

## STUDENT NOTES

### Section 01: The Issue Harmful Algal Blooms

#### The Toledo Water Crisis

HAB is short for \_\_\_\_\_.

In 2014 \_\_\_\_\_ people were without drinking water for 3 days, because of the HAB's in Lake Erie.

#### Doug Wagner Interview

The process to clean the water from start to finish is approximately \_\_\_\_\_ hours.

The toxin that shut down the water supply was \_\_\_\_\_.

The city of Toledo demand was unusually \_\_\_\_\_ during that time of year, and the water was moving through the treatment plant more quickly not allowing the \_\_\_\_\_ time to work.

They decided to add \_\_\_\_\_ to the process after the Toledo shutdown.

#### Lake Erie History

Which Great Lake is most shallow? \_\_\_\_\_

List ways humans have impacted Lake Erie and what impact they have had:

Three invasive species that have entered Lake Erie are:

How do farmers scientifically know which fertilizers to use and how much to apply to their field?

\_\_\_\_\_

#### Review

What is one of the challenges facing Lake Erie today?

Who or what is affected by this challenge?

## Section 2: Science of Harmful Algal Blooms

### H2Know Podcast: Part 1- Tom Bruulsema

What nutrient is a limiting factor for algal growth?

Why is the western basin of Lake Erie prone to algal blooms?

What are two sources of phosphorus mentioned in the podcast?

What is the correlation between the amount of precipitation/water run off between March and July and the size/severity of algal bloom in summer and fall?

### Algal Bloom Images

What do you notice is similar in each photo?

Why is knowing the depth of the lake important?

### H2Know Podcast: Part 2- Tom Bruulsema

What were some sources of phosphorus prior to 1970's?

By the 1980's, algal blooms occurred less often and with less severity. What steps had been taken to achieve that success?

Although phosphorus loads entering the watersheds was lower, Lake Erie started experiencing severe algal blooms again beginning in 2010. What is the cause?

What did **Edge of Field** research discover and based on these discoveries what were their recommendations?

## Review

What makes Lake Erie an ideal environment for HABS?

What is the primary nutrient that create an algae bloom?

## **Section 3: Western Lake Erie basin Watershed Dynamics**

### Watershed Lesson

A watershed is a land area that drains into a specific \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_ or \_\_\_\_\_.

If a watershed is in an urban area, the impacts come from \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.

If a watershed is in a rural area, the impacts come from \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_.

Which area has the highest amount of runoff? Urban, Suburban or Rural (circle one)

Topography is the \_\_\_\_\_ of the ground.

What impact does topography have on runoff? \_\_\_\_\_  
\_\_\_\_\_

## Review

Using the [Ontario Flow Assessment Tool](#) explore the Canadian side of Lake Erie to identify watersheds and the direction of water flow.

Make a comparison with the land use and phosphorous loading map and answer the following questions:

1. What are some possible areas of concern in the region? Why? (Include water flow direction, land use, phosphorous loads)
2. What other substances may travel with the water as it moves through the watershed?

3. Although the Thames River does not directly flow into Lake Erie, how does it contribute to nutrient loading in Lake Erie?

## **Section 4: Agricultural Research and Management Practices**

### Overview of the 4R Nutrient Stewardship

What are the 4R's of nutrient stewardship?

Right Source –

Right Rate -

Right Time –

Right Place –

Farmers are NOT losing a lot of nutrients they are only losing on average \_\_\_\_\_%

That means farmers have a \_\_\_\_\_% efficiency rate.

### Agricultural Use of Fertilizer and the 4R Strategies- Colin Elgie

What are the 3 macronutrients? \_\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_

Why is soil sampling important?

How does the application of nutrients at the **right time** prevent nutrients from being lost?

How do 4R Nutrient Stewardship practices help food production, the environment, and farmers?

## Watershed Dynamics and Theories – Dr. Merrin Macrae

What is the difference between particulate phosphorus and dissolved phosphorus?

What is the relationship between the slope of the land and the type of the phosphorus seen in nearby waters? Why?

How does climate change affect the amounts of phosphorus ending up in watersheds?

## Edge of Field of Research

What is the objective of **Edge of Field Research**?

What factor do Canadian researchers in particular, focus their investigations? What have they observed?

## Managing the Risk of Phosphorus Runoff- Kevin McKague

What actions were taken after the 70's to lesson the phosphorus overload?

What is PLATO? Describe how farmers can use Plato to help nearby watersheds.