Project Twin Streams

REPORT CARD 2016

Working together for healthy streams and strong communities

Introduction

Project Twin Streams (PTS) is a large-scale environmental project in West Auckland that was initiated in 2003 by Waitakere City Council and is led today by Auckland Council and its Local Boards. Working to improve stream health throughout the Huruhuru and Henderson Creek catchments, 56 kms of streamside has been replanted and properties within the flood plain purchased for removal. Auckland Council has implemented a sustainable community development approach that recognises the interconnectedness of social, cultural, spiritual, economic and environmental wellbeing.

PTS seeks to restore the *mauri*, or life force, of its waterways and at the heart of this project are the local communities that these streams flow through. Project Twin Streams' unique approach engages residents by partnering with their local community organisations. This is a local project with regional benefits – it works with both nature and people to improve the health of its waterways.

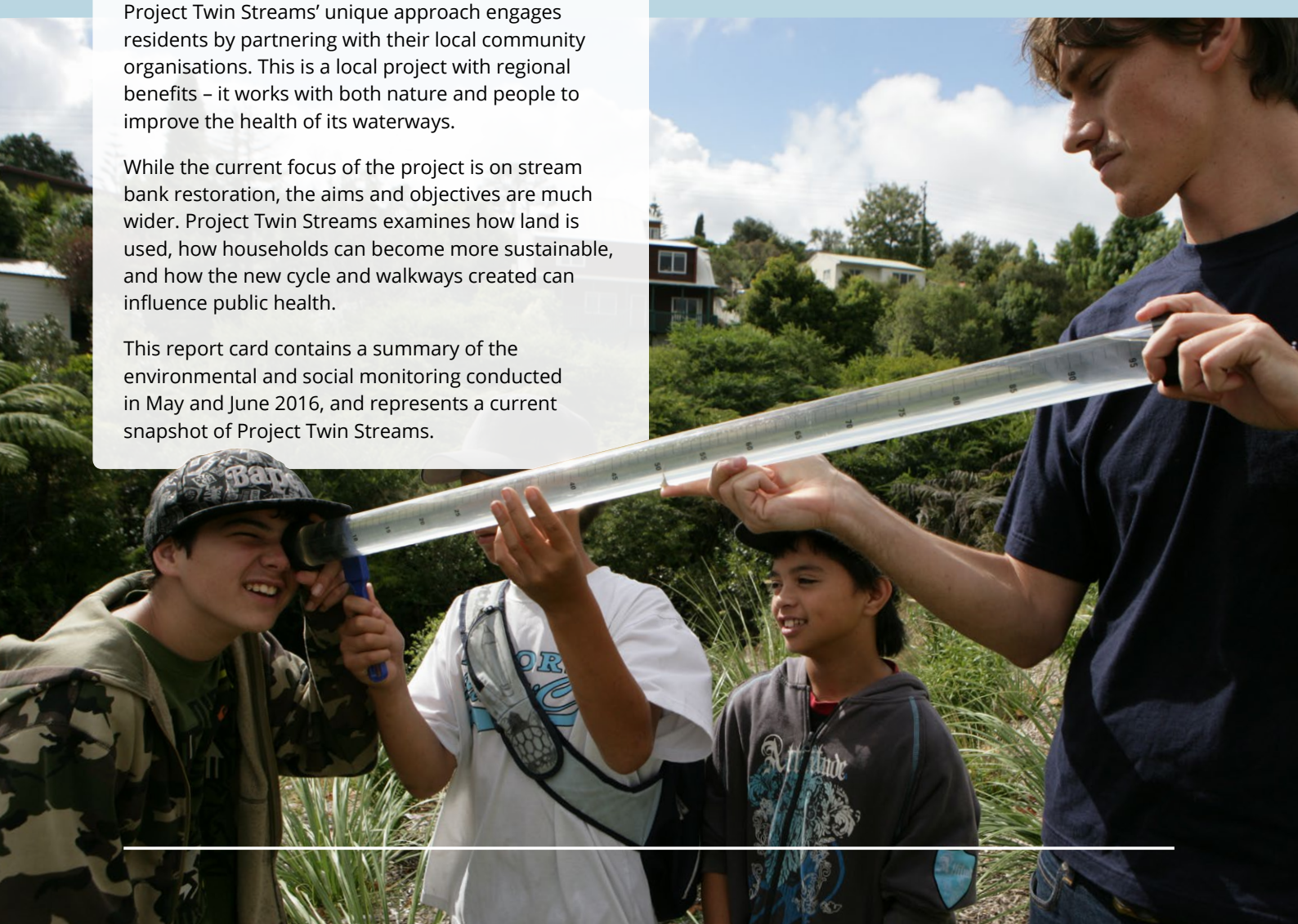
While the current focus of the project is on stream bank restoration, the aims and objectives are much wider. Project Twin Streams examines how land is used, how households can become more sustainable, and how the new cycle and walkways created can influence public health.

