

## RBR Biofouling Experiment

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### Aim

In this report, we look at the efficacy of one method to mitigate biofouling. **Bottom Wax** by Alex Milne Associate Ltd., Etobicoke, ON., is a non-toxic, safe alternative to toxic anti-fouling paints. We applied this wax to a model of the inductive conductivity cell and measured the amount of biofouling that built up over three months in the sea.

### Method

For the experiment, 10 toroids were prepared. They were the same size and made from the same material *Delrin™* (acetal copolymer) as the RBR inductive conductive cells. Five of them are coated with the Bottom Wax according to manufacturer's instructions. Another five are left as is. The toroids are hung on a rope with 10 inches distance between them in an alternating order (i.e. 1-non-coated, 2-coated, 3-non-coated...etc)

In June 2005, the samples were deployed in the Ship Harbor, Lunenburg, Nova Scotia at the mooring station (Fig.1). This harbor is known for intensive biogrowth, particularly in the summer time. The top toroid #1 was at the distance 2 m from the surface buoy. After deployment, the samples are inspected once a week by a team from the Oceanography department of Dalhousie University (Halifax). The condition of each sample is noted in a log sheet and each sample was photographed by digital camera. The experiment was conducted over a 3 month period from 28 June to 28 September 2005.

### Results

The condition of the toroids after the 3-month period of the deployment is presented in the Log sheets and pictures of the individually photographed samples. As noted in the report from 22 Sept 2005 (Fig.1), the overall condition of the coated toroids was much better than non-coated. All non-coated samples have medium to high level of biofouling consisting of algae, starfish, mussels, hydroids, bryozoa and skeleton shrimp. Wax-coated toroids have medium to low biofouling conditions, with only some casual species of algae and hydroids. These differences are seen clearly in the Fig.2, where all toroids were photographed 22 September 2005 at the time of inspection. As shown in the Fig.2, all non-coated toroids are completely biofouled, especially inside the hole. A lot of mollusks and algae stuck to the toroid surface and colonized in the central holes. At the same time, the wax-coated samples were in much better condition: all of them had clear central holes with low level of biofouling on the surface. There is still wax present on the toroid surfaces.

Very distinctive difference between coated and non-coated toroids is evident (see Fig. 3) where samples, closely positioned on the rope, showed dramatically different conditions. There is no doubt that any instrument with this amount biofouling seen on the sample #9 will lose the ability to properly measure the conductivity of seawater.

Fig. 4 shows a front view of the all samples, taken on 28 Oct 2005, after the samples arrived at RBR. As seen in the photo, conditions of the central hole for coated and non-coated toroids are different – all wax-coated toroids have a clear round profile of the holes, while non-coated still remain covered with mollusks and hydroids.

## RBR Biofouling Experiment

Location: Ship Harbour, Nova Scotia, Canada

Latitude: 44° 48.488N

Longitude 62° 50.654W

Water depth at high tide: 12.5m

### Setup

The ten plastic discs are hanging two meters from the surface, every 20 cm. Five discs are non-coated, and five are coated with a non-toxic waxy substance. They discs are arranged alternately, non-coated and coated, along the line. Only the non-coated discs are numbered.

### Instructions

Bring the line onboard. Take two pictures of each disc; one picture sideways and one picture showing the center hole. Place a card or a piece of paper next to the disc with the appropriate disk number on it, for future identification.

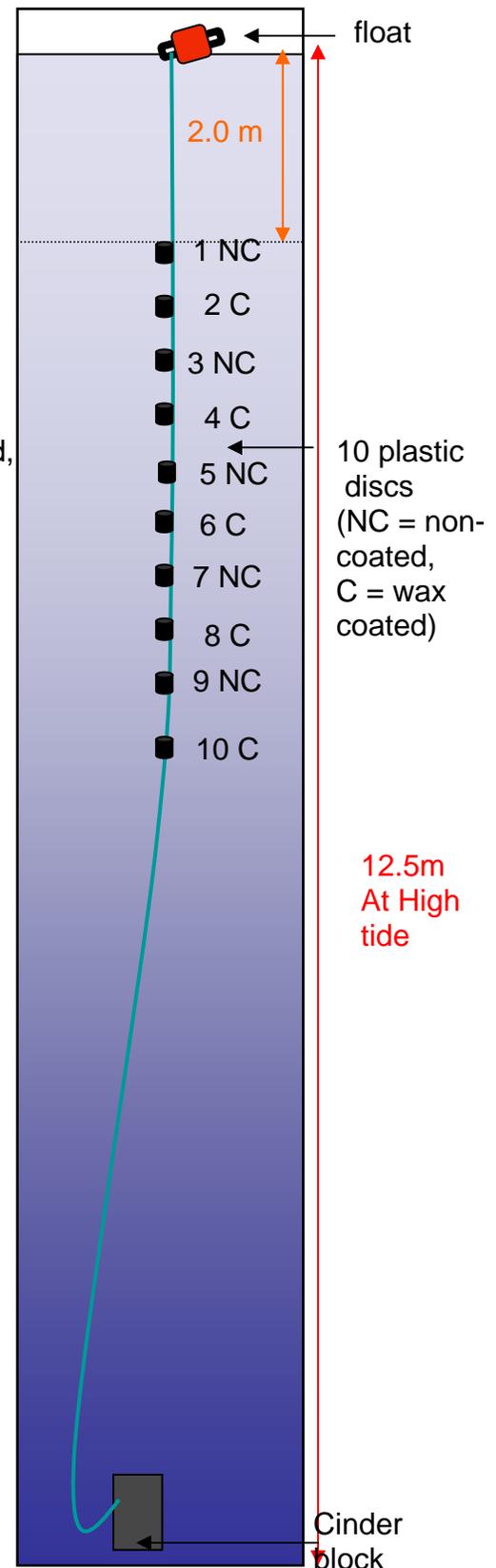
Write down the type of biofouling observed (algae, Bryozoans, barnacles, mussel).

Operator: Cheryl Rafuse and David Bowen

Date and time (UTC): Sept 22 2005 15:00

Disc #	Picture (y/n)	Comments & Biofouling type
1 NC	Y	Medium to High, Algae, starfish , Skeleton Shrimp
2 C	Y	Medium to low
3 NC	Y	Medium
4 C	Y	medium
5 NC	Y	Medium to high
6 C	Y	Low
7 NC	Y	Medium to high
8 C	Y	Low
9 NC	Y	high
10 C	Y	low

Figure 1. RBR Biofouling Experiment Log sheet at 22 Sept 2005.



**Non-coated samples:**



**Wax-coated samples:**



*Figure 2. Photos of all samples, taken during inspection after 3-month deployment period.*



*Figure 3. Samples #8 (wax-coated) and #9 (non-coated) positioned close to each other at 10 inch after 3 month deployment period.*



*Figure 4. The samples with the central holes view after receiving them back in RBR. From left to right: #1 – non-coated, #2 – coated, #3-non-coated, #4 –coated, #5-non-coated, #6-coated, #7-non-coated, #8-coated, #9-non-coated, #10 -coated*