**The Lake Carmi Implementation Team** has been in place since 2015 to support communications and trust-building among partners working to reduce phosphorus in the Lake Carmi watershed. Partner organizations implement actions legislated by the Vermont Clean Water Act of 2015. In support of the Implementation Team's efforts, the Vermont Department of Environmental Conservation conducted biweekly monitoring and sampling during the field seasons of 2016 and 2017. This intensive monitoring regimen will continue in 2018 and, if needed, beyond. Summer 2017 saw a perfect storm of factors (Figures 1 - 4). Unusually high levels of rainfall in late spring 2017 caused erosion of phosphorus-laden sediments that triggered early summer algal blooms. Typical stratification during early summer led to a lack of mixing in the lowest layer and depletion of oxygen by biological activity there. Under these conditions, phosphorus was released from the sediment and builds up in the lowest layer.

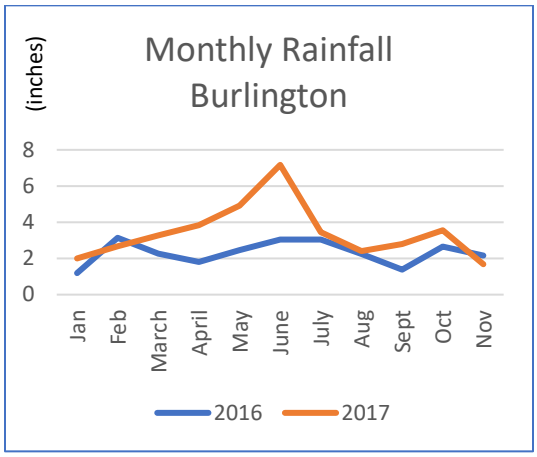


Figure 1. In 2017 late spring rains caused unusual levels of runoff from Lake Carmi's watershed, bringing phosphorus-laden sediments that led to an early start to algal blooms.

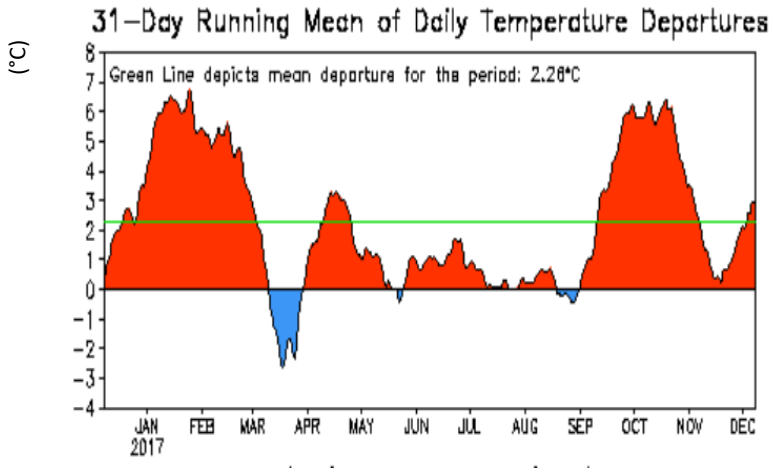


Figure 2. Cooler than normal temperatures in late August allowed Lake Carmi to mix, and then an extended warm spell exacerbated cyanobacteria growth.[1]

Cool temperatures for a short period in August caused mixing of the lake column, and the phosphorus in the lowest layer mixed up through the water column. This extra injection of phosphorus caused the intense algal blooms we witnessed in late August and early September. An extended period of unusually warm weather from late September through November caused extension of the cyanobacteria bloom.

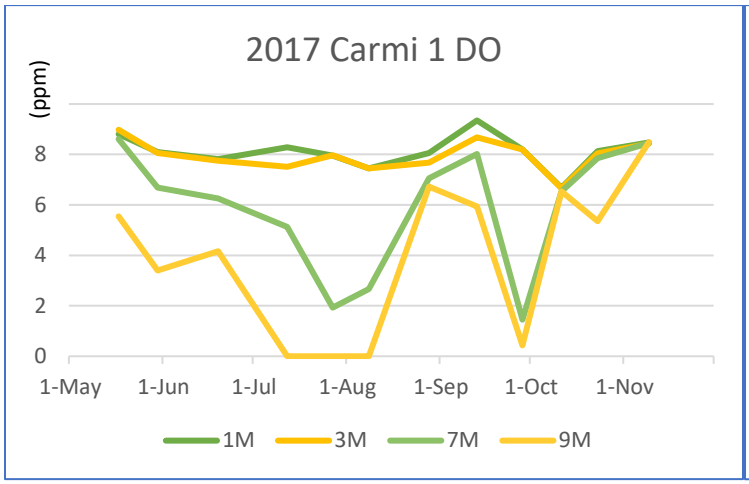


Figure 3. The water column in Lake Carmi mixed in late August. Note the lack of oxygen at the nine-meter level during late July and early August. Anoxic conditions allow release of phosphorus.

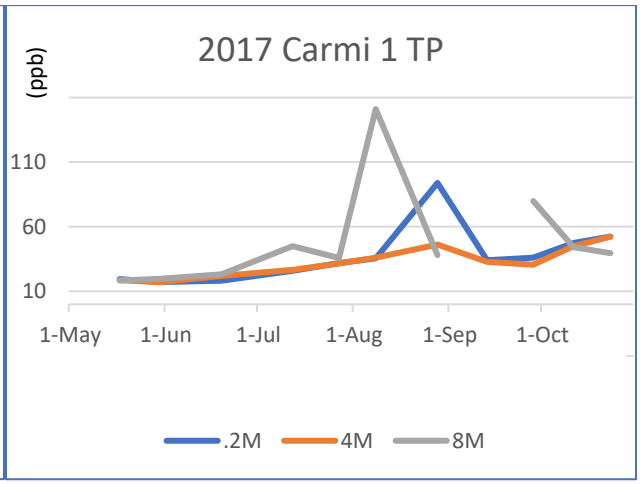


Figure 4. Total phosphorus accumulated at the eight-meter level during early August and then mixed into the water spurring intense growth of cyanobacteria.

