



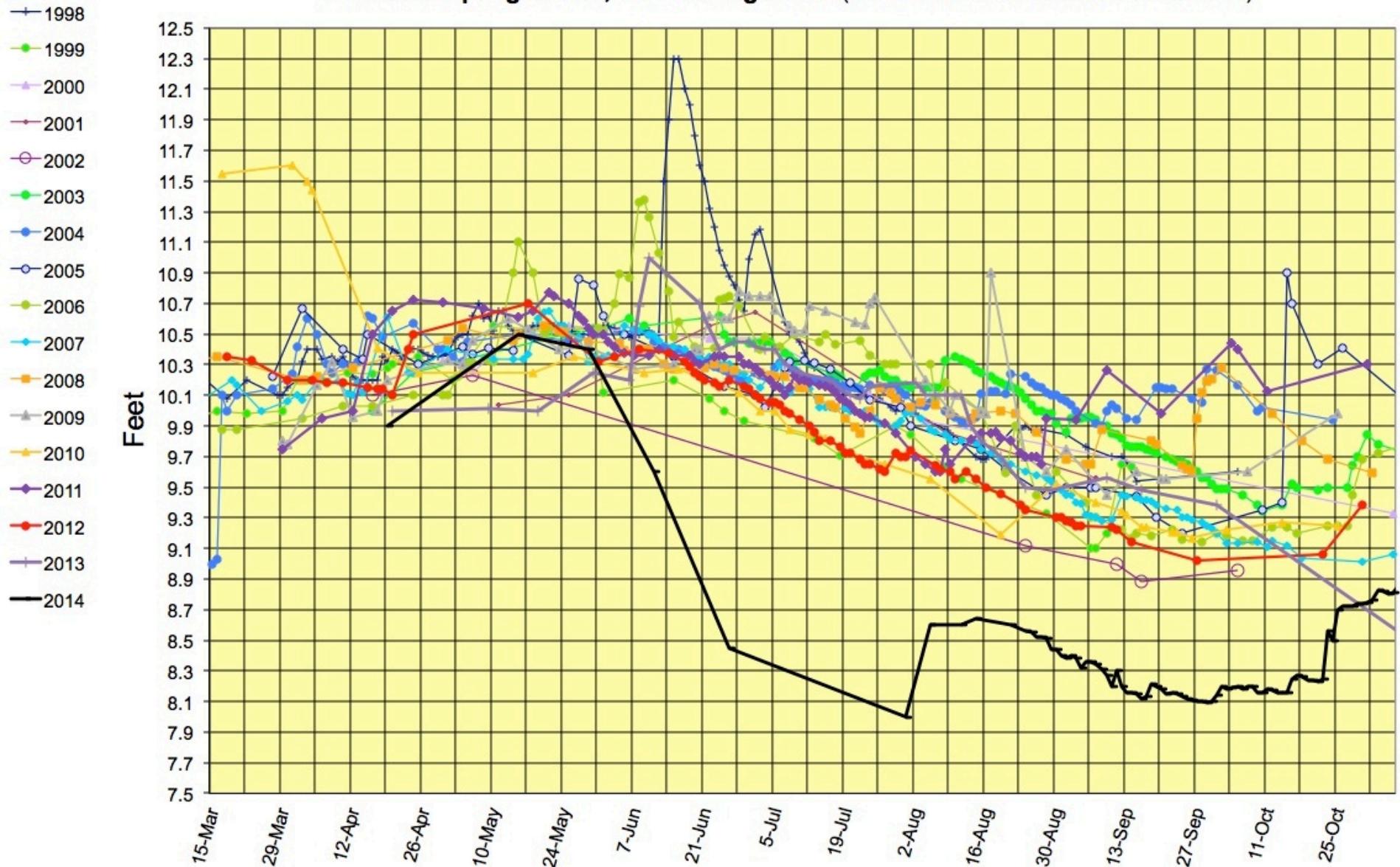
Sharon's Water Problem

by Paul Lauenstein

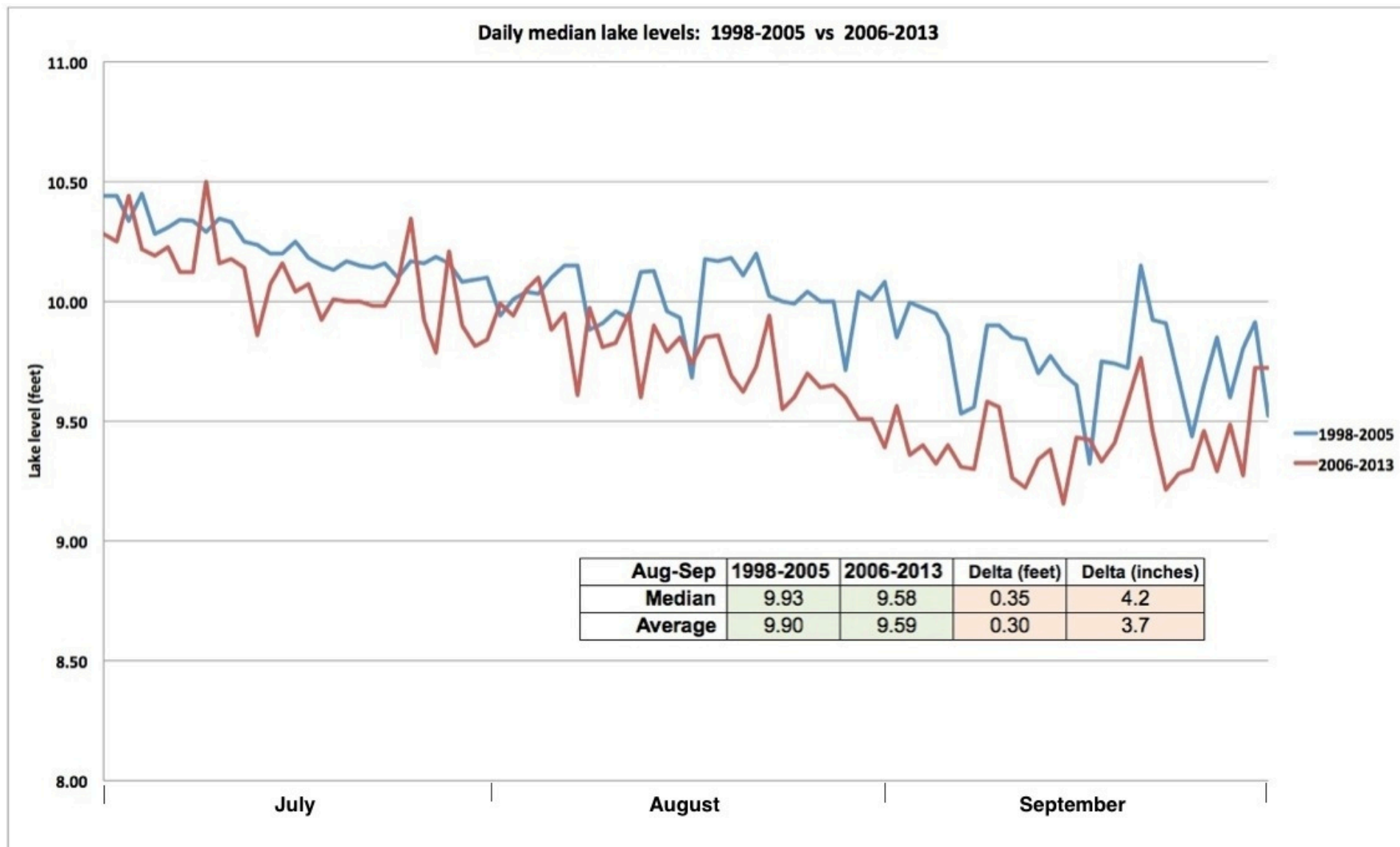


The low level of Lake Massapoag last summer upset many residents, especially those who