# Teachers Guide


## Help Wanted! Are you thirsty for a career in the water field?

The Cities of Northglenn, Thornton and Westminster, Colorado are looking for qualified junior water specialists for some very challenging yet rewarding jobs. Preferably 4th and 5th grade students who care about their water and want to learn more. Applicants must use water on a daily basis. Must be willing to learn about where their water comes from and where it goes after they use it. Must be able to read maps and use computers to access information about their local water supply. Some writing, reading, math, geography and science will be required for this job. Must be willing to look for ways to save water and take action to always protect water. Preferably familiar with how we need water to live and how wildlife and plants also depends on clean water. If you think you would be a good candidate for this job, please fill out the job application on the next page.

This "job" pays a rich salary of knowledge, insight and fun. Sorry no money!

City of Thornton

COLORADO WATER
LIVE LIKE YOU LOVE IT

WESTMINSTER

city of Northglenn

# Job Application

## for Junior H20 Specialist

Your Name_____

Your School _____

The City your School is in _____

Grade_____ Teacher _____

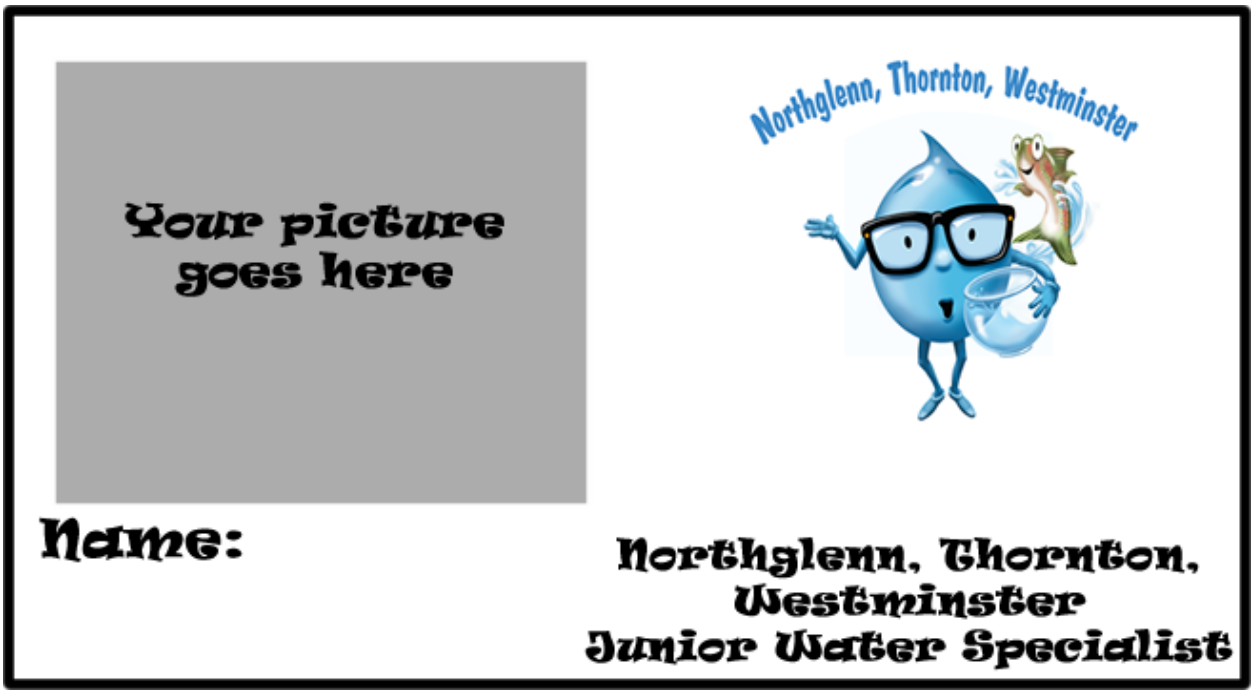
List 3 ways you use water:

1. _____
2. _____
3. _____

**Circle Yes or No for the following questions:**

| | | | |
|---|---|---|---|
| 1. | Do need water? | Yes | No |
| 2. | Do you want to learn more about water? | Yes | No |
| 3. | Do you turn off the water when brushing your teeth? | Yes | No |
| 4. | Do you know where your water comes from? | Yes | No |
| 5. | Do you know of ways to protect water? | Yes | No |
| 6. | Have you ever seen water being wasted? | Yes | No |

Congratulations! You are hired. Let's start by giving you your official ID card.




