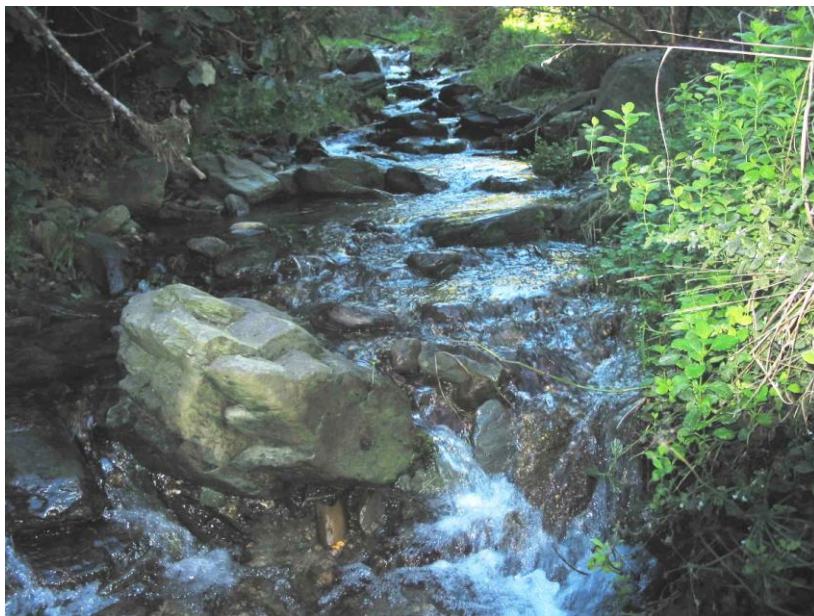


Stoke Streams Rescue

Final Project Report

Jenkins Creek, Poorman Valley Stream, Orphanage Stream &
Saxton Creek



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1. Introduction

This report summarises the deliverables of the Stoke Streams Rescue project, which commenced in July 2011 and will come to a close in September 2013. Originally proposed to reach completion in June 2013, the final deadline has been extended due to severe flooding in April 2013, which impacted severely on two of the four streams within the Stoke area.

The purpose of the project was to trial a community engagement process and to improve water quality of the four Stoke streams that have previously been monitored by the Nelson City Council as part of its State of Environment (SOE) monitoring programme. All streams were very degraded (E) in 2010.

The Stoke Streams Rescue project is a partnership between Nelson City Council (NCC), Waimaori Streamcare and the Cawthron Institute Trust Board and is supported with funding from the Ministry for the Environment (MFE).

The purpose of this report is to summarise activities that have been the basis of this programme, discuss the outcomes, what has been successful, areas that can be improved on and to provide recommendations.

2. Project objectives

The major objectives of the project are to:

- Improve water quality in four Stoke streams
- Improve riparian habitat in four Stoke streams
- Create behaviour change to support improved water quality and riparian habitat in four Stoke streams
- Trial an environmental community engagement project

A number of deliverables were agreed between NCC and MFE and these are explained in detail below in [Section 4 – Deliverables](#).

Project objectives are discussed further in [Section 5.0](#)

3. Recommendations

The summary of recommendations from the catchment reports which outlines actions that can be taken to improve water quality can be found in 4.3.1.1 on page 6. These include encouraging fencing and riparian planting in the rural environs, increased education – including signage, use of stormwater controls, and actions to improve fish habitat and ability for fish to migrate.

Other recommendations include:

Town planning – historically town planning has allowed for dwellings and outbuildings to be constructed close to streams without fully accounting for the dynamics of waterways and what may occur during or after a storm event. As a consequence, a number of properties are either subject to flooding or concerns are

raised as stream channels shift and erode during storm events, leaving buildings and property at risk of being undermined. The outcome of this invariably involves 'remedial actions' to either return the channel to its position prior to the storm event or hard engineering to reinforce the eroded stream banks. Both these methods are destructive to wildlife and habitat with the latter, in particular, being very difficult to restore to a satisfactory ecological standard.

