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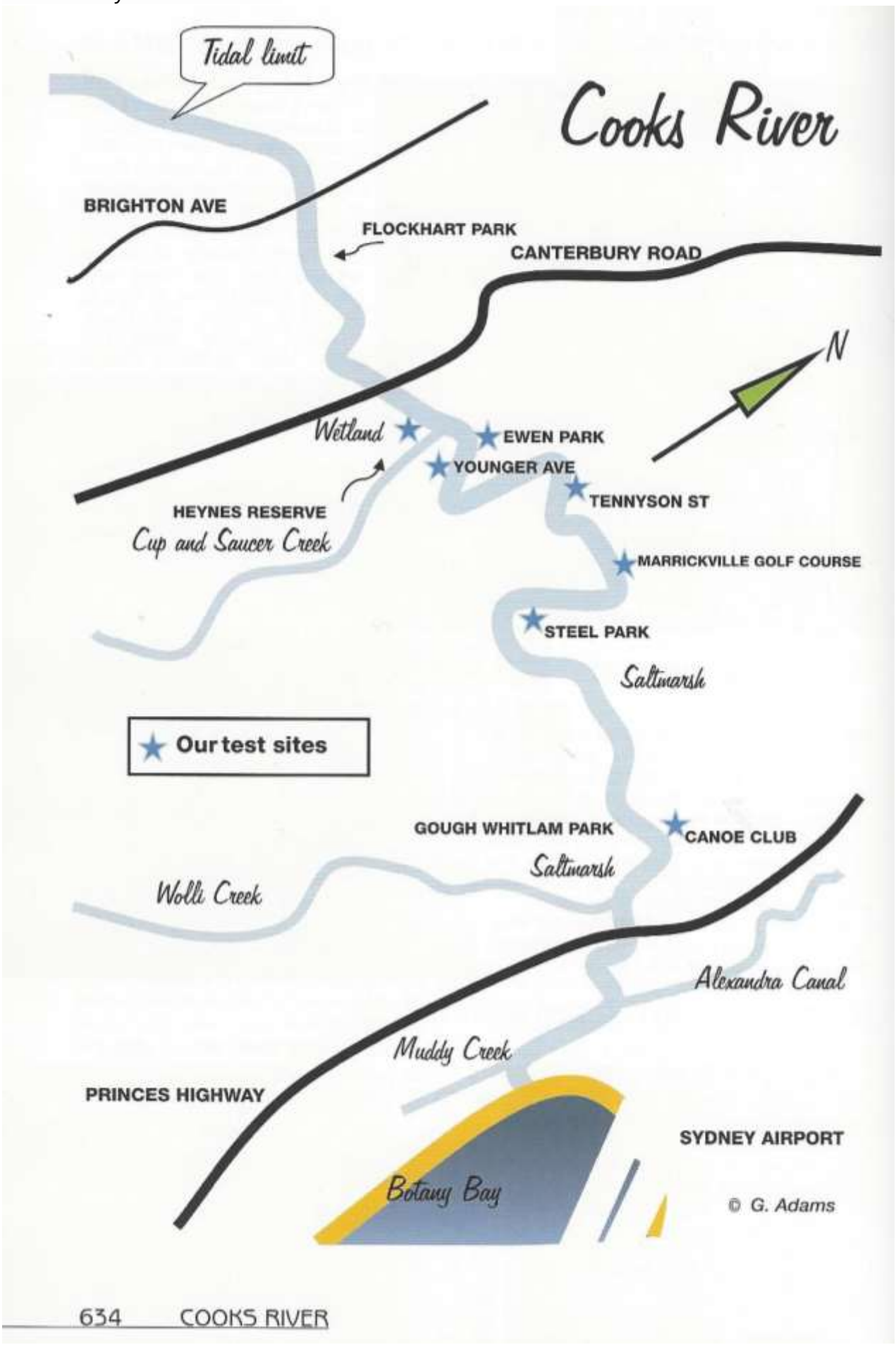

STREAMWATCH AND THE COOKS RIVER COMMUNITY

Gayle Adams

Some days down by Sydney's Cooks River you can almost imagine what it was like before European settlement. The water is so clear you can see the feet of ducks spinning just under the surface. The sun is shining, the air is fresh, just a little floating rubbish. Water birds and shoals of fish can be seen. Oxygen levels are good, phosphate concentrations are lowish and the *E. coli* count is less than scandalous. You can almost believe you could go for a dip in the River where, years ago, locals picnicked and swam and went prawning. But there are other days when water quality is not so good, in fact, it is quite poor. And those days are the majority.

