to review some videos, articles or presentations as a whole class.  
Conduct formative assessments at the end of each section by discussing the Section Review questions. | 5 – 10 minutes  
12 minutes +  
10 – 15 minutes student work  
12 minutes +  
5 – 10 minutes student work  
6 minutes +  
5 minutes student work  
**Total Est. Time:** 55 minutes |
| **Day 2**| Navigate to Section 04 – Research & Management. View multiple video interviews to learn more about agricultural research, management practices, and other contributors to algal blooms.  
Location: Section 04 – Research & Management  
Navigate to Section 05 – Solutions and Strategies for the final activities in the H2Know Case Study. Prepare for the final assignment and complete the post-test.  
Location: Section 05 – Solutions & Strategies | **Student Action**  
Guide students through one of the On-Field Ohio activities provided. This activity has multiple steps and will require some preparation work such as providing the instructions, breaking students into groups, etc.  
**Instructor Action**  
Complete the knowledge check at the end of the case study.  
Assign the final activity, adjusting as necessary for your classroom needs. | 22 minutes +  
30 – 45 minutes student work  
5 minutes +  
final activity  
**Total Est. Time:** 30 minutes + activities |