use the lake for swimming, boating and fishing, and those who live on or near the lake.

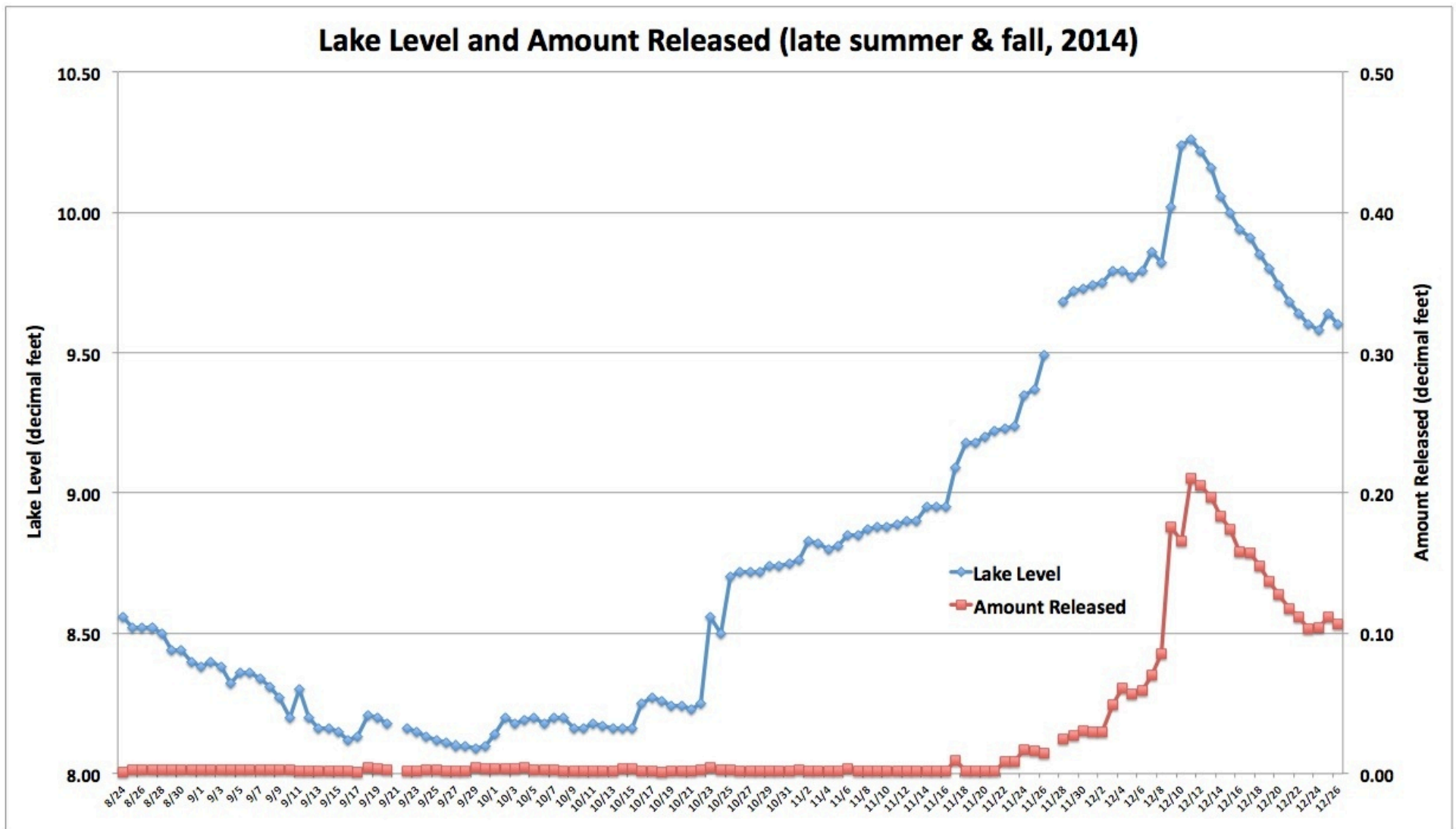
Lake Massapoag Levels, 1998 through 2014 (add 241.56 for feet above mean sea level)