But the local community is determined to see the River rehabilitated. Many of us joined the venerable Cooks River Valley Association—a community body keen to improve the water quality of the River. But how to do this? We had no expertise. We needed to know how bad the water quality was and how to monitor it for changes.

Then we had a bright idea. We found some old Sydney Water faecal coliform data for 2006/07 (Fig. 1). Wet weather medians varied between 8,000 and 25,000 colony forming units (cfu) per 100ml. But what did that mean? And what were the levels now?

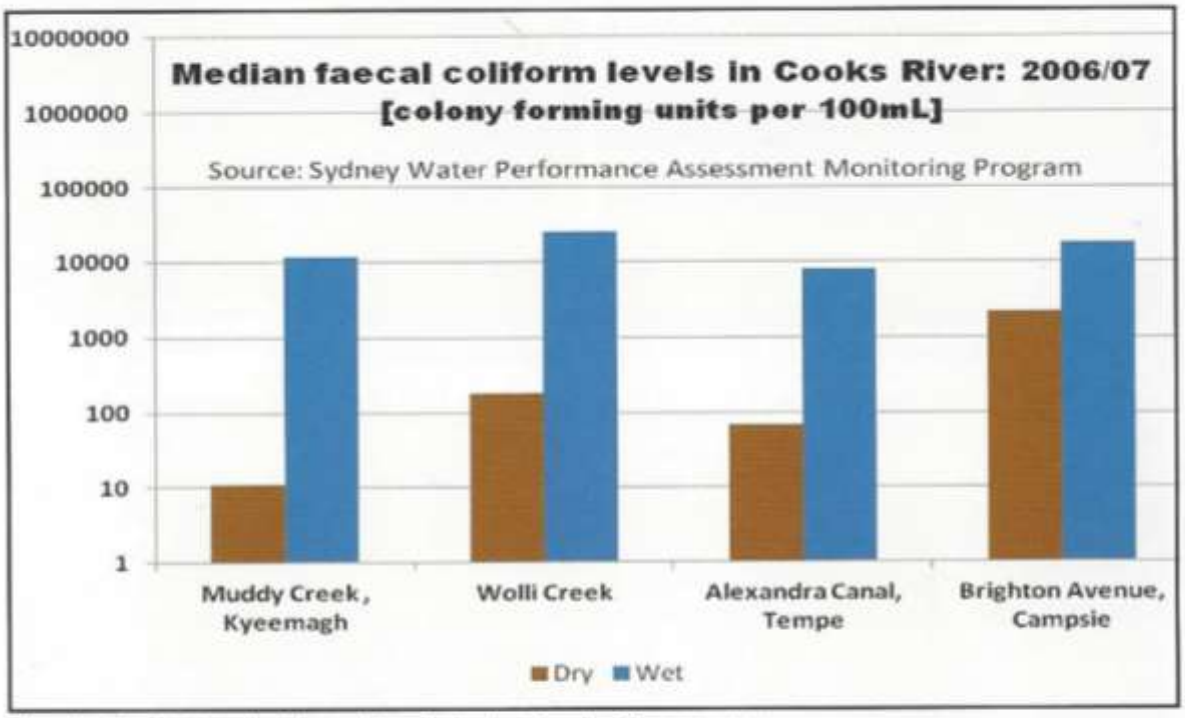

Fig. 1. *Our first look at faecal levels in the Cooks River system*

Then we had another bright idea. We discovered Sydney Water's Streamwatch program, 'a dynamic environmental action network educating and empowering communities to work together for healthy catchments'. We liked the sound of that.

We did the Streamwatch training. We studied the Streamwatch user guide. We learned that median *E. coli* levels above 150 colony forming units (cfu/100ml ('primary contact' guideline) suggested swimming was risky. And medians above 1,000 cfu/100ml

('secondary contact' guideline) put the kybosh on boating. Phew!! Swimming might be out of the question!

Streamwatch encouraged comparison of results with ANZECC (2000) guidelines. So we started testing. In 2007/08 we found our results to be generally higher than the primary contact guideline (150 cfu/100ml) and often much higher than the secondary level (1,000 cfu/100ml). We also measured available phosphate (AP) and found it to be above the Government guideline (0.0153 mg/L) at 3 of the 4 sites. (Streamwatch encouraged comparison of results with ANZECC (2000) guidelines).