Recommendation

Future planning should better account for stream flooding and channel movement by ensuring wider esplanade reserves and ensuring building setbacks of at least 20m.

Stormwater management and stream ecology

Issues around channel capacity are ongoing and preliminary discussions with engineers have reflected concerns about how streams are able to cope during flood events. There is a need to widen and deepen channels along with ongoing measures to remove gravel build-up within the stream beds. Engineering staff understand about fresh water ecology and the importance of riparian plantings, however in an urban catchment protecting infrastructure and property tends to take priority over wildlife and water quality.

Due to the likelihood of future river control work, there is a hiatus on riparian planting in esplanade reserves along some of the streams until there is a better understanding of where future work may be required.

Recommendation

Planning for future river/stream control to allow for good riparian management to be incorporated and to ensure that all needs are met.

Industrial Consent Monitoring

Council's environmental inspections contractors expressed that they would be undertaking actions to work with industrial operators in the lower reaches of the Stoke streams in Year 2 of the project. As a consequence the project manager was requested not to contact industry to avoid confusion. An officer was assigned to work in this area but due to changes in staff and other priorities, this has not occurred.

Recommendation

Working with industrial operators to educate, assess and where necessary enforce consent conditions needs to take a higher priority than it currently does and this work needs to be undertaken as soon as possible.

Life of Project

It is important to the success of the project to maintain a level of community liaison and education and the project needs to be kept alive in some way. While it is recommended that some work continues with the wider Stoke community so as not to lose momentum, it is suggested that one stream in particular is now highlighted and attention is focussed on this.

Poorman Valley Stream has been identified as a stream that should be used as a flagship for the Nelson area. There are several reasons for this including it has a number of schools alongside, there is very little rural activity in the upper catchment, sensitive native fish have been found in the stream, and there is an

active trapping group in the upper catchment. Of the Stoke streams, it has the most potential to achieve the best water quality improvements in the shortest space of time.

Recommendation

Building on the Stoke Streams project future effort is focused on Poorman Valley Stream as a flagship urban stream for improving water quality and to encourage community ownership and responsibility.

Resources (staff and financial)

As water quality of streams throughout NZ is becoming more of an issue, local authorities and other organisations with a responsibility for or interest in improving water quality need to ensure there are sufficient staff and monetary resources on hand to implement change. Nelson City Council has grants available to rural land owners to help with fencing and planting riparian margins. There is currently one 0.6FTE employee working with the community and private land owners across all aspects of biodiversity.

Recommendation

More staff hours should be allocated to addressing water quality issues in the Nelson area. This would ensure that water quality remains in the public eye in the Stoke area and the pilot programme is extended to other urban catchments.

Signage/fish symbols on drains

Highlighted in both the catchment reports and the residents survey is the suggestion of signage to identify the issues and to offer solutions.

A start was made with painting fish symbols alongside drains and it would be ideal to continue to work with the community to carry on with this. It is a cheap and simple way to raise awareness that drains are only for rain and is a good way to work with local community groups.

Recommendation

Investigate whether interpretation panels could be used to highlight the values of streams. Continue on with painting fish motifs alongside drains.

4. Deliverables

Milestones for both years were similar and are summarised below. They are set out in the order of the Milestones for year one, as detailed in the Project Plan.

4.1 Survey and plant

4.1.1 Stoke Streams Survey

The purpose of the initial survey was for gathering information from a random group of residents to obtain baseline information about what they knew about their local streams and whether they had an interest in or were concerned about water quality of these streams. There were 266 responses from members of the Stoke community. The responses indicated that there was genuine concern for the state of the local waterways and that most people would take actions to improve water quality if they could.

The second survey, to ascertain whether people are more aware of the issues now than at the commencement of the project and whether residents are taking actions to help improve water quality, has been deferred due to the impacts of

recent flooding in the area. While it is hoped there will be some change in knowledge and attitudes, the fact that there have been two major weather related events during the course of the project is likely to have a negative impact on what some people think about their streams.