[1] http://www.cpc.ncep.noaa.gov/products/global_monitoring/temperature/tn72617_1yr.gif

While the Agency appreciates the attention brought to Lake Carmi's water quality needs by the legislature, we are concerned that some language proposed in current bills would affect our ability to accelerate work toward meeting phosphorus reduction goals, by undermining working relationships among partners. An example of recent progress made by partners is the increase in best management practices applied on agricultural land (Figures 5 and 6).

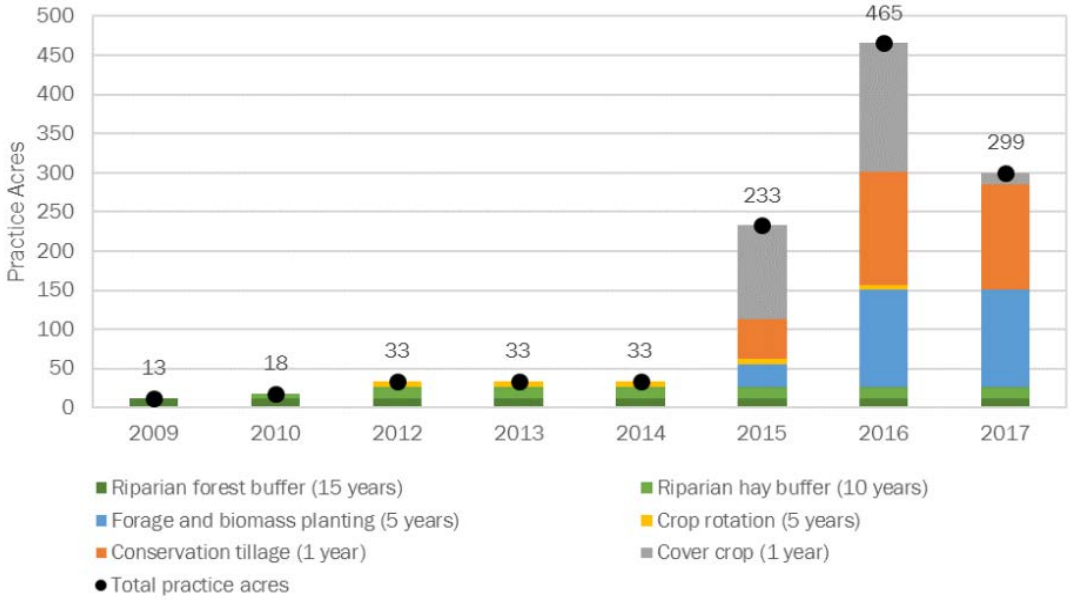


Figure 5. Acreage of best management practices applied in the Lake Carmi watershed using funding provided by partner organizations.

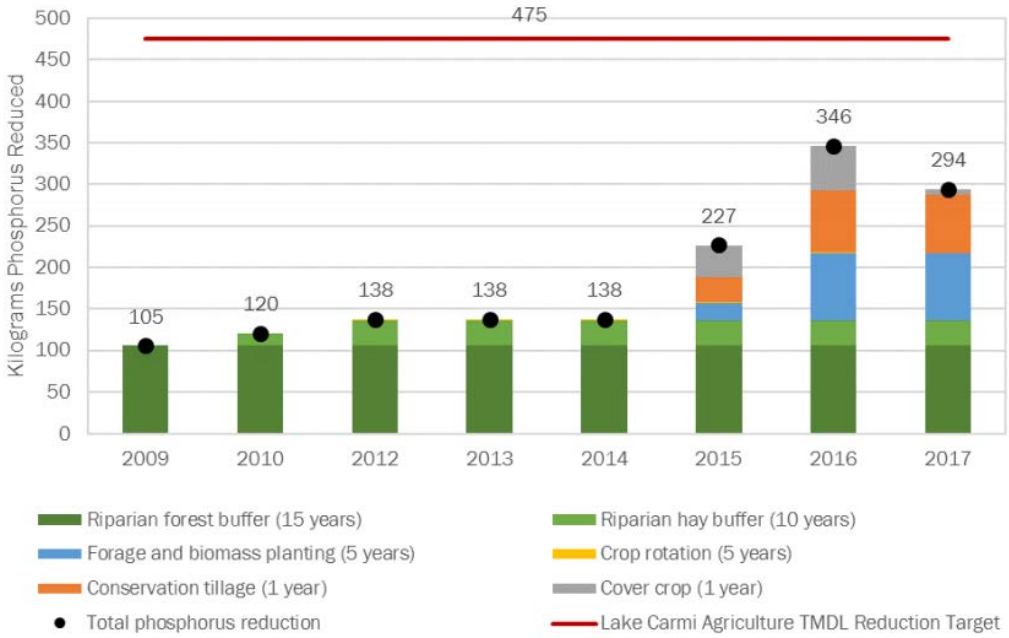


Figure 6. Estimated phosphorus reductions from best management practices implemented in the Lake Carmi watershed compared to the TMDL reduction target for agriculture.

For details of the Lake Carmi Implementation Team's objectives and work, see the Vermont Watershed Management Division's "Restoring Lake Carmi" web page at dec.vermont.gov/watershed/cwi/restoring/carmi and the Franklin Watershed Committee's "Current Objectives" web page at www.franklinwatershed.org/current-objectives.html.