Faecal coliforms and *E. coli* indicate possible sewage contamination while available phosphate is a measure of the phosphate compounds that are soluble in water and therefore available to be absorbed by plants. High phosphate levels can adversely affect life in the River and downstream in Botany Bay. We reported our findings to Sydney Water and local Councils.

We asked ourselves: "Where is this faecal pollution coming from?"

The Streamwatch user guide said: "Streamwatch is used to identify the source of pollution in your catchment so that appropriate action can be taken."

We said: "That's a relief!"

Figs 2 & 3. *The beautiful Cooks River on a good day and bad day.*

In 2008/09 we found that high faecal counts above 150 cfu/100ml occurred on more than 50% of testing occasions.

In 2009/10 we found high *E. coli* above 150 cfu/100ml at all River sites on more than 60% of testing occasions. Very high results were recorded at Marrickville Golf Course near Beauchamp St. (9,600 cfu/100ml), at Tennyson St., Marrickville (20,000 cfu/100ml) and Younger Ave., Earlwood (11,300 cfu/100ml). Younger Ave. downstream was particularly bad with 38% of results above the secondary contact guideline. We suggested this was likely due to human sewage in the River. The highest AP levels were recorded at Younger Ave. where the maximum AP was more than 40 times the ANZECC guideline. We reported our findings to Sydney Water and local Councils.

In 2010 the Cooks River Valley Association ran the Cooks River Forum in the lead up to the State election. We presented our work and showed how *E. coli* levels were high in both wet and dry weather. Putting the results in some context, it meant on average swimming would likely be unsafe up to 365 days of the year (Fig. 4). We were told, "It is nothing to worry about. It's probably duck, or dog poo."

In 2010/11 we found median *E. coli* results exceeded the primary contact level at all but one River site. The highest recorded results were 1.74 million in Cup and Saucer

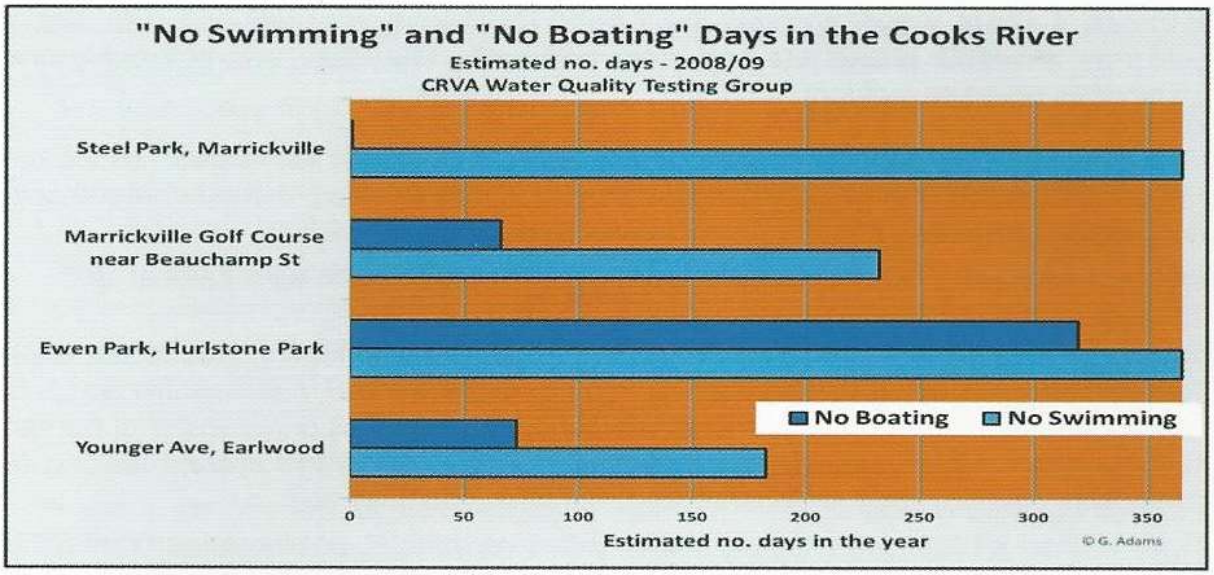

Fig 4: *No swimming and no boating days in the Cooks River.*

Creek and 70,000 in the River at Younger Ave., Earlwood. We suggested this was most likely due to human sewage in the River. Median levels of AP were above the ANZECC guideline at all sites, both river and stormwater. The highest AP levels were recorded in the inflow to Cup and Saucer Creek Wetland where a level of 6.35 mg/l was recorded (415 times the guideline). We reported our findings to Sydney Water and local Councils.