Comparison of Start and Finish Survey Results

Full survey results can be found in Appendices I & II

The main purpose of the before and after surveys was to gain an insight into whether the programme had helped to raise an awareness of water quality issues in the Stoke area and whether residents have made any changes to their actions in order to help improve water quality.

Nine questions were used in both surveys plus one that was quite similar. This has allowed for clear comparisons to be made between the two surveys. Other questions relate to the flooding in April 2013, and others ask for responses such as 'what are the actions that you would, or have, changed?'

Repeat Questions (figures in brackets use the recent survey first)

Q3. Do you know the name of the stream nearest to where you live?

3.6% more respondents (57.4%) knew the answer to this compared to the first survey (53.8%)

Q4. What do you value about your local stream?

Overall these responses remained fairly similar with aesthetics and wildlife habitat scoring the highest and stormwater management considered important by around 50% of respondents.

Q7. Do you know anything about the water quality of your local stream?

There was a downward trend of 2.5% (5%-7.5%) to 'Yes quite a lot', a slight upward movement of 4% to 'yes a little bit' (29.2%-25.2%) with 'not much' and 'nothing at all' within 1% change

Q8. If yes to the above, how you found out about this?

There was an increase of 40.7% (54.3%-13.6%) to 'Nelson City Council/Stoke Streams' and an increase of 24% (38.3%-15.5%) to 'newspaper'. Also a 33% increase (39.5%- 6.4%) for 'local school' and an increase of 9.9% (23.5% - 13.6%) for 'word of mouth'.

The first three of these were all elements of the Stoke Streams project. A number of articles appeared in the Nelson Mail, Live Nelson and the Leader throughout the project and schools within the Stoke area were targeted through the Waimaori Schools programme. Word of mouth could also be taken in part to be attributable to the project.

Q9. Do you think it matters whether the water in our streams is clean or polluted?

Responses to Yes, very much (84.9% - 89.1%) and Yes, a little bit (12.6%-9.4%) remained relatively similar.

Q10. Do think the contaminants listed might be present in your stream?

This was worded slightly differently between the two surveys but overall there is around 15% greater awareness that pollutants such as paint, oil, and detergents are likely to be present in waterways. There is an approximate 5% greater awareness to animal faeces, plastics and litter, and heavy metals.

Q11. Do you think the water quality in the Stoke streams has any impact on the Waimea Inlet?

There is a decrease by 9.8% (65.3%-75.1%) to 'yes', although a 5.3% decrease to 'no' (2%-7.3%). 'Don't know' increased by 8.2% (20.1%-11.9%) but there was also an increase for 'a little bit' (11.1%-5.7%).

Q12. Do you think that native fish live in your stream?

'Yes' remained similar in both surveys (51.3%-51.5%) and no (10.8%-15.3%) and don't know (37.9%-33.2%) cancelled each other out.

Q13. Where do you think that the water that flows down the roadside drains ends up?

Not a huge change to these responses. Sewerage/wastewater (27.4%-28.1%), piped directly into the sea without treatment (38.1%-39.8%), piped directly to the sea with treatment (5.9% - 8.1%), the nearest stream without any treatment (23.4%-25.8%).

The following questions were not included in the first survey

Q1. Did you respond to the previous Stoke Streams survey?

22.7% of respondents also completed the first survey

Q2. Were you impacted by the recent flood events?

31.2% of respondents were impacted by the recent flooding events.

Q5. If yes to Q2, has this changed how you think about your local stream?

25.9% answered that the flooding had changed the way they think about their local stream with 21.2% unsure. 52.9% claimed that the flooding did not impact on what they think about their local stream.

Q6. If yes to the above - tell us in what way.

Responses to this varied and included being much more aware of how streams cope in flooding situations, to the importance of improving drainage.

Q14. Are you aware that some of your actions may be contributing to poor water quality of your stream?