Now it is time to get to work! By working on the following job assignments you will be training as a Junior Water Specialist for your community. You will be just like local City staff who make sure your City has enough water to supply all of its needs.

Can you name some water jobs in your City?

- **Climatologist**
- **Meteorologist**
- **Hydrologist**
- **Water Resources Manager/Engineer/Specialist/Analyst/Technician**
- **Water Laboratory Analyst/Technician**
- **GIS Analyst (for Mapping Water Systems)**
- **Stream Restoration**
- **Water Conservation Coordinator**
- **Water and Wastewater Plant Operators**
- **Water Lines Maintenance Staff**
- **Stormwater Coordinator**
- **Water Rights Attorney**
- **Water Meter Staff**
- **Biologist**

# Job Assignment #1- Where Does Your Water Come From?

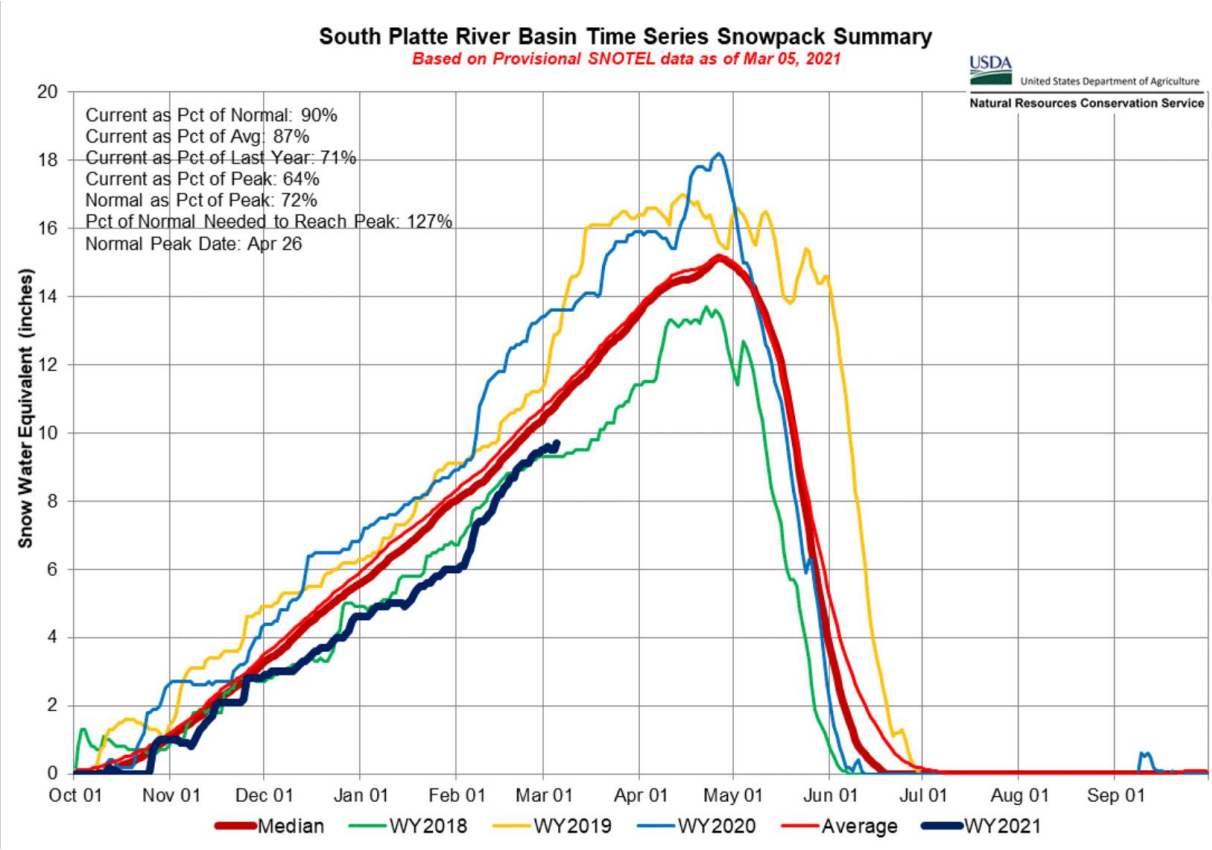
Did you know the water that supplies your school and home originates as snowmelt in the South Platte Basin Clear Creek Watershed?

