Declining Lake Levels at Artist Lake, Middle Island, NY

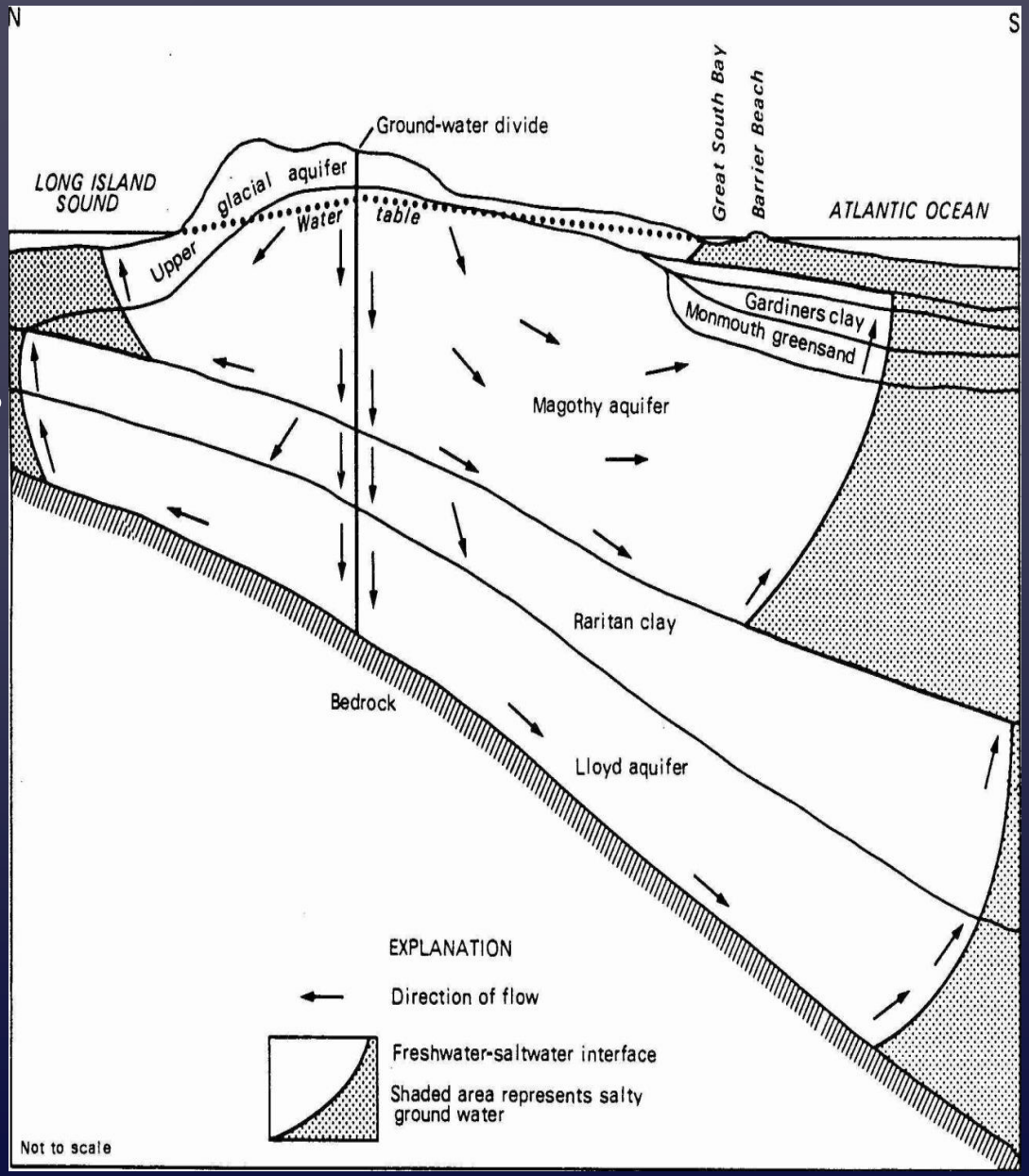
Annual Community Meeting
September 26, 2017

Ronald Busciolano
Supervisory Hydrologist

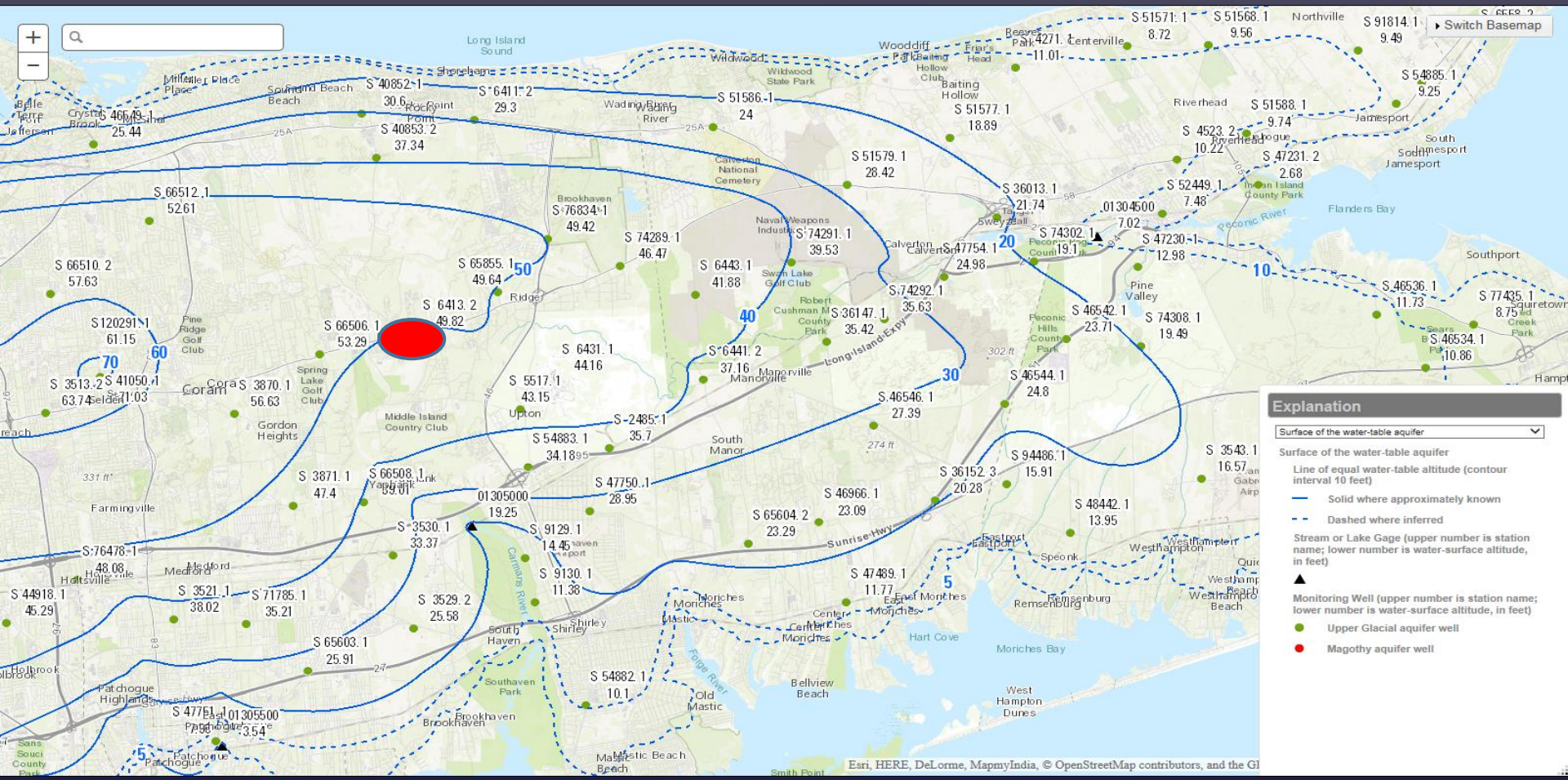
U.S. Geological Survey
New York Water Science Center
Coram Program Office

Basic Long Island Hydrology
Long Island's Groundwater Aquifers

- Three primary aquifers:
  - Upper Glacial (water table)
  - Magothy
  - Lloyd
- Flow into the deeper aquifers occurs along and near the ground-water divide.
- Boundaries to the flow system are the bedrock basement complex and the saltwater interface.
- Aquifer's groundwater is recharged by precipitation.