49.7% responded that they are aware of this and 17.8% didn't know. 32.5% answered no to this question.

Q15. Have you or would you change your actions to help improve water quality of your streams?

43.4% answered yes to this with 31.8% saying they intend to. 24.7% said no.

This is in contrast to the question in the first survey 'If you were aware that some of your actions may be contributing to poor water quality of your stream would you avoid doing these things?' 93.9% responded 'yes always', or 'yes most of the time'. There appears to be a backwards trend here with 24.7% (in the latest

survey) claiming they would not change their actions to improve water quality. This could be a result from the flooding.

Q16. If yes to the above – what are the actions that you would, or have changed?

101 of 129 responses indicated that actions would or are being taken eg washing cars on the lawn, ensuring contaminants do not enter stormwater drains.

Q17. Suggestions or comments about how we can improve water quality in our local streams

A total of 75 responses were received. Education was most dominant and included use of signage. Other comments were for more planting, stormwater improvements (to counteract impacts of flooding), address littering by having more bins present and ensuring livestock are fenced off from streams.

4.1.1.1 Commentary:

While the overall responses to awareness have not improved hugely, it seems that for those that do have an awareness, the Stoke Streams project and associated methods of engagement have been successful.

In contrast to the marginal improvements of knowledge and understanding depicted in the two surveys, responses to Q16 would allow for quite a different interpretation. Almost 101 respondents stated that positive actions are, or will, be taken eg washing cars on the lawn, ensuring contaminants do not enter stormwater drains etc. This indicates that around half the people surveyed are quite aware of the issues and therefore must be getting a message from somewhere. It may be that the connection with the Stoke Streams Rescue project itself is not being made but that through the various and repeated efforts to raise awareness through the course of this project that some sort of understanding of the issues is being achieved.

4.1.2 Riparian Planting

405 native plants were planted by Stoke School children along Orphanage Stream during the first year and a further 500 by the local community in the second year. In addition, Nayland College planted 400 predominantly native grasses along the riparian margin of Poorman Valley Stream beside the school, and Nelson Boys College have 'adopted' a section of Orphanage Stream, which they have been planting and utilising for learning activities based around water quality and riparian management.

Nelson College are also using the Stoke Stream Rescue Catchment Management Plans as source material to undertake a comparison of Orphanage and Brook streams. The field component of the work is facilitated by the Council Monitoring Officer. The student reports will be marked and contribute to their end of year grades.

Monitoring shows an approximate 80% success rate for planting. A number of plants, particularly in the lower margin were affected by the December 2011 flood event and further losses were received by the more recent event in April 2013. The latter was considered a one in 500 year event.



Figure 1: *Students from Stoke School planting alongside Orphanage Stream.*

4.1.3 Whitebait Habitat Report

This was completed by Tiakina and the Department of Conservation (DOC) in Year One and gives a comprehensive overview of the extent of native fish in our streams, spawning requirements and recommendations to improve habitat. In addition to this, we have gained extensive data from the fish recovery programme which was part of the December 2011 storm remediation work and has shown that traditional methods of surveying for fish species is only giving an indication of presence and abundance. A giant kokopu was found in Orphanage Stream (previously, there has only ever been one recording in Poorman Valley Stream) and a short jawed kokopu was found in Poorman Valley Stream. There have been no previous records of this species in Nelson's waterways. The unknown is the impact that the recovery may have on survival after the fish have been relocated. It would appear that invertebrates are recovering relatively quickly, although it would be expected that until populations have fully recovered that there may be a shortage of food for fish species.

The whitebait spawning workshop hosted by Tasman District Council (TDC) in April 2012 identified the locations of spawning sites in the four Stoke streams and this was followed up in 2013 by NCC staff who noted fewer eggs at the time of the site visits. There has been some loss of this very important and limited habitat in Saxton Creek and Orphanage Stream due to stream bank erosion caused by the April floods.