The lake dropped more in 2014 than in prior years, partly due to lowering the lake by about 8" in June to get rid of invasive weeds. This must be done every few years to prevent the lake from becoming choked with weeds. An unusually dry summer aggravated the problem.



The unusually low level of Lake Massapoag last summer continued a long-term downward trend that can be seen in the lake level data from 1998 through 2013. The median daily level of Lake Massapoag in August and September was about 4" lower during the 8-year period from 2006 through 2013 than it was during the 8-year period from 1998 through 2005.



Water must be released from the lake in summer to flush excess nutrients and keep it cool to inhibit weed and algae growth, and provide enough water for downstream wetlands. Only a bare minimum of water was released during late summer of 2014 when the lake level was low, because very little water was flowing into the lake from streams and springs. Only after several rain storms in October and November was inflow sufficient to manage the lake for water quality.



Flow leaving the lake on September 17, 2014 was so low that sand had to be dug out of the channel to allow water to be released to ponds and wetlands downstream. Note that the automated depth gauge installed by the Sharon DPW is out of the water.



Manual readings of the lake level were still feasible.
The gauge reading was 8.13 on September 17, 2014.



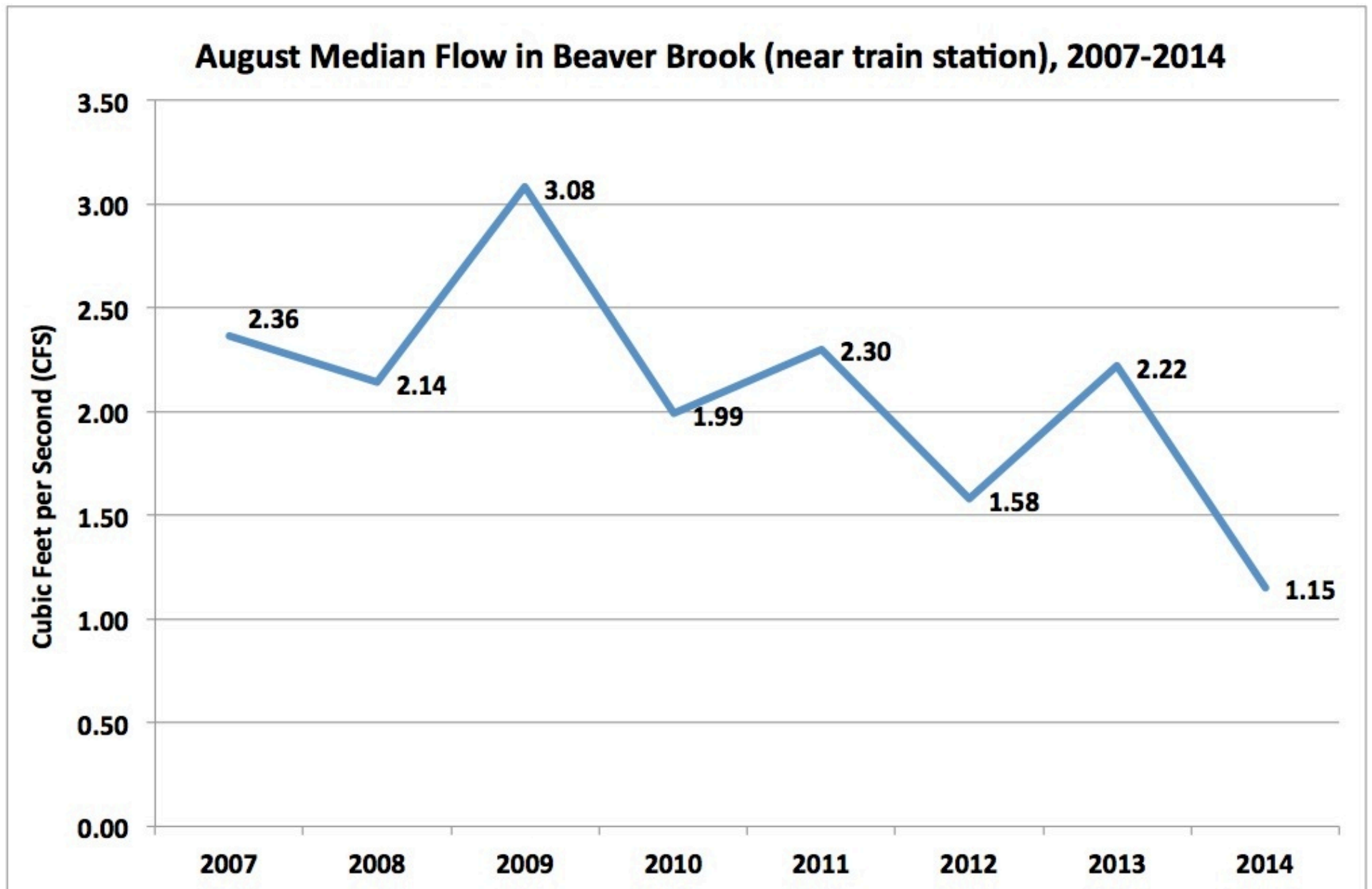
Several streams once flowed year-round into Lake Massapoag. Nowadays, they all dry up in summer, except for Sucker Brook, which was down to a trickle in late summer of 2014.