**Using a computer or tablet go online using Google Earth or Google Maps and search for Berthoud Pass, Colorado.** You could also use a printed map. This is where some of our water is, in the form of snow. Google Earth has lots of pictures of snowcapped mountains near Berthod Pass to click on. Follow US 40 Highway down the mountain until you find the Clear Creek River running alongside the Highway. Our water travels down Clear Creek as the snow melts in the Spring and Summer months. It travels all the way to Standley Lake in rivers and ditches. That's a journey of over 60 miles! Can you follow the Rivers and canals all the way to Standley Lake? Or you can search for **Standley Lake, Westminster, CO** and you will see where the water is stored for use by the Cities of Northglenn, Thornton and Westminster.


1. Where does your drinking water originate? **Snowmelt in the South Platte Basin**
2. How many miles does your water travel from Berthoud Pass to Standley Lake? **Over 60 miles**
3. What is a reservoir? **A reservoir (etymology: from French réservoir a "storehouse") is a natural or artificial lake, storage pond or impoundment from a dam which is used to store water.**
4. In what reservoir is water stored in for use by the Cities of Northglenn, Thornton and Westminster? **Standley Lake in Westminster, Colorado**

# Job Assignment #2 - What is the Average Snowpack for Your City?

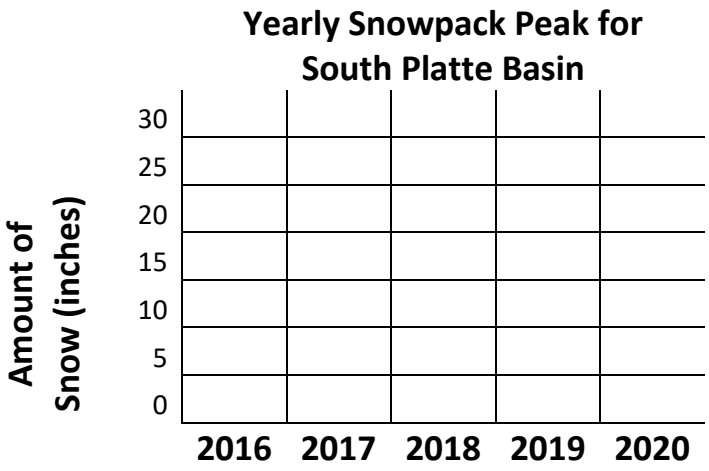
The amount of snow the mountains receive will determine how much water we will have to use down in the City each year. Snow in the mountains, also called **snowpack**, is measured regularly throughout the winter months to help Cities plan for how much water they will have for the rest of the year. If the snowpack is below average, Cities may enact outdoor watering restrictions to ensure that everybody has enough water. Snowpack is reported as inches of water.