This report card contains a summary of the environmental and social monitoring conducted in May and June 2016, and represents a current snapshot of Project Twin Streams.

Fresh Water Monitoring

PTS monitoring focuses on whether its streams are supporting a healthy ecosystem. Nineteen water quality monitoring sites are shown in Figure 1. These have been selected to present a range – from bush-clad headwaters (e.g. Sites P and A) through to rural (e.g. Site F), rural/urban fringe (e.g. Site G) and urban (e.g. Site I), from the four main freshwater streams in the PTS area – the Waikumete, Oratia, Swanson and Opanuku streams.

"PTS seeks to restore the mauri, or life force, of its waterways"



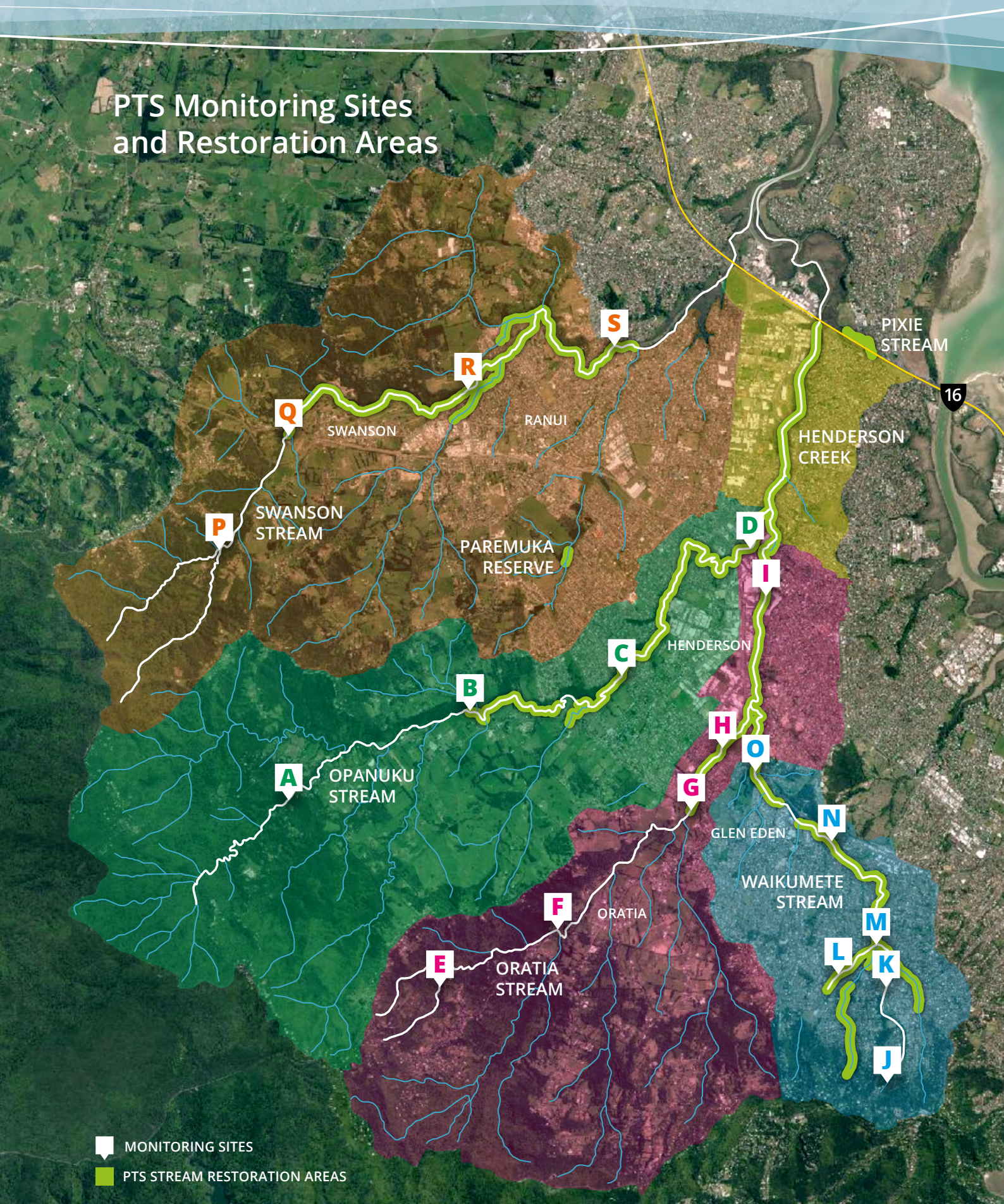


FIGURE 1: PTS Catchment: Monitoring Sites and Restoration Areas

Land Use and Pressures

PTS streams are all characterised by a warm climate, high rainfall levels, and soft erosion-prone soils. However, they all differ in the amount of pressure they are under from varying land use practices.

TYPICAL PRESSURES ON STREAMS IN PASTURE AREAS
Nutrients from fertiliser application and bacteria from stock effluent washed into the stream
Pesticides and herbicides being washed into the stream
Increased bank erosion from stock wandering in and out of the stream
Increased stream temperatures (when there is no stream bank vegetation)

TYPICAL PRESSURES ON URBAN STREAMS
Increased nutrients and bacteria from wastewater overflows in times of heavy rainfall (where the wastewater system is inadequate)
Changes to the speed and volume of stream flows, causing erosion and sedimentation
Increased heavy metals (e.g. copper and zinc) and hydrocarbons washed in from roads, roofs and carparks ('stormwater contaminants')
Modifications to accommodate flood flows (e.g. artificially widened or deepened, or stream banks concreted)

Two key pressure indicators for urban streams examined:

- **Impervious Area:** the proportion of the catchment covered by roads, roofs, driveways and other non-natural, impervious surfaces. (See box below)
- **Stormwater Outlets:** the number of stormwater pipes into the stream systems (only those >375 mm diameter were investigated).

The Waikumete Stream is the most urbanised catchment in PTS containing the greatest amount of impervious surfaces and stormwater pipes, and is therefore under the most pressure of all the streams. Anecdotally this stream also has a greater number of wastewater overflows (believed to be about 20 times per year). The good news is that the planned upgrade of the sewage system in Glen Eden should reduce this pressure on the Waikumete Stream.

Impervious surfaces are hard areas such as roads, pavements, driveways, parking lots and rooftops. Water cannot soak into the soil and instead moves into the stormwater network. This is a key urban pressure indicator as when the amount of impervious surfaces approaches 10% within the catchment, the amount of stream life reduces rapidly.

