



## The DIY Kit concept

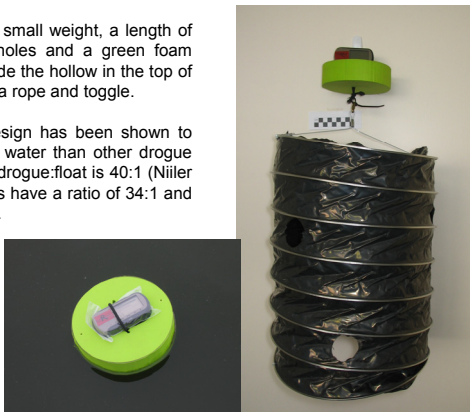
Many New Zealand councils are faced with aging and increasingly expensive infrastructure. Oxidation ponds are no exception. Rising populations, and increasing trade waste inputs can overload existing pond systems which are often required to install aerator/mixers or other devices to help improve biological oxygen demand (BOD) loads. These devices can have a marked effect on the original design specifications through reduced hydraulic retention times and subsequent reduction in treatment performance and discharge quality to freshwater, estuarine and coastal receiving environments. Small GPS drogues have been used in pond circulation studies carried out by the Cawthron Institute and have been shown to effectively measure circulation.

Cawthron Institute received support from the Marlborough District Council and Envirolink in 2006 to develop a cost effective, simple and repeatable method to measure oxidation pond circulation. This DIY kit is intended to be detailed and simple enough that council staff could use it to deploy drogues and collect the data required to enable Cawthron to produce a simple report. Councils may then use the data and report to optimise aerator/baffle placement and thereby obtain an increase in effluent quality. The data collected could also be used to validate computer modelled circulation/retention times. By collecting the data themselves councils may significantly reduce the cost of carrying out a drogue study.

## Small Scale Holey-sock GPS Drogues

Each drogue consists of a small weight, a length of black hollow tubing with holes and a green foam float. The GPS unit fits inside the hollow in the top of the float and is secured by a rope and toggle.

The holey-sock drogue design has been shown to more effectively follow the water than other drogue designs. The ideal ratio of drogue:float is 40:1 (Niiler *et al.*, 1995) These drogues have a ratio of 34:1 and are therefore very effective.

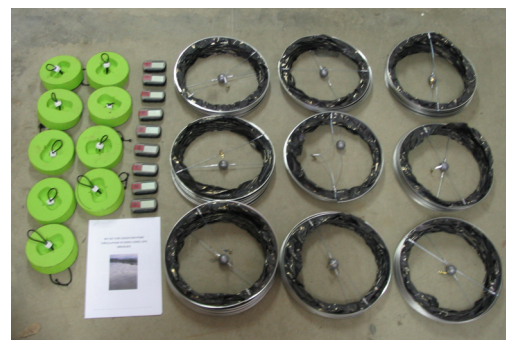


## DIY = Drogue It Yourself!

### DIY Kit

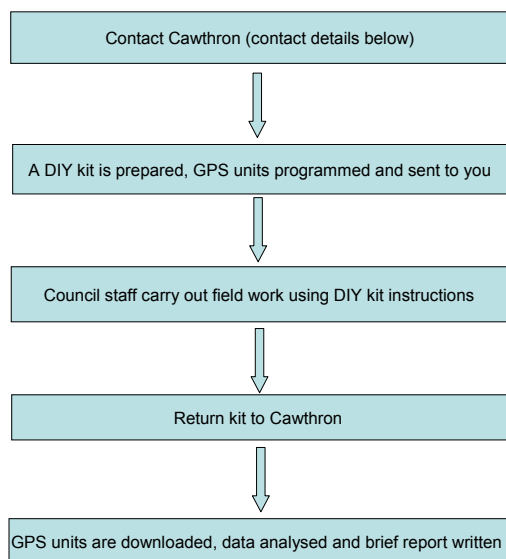
The DIY kit contains the following equipment needed to carry out an oxidation pond drogue study;

- 9 floats
- 9 GPS units
- 9 small ziplock plastic bags
- instructions

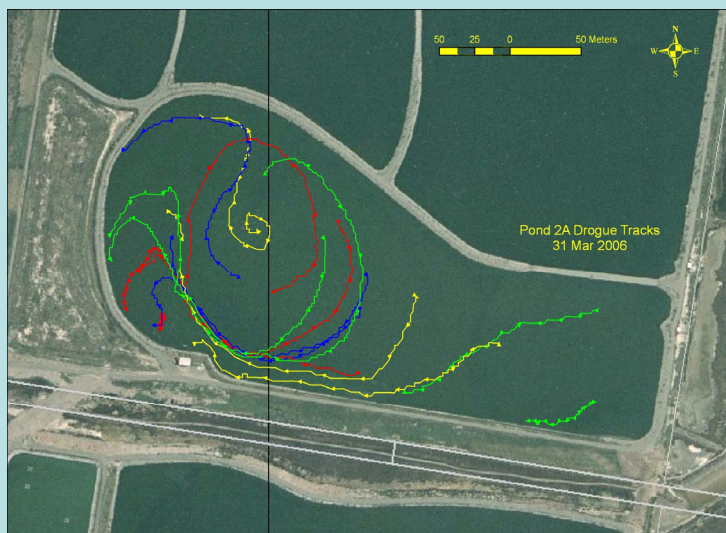


Using the DIY kit to carry out an oxidation pond study using council staff is easy and affordable.

## How it works



The report will consist of a brief interpretation of results as well as both static figures of drogue tracks and time series animations. The report could be issued within four weeks of the kit being returned.



An example of a circulation figure produced from a drogue study. A clockwise eddy can be seen on the western side of the pond. A "dead zone", where little or no mixing is occurring, is also apparent on the far west edge of the pond.

## References

Niiler, P. P., A. Sybrandy, K. Bi, P. Poulain, and D. Bitterman, Measurements of the water-following capability of Holey-sock and TRISTAR drifters, *Deep Sea Res., Part 1*, 42, 1951–1964, 1995.