

# Groundwater Connections

## Lesson 5: Web Portal Activity



UNIVERSITY OF  
CALGARY

### WEB PORTAL ACTIVITY

#### Rocky View Well Watch:

The web portal is an online database, which stores and displays the water level data recorded by volunteer participants in Rocky View County. For more information on the web portal there is a *Fact Sheet* in the *Research Connections* section of the *Groundwater Connections* website.

### 1.0 OVERVIEW

#### 1.1 Description of Lab

This lab will be a **computer based activity** exploring data from the Rocky View Well Watch web portal (Figure 1). The activity is designed to show students actual data collected in Rocky View County. This data can be used to (1) show the seasonal and inter-annual differences in water levels and (2) allow students to compare data collected for the same well over different time periods, which highlights the importance of long-term monitoring.



Figure 1. Screen shot of the Rocky View Well Watch site

#### 1.2 Learning Connections

Students will be able to:

- Read maps and learn to interpret graphs
- Observe the seasonal and inter-annual water level fluctuations for different wells
- Explain the importance of long-term monitoring programs

#### 1.3 Curriculum Connections

Alberta Program of Studies for Science 8  
Unit E: Freshwater and Saltwater Systems  
STS & Knowledge Outcomes 1, 2, 3, & 4

**Teaching Notes:**

Students will need to understand that each time they come to the web portal the wells will move location slightly. Point out the disclaimer on the left hand side, which states that the well is randomly placed within an 800 meter circle.

The Groundwater Connections web site, the Web Portal Fact Sheet and the FAQ section on the Rocky View Well Watch site are all resources available to answer questions about the web portal.

**Monitoring Well:** the well is not pumped for stock or domestic purposes and therefore shows the static water level

**2.0 Preparation and Materials****2.1 Logistics**

- This activity requires internet access. If there are a limited number of computers available, students can work in groups on the computer
- If the server is down, the web portal will not load, please contact the Project Coordinator at [hydro@ucalgary.ca](mailto:hydro@ucalgary.ca) if the problem persists.
- Instructions for the *Web Portal Activity*, and *Student Lab Journal* are provided in the Appendices.

**2.2 Class Materials**

- Computer with internet access — [rockyview.geocens.ca](http://rockyview.geocens.ca)

**2.2 Student Materials**

- *Student Lab Journal* (see, Appendix) and pencil

**3.0 Web Portal Activity**

The overall goal of this activity is to help students understand the fluctuations of groundwater in Rocky View County. This activity explores the seasonal fluctuations and the need for long-term monitoring projects.

- *Seasonal fluctuations*— students will observe and interpret changes in water level during different seasons (spring, summer, autumn and winter).
- *Inter-annual* — students will observe and interpret the changes in water level over a number of years.

**3.1 Lab 1 ~ Shallow Well**

- Use the *Lab Instructions* (Appendix I) as guide for the inquiry, followed by a discussion on how groundwater fluctuations can be observed in shallow wells
- After the observations have been made, invite students to discuss and identify factors within the seasons that might impact the recorded water level in the wells.
- After the exploration, invite students to discuss the inter-annual trends and possible reasons for monitoring wells over a long time period.

**3.2 Lab 2 ~ Long Term Monitoring**

- Use the *Lab Instructions* (Appendix I) as guide for the inquiry, followed by a discussion on how groundwater levels can fluctuate over different time periods.
- Note that the wells used in this exercise are **monitoring wells**, which means they are not pumped for stock or domestic purposes.
- After the exploration, invite students to discuss and identify reasons why automatic data loggers might be used and the purpose of a monitoring well.
- After the exploration, invite students to discuss the observed trends and possible reasons for monitoring wells over a long time period.