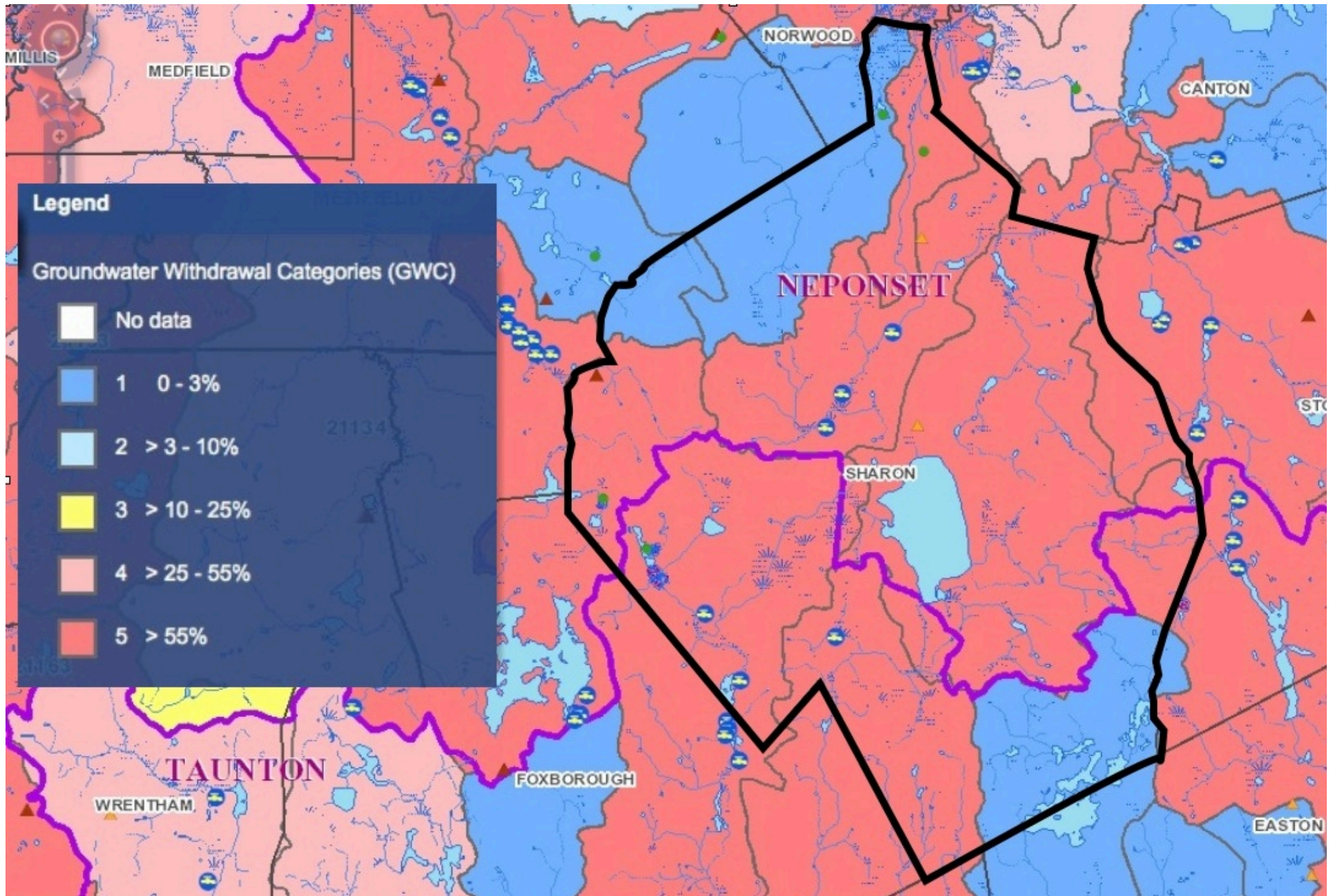
Sacred Heart Pond is just 500 yards from Lake Massapoag. It was excavated in the 1940's by the Brothers of the nearby Sacred Heart School for their students to swim in summer and skate in winter. It had a sandy beach, a swimming float, and an ice-skating bench. No streams flow into or out of the pond. The water level in the pond rises and falls in lock-step with the water level in Lake Massapoag and the water table. Last summer the water level in the pond was less than knee-deep. Twice over the past decade, the skating bench has been moved closer to the pond, as the water's edge has retreated.



Much of the spring water feeding Lake Massapoag comes from Sharon's Atlantic White Cedar Swamp, as well as much of the base flow in Beaver Brook, which provides about 60% of the town's drinking water. Sharon's Atlantic White Cedar Swamp is drying out, as evidenced by hundreds of dead and fallen cedars. Encroachment of upland vegetation accelerates evapotranspiration.