In the 4 years we have been engaged in doing Streamwatch we have clocked up 180 test sessions, 1,100 individual data items and over 1,000 volunteer hours. During that time there has been some movement in individual water quality parameters, but no overall improvement (Fig. 5).

We asked ourselves: "What is Sydney Water doing with our Streamwatch results?"

The Streamwatch user guide said: "Streamwatch is not just about water testing however, it is also about using the water quality test results to interpret environmental conditions and take action if necessary." We said: "That's a relief!"

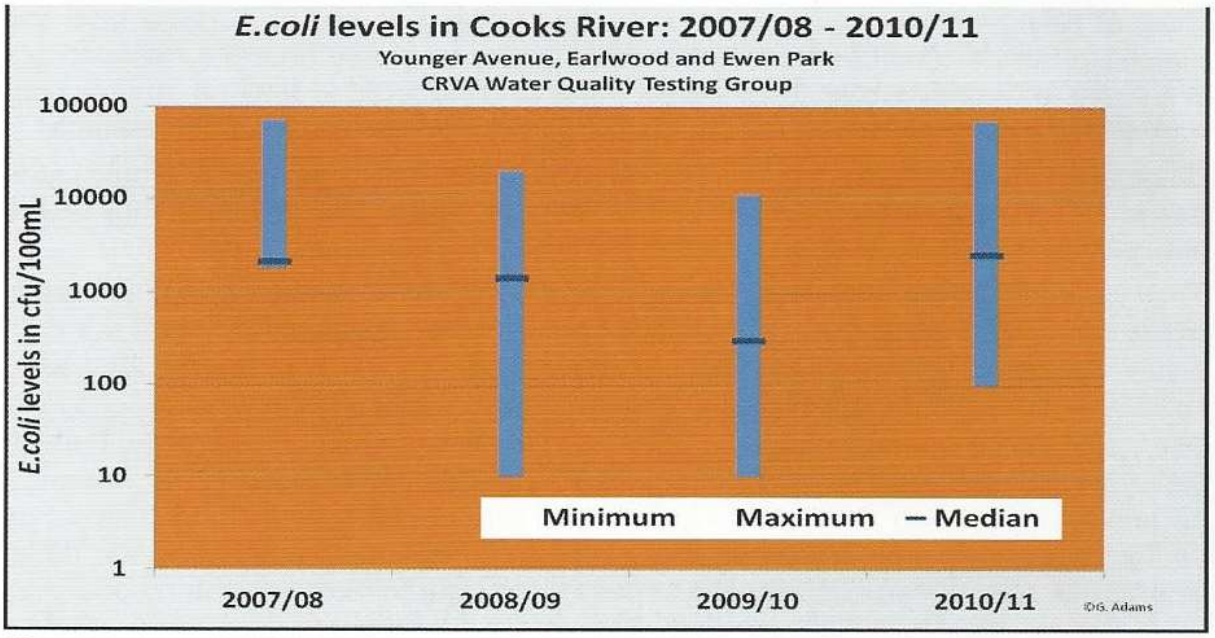

Fig 5: *Four years of testing* E. coli *at proximal sites in the upper Cooks River estuary.*

In those 4 years we discovered the Cooks River was very polluted with faecal coliforms, available phosphate and other pollutants. The River was effectively one continuous pollution incident.

> The stream watch user guide said: "In the event of unusual test results, immediate communication with your regional coordinator and stakeholders means that potential pollution incidents can be followed up as soon as they are spotted."
>
> We asked ourselves: "What if the River is permanently polluted? Who will follow that up?"

People often say the water looks very clean except for the floating plastic soft drink bottles and other junk (Fig. 3). When we tell them about the *E. coli* they are amazed. "Where does it come from?" We say: "We don't know, but it is an indicator of human sewage in the River so it might be coming from the sewerage system leaking or overflowing." No!!! They are gobsmacked. But what could we do?

Then we had a bright idea. Surely a river with such high *E. coli* levels can't be good for human health. So we wrote to the NSW Minister for Health. At last, someone was listening. In September 2010, the Government's Beachwatch Programs team kindly offered to do a sanitary inspection of our River. Alas! Due to the risk of contamination from human sewage indicated by the high concentration of enterococci, all the sites we had nominated were ruled out. Including during dry weather.

