

WATERSHED ASSOCIATION OF SOUTH HARWICH

SKINEQUIT POND STATUS REPORT

Introduction:

Skinequit Pond in South Harwich has been included in the Harwich Water Quality Task Force testing program since 2001. In April 2007 the pond neighbors (Watershed Association of South Harwich, or W.A.S.H.) purchased and installed a SolarBee SB10,000. This solar powered water re-circulator has been in service year-round since then. Bob Sarantis of HWQTF suggested that our experience with the SB would be of interest to other Harwich pond residents and testers and requested a report on its effectiveness.

Summary Overview:

This section summarizes our observations concerning the SolarBee and the Pond's water quality. Following that is the appendix with supporting data. The general approach was to compare the SB years of 2007 and 2008 to the base period of 2001-2006. Complete data is not available for all years. For example, UMass chemical analyses are not yet available for 2008. Early testing data is not as complete as more recent data; in 2007 and 2008 Skinequit was tested weekly, but earlier testing was monthly. With those caveats, here is what we have found to date:

1. Water Clarity (Secchi Disc Readings in feet)

- * Skinequit had declining clarity from 2001 to 2006 with an average 2006 reading of 4.2 ft. The first year of SB use averaged 5.7 ft, reversing the 5 year declining trend. In 2008 the average dropped to 4.9 ft.
- * For the June through mid-August averages, clarity varied from 8.1 ft in 2002 down to 4.1 ft in 2006. The 2007 reading was 6.6 ft, dropping to 5.6 ft in 2008. In mid-August through October the Secchi readings were worse in 2007 and 2008 than in the pre-SolarBee years of 2001-2006.
- * The June and July vacationers were quick with their praise of the SB. The late summer visitors noticed little change from previous years, and the post-Labor Day visitors were disappointed.

2. Rainfall

- * Heavy rain is often blamed for degraded water clarity. An illustration: the summer of 2007 was dry - less than 7 inches of rain for May through September - and the clarity was fairly good. It was much wetter in 2008 - nearly 19 inches in the same period - and the clarity declined.
- * However, on a short term basis, rainfall appeared to have little immediate effect on clarity. We compared Secchi readings, moving up or down, to the rainfall in the five days prior to the reading. With no rain, the readings were split 50/50, i.e. half the time after five dry days the reading improved; half the time it got worse. With light rain, up to .5 inches, the readings were still 50/50. Even with heavy rain of 1.0 inches or more, only three times in five did the reading go down. The other two times the clarity improved after the rain. This analysis covered all of the readings taken in 2007 and 2008.
- * This suggests that immediate run-off from the pond banks had little effect on clarity, either from particulates entering the water or short term surges in algae growth due to inflows from nutrients. The long term effects could be much more significant.

3. Dissolved Oxygen (Depths in Meters)

- * From 2001 to 2006 Skinequit DO averaged 2.8 mg/l at 4M and .3 at 6M for June through September. The pond had the worst DO at 4 and 6M of all the Harwich ponds tested in this period. The shallower depths had acceptable levels.

* In 2007 the average DO for the season was 5.0 mg/l at 4M, almost double the prior levels. In 2008 the average was 4.2, about 70% better than the 2001 to 2005 period.

* DO at 6M has been nil for the entire period. In 2006 only October, after fall turnover, showed a reading above zero. In 2008 we had very low but positive readings for all months, except August.

* Overall the higher DO at deeper levels was a good sign and consistent with SB's function of circulating water between the higher DO surface and the oxygen starved lower levels. The SB can be adjusted from about 2 ft. to 20 ft. in depth of circulation. The setting for 2007 was 6.5 ft. and in 2008 at 9 ft.

4. Fish

* We have not had a fish census, but pond residents have reported a good crop of small bluegills, sunfish and perch in both 2007 and 2008, probably more numerous than in prior years. There appear to be no larger species, such as small mouth bass. Visits by osprey and herons are common.

5. Algae

* Skinequit had three algae pulses in 2007 and in 2008. There were similar pulses in prior years but their frequency and severity were not recorded. (The installation of the SB has made pond residents much more alert to pond conditions.) Some of the pulses included the blue green cyanobacteria algae, some were of the harmless green varieties. All were analyzed by the SB technical people and are described in the appendix. Most pulses lasted a few days, then disappeared. One outbreak each season lasted several weeks. There were no fish or shell fish kills. Although the visible algae disappeared after the pulse, the clarity of the water was degraded. Bottles of sample water appeared to be quite clear and little biological matter could be found, but the pond would appear greenish and cloudy to an observer standing on the shore. There is, so far, no explanation for this greenish tint without a corresponding organic matter to cause it.

6. Phosphate Loading

* Fresh water ponds with high concentrations of dissolved phosphates and nitrates are an excellent growing medium for algae. Generally phosphates are the limiting nutrient in fresh water ponds and get the focus of attention. The algae can be the green varieties eaten by marine life or the inedible blue green cyanobacteria which in the right conditions can grow explosively into a bloom. The blue greens produce a toxin, harmful to marine life, animals and people. It compounds the damage by robbing the water of oxygen as it dies, oxidizes and settles to the bottom.

* The SB operates on the premise that moving, circulating water disrupts the reproductive cycle of blue green algae and reduces the probability of a full bloom. Getting sufficient circulation throughout the pond and at the proper depth appears to be the key to a successful operation. A heavy phosphate loading would seem to make this a more difficult job.

* Skinequit has a long history of high phosphates and nitrates. In the 2001-2005 period, Skinequit had the highest level of phosphates at the lower levels (about

7M)of all of the 13 Harwich ponds tested. At the surface (.5 M) only one pond had slightly higher readings than Skinequit.

- * The phosphate loading increased sharply in 2005, prior to the SB installation, and has remained elevated since. In 2007 the average .5M depth phosphate readings were 57% higher than in the 2001-2005 base period.
- * The lower levels were even worse. At 7M, the readings were about double that of the base period.
- * The source of the phosphates can be from water shed area run off, and from accumulated sediment at the bottom of the pond. There has been a moderate amount of new construction near the pond (three new houses) and in the overall watershed area. On the plus side, at least some pond residents have (hopefully) curtailed their use of phosphate rich soaps and fertilizers, as a result of education.

Conclusion:

* The improved Secchi readings suggest that the SolarBee has probably improved water clarity, at least for part of the summer. The higher dissolved oxygen readings are encouraging and almost certainly occurred because of the SolarBee. These improvements in the face of increased phosphate loading in the pond, whether from run-off or rising from the bottom sediment, have led to the conclusion that the SolarBee has contributed positively to the health of the pond and may have held off more serious algae blooms and fish kills. The officers of W.A.S.H.** have decided to continue the SolarBee operation, and the Solarbee personnel have promised continued technical support to achieve future improvements.

** W.A.S.H. Officers: Deborah Aylesworth, President; Joe Seidel, Treasurer; Sandy Thompson, Secretary.

Joe Seidel
April 7, 2009