NCC's monitoring officer also ran a workshop in 2012 for contractors to explain the importance of whitebait habitat, in particular spawning habitat, the importance of understanding instream values when operating machinery, correct riparian vegetation and maintaining vegetation at spawning sites.

The four catchment improvement reports prepared by The Lawless Edge identified a number of fish barriers in the four streams and NCC and NELMAC staff have been taking actions to remedy these as much as possible. The catchment reports also identified areas where vegetation is present - providing fish habitat, and also recommended areas where planting could be undertaken.



Figure 2: *Inanga* spawning site at Orphanage Stream. One of the outcomes of the workshop with contractors was to identify *inanga* spawning habitat with wooden pegs painted with fish symbols to reduce the likelihood of it being sprayed or mowed by contractors.

4.2 Inform and monitor

4.2.1 Flyers

These milestones saw the preparation of a flyer which was distributed to 7,200 households in January 2012. The flyers were designed to advise urban dwellers of water quality issues in the Stoke Streams and to recommend a number of simple actions that could be undertaken by residents to ensure less contaminants were entering the stormwater system, and therefore, helping to improve water quality.

In Year 2, the front and rear cover of the flyer along with the introduction on page two were changed and the revised flyer was delivered to all residents in the Stoke area in February 2013.

Feedback for both versions of the flyer has been very good. This is potentially the most effective measure to raise awareness and encourage positive actions.



Figure 3: Original flyer produced in Year 1 of the project

4.2.2 Library Display

Set up in the Stoke Library for 6 weeks in November and December 2012 and again for three weeks in May 2013, this has highlighted some of the work that Waimaori has completed with schools and local groups and also projects that Nayland College and Nayland Primary School have been involved with. It has also provided some general information about the project with flyers and stickers available from the stands.

The display has served as a reminder to local residents that the project was underway and that the local schools are active in educating and raising awareness of water quality issues.



Figure 4: Three of the four display boards at Stoke Library.

4.2.3 Monitoring

Additional monitoring commenced in November 2011 in conjunction with the SOE monitoring. An extra 12 sites were set up and sampled. With Cawthron Institute coming on board as a project partner in 2011, funding was provided for an extra two rounds of monitoring over and above the two that were scheduled as part of the original agreement. This has allowed a total of four rounds of additional monitoring to be implemented over the two year programme. Two of the rounds included invertebrate sampling.

The additional monitoring has produced valuable information to help pinpoint which parts of the catchments that pollutants are entering the streams. This will help with future management of the streams and allow further investigation and targeting of areas where stream contamination appears to be occurring. Additional monitoring is discussed in more detail in [Section 5.1 - Improve Water Quality in Four Stoke Streams](#)

4.3 Report and Speak

4.3.1 Catchment Reports

All four catchment reports have been completed. These have targeted each of the four streams and given a clear overview of the issues faced within each catchment. Each report has collated and summarised existing data about the streams as well as reported on current issues, identified specific land use and potential problems associated with this and gives recommendations for actions that can be taken to help improve water quality.

4.3.1.1 Summary of Recommendations from Catchment Reports

- Encouraging riparian planting and fencing to restrict stock access to both permanent and ephemeral streams.
- Encouraging riparian planting to reduce erosion and to provide shade to both permanent and ephemeral creeks.
- Enhanced riparian planting in urban and lifestyle areas to provide better shading and native species connections from the estuary to the hills.
- Education to increase rural, urban and industrial residents' and occupiers' understanding of stormwater and how their activities can affect water quality.
- Investigating cross connections between the stormwater and sewerage systems in the urban area.
- Signs along the lower end of the streams advising of risks from trampling and mowing during whitebait spawning.
- Improved stormwater control using swales, detention ponds, wider channels, filtration, and street cleaning; noting that there are limited options for enhancing existing stormwater systems of drains and outfalls in urban areas, but many options for new developments.
- Investigating options for Council policy to reduce development levies where low impact design of stormwater is used and rates rebates for properties that convert to on-site stormwater detention.