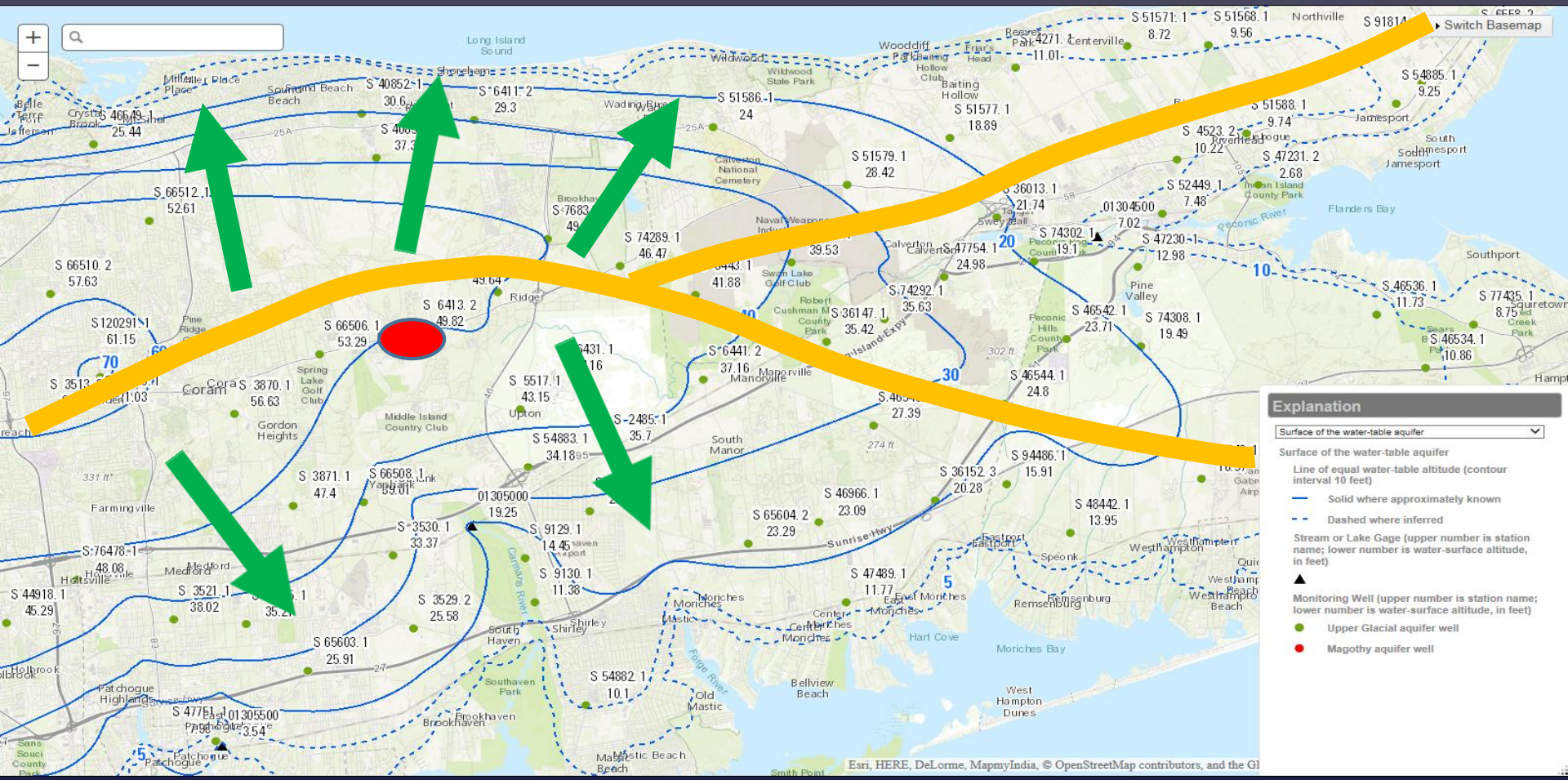


Basic Long Island Hydrology
Water Table and Groundwater Flow



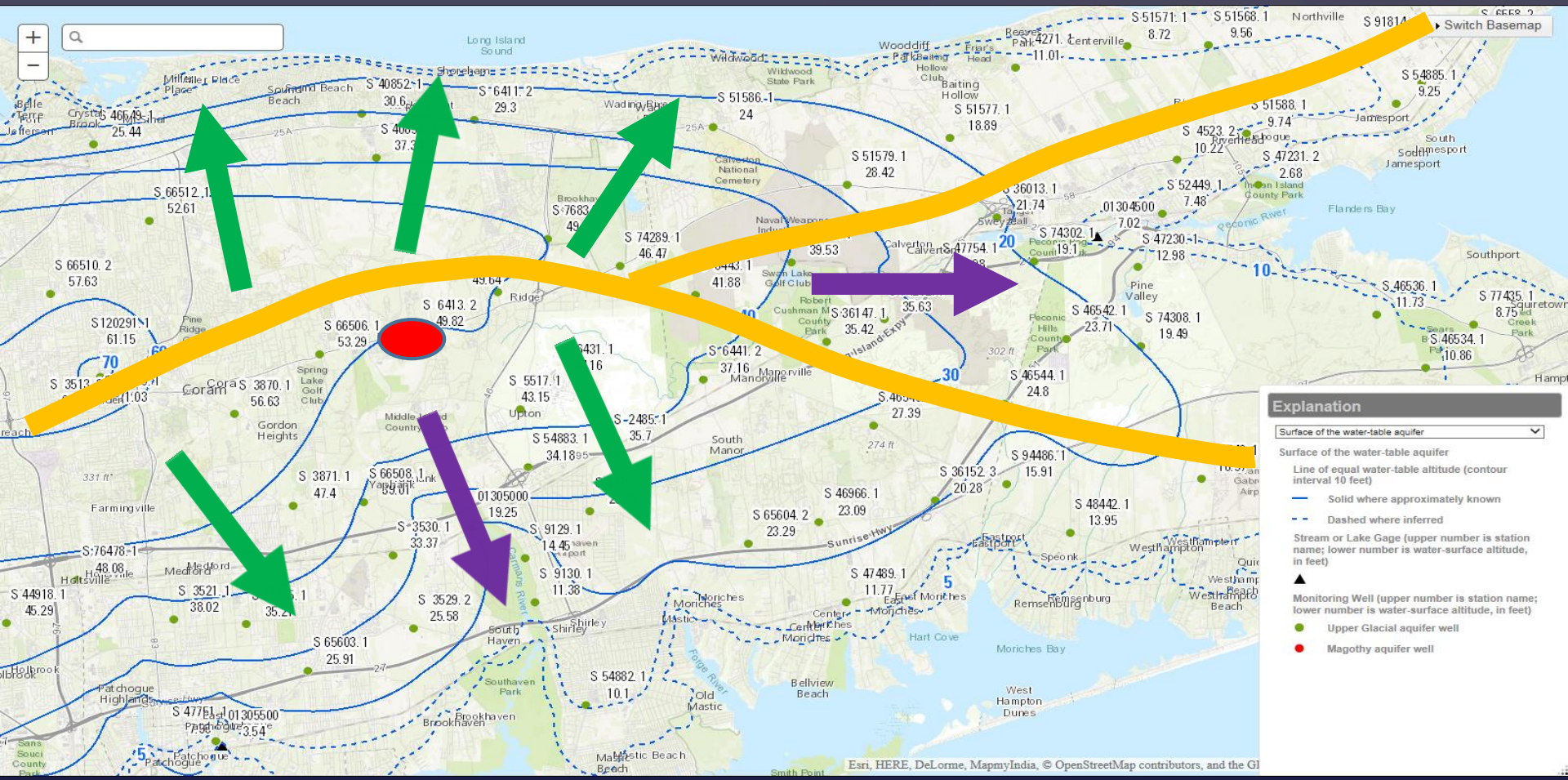
- Artist Lake location (red oval)
- Blue lines indicate the elevation of the water-table aquifer (2013).