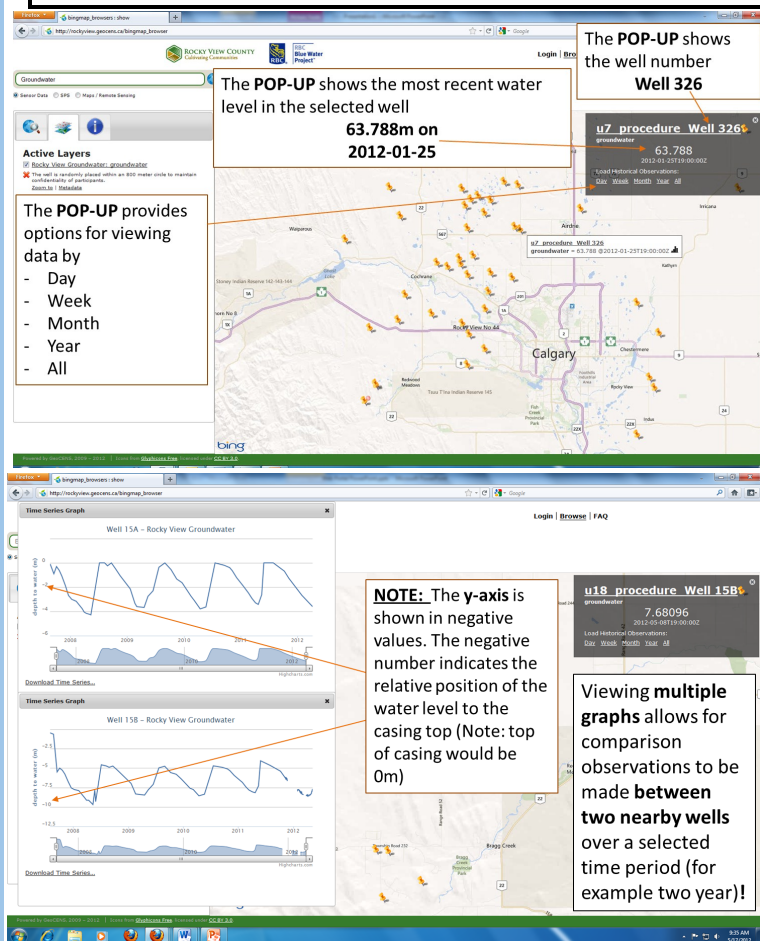
**4.0 Reflection & Assessment**

Invite groups to reflect on and discuss how the information over shorter periods of time differ from examining longer time periods. Have students explore the concept of whether more data is actually better. Get students to consider who might find the information on the web portal useful and what their reason for using the data might be.

Invite them to not only use the adapted primary literature article, but to also explore the *Fact Sheets* on the Web Portal and Community-based Monitoring on the *Groundwater Connections* website.

# Appendix I: Web Portal Activity Instructions

p1



## A. Preparation

### Learning to navigate the web portal

#### Instructions on how to move around the map

- Hoover over the map until the hand appears
- Click and hold the left mouse button
- Move the map around to the location you want visible

#### Instructions on how to zoom into an area of the map

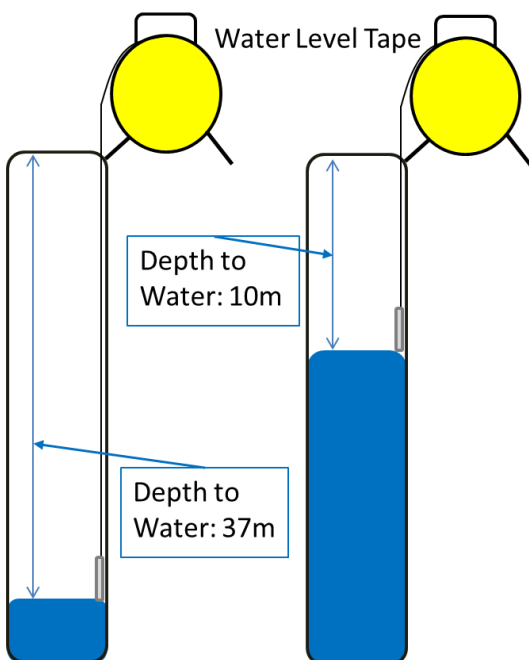
- The magnifying glass with the minus sign zooms out to show more of the map.
- The magnifying glass with the plus sign zooms in closer to show less of the map, but more detail.

### Things to Note:

- Each push pin represents a well being monitored in the Well Watch network
- Clicking on a well (push pin) will pop-up a window with options to view time series data.
- The “pop-up” window is shown in the top screen capture. This is where you can select the amount of data you wish to view—a day, week, month, year or all
- The y-axis on the graph shows negative values indicating the position of water level with respect to the casing top. This illustrates the water level better as the depth to water is **measured from the top of casing**. (Top of casing = 0m)
- The wells in the 200 and 300 series have automatic data loggers instead of manual measurements completed by community volunteers.