> We had some questions:
>
> Q. Where are these enterococci coming from? A. From the sediments.
>
> Q. What can we do about the sediments? A. Nothing. But they are also coming from sewage.
>
> Q. Where does the sewage come from? A. Everywhere. It's impossible to identify every source and the concentrations are nothing to worry about.
>
> Q. How do we stop the sewage? A. You can't. All rivers in Sydney have sewage in them. The Cooks is just not very good at flushing the sewage out.

What a bummer! Then we had a bright idea. We would try a different approach. We would shift our focus to the tributaries and look for *E. coli* hot spots.

Cup and Saucer Creek is a large domesticated waterway that drains into the Cooks River at Heynes Reserve, Canterbury. We had taken a couple of samples from this major stormwater drain and knew the water quality was very poor (i.e. 'disgusting'). We wrote to Sydney Water. They agreed, and kindly offered to brief us on how poor and why. We learned that, on average, sewage overflowed into the Creek monthly.

They also told us they were building a Wetland beside the Creek which would clean the water before it entered the Cooks. We thought, 'Great, but why don't they fix the sewers as well?'

They invited us to test the water flowing in and out of the Wetland, saying our results would be used to help manage the catchment and the Wetland. We hoped our data would say something sensible about Wetland performance. And true to their word Sydney Water installed underground monitoring pits for the purpose.

The Wetland is a splendid project—a jointly funded collaboration between the Federal Government, Sydney Water and Canterbury Council worth close to $1 million. It certainly engaged the community. Open over a year now, it is flourishing. It soaks up all the oil, sewage and phosphates diverted into it from the Creek during low flows. The design allows high flows mostly to pass by. We set to monitoring and observing.

We confirmed the stormwater in the Creek upstream of the Wetland was very polluted. We also found:

- some days the inlet was blocked with litter, no water could flow into the Wetland;
- a comparison of pollutants taken on the same day from the inflow and outflow suggested the Wetland was doing its job but this simple comparison was not sufficient to draw conclusions about Wetland performance because…;

1. …."an understanding of the hydraulic retention time is needed to properly assess the performance of the Wetland. This can be monitored by adding various 'tracer' chemicals to the influent or just by monitoring variations in flow rates in and out (if they are sufficiently variable and not highly buffered within the system)" (pers. comm. Dr Stuart Khan, University of NSW);
2. we also needed flow rates to convert concentrations to pollutant load.

In short, we needed help to develop a valid and useful testing strategy to monitor Wetland performance. We tested every 4 weeks for a year. We had been told our results would be used to help manage the catchment and the Wetland. Sadly this did not happen. We wondered why we were putting in the hours. We suspended testing and reassigned our volunteers to another site.

Meanwhile just upstream of the Wetland Sydney Water's Canterbury-Bankstown sewerage submain crosses the Creek, and sometimes overflows into it. In March Sydney Water's SewerFix contractors visited the submain to do major repairs. We were thrilled. Maybe this would reduce the frequency of sewage leaks.

So then what? Did we just wait until all the sewers are fixed and all the stormwater drains have mini-wetlands constructed on them? Then we had a bright idea. Over at University of NSW Water Research Centre, Dr Stuart Khan was interested in developing a faster, cheaper method of hunting down sewage leaks in the field. He needed to test it against existing methods using trace pharmaceuticals. Why not the Cooks River and some of its tributaries, like Cup and Saucer Creek? There was plenty of *E. coli* in the Cooks and these tests might shed some light on the source of *E. coli* — ducks, dog poo or human sewage.

Dr Khan initiated the project and the work was done by Philippe Laou, international practicum student from France. We provided assistance. They were able to identify the chemicals being transferred from toilets, etc to the River. Dr Khan found:

- "Chemicals are being transferred directly from sewers into the river."
- "The highest loads were detected following heavy rainfall when the sewers are designed to overflow into the stormwater system, which flows to the river. However, even during extended dry weather, high concentrations persist, indicating that the aging sewers are leaking into the river."
- "The high concentration of chemicals suggests there is very little dilution and the Cooks River at times is really an 'open sewer'."
- "I would discourage anyone swimming in the river under any weather conditions."

Now people are listening!! It's raw human sewage—not duck, not dog poo!

A local paper carried a statement by a Sydney Water spokesperson:

- "This is not raw sewage," the spokesperson said after sampling officers tested Cup and Saucer Creek, a tributary of the Cooks. "It is a low level of contamination."

Now we are confused. The Streamwatch user guide said "Streamwatch is used to identify the source of pollution in your catchment so that appropriate action can be taken". We wondered whether we've been conned. Meanwhile, our dream of safe swimming may still be a long way off.