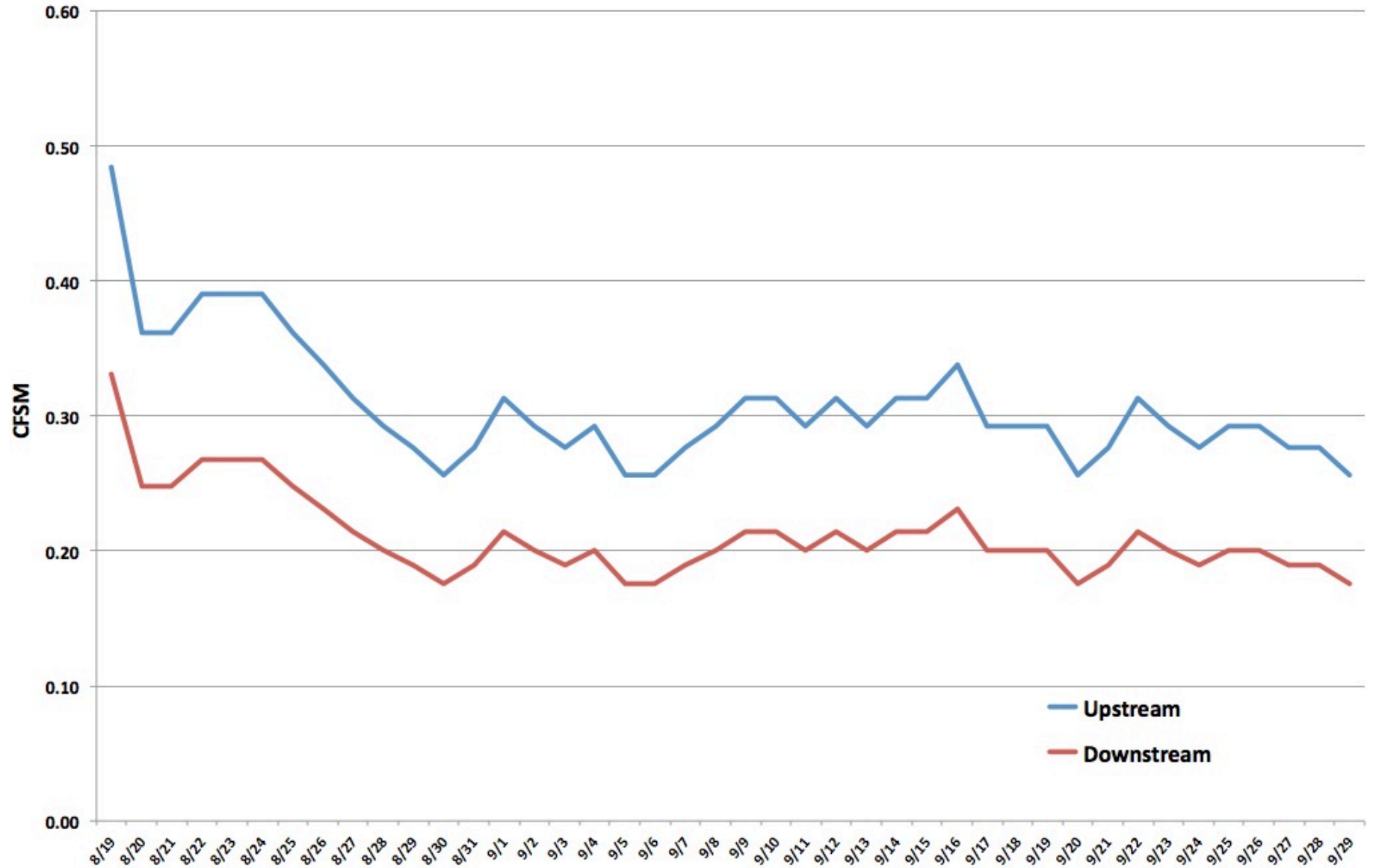


August median flows in Beaver Brook have been declining since daily gauge readings were commenced under the supervision of the MA Dept. of Ecological Restoration in June, 2007.