Basic Long Island Hydrology
Water Table and Groundwater Flow



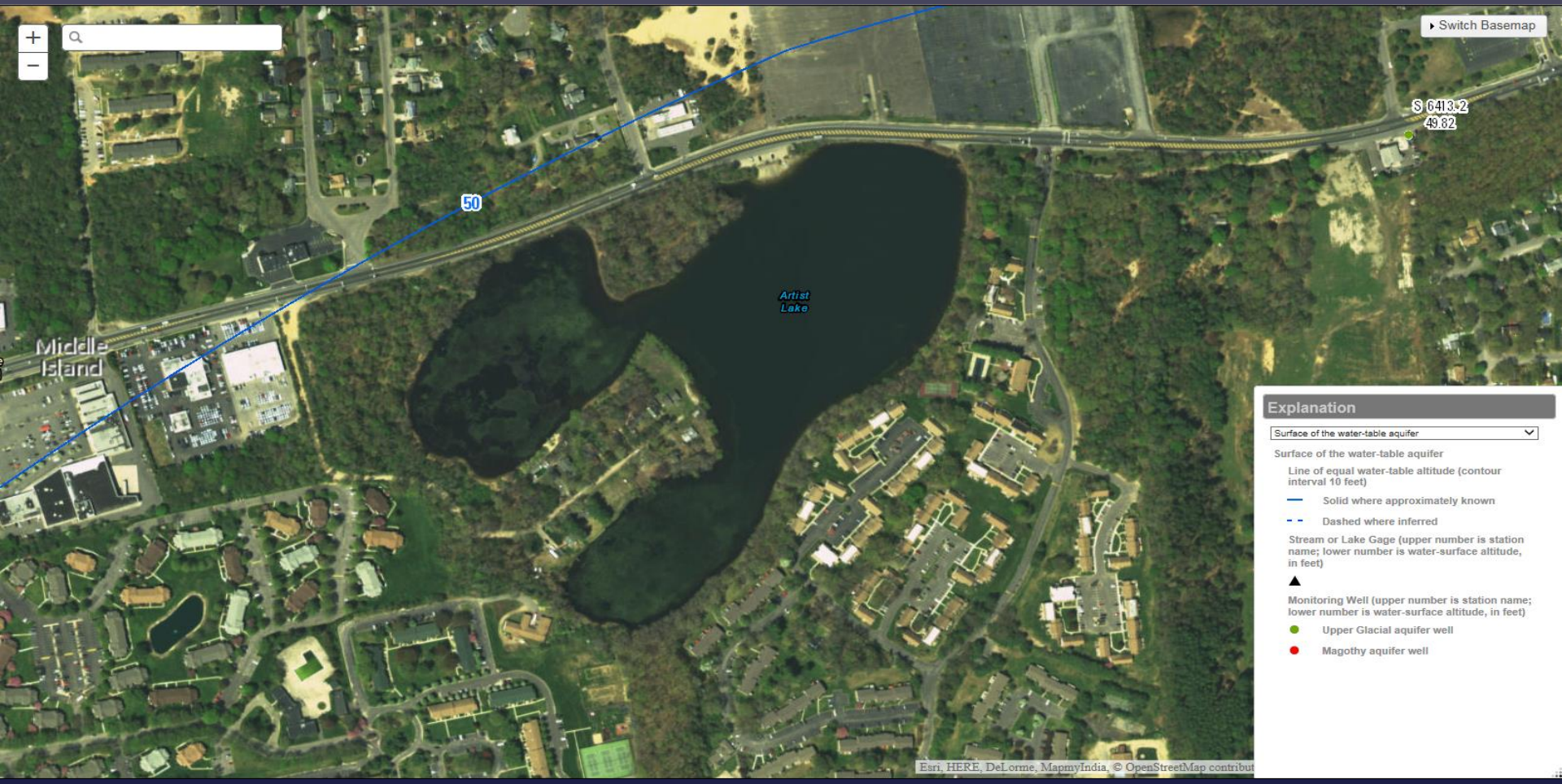
- Regional groundwater divide (orange line)
- General groundwater-flow direction in the water table (green arrows)

Basic Long Island Hydrology
Water Table and Groundwater Flow



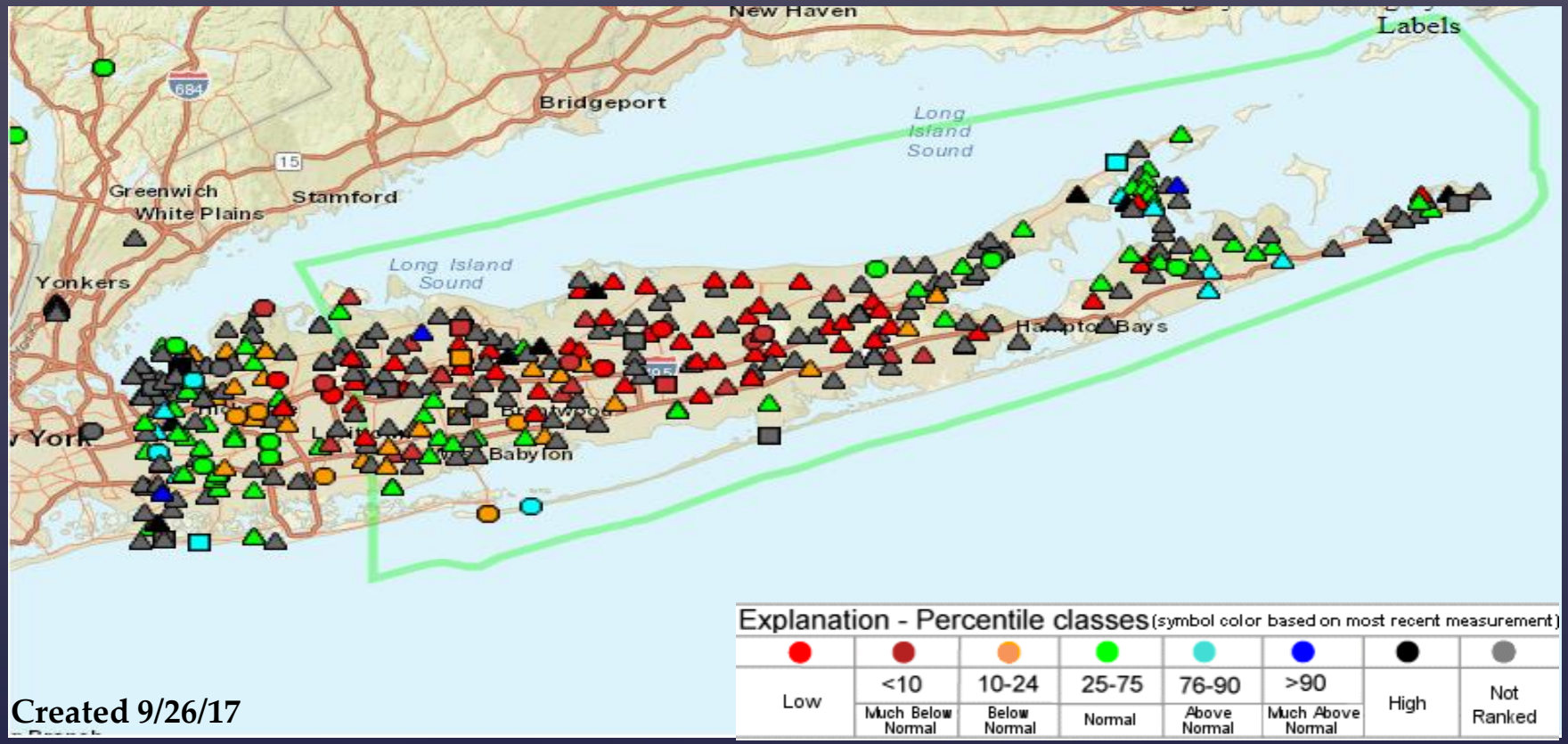
- Shallow groundwater flow (purple arrows) flows into the Carmans River, and further to the east into the Peconic River.

Basic Long Island Hydrology
Water Table and Groundwater Flow



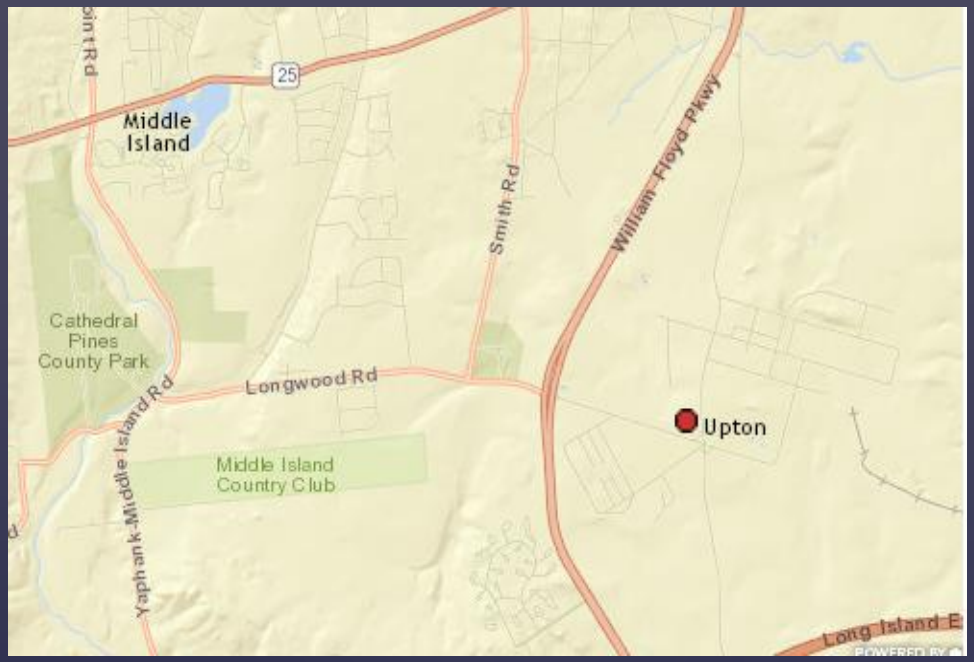
- Artist Lake is like a window to the water table.
- Primarily groundwater fed as water moves from north to south.
- Some surface runoff from surrounding land and paved surfaces.

