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House of Commons
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Via email - sarah.newton.mp@parliament.uk

Our ref: AM/2733

Your ref:

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Dear Sarah

Fish Mortality at Swanpool Lagoon SSSI

Thank you for your email on 13 September regarding recent fish mortality in Swanpool Lagoon near Falmouth.

I can confirm that we received a number of reports over several days from members of the public concerning dead fish. We recorded these as an incident and attended the site to investigate what may have caused the fish to die.

Between 21 and 30 August we visited Swanpool lagoon on 5 occasions to make observations, take readings and collect water samples. We received no reports of pollution observed either in Swanpool Lagoon or from the feeder streams. Some reports alluded to the possibility of oil pollution or contaminated drainage from the local development site being a possible cause. We did not detect any pollution ourselves.

On 21 August we confirmed that the fish species affected were mullet and juvenile bass. Both are marine species. We saw live mullet in the vicinity of the confluence of freshwater feeder streams entering the lagoon as well as dead fish. We collected water samples and submitted them for full analysis to include hydrocarbon/oil pollutants.

Our initial view was that a pollutant may have entered the lagoon from a stream and killed some of the fish near the confluence areas before being flushed out to the sea. Test results did not reveal evidence of any pollutants at a level which could be considered responsible for the fish mortalities observed.

We took spot readings of oxygen and ammonia using our portable meters. Our measurements for oxygen showed that the lagoon was super saturated with oxygen. The temperature of the lagoon water was also high at 21 degrees C. This is not uncommon in shallow lakes containing high levels of aquatic algae in hot sunny summer weather. These readings also confirmed that the lagoon was experiencing a diurnal shift for oxygen in the water. Our sample results also confirmed that Ammonia levels were negligible, which discounted a sewage or cattle slurry type pollution.

To better understand what may be happening in the absence of any obvious pollutant, we attended the lagoon again in the early hours of the morning to take readings of the levels of oxygen. From these readings we discovered that, unlike during the day, water oxygen levels at night had fallen sharply and were less than half that recorded during the day. The water temperature in the lake remained elevated overnight.

During the day the water became super saturated by the photosynthesis of algae in bright sunlight. As darkness fell the algae then consumed oxygen causing a rapid decline in lagoon water overnight and up to dawn. Many of the reports we received confirmed observations of gasping fish early in the morning just after the oxygen levels would have been at their lowest. Warm water in the lagoon is less able to hold oxygen compared to cold water so at night the removal of oxygen by algae and the loss of oxygen due to the warm water would have peaked causing a temporary oxygen 'crash.'

At the time of the fish kill there were also very high spring tides. Our observations showed that, on the biggest tides, the level of sea water at the beach was higher than the level of water in Swanpool lagoon. This caused a significant inflow of saline water from the beach to the lagoon via the culvert. We believe that this inflow from the beach allowed large numbers of juvenile bass and mullet to enter the lagoon on the high tide.

Our conclusion is that the big spring tides allowed a large volume of seawater and marine fish into a brackish water environment, at a time when lagoon water temperatures were high due to sunny weather and algae causing daytime oxygen super saturation. The marine fish species would have been subject to stress caused by moving rapidly from a fully marine saline environment to a brackish/freshwater lagoon. Mullet can acclimatise to live in brackish water and the lagoon has a resident population of this species. During the day the high levels of oxygen would support fish life but at night when oxygen levels fell steeply and quickly, the oxygen stress in combination with brackish water adaptation demands would have been sufficient to cause the mortality observed.

Although Swanpool is a brackish water lagoon, significant volumes of seawater only enter during big tides or during storm events. It is the combination of factors which we believe caused the fish kill on this occasion.

We welcome reports from the public of any sightings of pollution or fish kills to our free 24 hour incident hotline on 0800 80 70 60. We will then do our best to detect, stop and mitigate the cause of such incidents.

We have also been invited to attend the next Swanpool forum meeting and will be happy to share our investigation findings along with the other work and outcomes we are delivering in this area.

Yours sincerely



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