Swanland Pond - Opal Pond Survey Results 2010 – 2014

Survey Date	Weather	Water Colour (Visual)	Water Clarity No. Opal Logo's Seen[1]		pH_2	Opal Health Score[3]	Pond Life Recorded
			East	West			
05/09/10	Sunny	Green	0	0	6.0	17	Caseless caddisfly larvae, Water bugs, Water slaters, Worm-like animals, Water flea.
24/10/11	Sunny	Brown	0	0	6.5	32	Caseless caddisfly larvae, Mayfly larvae, Water beetles, Water bugs, Water shrimps, Water slaters, Worm-like animals, Water flea.
12/09/12	Sunny	Brown	4	7	5.5	32	Alderfly larvae, Caseless caddisfly larvae, Water bugs, Water shrimps, Water snails, Worm like animals, Water flea, Water mite.
14/09/13	Cloudy	Brown/ Grey	3	3	5 - 5.5	38	Dragonfly larvae, Damselfly larvae, Water beetles, Water bugs, Water shrimps, Water snails, Water slaters, Worm-like animals, Water flea, Water mite, Common duckweed.
28/09/14	Sunny	Brown	2	2	6.5 – 7.0	18	Mayfly larvae, Water bugs (lesser water boatman & backswimmer), Water shrimps, Water snails, Water slaters, Worm-like animals, Water flea, Common duckweed.

Notes:

1. Opal Survey Scale from 0 - 12. 0 = Poor, 12 = Very Good.

2. Water Acidity/Alkalinity. Based on a Scale of 4 – 9; < 7 = Acidic; 7 = Neutral; > 7 = Alkali.

3. Opal Pond Health Score based on the pond life recorded on the survey date:
Score 0 – 5: Pond could be improved; 6 – 30: Pond is quite healthy; > 31: Pond is very healthy.

Opal Pond Survey

The Open Air Laboratories (OPAL) network is a UK-wide science initiative that allows people to get hands-on with nature, whatever their age, background or level of ability. It is a lottery funded project led by Imperial College London which provides information and support materials that allow members of the public to carry out mini pond surveys in their locality. The scientific methods adopted do not require prior scientific knowledge and give a good ‘snap shot’ of the health of the pond on the survey date. These glimpses into the health of the pond can be compared from one year to the next to show general trends in water quality and pond health. These results coupled with other observations throughout the year regarding wildlife, fish populations, water clarity etc. help to build a more complete picture on how the water quality may be improving or deteriorating and how this is influencing life in and around the pond.

Pond Health 2014

Aquatic Invertebrates

The pond health score is 18 this year which places the pond in the “quite healthy” range. The absence of dragonfly and damselfly larvae which are high scoring species in the survey explains the lower score when compared with results in 2013. (The 2013 survey placed the pond in the “very healthy” range with a score of 38.)

The Opal survey method only records the presence or absence of species; the abundance of any given species is not quantified. It was very encouraging this year to observe an increased abundance in the mayfly, water flea (Daphnia), and water bug species (backswimmer and lesser water boatman) which suggest that the populations of the more pollution resistant species are developing and becoming well established. The established planting is clearly providing a good habitat for these species which are an important source of food for the fish and other carnivorous larvae and an integral part of the ponds ecosystem.

Mayfly larvae and the two water bug species are found in both clean and poor water quality environments. These species are less sensitive to water pollution and poor water quality; tolerating higher silt concentrations in the water and lower oxygen levels. Dragonfly and damselfly larvae are less tolerant of poor water quality, particularly nutrient rich waters and their “gills” are much more sensitive to silt deposits in the water.

The absence of dragonfly and damselfly larvae in the samples does not prove that these species are no longer present in the pond. Although the sampling methods were the same as previous years with the same number of netted samples being taken, we did have fewer samplers in the

water, with three individuals taking part compared to six in 2013. It is possible that the lower level of water disturbance in the sampling zone could have reduced the chances of netting the dragonfly/damselfly larvae.

Considering the abundance of the more pollution resistant species in ALL the samples taken it is disappointing that none of the dragonfly/damselfly larval stages were evident. This is particularly surprising as the breeding conditions for these species has been good over the last two years and numerous adults have been observed flying around the pond during the summer months. One would expect to find some evidence of the early nymph stages for both species even if the older nymphs (discovered last year) had emerged to adulthood. These results do therefore suggest that the current water quality is not good enough to sustain a healthy population of the more sensitive larval species and/or fish predation is restricting numbers.