Water Quality

Water samples were tested for temperature, oxygen concentration, water clarity (known as turbidity), *E.coli*, heavy metals (e.g. zinc and copper) and nutrient levels (high nutrient levels are bad for stream health). They were then compared to Australasian and national guidelines for water quality (where these exist). Figure 2 (above) shows which sites exceed guidelines for water quality. Only three quality standards were exceeded by any of the streams. These were for copper, *E.coli*, and a form of ammonia related to high organic waste loads in streams.

Overall, urban streams had the worst water quality – particularly Waikumete Stream which directly relates to the higher pressures this catchment is under. Copper concentrations were exceeded at five of the nine urban sampling sites indicating a clear urban influence on the streams.

Eleven of the 19 sites exceeded the *E.coli* guideline. *E.coli* is a species of bacteria that indicates faecal pollution (animal or human) and suggests other disease-causing organisms may also be present. This bacteria may come from sewage (wastewater) overflows, runoff from pastoral farmland and/or wildlife living in and around water bodies.

The ammonia guideline was exceeded at two Waikumete sites (M and K) and, like *E.coli*, is likely linked to wastewater overflows in this area. Note that two Swanson sites (R and S) may have exceeded the *E.coli* guideline, but not enough testing was done to confirm this.

Water quality parameters were also measured three previous times between 2003 and 2010. No change in water quality has been detected.

Sediment Quality

The quality of stream sediments was also examined. Sediment can be a 'sink' for pollutants – pollutants attach to sediment and can accumulate. Eventually the sediment and the pollutants attached to them end up in the estuary and in the Waitematā Harbour.

Sediment quality is important for the ecology of a stream as many organisms either live in the sediment or feed on the sediment, or on algae that grows on the sediment. None of the PTS sites exceed the sediment guidelines for copper or zinc levels.