USGS Hydrologic-Monitoring Network
Regional Groundwater Levels

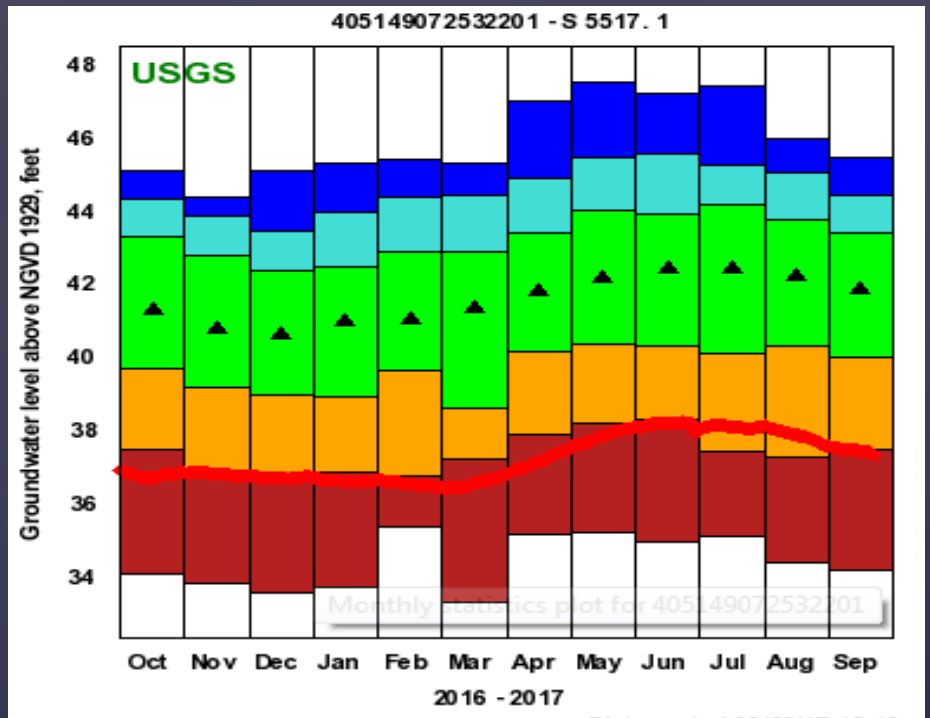


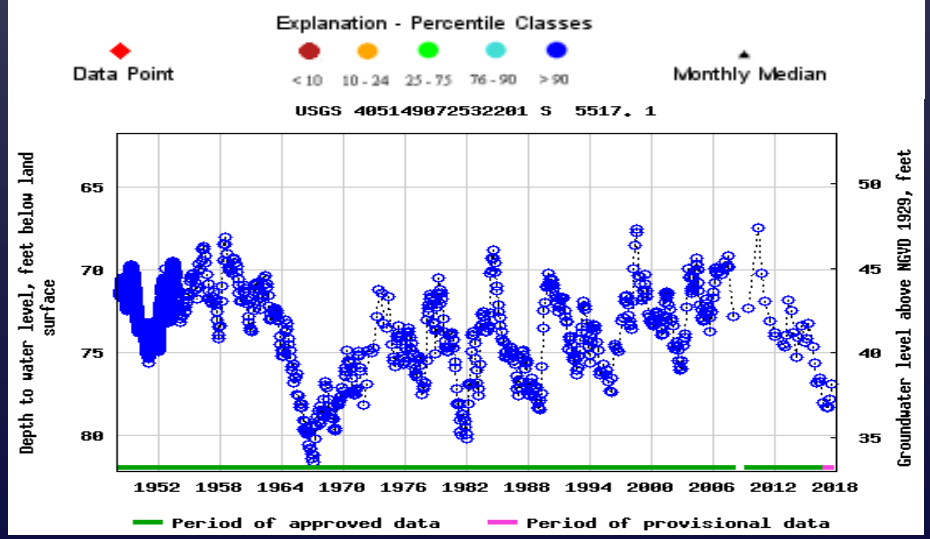
- Declines in groundwater levels throughout most of eastern LI.
- Natural cycle caused by deficits in precipitation over past few years.
- Changes to level of Artist Lake are related to similar changes in the underlying water-table aquifer.

USGS Hydrologic-Monitoring Network
Groundwater Level Declines

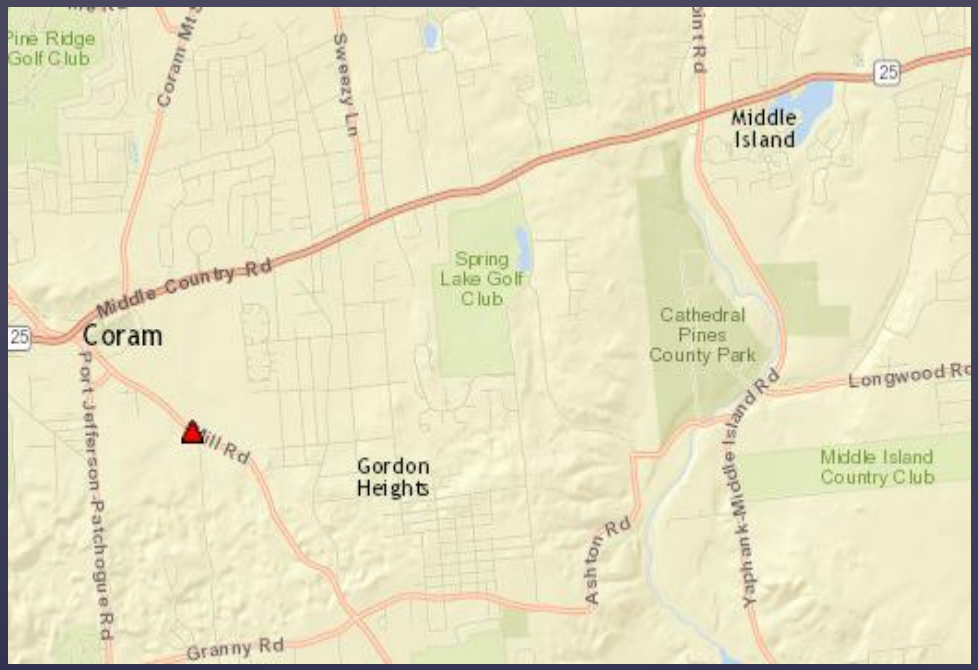


- USGS long-term water-table well S-5517 at Upton, NY.
- Records going back to 1940's.
- Well below water-levels over the past year.
- Water-level declines approaching 1960's drought levels.