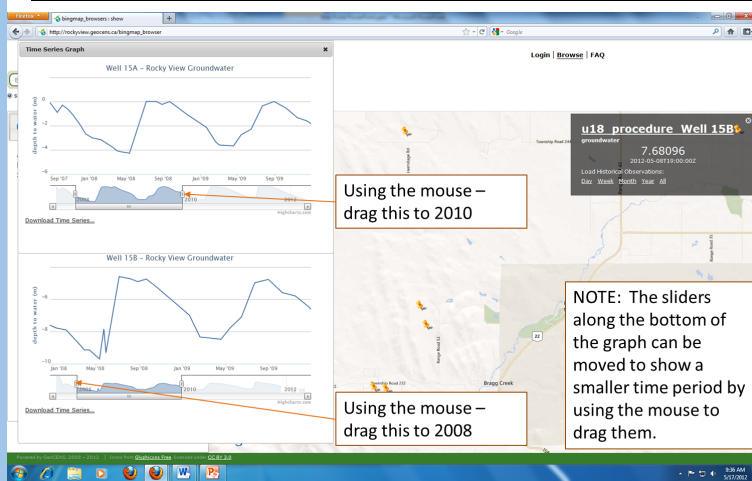
### Background Top of Casing Measurement:

The diagram to the right shows how a manual measurement is taken with a well tape. The measurement is taken by lowering the tape into the well and reading the depth at the top of casing.



# Web Portal Activity Instructions

p2



## B. Performing Investigation

Point out to students that changing the time period can cause the y-axis to change.

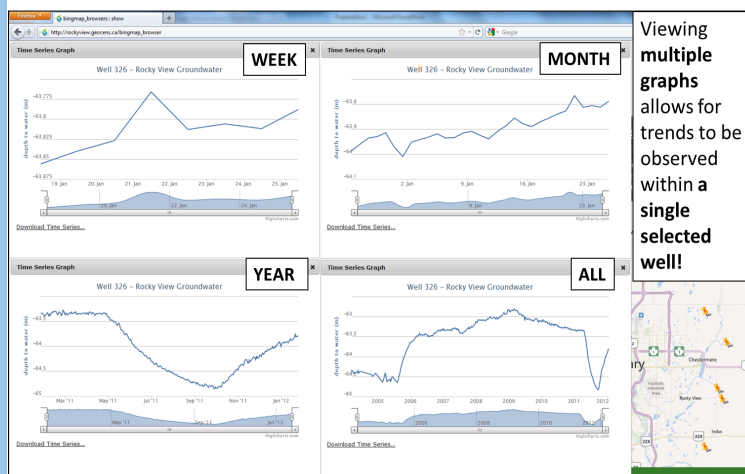
Students should be encouraged to determine the scale of the y-axis and the intervals of each line on the y-axis.

### Shallow Wells

To locate Wells 15A and 15B

- Both wells are located just Northwest of Bragg Creek along Range Road 52
- These two wells are located next to each other; therefore the student will need to zoom in to select the correct well.

To view smaller sections of the graph, move the sliders along the bottom of the graph. This will show only the requested time period on the graph. This is done by using the mouse to drag over the vertical slider bars.



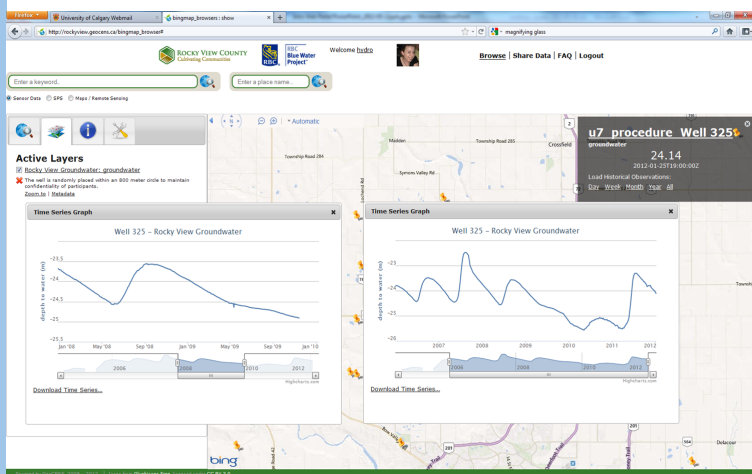
### Long Term Monitoring:

This uses Wells 326 & 325

- Both wells are located **west of Airdrie** on Highway 567 (Big Hill Springs Road) – near Highway 772 (Simons Valley Rd).
- These two wells are located next to each other; therefore the student will need to zoom in to select the correct well.

NOTE: Wells within the 200 and 300 series are monitored using an automatic data logger, whereas

NOTE: As data is reported the information on the graphs will be updated and the answers to questions may change.