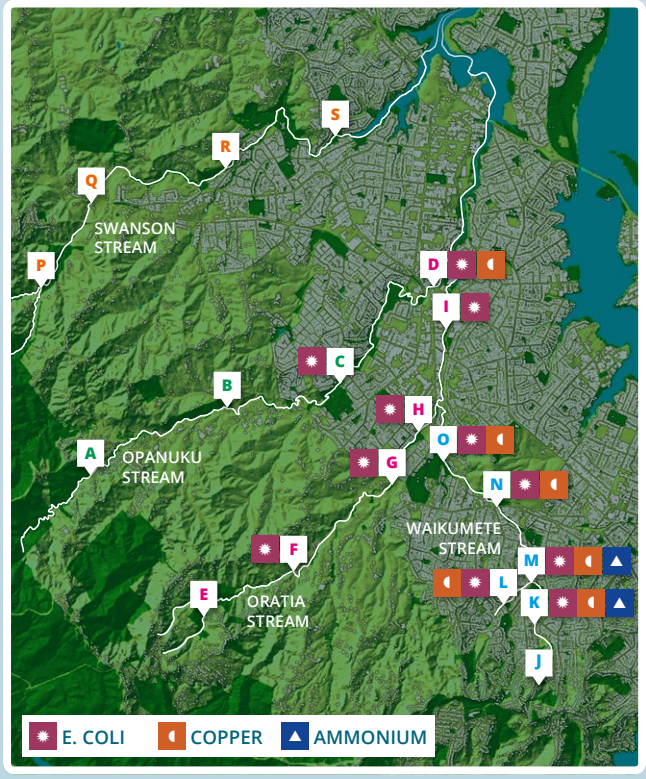


FIGURE 2: Water sampling locations that exceeded guidelines for stream health

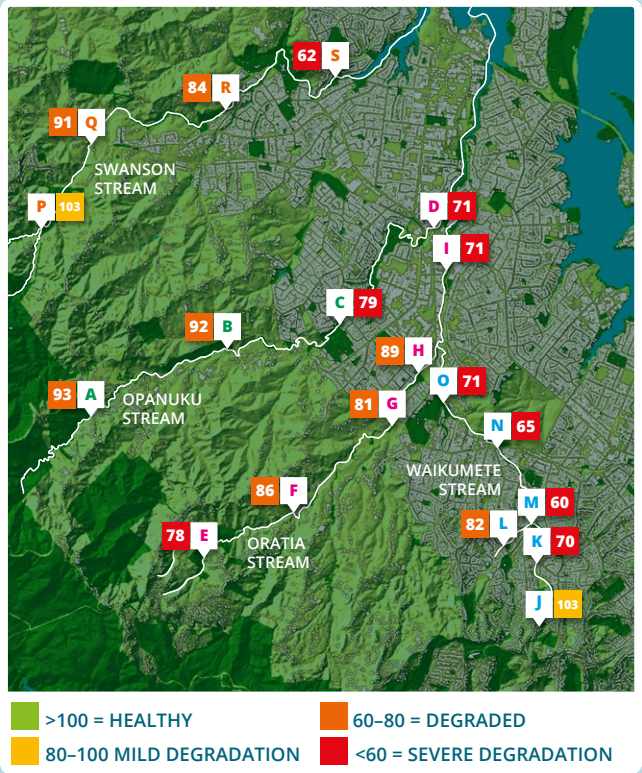


FIGURE 3: Macroinvertebrate Community Index values at each of the monitoring sites

WHERE DO HEAVY METALS COME FROM?

The heavy metals zinc and copper in our streams come from road runoff (from brake pads etc.), roof runoff, and copper-based fungicides used on orchards and vineyards. There are also natural background levels in the soil.

Magnified photos of common macroinvertebrates found in PTS streams

Invertebrates

Aquatic invertebrates (small organisms without backbones) are often used as indicators of water and habitat quality because they show different sensitivity to pollution and changing stream conditions. Mayflies, stoneflies and caddisflies for e.g. are intolerant of poor quality water so their presence indicates a healthy stream.

Every invertebrate species is given a score between 1 and 10 based on their known tolerance to pollution. Biologists use this to calculate the 'Macroinvertebrate Community Index' (MCI). High MCI scores (over 120) indicate *very good* water quality, while MCI scores below 80 indicate *probable severe pollution*.

Figure 3 shows that MCI scores were generally higher at upstream sites, although no sites scored in the highest category. That may have been because samples were taken in dry, warm conditions in early April (there is a seasonal impact on MCI values with better scores in winter than in summer). Again, the Waikumete Stream system had the poorest overall ecological quality. Only two sites showed any real change. Site L in Waikumete has shown some improvement which may be related to stream bank planting. Site E in the upper part of the Opanuku has declined.

"The abundance of weeds has reduced."

Flora and Fauna

The PTS area supports more exotic than native birds, but does include important native species such as tui, kingfisher and kererū.

Eighteen transects set up in 2004 to monitor changes in vegetation were re-examined. These transects are spread throughout the catchment, and all have had extensive planting and weed control apart from Woodside Glen, in Titirangi.

Findings:

- 15 of 18 had an increase in the proportion of native species.
- All but two sites have seen an increase in native seedlings. This suggests that weeding and planting work undertaken by PTS has moved the sites towards a state where native species are dominant and self-sustaining (i.e. producing their own seedlings).
- The abundance of weeds has reduced. For e.g. *Tradescantia* is now found at far fewer sites, and there is less of it at the sites where it remains. In 2004 it was found to be "occasional", "common", "very common" or "dominant" at seven of the sites. In 2016 it is only "rare" at two PTS managed sites.
- Woodside Glen (the site PTS hasn't touched) has seen an *increase* in weed diversity and abundance. Whilst this is only one site, it does suggest that PTS has prevented a similar trend from occurring elsewhere. There are also no native seedlings being produced there.
- Despite a reduction in weeds, 79% of the sites surveyed still had weed species present. In 2016 the weeds found were mostly seedlings – indicating that weed reinvasion is an on-going risk.
- Although the amount of weed control required to keep these sites relatively weed-free is now much less than in 2004, it is required on an on-going basis. Stream banks are, by their nature, vulnerable to weed invasion.

