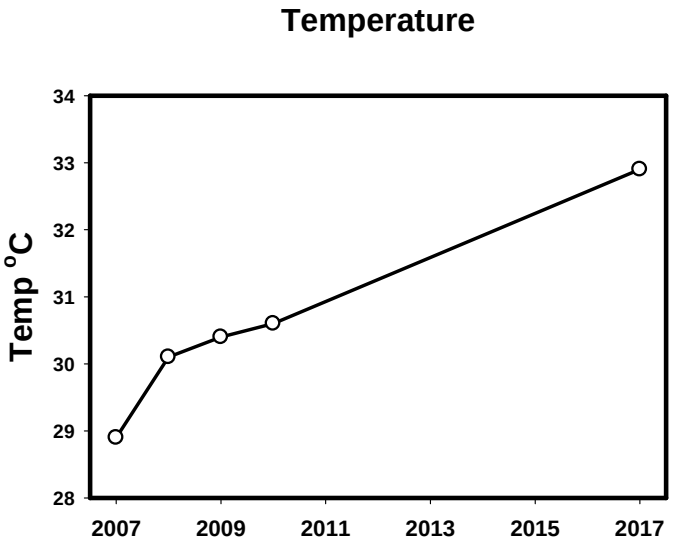
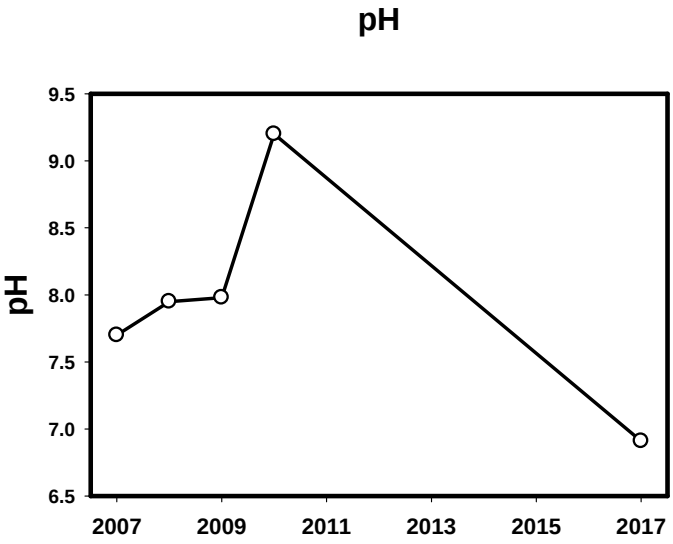
Water Sampling, July 2017

Lake Pasbehegh in First Colony was first sampled in July 2007 and analyzed in comparison with surface water samples collected from 24 other stream, pond, and tidal creek locations in the College Creek watershed. We continued sampling quarterly through 2010, then sampled again in July 2017. The results and interpretations below are from a comparison of water quality from July 2007-2010 and 2017:

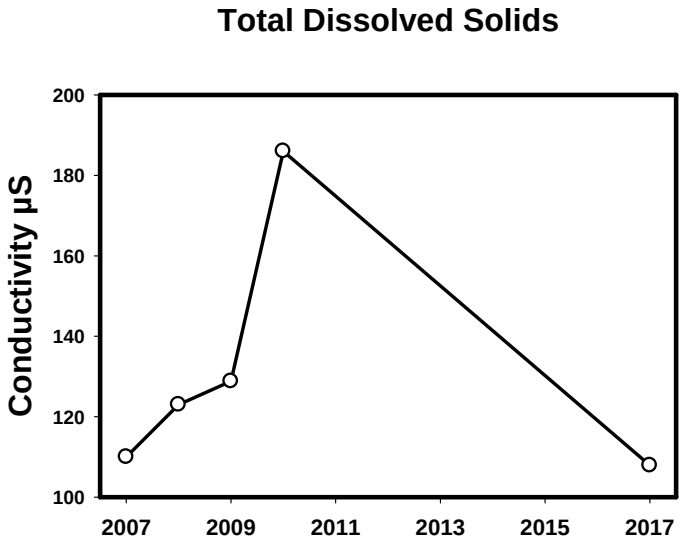
Temperature: 33° C measured in July 2017 is pretty warm, but we have had a warm and dry July 2017 (College Creek watershed average for lakes/ponds was 30.0 ° C). Based on the trend in the data, we have strong evidence for global warming…NOT! Five data points do not constitute climate change, and other ponds in our sampling regimen have not shown the increase in temperature seen in Lake Pasbehegh.



