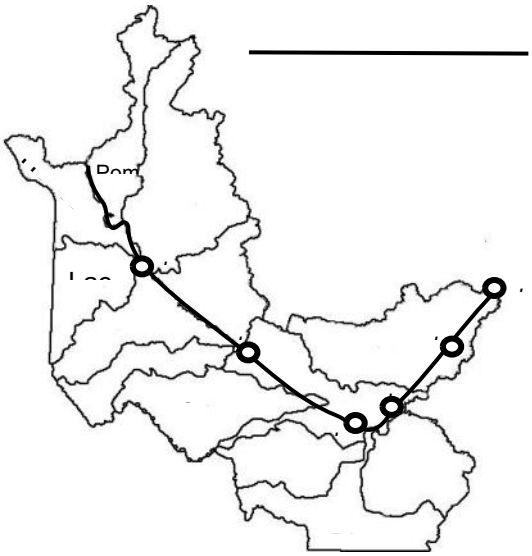
Nutrient Pollution in Minnesota River Basin

The results of your Minnesota River Watersheds monitoring are in. The Minnesota Pollution Control agency has collected phosphorus and nitrogen concentrations starting as far back as 2006, for some areas that is over 10 years of data. Your task to complete the data table below and complete your own graphical representation.

1. Go to Watershed Pollutant Load Monitoring Network (WPLMN) Data Viewer
2. Set the following settings
    a. Average Values
    b. Check: Watersheds and Subwatersheds
    c. Check Total Kjeldahl Nitrogen
    d. Get your pan tool for the map
3. Hover over the watersheds of the Minnesota River Basin, write down the testing site name, and record Both the Total Kjeldahl Nitrogen and the Total Phosphorus for the site.

Watershed	Testing Site	Average Values of Total Kjeldahl Nitrogen (mg/L)	Average values of Total Phosphorus (mg/L)
Upper Minnesota	Yellow Bank River CSAH40		
Pomme de Terre			
Lac Qui Parle			
Chippewa			
Yellow Medicine			
Hawk			
Redwood			
Cottonwood			
Middle Minnesota	Seven Mile Creek nr St. Peter		
Watonwan			
Blue Earth			
Le Sueur			
Lower Minnesota	High Island Creek CSAH6		
Minnesota River #1	Nr Lac Qui Parle, MN		
Minnesota River #2	At Morton, Mn		
Minnesota River #3	At Judson		
Minnesota River #4	At St. Peter		
Minnesota River #5	At Jordan		
Minnesota River #6	At Fort Snelling State Park		

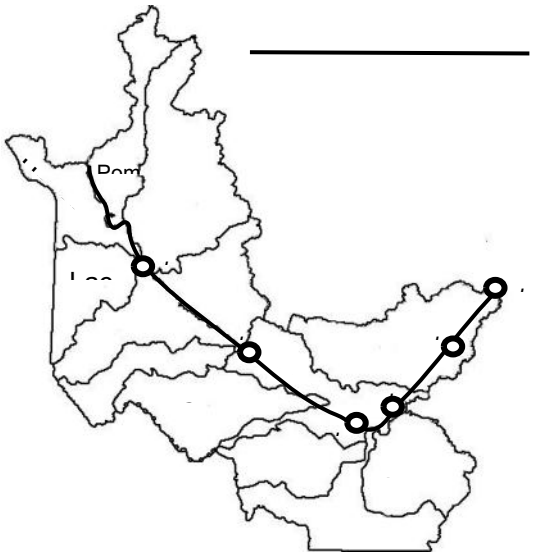
Graphical representation of Total Nitrogen



