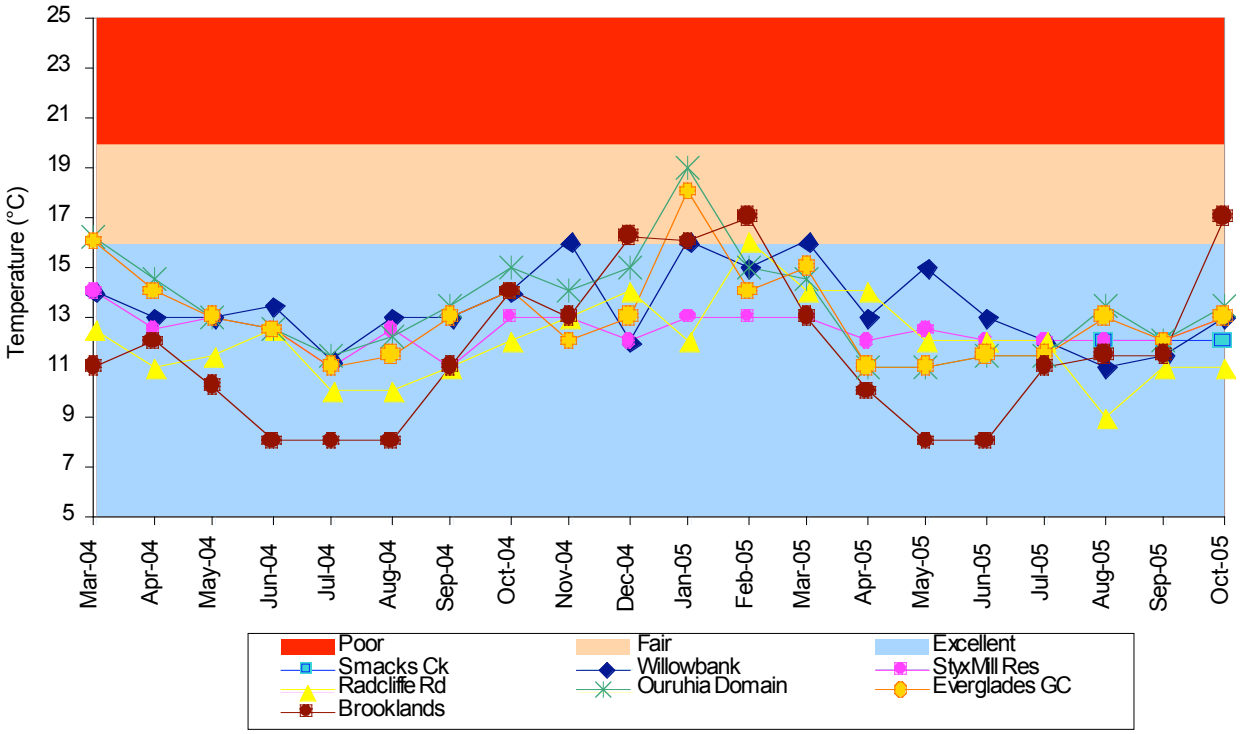
Styx Annual Report
2005

This report covers the period March 2004, when the community monitoring programme began, to October 2005, when the results were last collated. Future annual reports will present data collected over the 12-month period October to October. Taking a look at results once a year is a good frequency, as it enables us to see the way water quality changes with the seasons, and, over a longer period, allows us to look for changes or trends.