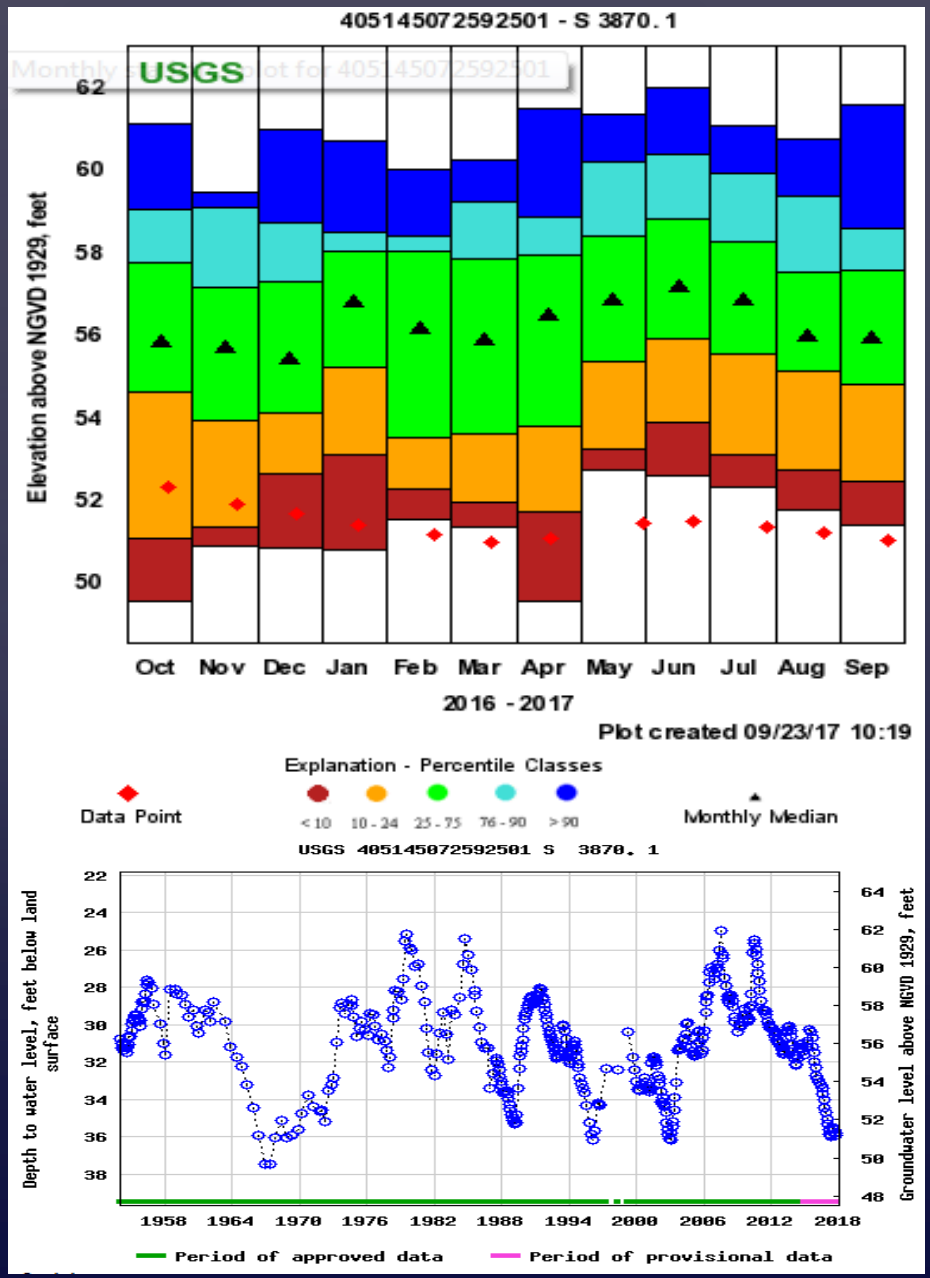




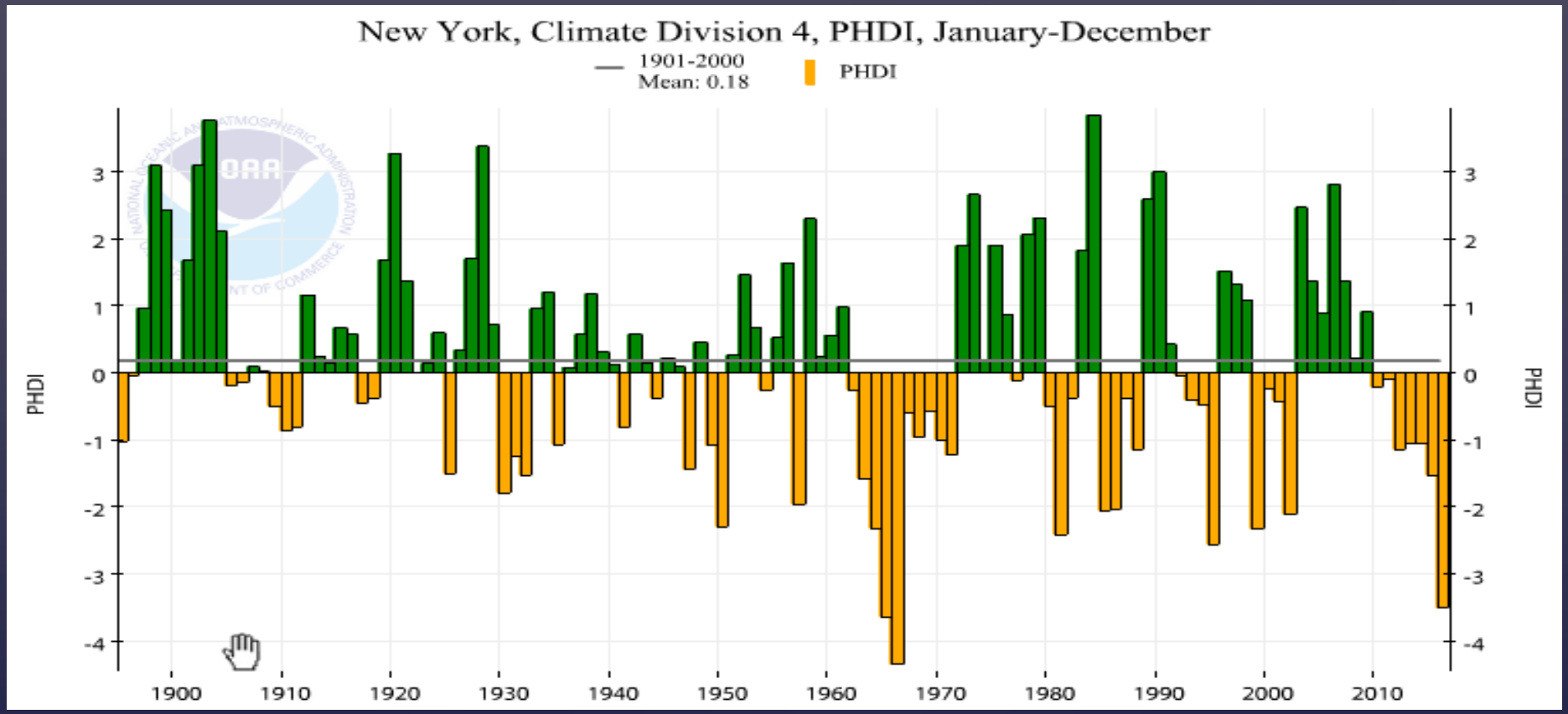
USGS Hydrologic-Monitoring Network
Groundwater Level Declines



- USGS long-term water-table well S-3870 near Coram, NY.
- Records going back to 1950's.
- Record low water levels for past 5 months.
- Water-level declines approaching 1960's drought levels.



Why Is Regional Groundwater So Low?
Long-Term Precipitation Deficits

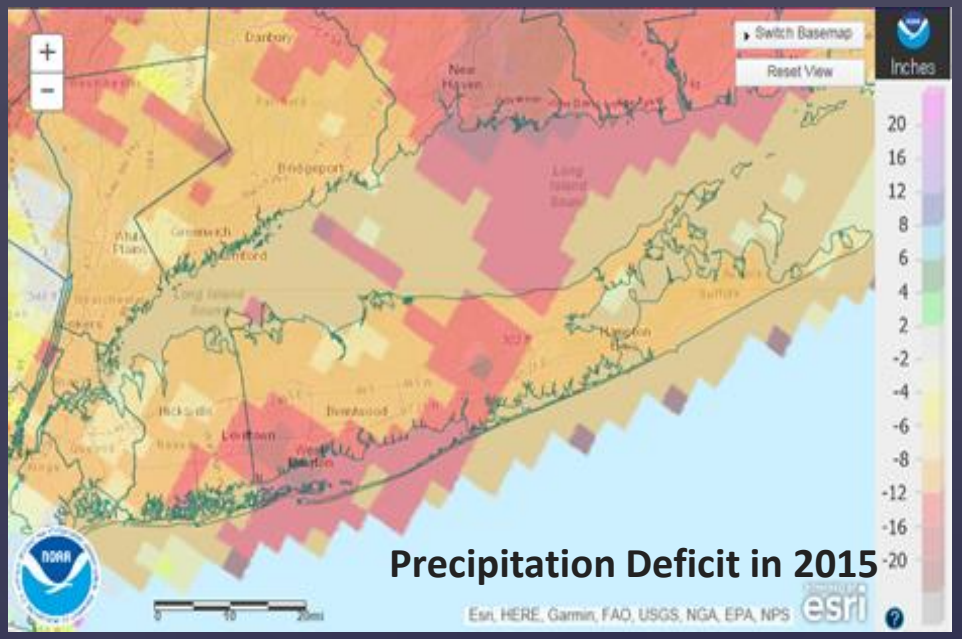


- NOAA chart showing Palmer Hydrological Drought Index for New York State Coastal Region.
- Shows increasing deficits in precipitation from 2010 to 2016.
- Longest period of deficits since the 1960's drought.