Snowpack charts like this one, help water providers plan for the water needs of the community. **Check out and compare the snowpack levels from previous years.**

**Create a bar graph with the snowpack data for your watershed. Graph the last 5 years of snowpack. Then calculate the average snowpack. Draw an average line across the graph.**

| Year | South Platte Snowpack Peak (inches of water) |
|---|---|
| 2016 | 17 |
| 2017 | 14 |
| 2018 | 13 |
| 2019 | 17 |
| 2020 | 18 |




1. What is snowpack and why is important? **Snowpack forms from layers of snow that accumulate in geographic regions and high altitudes where the climate includes cold weather for extended periods during the year. Snowpacks are an important water resource that feed streams and rivers as they melt. Therefore snowpacks are both the drinking water source for many communities and a potential source of flooding (in case of sudden melting).**
2. What is drought? Looking at the snowpack data, which year were we in a drought? **2012**
3. What can you do in a drought to help save water?
    a. **Water less outdoors**
    b. **Don't water when it rains**
    c. **Replace and upgrade water wasting fixtures like toilets & washers**
    d. **Look for and replace leaks**
    e. **Ask the students for more ideas**
4. Word problem: A city's snowpack is at 100%, the town gets 10,000 acre feet (AF) of water from the rivers into its reservoir. If snowpack was only 50% of average. How many acre feet of water would the city get in 2012? **5,000 Acre Feet (AF)**
5. How many acre feet of water will the town get if snowpack is 25% of average? How about 150% of average? **2,500 AF = drought, 15,000 AF = possible flooding.**

6. To see what the current snowpack levels are (as percent of normal) for the South Platte River Basin click on this link https://www.wcc.nrcs.usda.gov/ftpref/states/co/charts/basinplotsprb21.gif

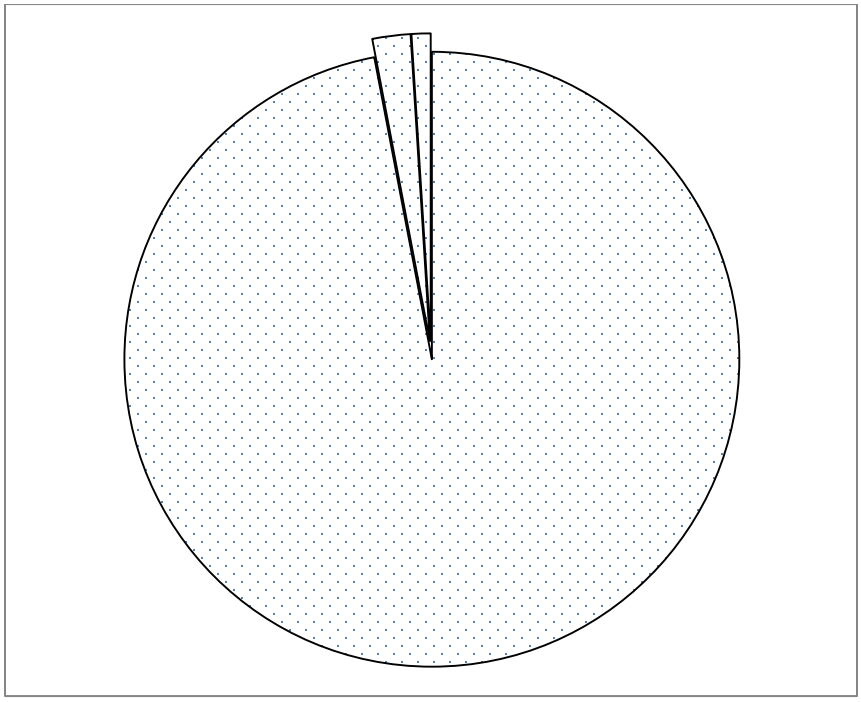
7. Based on current snowpack levels, how is your City water supply looking?

## Job Assignment #3 – How Much of the Earth's Water is Available to Humans?

Water is a limited resource both globally and locally. Figure out how much water is available for humans to use. 70% of the Earth is covered with water, however 97% of that water is salt water in the oceans, 2% is frozen in ice, the remainder is fresh water available for human consumption. What percentage is remaining?