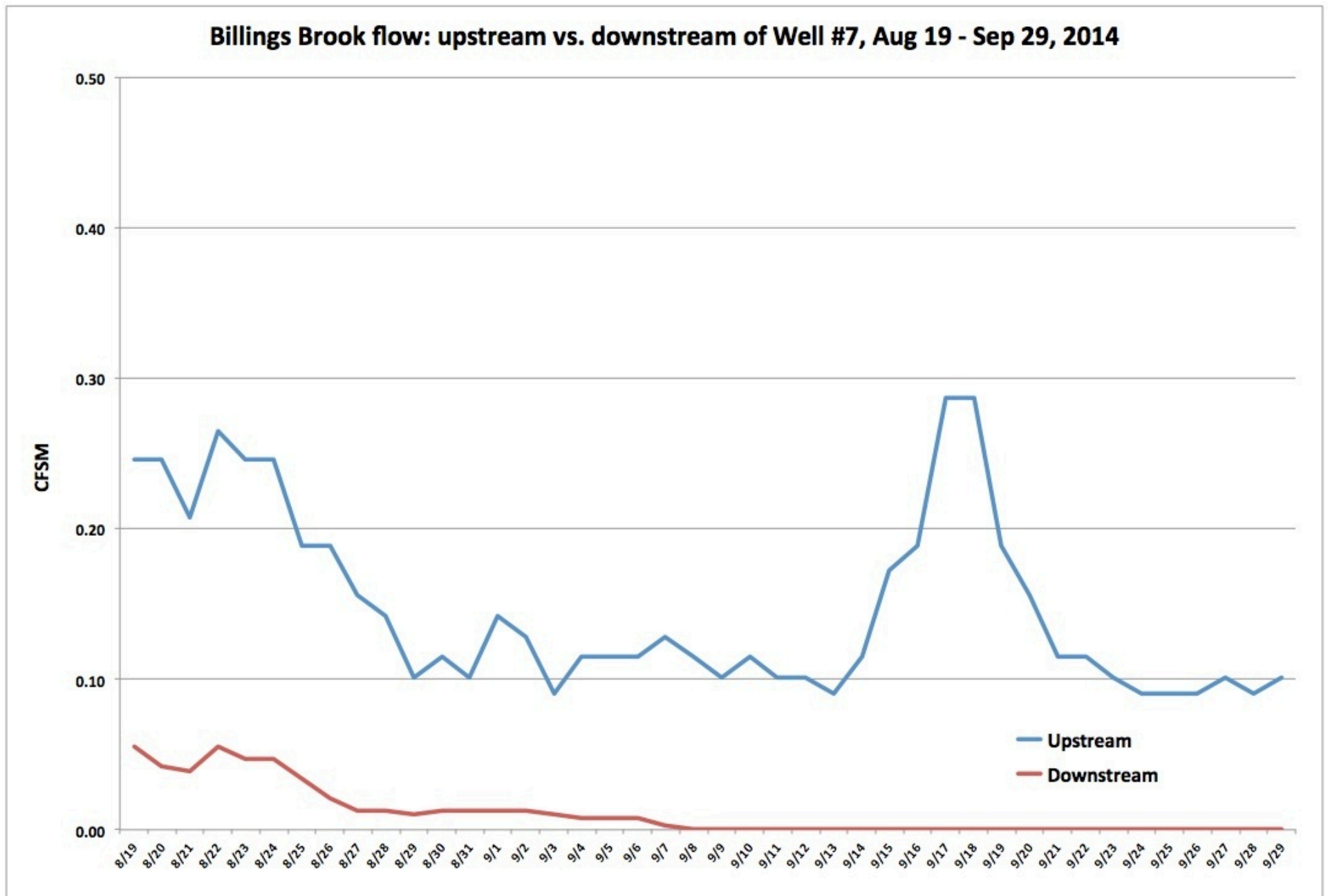


According to the state, most of Sharon is classified as Groundwater Withdrawal Level 5, i.e. maximally impacted by pumping of municipal wells in both Sharon and neighboring towns.

Beaver Brook flow: upstream vs. downstream of Well #4, Aug 19 - Sep 29, 2014



Sharon's largest municipal well, Well #4, is located next to Beaver Brook. It pumps up to one million gallons per day, which significantly reduces flow in the stream in summer.



Billings Brook stopped flowing downstream of Well #7 in late summer and fall, 2014.