Temperature



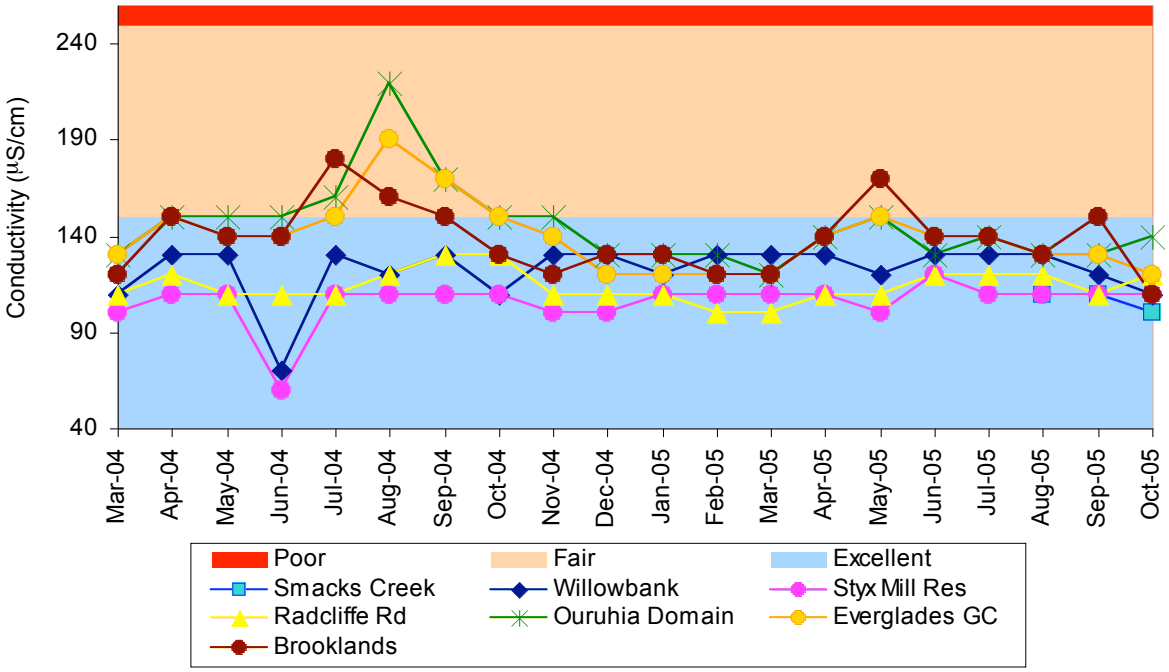
Temperatures at all sites have been reasonably constant, fluctuating over a range of around 7.5-19°C, but generally lying between 10 and 16°C. This is because most of the water in the Styx system is derived from groundwater, which has a narrow temperature range. Temperatures do fluctuate a little with the seasons, peaking in mid-summer. The Styx Mill Reserve site, which is closest to the springs feeding the stream shows the least variation in temperature, whereas the Brooklands site, at the bottom of the catchment shows the greatest – this reflects the length of time the water has been exposed to air temperature.

The water temperatures were in the “excellent” category (i.e., the best conditions for plants and animals living in the streams) almost all of the time. On occasions during summer some of the downstream sites fell in to

the “fair” range. At these temperatures there is the potential for some insects to become stressed.

Things to look out for are prolonged periods of high temperatures (above 18°C) or sudden changes in the temperature, which may indicate a periodic discharge of water or waste at a different temperature to the normal background in the stream.