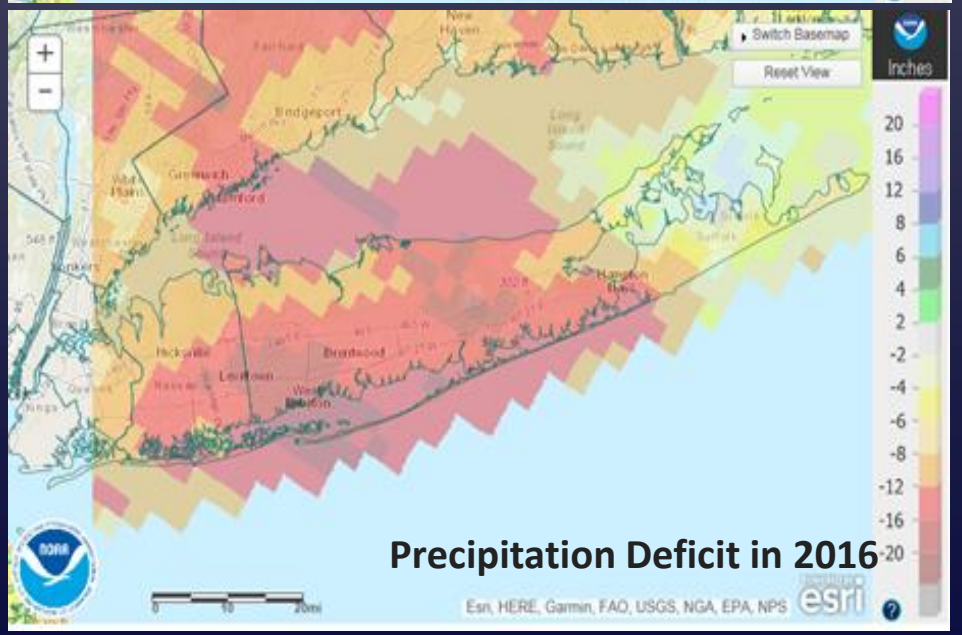
Why Is Regional Groundwater So Low?

Long-Term Precipitation Deficits

- Regional groundwater declines attributed to two years of well below normal precipitation in 2015 and 2016.
- Even though more recent precipitation has been near normal, it has fallen during the growing season.
- Water has been taken up by growing plants, and/or been used to fill soil-moisture deficits caused by years of below-normal precipitation.
- Therefore, water has not been able to replenish the aquifer.