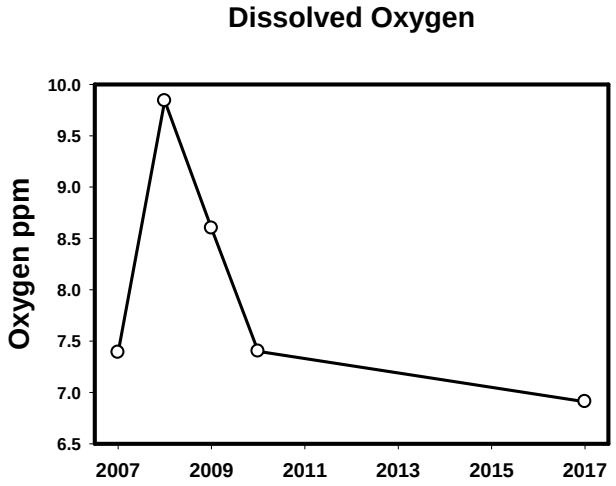
pH: The pH of the lake in July 2017 (6.9) was the lowest measured in our five years of sampling, and lower than the average of other ponds in the College Creek watershed (pH = 8.0). Typically ponds tend to have a higher pH during summer when algal blooms decrease the carbon dioxide concentration in the water, which increases the pH (makes the water more basic). Because Lake Pasbehegh has so little buffering (see conductivity), the pH tends to vary substantially. A pH of 6.9 is not dangerously acidic—it is circumneutral. No worries, just odd to be so low.

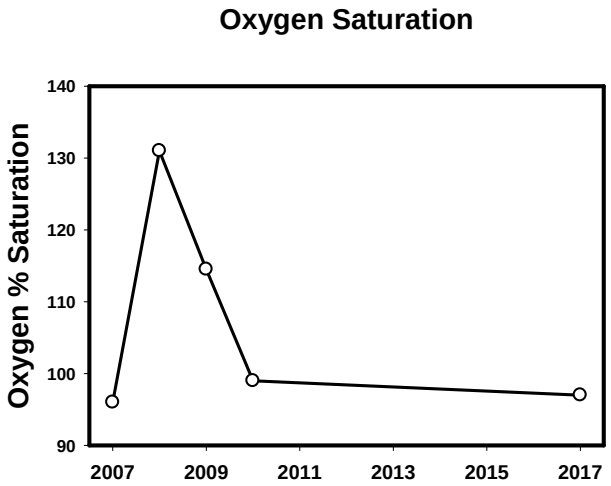


Conductivity: The conductivity of the lake was 108 µS, a very low measure of the total amount of ions dissolved in the water. For comparison, the average conductivity of lakes in the College Creek watershed in July 2017 was 281 µS. The only pond with a lower conductivity (79 µS) was a small pond fed entirely by stormwater runoff—rainfall and runoff from Route 199. Low conductivity means low dissolved calcium and bicarbonate ion, and thus low buffering capacity (little resistance to changes in pH). The upshot is that the lake will experience seasonal swings in pH and other variables.