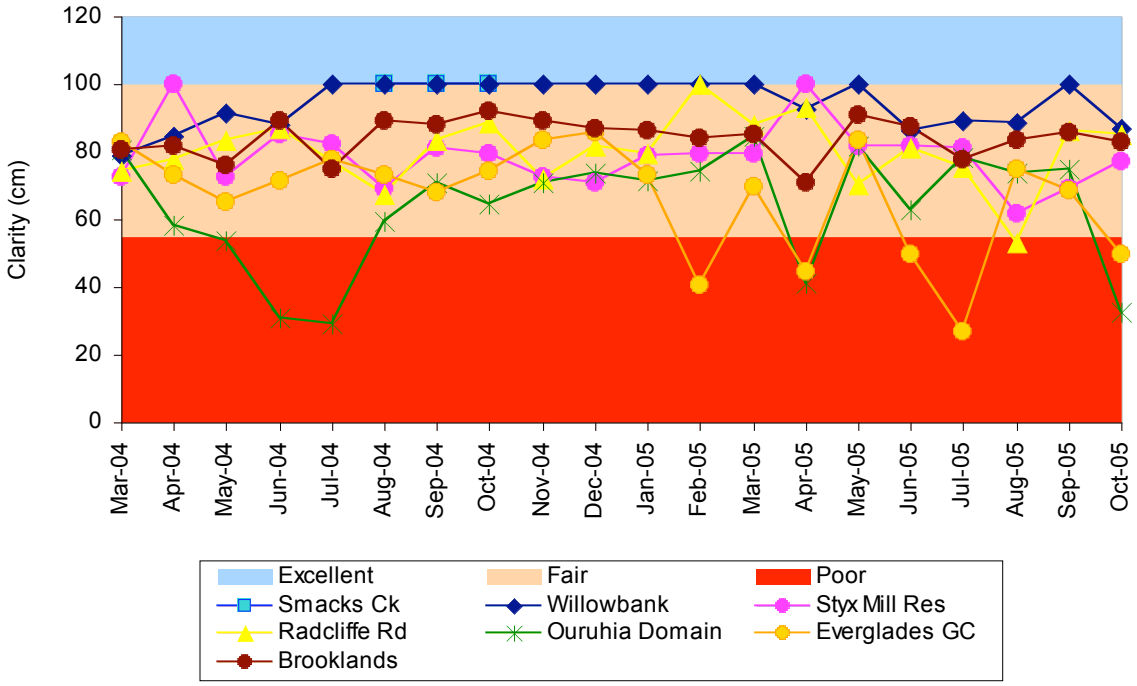
Conductivity



Conductivity measurements reflect the quantity of nutrients, such as nitrogen and phosphorus, and other compounds in the water. Measurements between March 2004 and October 2005 show a distinctive seasonal pattern for some sites, particularly those on Kaputone Stream and at Brooklands, where the influence of increased inputs of storm water, particularly during the winter months, is evident. Other sites were very constant, mostly fluctuating between 100 and 130 µS/cm. This is to be expected in the upper reaches of the Styx tributaries, where most of the water, even during wetter months, comes directly from groundwater. However, the consistent readings for the Styx at Radcliffe Road are a little unusual, perhaps indicating that the river is less impacted by stormwater than Kaputone Stream.

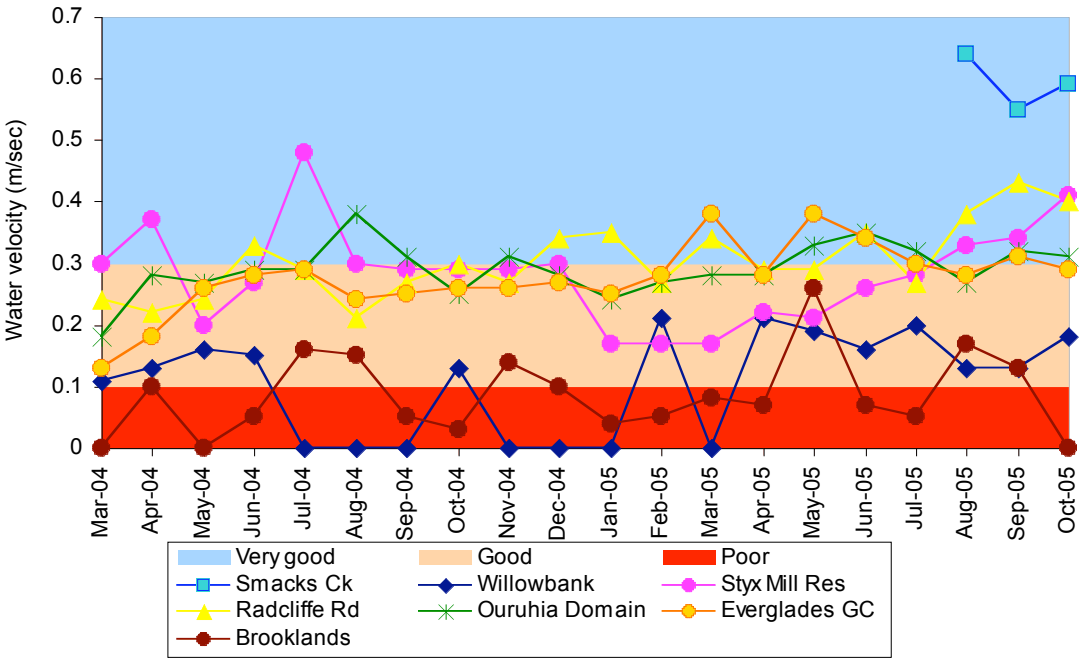
For the most part the results indicate that, in terms of chemistry, the water quality in the Styx system is excellent, and the potential for problems such as nuisance weed or algal growth is low. However, increases in conductivity over time would be a cause for concern.

Clarity



With the exception of the two Kaputone Stream sites, clarity readings were very consistent over the monitoring period, ranging between 53 and 100 cm (note that 100 cm is the maximum value that can be measured using this method, so clarity values recorded as 100 cm may be greater than this). These values are considered to represent “fair” clarity, that is, water that is generally adequate for aquatic plants and animals. The Ouruhia Domain and Everglades sites showed periodic reductions in clarity with a number of values in the “poor” category. As noted above with respect to conductivity, the Kaputone Stream appears to be impacted to a greater degree by stormwater runoff; stormwater carries sediments into waterways, and this can have a marked effect on the appearance of the water during and immediately after rainfall. Disturbance of the banks and/or bed of the stream by stock and other activities can also have a considerable effect on clarity. Although occasional instances of low clarity, such as those associated with rainfall, generally have little long-term consequences for the stream, prolonged periods of high sediment inputs can have serious consequences for stream health.