Total

Claims	Evidence

Graphical representation for Total Phosphorus



Total

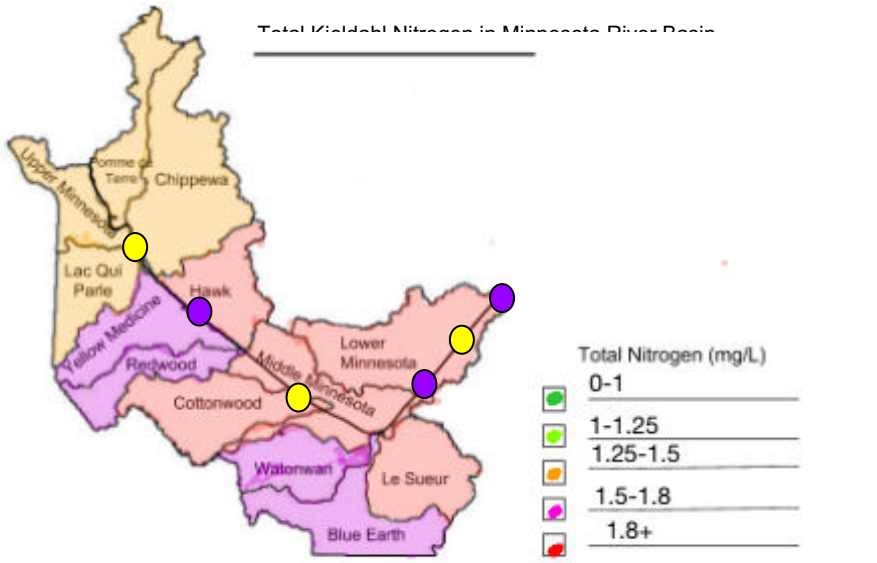
Claims	Evidence

Caption (written on next notebook page)

KEY

Watershed	Testing Site	Average Values of Total Kjeldahl Nitrogen (mg/L)	Average values of Total Phosphorus (mg/L)
Upper Minnesota	Yellow Bank River CSAH40	*1.47*	*0.352*
Pomme de Terre	Pomme de Terre at Appleton,MN	*1.44*	*0.209*
Lac Qui Parle	*Lac Qui Parle nr Lac Qui Parle, CSAH31*	*1.34*	*0.248*
Chippewa	*Chippewa River nr Milan, MN40*	*1.49*	*0.174*
Yellow Medicine	*Yellow Medicine River nr Granite Falls, MN*	*1.53*	*0.23*
Hawk	*Hawk Creek nr Granite Falls, CR52*	*2.22*	*0.429*
Redwood	*Redwood River nr Redwood Falls, Mn*	*1.74*	*0.453*
Cottonwood	*Cottonwood River nr New Ulm, MN68*	*1.82*	*0.292*
Middle Minnesota	Seven Mile Creek nr St. Peter	*3.28*	*0.343*
Watonwan	*Watonwan River nr Garden City, CSAH13*	*1.75*	*0.252*
Blue Earth	*Blue Earth River nr Rapidan, MN*	*1.59*	*0.273*
Le Sueur	*Le Sueur River nr Rapidan MN66*	*1.95*	*0.356*
Lower Minnesota	High Island Creek CSAH6	*2.39*	*0.464*
Minnesota River #1	Nr Lac Qui Parle, MN	*1.41*	*0.171*
Minnesota River #2	At Morton, Mn	*1.71*	*0.225*
Minnesota River #3	At Judson	*1.44*	*0.224*
Minnesota River #4	At St. Peter	*1.57*	*0.254*
Minnesota River #5	At Jordan	*1.45*	*0.257*
Minnesota River #6	At Fort Snelling State Park	*1.43*	*0.235*