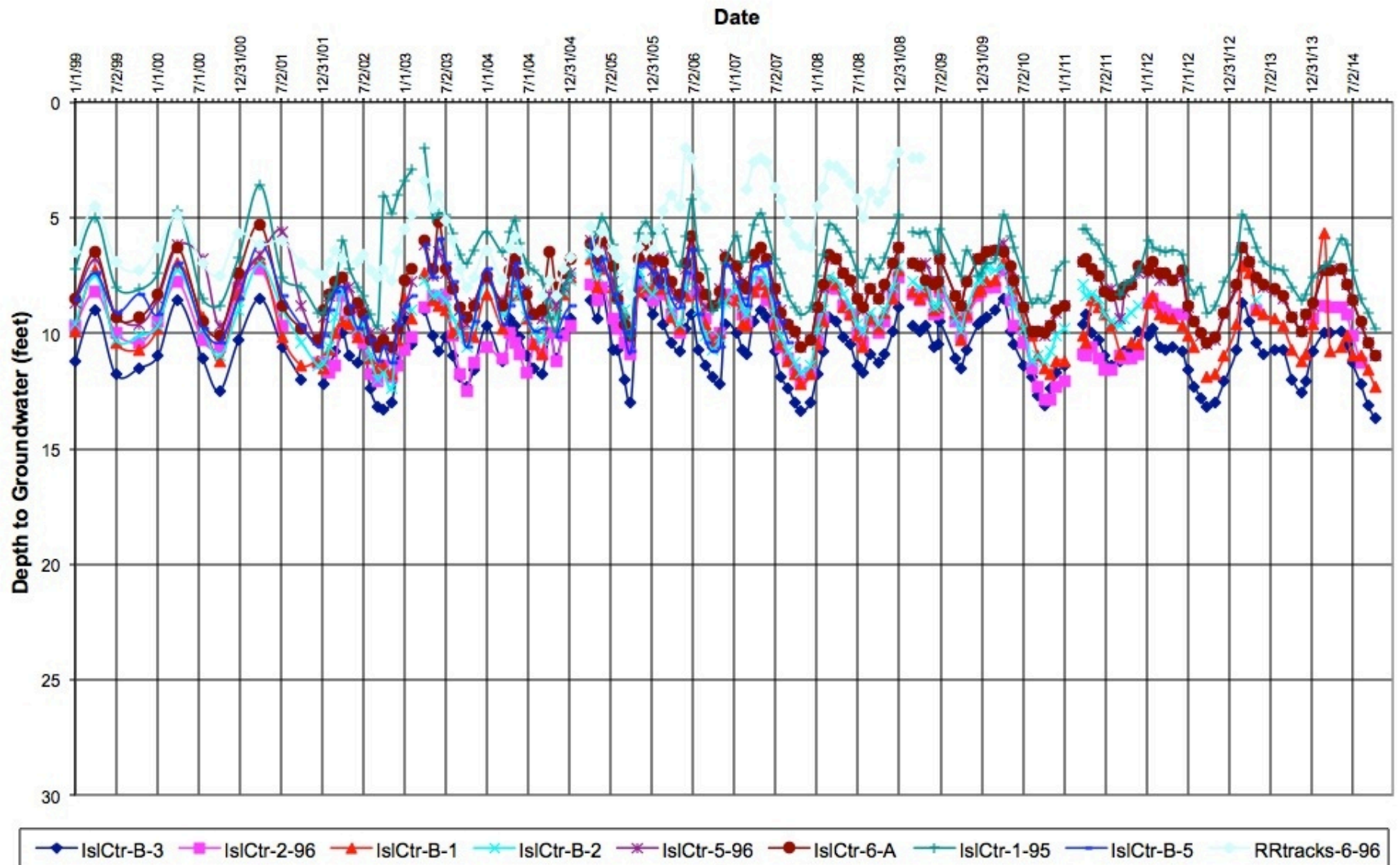


When Billings Brook dried up downstream of Gavins Pond, aquatic wildlife such as these freshwater mussels that filter the water died.

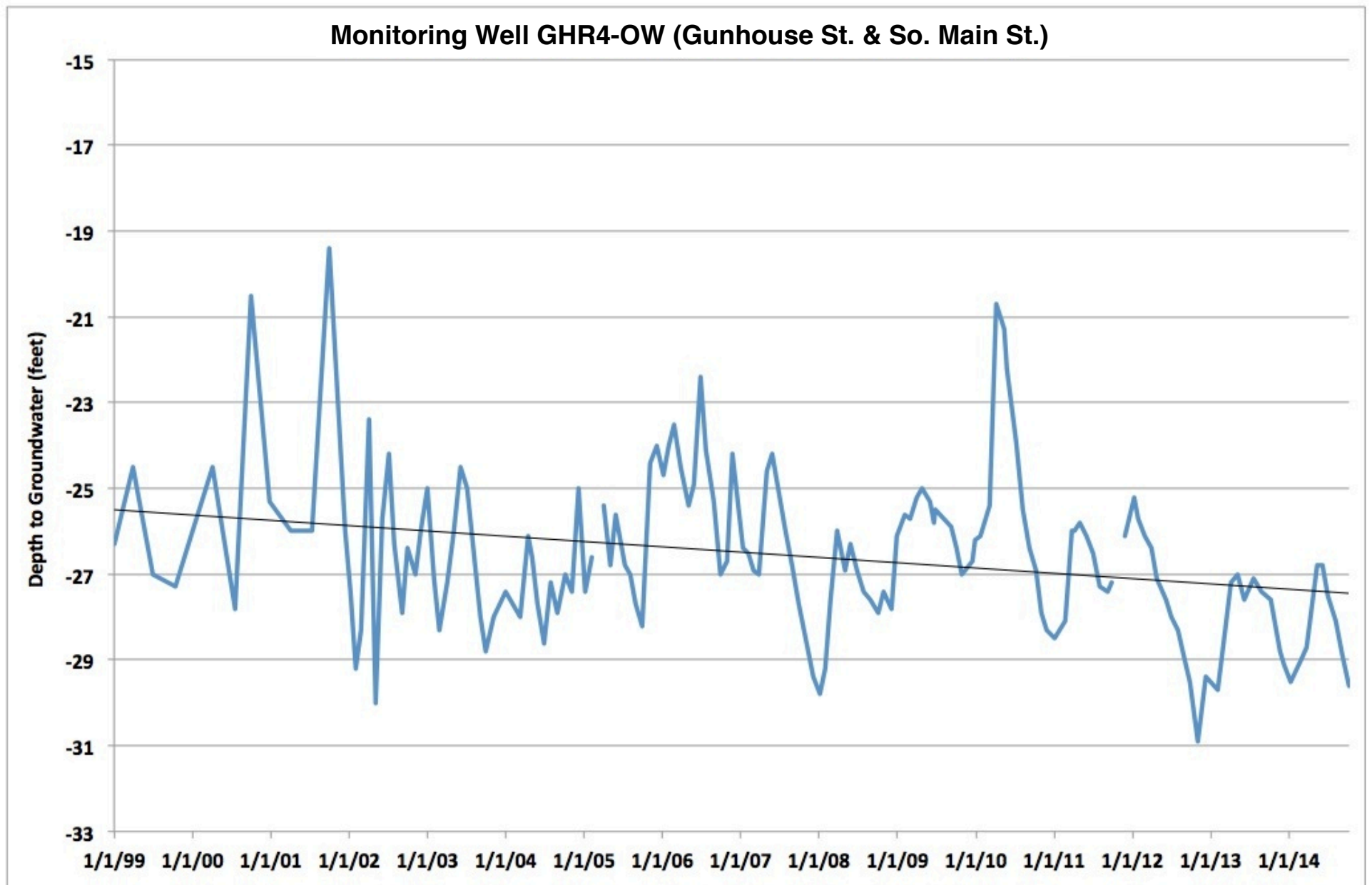


Three ponds in Foxboro dried up when Billings Brook stopped flowing.