## Appendix: Student Lab Journal

p1

### Preliminary: Reading and Navigating the Map

**Objective:** Understand how to read and navigate the map to find wells

**Procedure:**

- Instructions on how to move around the map
  - Hoover over the map until the hand appears
  - Click and hold the left mouse button
  - Move the map around to the location you want visible
- Instructions on how to zoom into an area of the map
  - The magnifying glass with the minus sign zooms out to show more of the map.
  - The magnifying glass with the plus sign zooms in closer to show less of the map, but more detail.
- Answer the Preliminary Question Set

**Preliminary Question Set:**

1. Find the well located furthest to the **East, West and South** and record their well number
2. How many wells are located near Bragg Creek (West of the Tsuu T'Ina Indian Reserve 145)?

### Part 1: Shallow Wells

**Objective:** Observe and interpret seasonal and inter-annual fluctuation in shallow wells.

**Procedure:**

- Locate Wells 15A and 15B (HINT: these wells are located just Northwest of Bragg Creek along Range Road 52)
- Uploading the graph for Well 15A
  - Locate Well 15A and left click on the push pin for the well
  - Click on the "All" option under "Load Historical Observations"
  - Move the graph to the left of the screen, by clicking and holding the left mouse button along top of the graph window (the grey bar where it says "Time Series Graph").
- Uploading the graph for Well 15B using the same procedure as Well 15A
- Move the graph underneath the graph for Well 15A
- To make the graph simpler, move the bars along the bottom of the graph to line up with 2008 and 2010
- After you have answered the questions, close all the graphs by clicking on the "X" in the top right hand corner of the graph window

**Discussion:**

What does "Depth to Water (m)" mean along the y-axis? What is the unit of measurement?

What do you notice about the shape of these two graphs, are they similar or different? When looking at all the data is there a trend in the water level over time?

What month is the depth to water highest for Well 15A and Well 15B? What month is the depth to water lowest for Well 15A and Well 15B?

## Student Lab Journal

p2

### Part 2a: Long Term Monitoring

**Objective:** Observe and compare graphs showing different data over different time periods to examine the concept of long term monitoring.

**Procedure:**

- Locate Wells 326 (HINT: this well is located west of Airdrie on Highway 567 (Big Hill Springs Road) - near Highway 772)
- Uploading three graphs for Well 326
  - Locate Well 326 and left click on the push pin for the well
  - Click on the "Month" option under "Load Historical Observations"
  - Move the graph to the left of the screen, by clicking and holding the left mouse button along top of the graph window (the grey bar where it says "Time Series Graph").
  - Click on the "Year" option under "Load Historical Observations" and move the graph if necessary on the screen.
  - Click on the "All" option under "Load Historical Observations" and move the graph if necessary on the screen.
- Move the graphs so all three can be seen at one time and answer the discussion questions
- After you have answered the questions, close all the graphs by clicking on the "X"

**Discussion:**

What is the interval between the values on the y-axis for each graph?

Sketch the shape of each graph and briefly describe the similarities and differences between the graphs?

Explain which graph you think would provide the best information about water levels to a water resource manager?

### Part 2b: Long Term Monitoring

**Objective:** Observe and compare graphs for the same monitoring well over three different 2-year time periods

**Procedure:**

- Locate Wells 325 (HINT: this well is located west of Airdrie on Highway 567 (Big Hill Springs Road) - near Highway 772)
- Uploading three "All" graph for Well 325
  - Locate Well 325 and left click on the push pin for the well
  - Click on the "All" option under "Load Historical Observations"
  - Move the graphs so you can see all three at once
- On the first graph move the sliders along the bottom to show the data for 2006-2008
- On the second graph move the sliders along the bottom to show the data for 2008-2010
- On the third graph move the sliders along the bottom to show the data for 2010-2012
- After you have answered the questions, close all the graphs by clicking on the "X"

**Discussion:**

What is the interval between the values on the y-axis for each graph?

Does the water level increase or decrease over the time period and by how much does the water level change?

What is one possible reason for the gap in the data on the 2010 –2012 graph?

This well is a monitoring well, which means it doesn't pump water for human or animal use. What might the purpose of a monitoring well be? Why might it be useful to have both pumping wells and monitoring wells within a groundwater monitoring project?

**RESOURCES:**

**Rocky View Well Watch:** [rockyview.geocens.ca](http://rockyview.geocens.ca)

Frequently Asked Question: <http://rockyview.geocens.ca/faq>

**Groundwater Connection Website:**

Web Portal Fact Sheet

***Groundwater Connections Lesson Plans*** are published by the University of Calgary in partnership with the Biogeoscience Institute and Royal Bank of Canada—Blue Water project. This material may be freely copied for educational use provided the source is acknowledged.

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