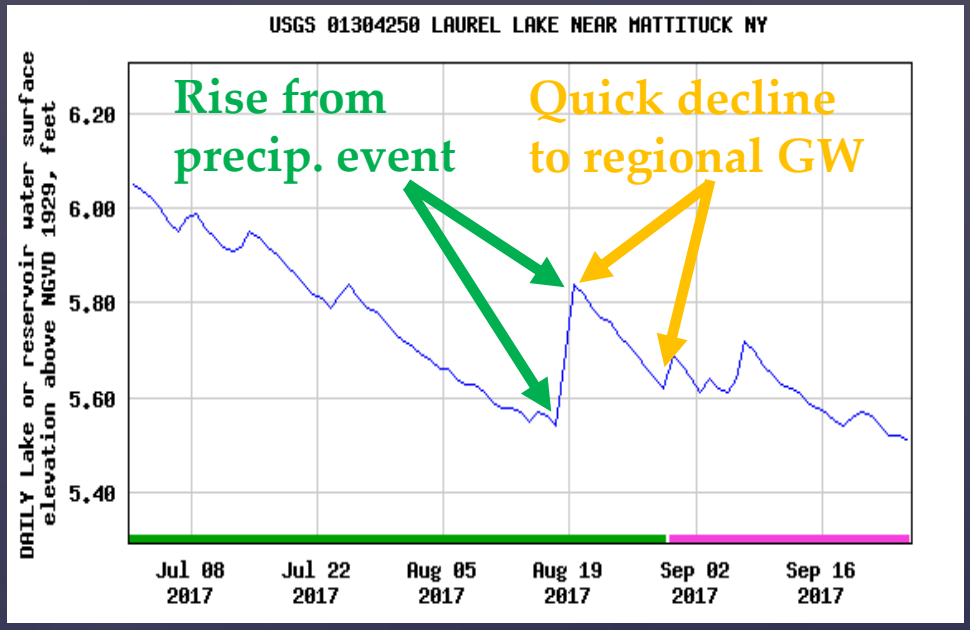
Precipitation Deficit in 2015

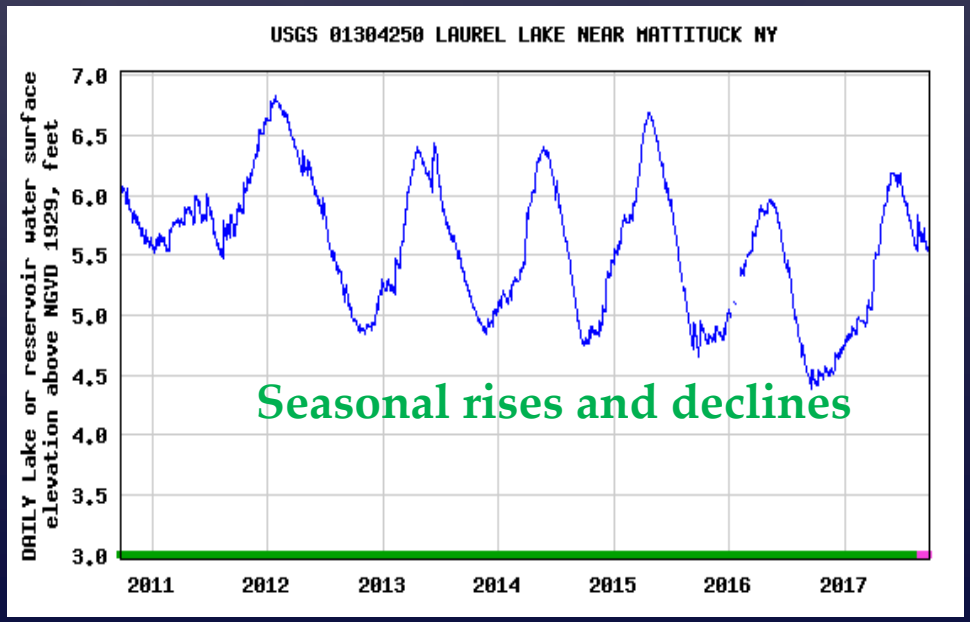


Precipitation Deficit in 2016

USGS Hydrologic-Monitoring Network
How Lakes Respond to Precipitation

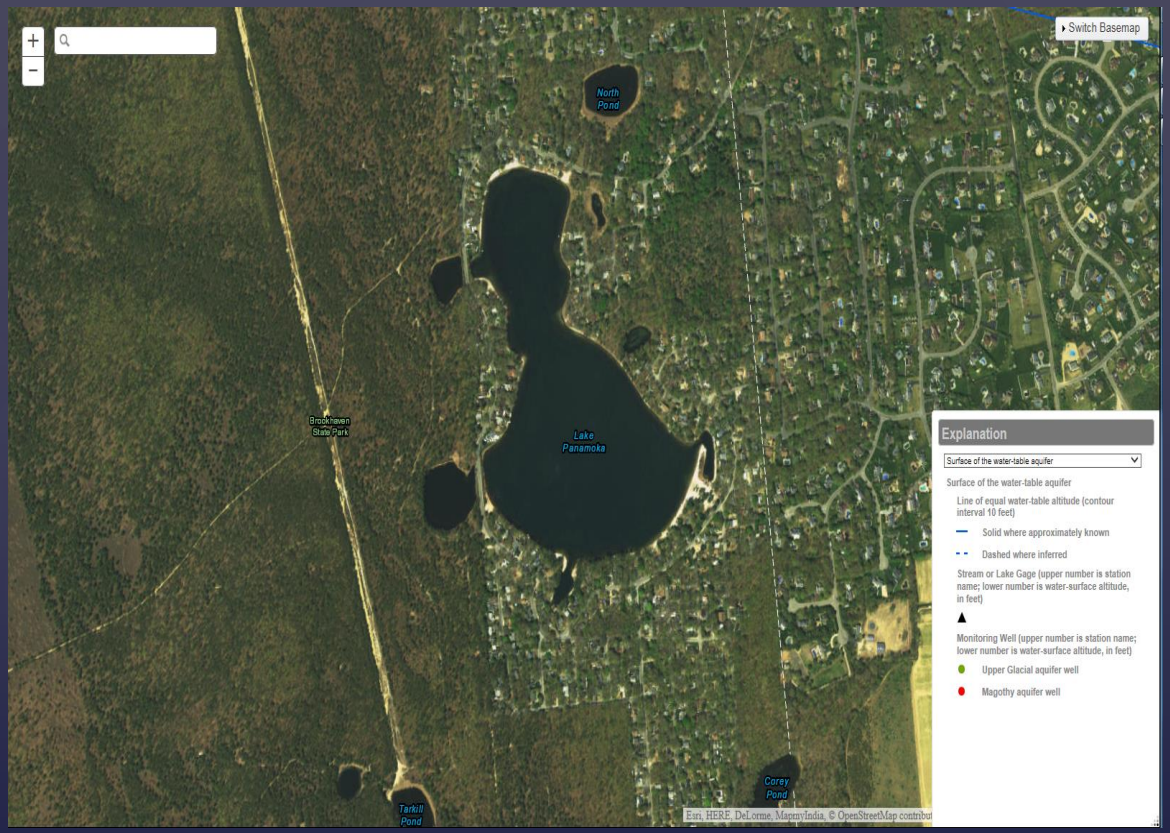
- After a storm, you may see a quick rebound in lake levels for a short period (from surface runoff and local water-table rises).
- These levels will quickly decline as the water in the lake equalizes to that of the surrounding regional water levels.
- Most aquifer recharge occurs in the non-growing season (Nov. through Apr.), this is when you are likely to see some recovery.
- Only when the water table recovers to more normal levels will the lake recover.





USGS Hydrologic-Monitoring Network
Declining Surface Water

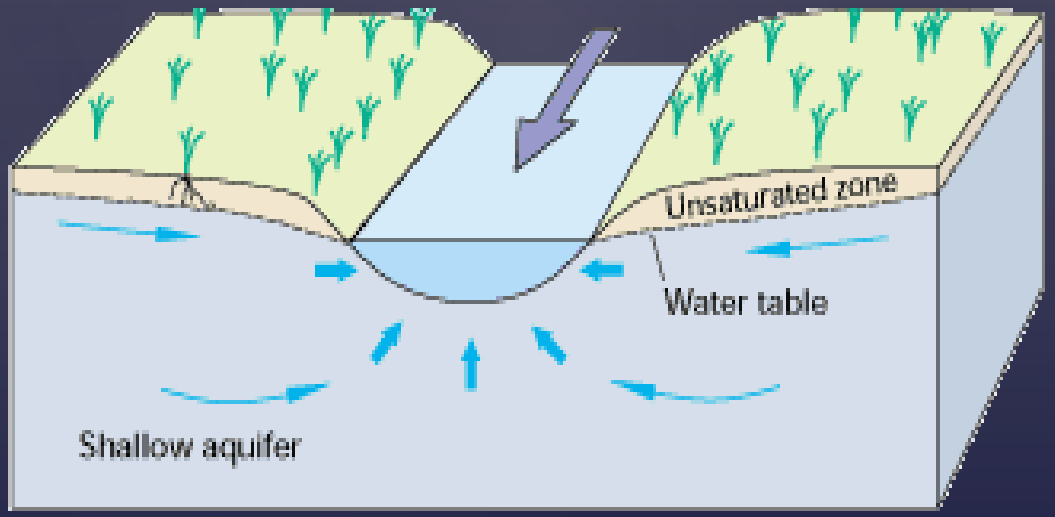
- Seeing similar, if not worse conditions, at other lakes in eastern Long Island, such as Lake Panamoka.
- In addition, streamflow levels at many east end streams are at or near record low levels.



USGS Hydrologic-Monitoring Network
Declining Streamflow

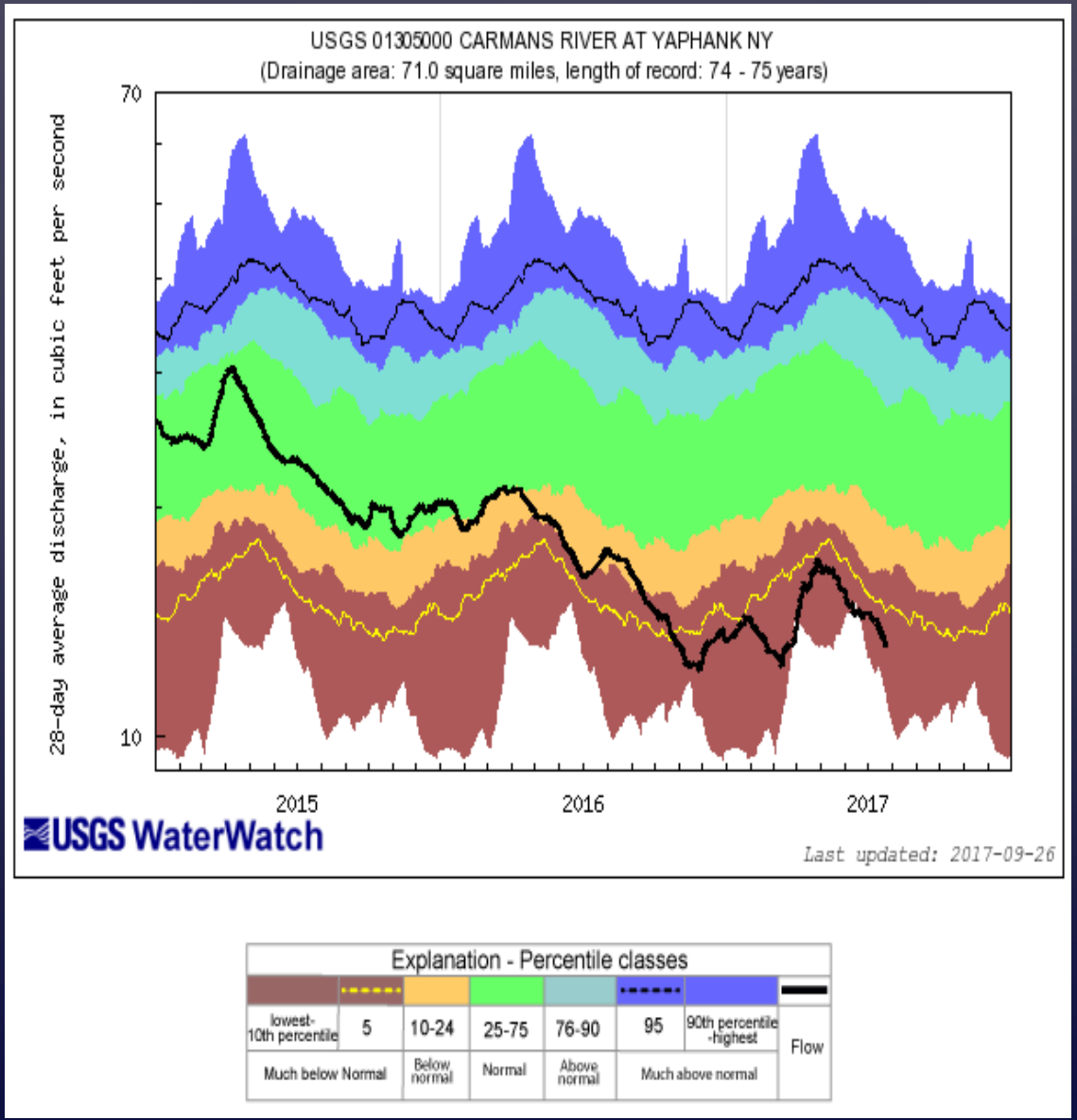
- Most streamflow is produced by groundwater entering the stream from the water table.

- Therefore, streamflow is another useful indicator of conditions in the water-table aquifer.