Graphical representation of Total Nitrogen



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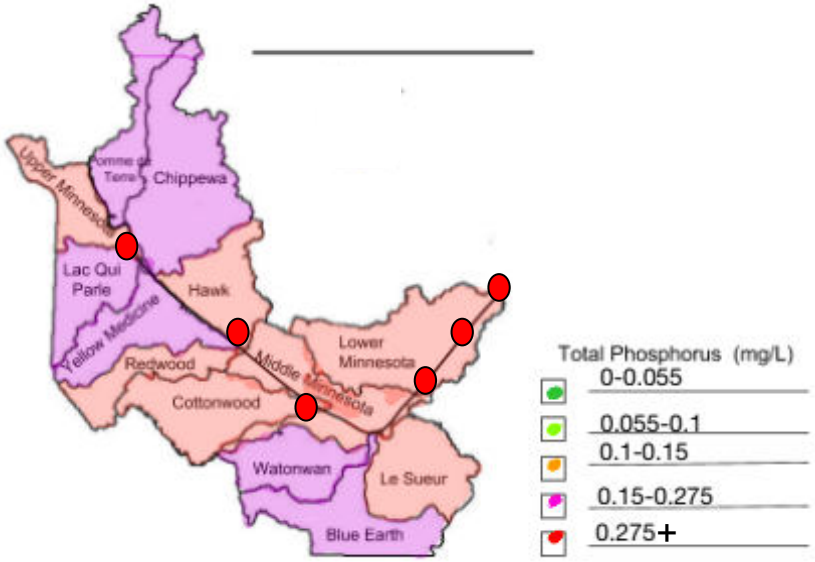
Claim	**Evidence**
Total Kjeldahl Nitrogen levels increase downstream with lowest levels found in watersheds near the source and higher levels found near the mouth of the river.	*The watersheds of Upper Minnesota, Chippewa, Pomme de Terre, and Lac Qui Parle watersheds all have the lowest levels of Total Kjeldahl Nitrogen in the range of 1.25-1.5 mg/L. Farther away from the source levels increase to the range of 1.8+ mg/L in the Lower Minnesota, Middle Minnesota, Le Sueur, and Cottonwood watersheds having the highest level.*
Seven Mile Creek in the Middle Minnesota Watershed has the highest levels of Total Kjeldahl Nitrogen then all other areas tested.	*Seven Mile creek has a the highest levels of Total Kjeldahl Nitrogen at a value of 3.28 mg/L. This value is significantly higher than any other values found in the Minnesota River basin. The next highest is found at High Island Creek 2.39 mg/L. All other locations have values smaller than 2.00 mg/L*
There are no watersheds where the values of Total Kjeldahl Nitrogen 1.25 mg/L. This means	*The lowest watershed is* Lac Qui Parle watershed with a *Total Kjeldahl Nitrogen value of 1.34 mg/L*

Encourage students to use names of watershed and the meaning of the colors rather than the colors. Students tend to write the colors found in the maps rather then the what they colors mean according to the key when making claims and writing evidence.

Graphical representation for Total Phosphorus



Claims	Evidence
Total Phosphorus levels are high or very high for all areas of the Minnesota River Basin	*The lowest value for the Minnesota River Basin for Total Phosphorus is 0.23 mg/L found in Yellow Medicine Watershed. This is still in the high category.*
More watersheds have a total phosphorus in the very high range of 0.275+ mg/L then in the high range of 0.15-0.275 mg/L	*7 watersheds are in the very high range, there are 6 in the high range*

Caption

The Minnesota River is polluted with nitrogen and phosphorous. This pollution is called nutrient pollution. Nutrient pollution for the Minnesota River Basin is caused by non-point source pollution primarily pollution runoff from farms. Land use has changed over the last 100 years from prairie to farmland. This change to farmland could be due in part by the increase in population for Minnesota and the United States. As the demand for food to feed a rising population increases so does the need to change the prairie into farmland. This area of Minnesota is very important for food production and one of the most productive areas in the world. Farmers use fertilizers rich in nitrogen and phosphorous to help grow their crops. Some of these nutrients end up in the streams and rivers that flow into the Minnesota River. Increases in nitrogen and phosphorous provides nutrients for algae to grow. This excess growth is called an algal bloom which causes a think, green much in the water, blocks sunlight for other plants, and creates toxins that can kill fish and other animals. Farther away the dead zone in the Gulf of Mexico where the Mississippi river empties into the Gulf is partially caused by nutrient pollution from the Minnesota river. The dead zone is caused by decomposing algal blooms decreasing the amount of oxygen in the water.

***Answers will vary depending where students take their data points. For this key data points where take closest to where the watershed flowed into the Minnesota River.**