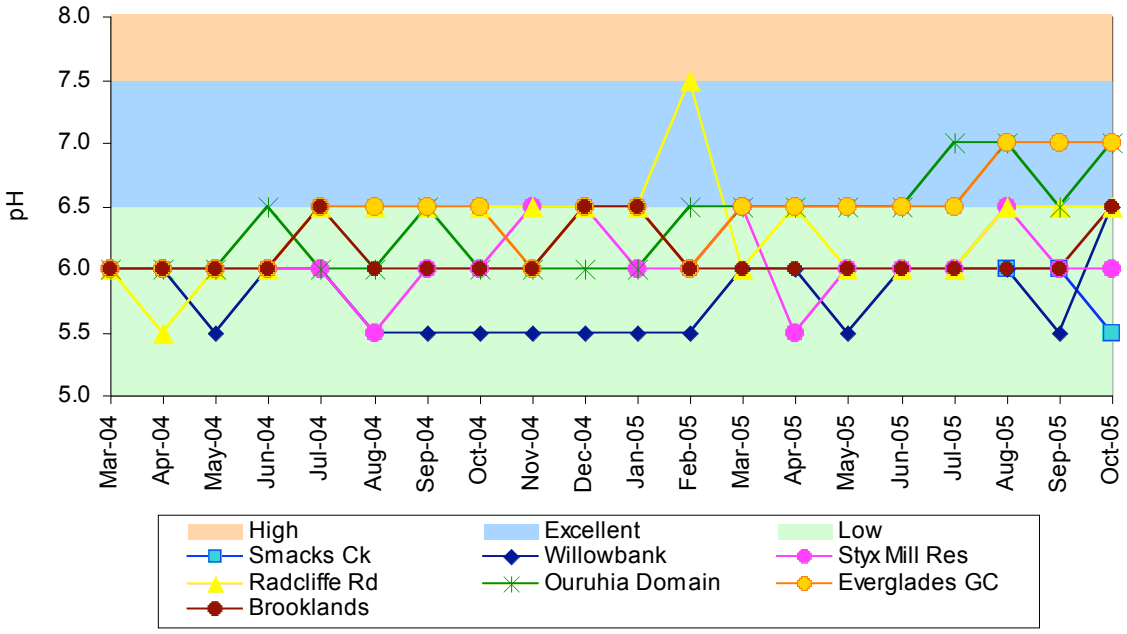
Velocity



The amount of water flowing in a stream is a critical factor in the quality of the habitat provided for plants and animals. Strictly speaking, the monitoring programme measures stream velocity (the speed with which the water is moving, measured in metres per second) rather than flow (the volume of water that is moving over a given time, measured in litres per second). However, velocity does provide a useful indication of the amount of water in the stream.

The results presented here do not show a strong seasonal pattern, which is a little surprising given the groundwater source; normally in spring-fed systems flows reflect seasonal fluctuations in groundwater levels, which tend to be highest in spring. Styx Mill Reserve, which is the uppermost site on the Styx does show higher water velocities in late-winter -spring but there is little indication of this for other sites. Radcliffe Road shows an apparent general trend of increasing velocities over the monitoring period, with peaks mirroring those at Styx Mill Reserve. The zero values for Brooklands are a consequence of tidal influences at the lower end of the Styx River, rather than a reduction in the volume of water moving down the river. On the other hand, low velocities at Willowbank suggest periodic flow loss which may have consequences for aquatic plants and animals in this part of Smacks Creek.

pH



Monitoring results indicate the pH is very stable at most sites, fluctuating within a range of 1 unit. The site at Radcliffe Road show greater variability, ranging between 5.5 and 7.5 units. Generally, pH in streams is variable on a daily cycle, particularly where there are lots of plants in the water, as CO_2 is taken up during daylight hours with photosynthesis, and released at night as the plants respire. The presence of CO_2 in the water lowers the pH, so pH tends to be higher during the day and lower at night. It may be that the more extreme values recorded at Radcliffe Road reflect this effect.

Results depicted here suggest that the pH of the Styx and its tributaries generally falls into the category of “low”, i.e., between 5 and 6.5, whereas most Canterbury waters are usually greater than 6. However, recent comparative lab testing of Styx samples indicates that the method used may be under-measuring actual values. For this, and other reasons, pH measurement requires further investigation. Factors to be considered include the difficulty of carrying out alternative methods in the field, the consistency and stability of the measurements obtained thus far, and the lack of any evidence of pH-related adverse effects on stream biology. Other measurements of water quality relevant to the values of the Styx system will be considered.

Overall assessment March 2004-October 2005

The observations made by the community monitoring group indicate that the water quality of the Styx River and its tributaries is in good condition and should support diverse and healthy plant and animal communities, provided other factors that impact on stream habitat, such as flow, are also

adequate. Most of the things that are measured show consistency between sites and through the year. Kaputone Stream is the most variable, with seasonal fluctuations in clarity and conductivity associated with stormwater runoff.

Results for pH suggest some problems with the measurement method, and this requires more investigation during 2006. This will include assessment the suitability of other water quality tests.