

Ponds in the Medina Valley

A common study for A Level students is comparing the diversity of invertebrate species within ponds. We have three ponds within walking distance of the Centre, including one in our Centre grounds. The other two are Dickson's Copse pond, in a woodland area, and Dodnor Creek, separated from the Medina estuary by a concrete walkway with built-in sluices to help prevent flooding.

There are many abiotic factors which will affect species diversity, and students are encouraged to consider all of these, but to make a hypothesis based on which they feel will have the greatest or least effect.

Background Information

The Centre pond was constructed in 1986, its size is about 10m x 5m and it is lined with butyl rubber. It has an open position, plants around the edge and large amounts of surface algae.

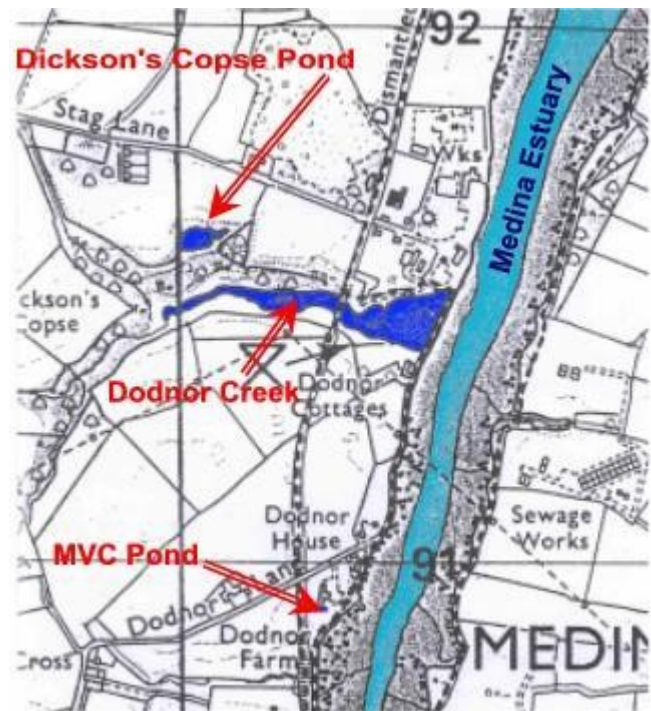
Dickson's Copse pond is estimated to be 100 – 150 years old and is about 150m x 50m. It is shaded by the trees surrounding it and can have low oxygen levels at certain times of year due to decomposing leaves. There are plants around the edge, water lilies on the surface and also some surface algae.

Dodnor Creek is estimated to be 100 – 150 years old; it is even larger than Dickson's Copse but much of this area is silted up and only grows reeds. It receives a regular input of salt water from the estuary at high tide making the water brackish. On extreme high tides or in stormy conditions the salt water input is increased due to estuary water coming over the top of the walkway. It has an open position, reeds grow in large quantities in the water and there is little surface algae.

Students must therefore consider size, age, light, salinity, oxygen, plant cover and linings in order to decide which pond is likely to have the greatest diversity. There are pros and cons for each pond, but which of the factors is likely to be the most limiting and, therefore, limit diversity? A hypothesis can be written to support any one of the ponds which is a bonus to help students realise it doesn't matter if their hypothesis is wrong, as long as they can justify their choice and it is testable.

Sampling methods must then be considered, emphasising the importance of fair testing. A 1mm mesh net is used to collect samples from each pond but questions arise such as the number of sweeps and how to keep the sweeps the same. Also what abiotic factors should be measured? We use LogIt meters with a variety of sensors to record light, temperature of water and air and humidity. We can also measure oxygen levels with a pHox oxygen meter and conductivity (a relative measure of salinity). Size and plant cover are usually assessed by eye.

On return, students will sort each sample, identifying the species found by means of a dichotomous key, and record numbers of individuals of each species. These figures can lead to the use of a diversity index or other statistical analysis to assess the significance of the results. Graphical techniques can also be put to use displaying abundance data.



A Mayfly nymph

The Simpson Diversity Index is a useful method of assessing diversity based on the number of different species found and abundance of each of these. It can be done using individual and/or class results. The higher the index obtained the greater the diversity of the sample. These results show an average sample from each pond.

SPECIES	MVC POND	DICKSONS COPSE	DODNOR CREEK
Bladder snail	9	0	0
Brackish water prawn	0	0	2
Damselfly nymph	3	0	0
Diving beetle larva	2	0	0
Flatworm	14	1	0
Gnat larva	5	0	0
Greater water boatman	2	2	0
Jenkins spire shell	2	0	0
Lesser water boatman	2	8	7
Mayfly nymph	7	2	1
Midge larva (Bloodworm)	2	3	4
Newt	3	0	0
Phantom midge larva	45	3	0
Ramshorn snail	20	0	0
Saucer bug	1	0	0
Scavenger beetle	1	0	0
Shrimp (Crangonyx)	2	3	0
Shrimp (Gammarus)	0	0	2
Wandering snail	0	3	0
Water flea (Cyclops)	8	70	41
Water flea (Daphnia)	23	15	162
Water hoglouse	10	4	0
Water mite	3	6	1
Whirligig beetle	1	2	0
Worm (Tubificidae)	0	1	3

Students can then use the Simpson's Diversity Index (see separate MVC Guide) to compare the level of diversity in each pond.