Amphibians

Although no amphibians were found during the survey, frog spawn and tadpoles have been noted in both the marshy area and the main body of the pond. Adult frogs have also been observed in the pond during the spring and one was found hiding in the reeds during the autumn maintenance. Although some of the frogs and spawn could have been released into the pond, (a practice we are trying to discourage because of disease transmission), it is encouraging to see these species returning.

Water Quality

pH.

The pH value was 6.5 -7 which is less acidic than previous years. The pH of the water is influenced by many factors so we should expect some variation between surveys. Whilst most aquatic organisms should be able to survive within a pH range of 5 – 9, they can, however, become stressed or die when exposed to pH extremes or when pH changes rapidly, even if the change occurs within a pH range that is normally tolerated. Algae cause pH fluctuations in the water during the day and night. Large numbers of algae are likely to cause more frequent, wider fluctuations, which highlights the importance of controlling algal growth.

Water Clarity.

The water clarity score (2) was lower than 2012/13 which supports general observations of poorer clarity throughout the year. Water clarity will vary from week to week in the pond and is influenced by many factors including weather conditions, pollution, algal growth and duck and fish activity.

Weather.

We have had two consecutive hot summers; but unlike 2013 we've had more extreme rainfall events this year. Whilst the rainfall helps to replenish water and oxygen levels it can also cause rapid fluctuations in the water temperature and pH, stirs up the silt and introduces petroleum products and other "unseen" pollutants from road run-off. The established planting helps to reduce the impact of these pollutants as it lagoons and removes some of the chemicals in the gabions, but the sheer quantity of water in these extreme events can quickly "overflow" these protection systems. The following rapid water loss from the pond over time, adds to these problems. The resulting shallow waters are more subject to silt disturbance, toxin release, temperature fluctuations, and algal blooms. In the hot weather these factors cause increased oxygen depletion which has a negative impact on all the aquatic life in the pond, and the potential loss of more sensitive or "ailing" aquatic species.

Ducks.

The dramatic increase in the duck population this year (from approx. 10 to 35+) will also have a negative impact on the water quality as their activities churn up the silt and their by-products create toxic sludge's and increased nutrient loadings which "feed" algal populations. Larger duck and duckling populations attract more people to feed them and though many villagers do feed grain there seems to be an increasing number of people feeding bread which introduces harmful yeasts to the water.

Algae.

The green tinge to the water at various periods throughout the year has suggested the start of a major algal bloom. Fortunately, on all occasions to date, a full algal bloom has been averted. This may be due to a change in weather conditions at the time or factors such as nutrient removal by the reeds etc.

Algae are an important part of a ponds ecosystem and food chain but they also have a major influence on the water quality, mainly by affecting the balance among dissolved oxygen, pH, carbon dioxide and nutrients. During photosynthesis, algae produce oxygen, remove nutrients and take

up respired carbon dioxide from the aquatic invertebrates, fish and the algae itself. At night, all three of these populations consume oxygen from, and exhale carbon dioxide into the system which depletes oxygen reserves and causes pH fluctuations.

A potentially serious impact of an algal bloom is the risk of an "algae crash" triggered by temperature or barometric pressure. When an algal bloom collapses, dead algae cells settle to the bottom of the pond adding to the decomposing sediment's oxygen demand. If the crash is severe, the pond's oxygen supply can be quickly depleted, endangering the fish and other aquatic species.

The factors outlined above, coupled with the sonic device and water fountain being non-operational could all be contributing to the apparent decline in water quality this year. The sonic device will help to control and stabilise algal components in the silt and water column which will improve water quality and oxygen levels. The water fountain, although a potential contributor to increased evaporation, will also help to oxygenate the water.

S**ummary**

The results show that the pond remains quite healthy, although there does seem to be evidence of a decline in water quality when compared with 2013. This may be due to a number of complex interacting factors. The established planting is clearly providing a valuable habitat for aquatic species and wildlife in and around the pond and is helping to reduce nutrient levels and pollutants in the water.

These results emphasise the continuing need for a combined management strategy that is designed to optimise conditions to improve water quality and maintain a diverse and healthy aquatic ecosystem. Completing the project to seal the leak clearly remains a high priority together with duck, algae and plant management to provide a more stable aquatic environment. This combined approach should hopefully improve the water quality and species diversity in 2015.

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