**Color and label the pie chart below to show the percentages of fresh water, salt water and ice on the Earth. Make a color key to the right of the pie chart.**

**Global Percentages of**
**Fresh Water, Salt Water and Glacier Ice**



## Classroom Exercise:

Take 2000 ml of water. (Fill a 2 liter bottle with water)

- 1940 mls will represent salt water
- 40 mls will represent ice water in glaciers and polar ice caps
- Only 20 mls will represent fresh water available for humans to drink

## Job Assignment #4 - Be a Home Water Inspector

Get your family involved to find out how much water you use inside the home and track down leaks. Ask an adult to help you conduct an inspection at home. Tools you will need:

- **Pencil and paper**
- **Food coloring**

Let's focus on the bathroom since that is where **over half** of the water is used indoors.

1. **Inspect toilet water use. Ask an adult to place a drop of food coloring in the toilet tank. Wait 10 minutes without flushing the toilet to see if the color shows up in the toilet bowl. If it does, there is a leak and the flapper needs to be replaced. Flush the toilet after testing to avoid staining the toilet bowl.**

   Did you know? A leaking toilet can waste about 200 gallons of water every day. That would be like flushing your toilet more than 50 times for no reason!

| Toilet | Leak? (yes or no) | If yes, enter 200 gallons/day | Gallons/flush (A) | Number of flushes/day (B) | Gallons/day Multiply A x B |
|---|---|---|---|---|---|
| 1 | Y | 200 | 1.6 | 10 | 16 |
| 2 | N | | 1.6 | 5 | 8 |
| 3 | | | 1.6 | | |
| Total gallons/day leaked | | 200 | | Total flush gallons/day | 24 |

Example data

**Multiply total flush gallons/day by 365 days/year to get 8,760 gallons/year. (Doesn't include 200 gallons per day leaked)**

Did you know? The typical toilet uses 1.6 gallons/flush. Toilets older than 1994 use 3.5 gallons/flush or more! EPA WaterSense labeled toilets use less than 1.3 gallons flush.

How much water per flush would be saved by replacing an old 3.5 gallon/flush toilet with a 1.3 gallon/flush toilet?
2.2 gallons.

That's 18 glasses of water that could be used for drinking instead of flushed down the drain each time the toilet is flushed!

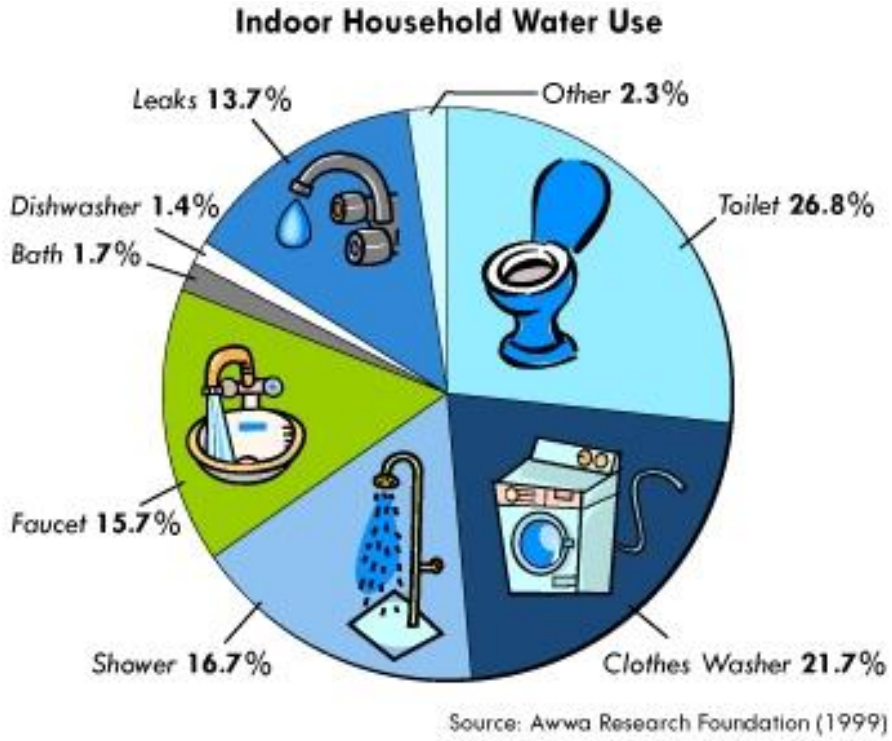
2. **Inspect shower water use. Estimate the total number showers taken each day by everyone at home. Ask everyone how many minutes they spend in the shower, add them up and divide by the number of people at home to get an average number of minutes. The average shower flows at about 3 gallons per minute.**