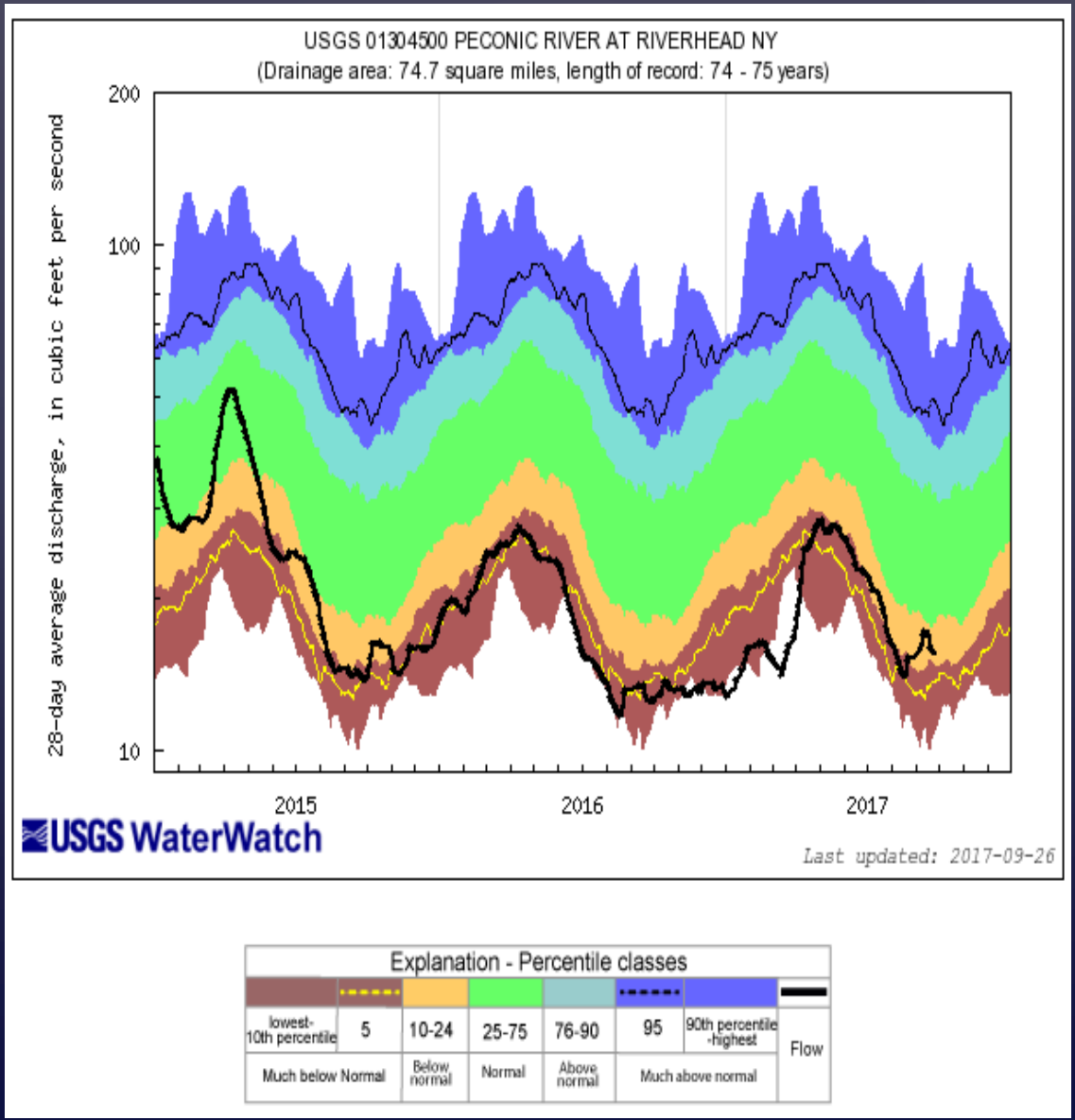
USGS Hydrologic-Monitoring Network
Declining Streamflow

- Carmans River has been below normal since 2016.
- Streamflow has reached record to near-record low levels.



USGS Hydrologic-Monitoring Network
Declining Streamflow

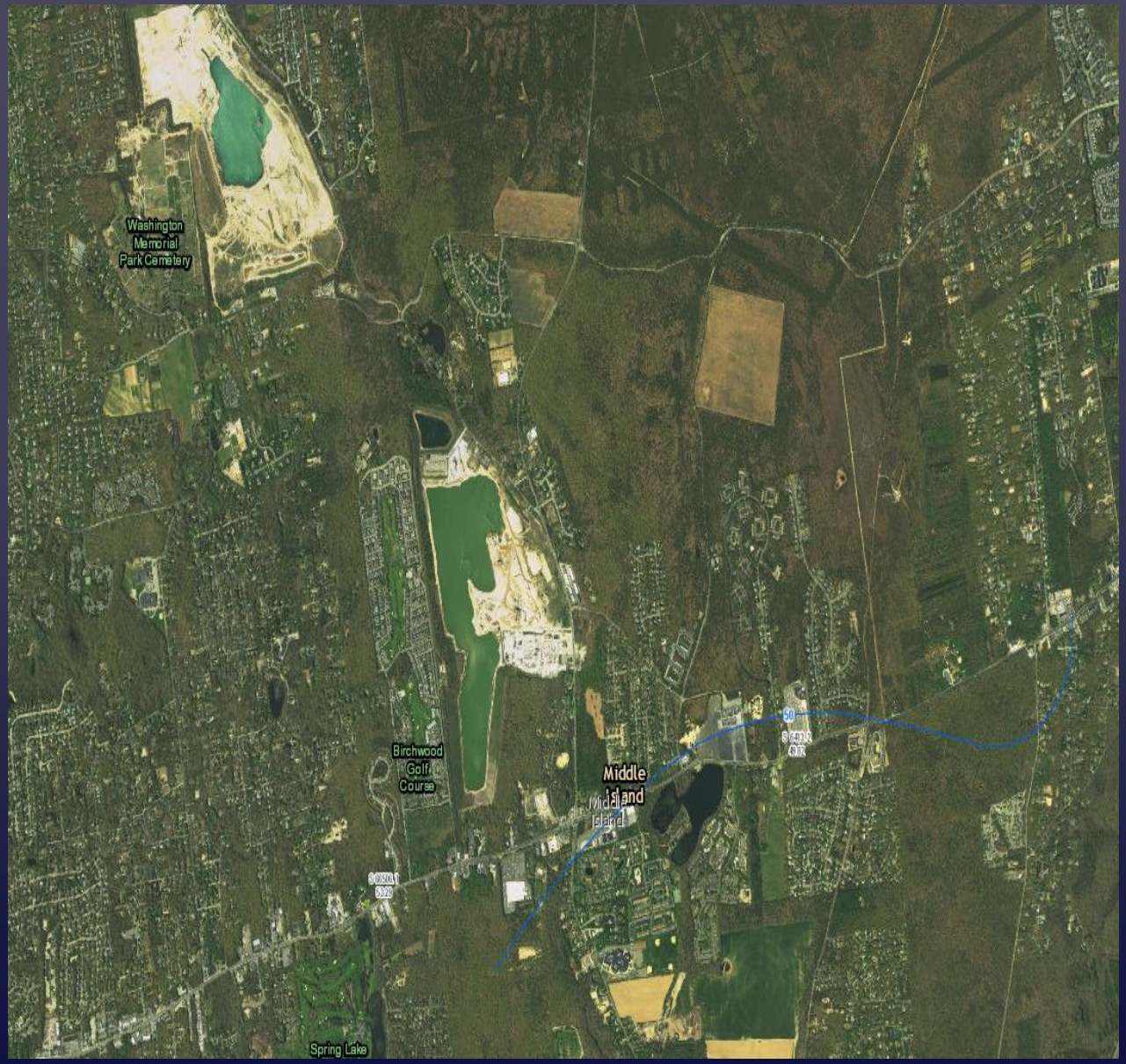
- Peconic River has been below normal since 2015.
- Streamflow has reached record to near-record low levels.
- Both streams have long-term records going back 75 years.



USGS Hydrologic-Monitoring Network
Future Work

- As part of an upcoming project, the USGS plans to install a continuous recorder at a groundwater well near the lake (2018).

- Additionally, if funding is available some lake-level monitoring may also be done at Artist Lake (2019?).



USGS
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For More Information:

U.S. Geological Survey
New York Water Science Center
Coram Program Office
2045 Route 112, Building 4
Coram, New York 11727-3085 631-736-0783

http://ny.water.usgs.gov

Ronald Busciolano rjbuscio@usgs.gov