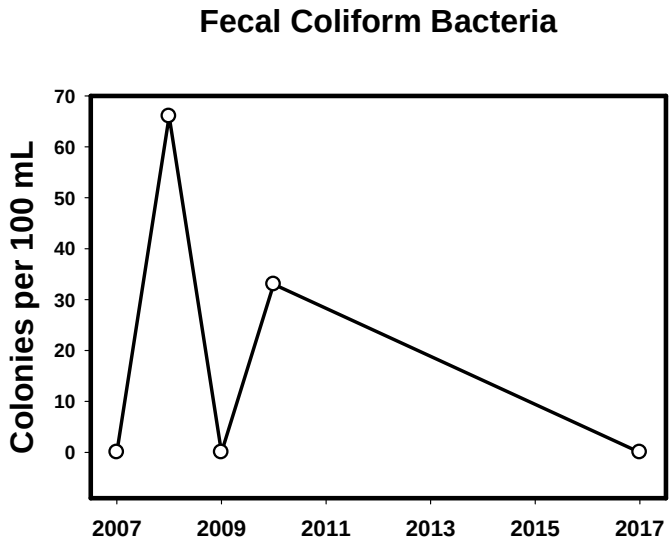


Oxygen: Oxygen content in the lake (6.9 ppm) was at 97% saturation. At 100% saturation, the water is holding as much oxygen as can be dissolved at that temperature. When saturation is greater than 100%, "extra" oxygen is being supplied by the algal blooms active in the lake. When saturation is less than 100%, then decomposition is using up oxygen faster than it is being produced by algae or dissolved into the water from the atmosphere. Since algal blooms are active during the day, one would expect the lake to be oversaturated with oxygen, but it was not. There's the possibility that the lake surface is beginning to "sense" the bottom, i.e., decomposition of organic matter at the bottom is starting to affect oxygen concentration near the surface. Oxygen saturation, however, was just as low in 2007 as it is here in 2017, so I'm not real worried that something apocalyptic is on the horizon for your lake. As in years past, the telling time will be in the fall when the algal blooms begin to die back. Will decomposition of that algal biomass drive down the oxygen content in the lake water?

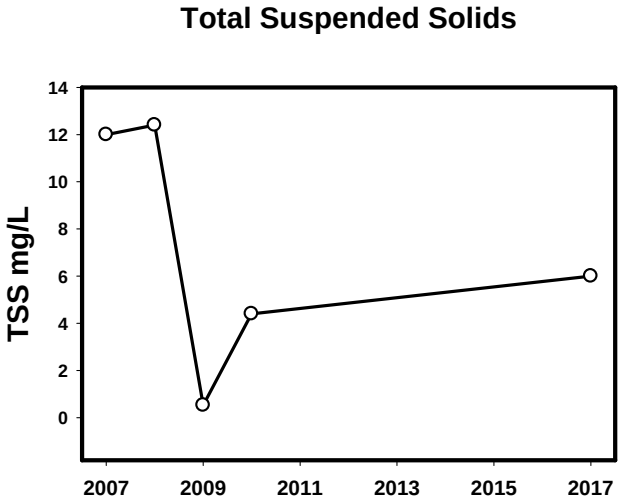


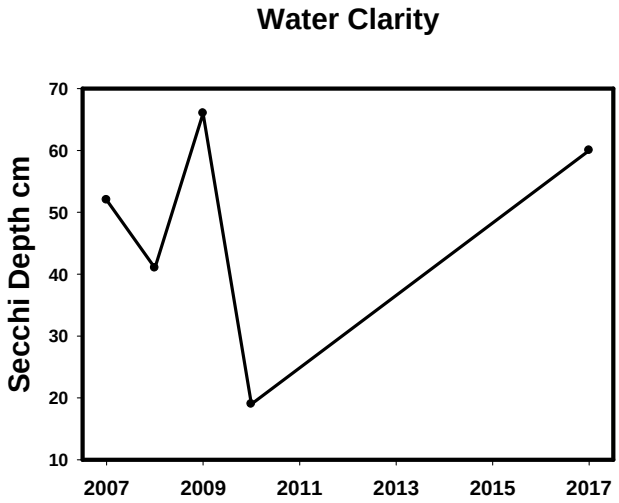


Bacteria: The fecal coliform test yielded a count of 0 fecal coliform bacteria per 100 ml of water. The standard for swimmable, fishable waters is over 265 fecal coliform bacteria per 100 ml, so the lake is not dangerous for fecal coliform bacteria in any way. Low to no counts have been recorded for every season sampled at Lake Pasbehegh. The presence of any fecal coliform bacteria may be from geese, raccoons, or other wildlife and is probably not derived from human waste. It is doubtful that any vectors for human diseases are present in the water of Lake Pasbehegh.