| **Number of people living at home** | **Average Number of Showers Taken/Day** (A) | **Average number of minutes in shower** (B) | **Total minutes shower water use/day** (Multiply A X B) | **Total gallons per day in shower use** (Multiply Total minutes X 3 gallons per minute for an average shower) |
|---|---|---|---|---|
| 4 | 4 | 10 min | 40 min | 120 gal per day |

If the average shower time decreased by 2 minutes per day, how much water would be saved? ___60_____gallons/day ____21,900_____gallons/year

If a bathtub holds 50 gallons, how many bathtubs could you fill with the **gallons/year** your family could save? _____438_____bathtubs

3. **Inspect other water uses inside your home.**




**Looking at the chart above, if one person uses a total of 45 gallons/day indoors, how many gallons would be used for each type of use (shower, toilet, etc.)? Now multiply, that number by the number of people living at home to estimate how many gallons are used at home.**

| | Percent | Gallons (A) | Number of people at home (B) | Daily household use in gallons (A x B) |
|---|---|---|---|---|
| **Toilet** | 26.8 | 12.06 | 4 | 48.24 |
| **Clothes Washer** | 21.7 | 9.765 | 4 | 39.06 |
| **Shower** | 16.7 | 7.515 | 4 | 30.06 |
| **Faucet** | 15.7 | 7.065 | 4 | 28.26 |
| **Leaks** | 13.7 | 6.165 | 4 | 24.66 |
| **Other** | 2.3 | 1.035 | 4 | 4.14 |
| **Bath** | 1.7 | 0.765 | 4 | 3.06 |
| **Dishwasher** | 1.4 | 0.63 | 4 | 2.52 |
| **Total** | 100 | 45 | | 180 |

**As Home Water Inspector, it's your job to recommend ways your family can reduce water use at home. What would you propose as the top 3 actions your family could take to save water?**

(Hint: The website http://epa.gov/watersense/kids/index.html might give you some ideas)

- **Fix all leaks as soon as possible**
- **Replace water wasting fixtures with efficient ones**
- **Replace flapper in toilet, if found to be leaking or replace**
- **Take shorter showers or take showers instead of baths**
- **Only run full loads in dish washers and clothes washers**
- **Collect warm up shower water in a bucket to water plants**
- **Turn off water when brushing teeth**
- **Save water outdoors by only watering grass 2 or 3 times per week**
- **Be aware of your water usage**

**Find out more ways to save at your water provider's website:**

**Northglenn – www.northglenn.org/mywater**

**Thornton – www.ThorntonWater.com**

**Westminster - www.ci.westminster.co.us/Environment/WaterUseConservation/Conservation.aspx**

## Job Assignment #5 – Draw a Picture of Water, Take a Photo or Make a Short Water Movie

**For this job assignment you will need to tap into your artistic side. Express what you have learned about water by drawing, photographing or even making a short**

**video about water.** There are lots of apps, like iMovie for example, that will help you make your own movie using pictures of water. Share your creative water works of art with your school or send them in to the Water Festival Committee and your class could receive a prize for your efforts!

Mail to: City of Thornton
Water Resources Division
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Thornton, CO 80229 or e-mail Water@ThorntonWater.com