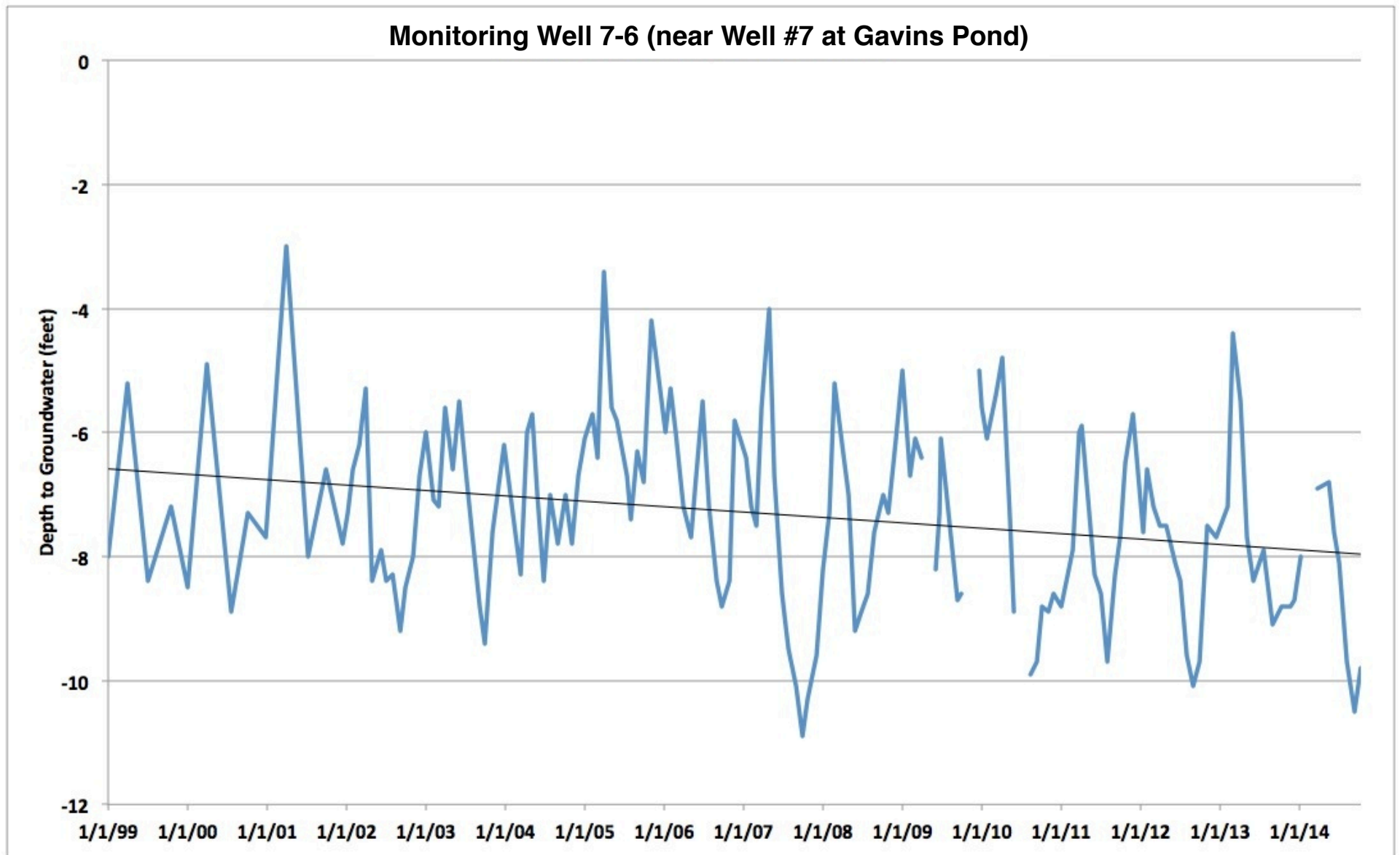
Islamic Center Monitoring Wells



Graphs of monitoring well data have been presented at public meetings in Sharon to show that there has been no trend in the water table in Sharon since monitoring began in 1999.



However, upon closer inspection, data from some monitoring wells do show a downward trend.



Elevations and soil transmissivities of the monitoring wells are needed to better understand groundwater flows that support Lake Massapoag and Sharon's municipal drinking water wells.



Possible Solutions to Sharon's Water Problem

- Acknowledge that Sharon has a water problem.
- Determine and quantify the causes of the problem.
- Continue to reduce Sharon's water use through conservation.
- Continue Cedar Swamp restoration project.
- Keep invasive species out of Lake Massapoag.
- Infiltrate stormwater rather than allowing it to run off.
- Seek reductions in neighboring towns' well pumping.
- Develop a new well to spread out the impact of well pumping.
- Import water from MWRA to replace well pumping in summer.

Sources & Methods

Slide #3: Lake levels 1998-2014

Plot of lake level observations from Massapoag Yacht Club and Lake Mgt. Study Committee

Slide #4: Median lake levels 1998-2005 vs 2006-2013

Using data from slide #3, median lake levels were plotted for each day from July 1 through Sept. 30 for 1998-2005 (blue line) compared to the same days for 2006-2013 (red line).

Slide #5: Lake levels August 24 through December 25

Daily lake levels observed at flume house gauge by author. Daily outflows based on author's observations of depth in outflow channel, which were converted to flow in cfs by using a rating curve derived from USGS observations of depth vs flow.

Slide #11: Median August flows from RIFLS data at www.rifls.org.

Slide #12: From SWMI map at

<http://www.mass.gov/eea/agencies/massdep/water/watersheds/sustainable-water-management-initiative-swmi.html>.

Slides 13 and 14: Daily flow data from www.rifls.org.

Slides 17, 18 & 19: Monitoring well observations by Sharon DPW.