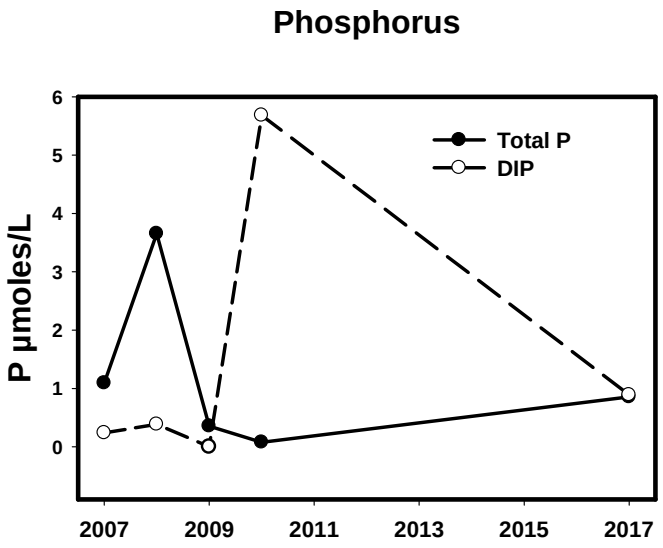


TSS: Total suspended solid (TSS) is the particulate material trapped on a filter when lake water is passed through the filter. The suspended solids concentration in Lake Pasbehegh this July was 6.0 mg/l, half of that measured July 2007. Solids suspended in the water tend to decrease light penetration and thus TSS tends to be inversely related to water clarity. Suspended solids are comprised of inorganic sediment and also algae and other organic matter. Ponds in the region averaged water clarity of 87 cm during July 2017; Lake Pasbehegh is on the lower end of water clarity at 60 cm. Roughly, this means one can see about 2 feet into the water. Some folks like to be able to see their feet when they swim. Swimming in your lake would not provide this experience.

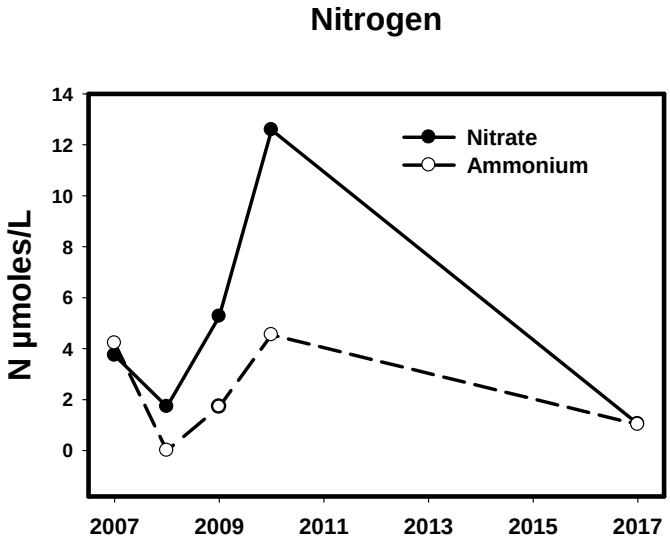




Total P and DIP: Total Phosphorus is the phosphorus associated with suspended solids (TSS). The amount of total phosphorus in the lake during July 2017 (0.86 µmoles/l) was below the average for ponds in the region (1.34 µmoles/l). Phosphorus is a nutrient that limits the growth of algae in freshwater streams and lakes. Dissolved phosphorus concentration (0.89 µmoles/l) was right at the regional average for ponds (0.84 µmoles/l). The concentration of phosphorus in the water column is relatively low in Lake Pasbehegh. Total P was high in 2008 and DIP was high in 2010, but otherwise phosphorus levels have been low—a good thing.



Nitrate and Ammonium: Dissolved inorganic forms of nitrogen are dominated by ammonium and nitrate in the water of ponds and streams. Both were found in low concentrations in Lake Pasbehegh for July 2017, each at 1.0 µmole/l, right at the average for other ponds in the region. Where is the nitrogen in the lake? Much of it could be stored in the biomass of algae and plants in the lake water. One measure of nutrient availability is the N:P ratio—the ratio of dissolved nitrogen relative to dissolved phosphorus. For your lake, the N:P ratio tends to be low during the summer months, which indicates that algal growth is nitrogen limited.



Overall, Lake Pasbehegh is a eutrophic water body with elevated levels of algal production visible as rafting mats of floating organic matter in some locations. Because the lake has such a low concentration of dissolved ions (low conductivity), buffering capacity remains low and so the lake will continue to respond to algal production with substantial swings in measures like pH and oxygen content. The only concern at this juncture is the extent to which the lake is infilling, i.e, the rate at which the lake bottom is filling up with sediment.

My research assistant and I will try to get out to the lake sometime to complete a depth survey and determine the bottom bathymetry.