Social Monitoring

In 2016 email surveys were completed by those connected to PTS and the general community was surveyed by phone.

Approx. two thirds of those surveyed by phone (67%) had heard of PTS. This is similar to the number in 2010 – and is despite the relatively high proportion of West Auckland residents who change addresses frequently. **All** residents spoken to (who knew of the project) knew about the planting or weeding, or both.

- **Almost all** those who had heard about PTS were incredibly positive about it
- More than half had noticed **LESS** rubbish and weeds in the area
- Over 90% said walkways and cycleways are a "**great asset**" in their community
- Over 90% rated PTS as at least "valuable" if not "**very valuable**"

The number of volunteers and volunteer hours on Project Twin Streams is truly staggering. In the 2014 calendar year alone there were almost **20,000 volunteer hours provided by over 700 volunteers**.

"Over 80% of residents surveyed believed that PTS art projects have made the streams a more pleasant place."

Learnings

Project Twin Streams is well-known and popular with residents. They have experienced better connections to the stream areas (e.g. walkways and cycleways) and noticed the decrease in weeds and increase in native plants in the area. This improvement in the quality of stream bank vegetation is confirmed by the 2016 monitoring which shows less weeds and more native seedlings in PTS focus areas.

When comparing the 2016 results with earlier results it does appear that water quality has neither **improved nor deteriorated** since the beginning of the project. However due to the high cost of testing, insufficient data has been collected in the studies over the years to say this for certain. As water quality fluctuates (both seasonally and in response to flooding and one-off events) a larger number of samples are needed before any trend can be confirmed. It is likely, however, that PTS streams have been under greater pressure due to the increase in population and development within the catchment since the beginning of the project in 2003.

Along with the planned wastewater upgrade in Glen Eden, future actions that may have the greatest impact on water quality are (1) the restoration of smaller, upstream branches of the stream network in rural and semi-rural areas and (2) increased treatment or reduction in flow of stormwater before it is piped to the streams.

FURTHER READING

The results shown here have been drawn from the following:

Project Twin Streams Current State Report, Vols 1–3 (2016) Prepared for Auckland Council by Thomas Civil and Environmental Consultants in association with Environmental Impact Assessment and Tasman Research.

Project Twin Streams Synthesis Report (2016) Prepared for Auckland Council by Thomas Civil and Environmental Consultants in association with Environmental Impact Assessment.

64,834 VOLUNTEER HOURS ENGAGED IN RESTORATION AND EDUCATION ACTIVITIES

801,584 NATIVE TREES AND SHRUBS PLANTED (521,489 PLANTED BY COMMUNITY, 280,095 PLANTED BY CONTRACTORS)

9.3 KMS OF WALK/CYCLEWAYS CONSTRUCTED IN A NETWORK OF 6 TRACKS

75 EDUCATION PROVIDERS ENGAGED

1694.2 CUBIC METRES OF BAMBOO REMOVED

9 AWARDS WON

OVER **35** BUSINESSES ENGAGED

HECTARES OF LAND PURCHASED AND CONVERTED INTO STORMWATER RESERVES **37.3**

81 HOUSE AND LAND PURCHASES

4 COMMUNITY ORGANISATIONS FUNDED

OVER 98 ART PROJECTS COMPLETED (OVER 7000 PARTICIPANTS) INCLUDING:

COMMUNITY GARDENS BUILT

3 THEATRE/DRAMA PRODUCTIONS

1 PĀ HARAKEKE (FLAX WEAVING GARDEN)

3 AUDIO CDs

1 RONGOĀ GARDEN (MAORI MEDICINAL GARDEN)

4 BOOKS PUBLISHED

1 SONG QUEST

9 MOVIES

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