- Working with existing landowners to improve stormwater discharge quality and quantity.
- Sampling of first flush stormwater runoff entering streams.
- Signs advising the public not to dump rubbish in reserves in the Marsden Valley.
- Removal of the fish passage barriers or making them fish friendly; noting that these same barriers may impede the stormwater flow at peak times exacerbating erosion.
- Consideration to additional sampling of sediments for zinc and PAH.
- Review of the new culvert structure upstream from Main Rd Stoke (Saxton Creek).

4.3.2 Public Speaking and Forums

Over the two year programme a number of presentations were given to community groups to explain water quality issues in the Stoke Streams and what can be done about them. This was also an opportunity to gain feedback from members of the community about what was important to them and suggestions about how community, council and other organisations can work together towards achieving improved water quality.

Most of the presentations were delivered by the Project Manager together with the Cawthron Environmental Educator (Jo Thompson) and others were delivered by the Project Manager and Waimaori representative (Mel McColgen). The latter tended to be in conjunction with the Waimaori programme or to the Stream Care group.

Four presentations were given in Year 1 to the Nelson Biodiversity Forum, Probus Stoke/Tahunanui Ladies, National Council of Women Nelson Branch and Probus Stoke/Tahunanui Men (and spouses). Approximately 185 people attended these. In Year 2 presentations were given to Stoke Seniors, Rutherford Rotary Club, Nelson Soroptomists and the Stream Care group – approximately 85 people in total.

The public speaking has provided a valuable contribution to the project by connecting directly with members of the community. Although the total number of people reached is small in terms of the population of Stoke, it can be expected that a many of the attendees will share the message with family members, friends and neighbours.

The formation of Stream Care groups has not been particularly successful due to low interest from the community. Activities for those who have shown an interest have included litter clean up and painting fish motifs alongside drains. The latter seems to appeal to other community groups as well, with the Stoke Scouts being issued with painting kits. Future opportunities lie with groups such as Lions and Rotary who have expressed an interest in fish painting. This would be an effective way to keep the project going for the Stoke community into the future.

4.4 Waimaori and Publicity

4.4.1 Waimaori

A total of eleven community workshops were run by Waimaori over the course of the project. These included activities such as attending community events and informative sessions delivered to community groups. Most of these included streamside workshops. In addition, the screening of the Water Whisperers documentary and meetings to bring together Stream Care groups were co-hosted by Mel McColgan who delivers the Waimaori programme.

Alongside the community workshops, the Waimaori programme has targeted local schools to reinforce the message of water quality issues in the Stoke area. Working with schools to educate children is a major part of the Waimaori programme but over the course of the Stoke Streams Project attention was directed to schools in the Stoke area.

Two reports have been submitted by Waimaori, one for each year. These detail the activities carried out by Waimaori and have been submitted to MFE along with milestone reports.

Working in partnership with Waimaori has been extremely important to the project as it has brought an iwi world view to the community and reflects the importance of freshwater to maori. The strong connections between land-use, freshwater and the marine environment were also a major feature of the message conveyed as part of Waimaori's input.



Figure 5: Electric fishing in Orphanage Stream as part of Waimaori workshop January 2012.

4.4.2 Publicity

Throughout the project a number of articles based on the project have been published in the Nelson Mail, Live Nelson (Council publication that goes to every household in Nelson) and the Nelson Weekly. There was an editorial written for the Nelson Mail based around the Stoke streams initiative. In addition, the project has been mentioned in Live Nelson in association with storm recovery work and its details are included in the River and Stream Health scorecards which are produced annually by Council to explain the outcome of monitoring results to the Nelson community along with actions and activities undertaken by Council towards improving freshwater quality.

In January 2012, a promotional article was published in Live Nelson for the Waimaori/Family Fun day along with advertising in the Nelson Mail. The Council's residents survey (including an overview of the project) was featured on the opening page of NCC's website and there is a permanent webpage on the NCC website.

The Stoke stream flyer is displayed and available in the NCC customer service centre and a poster was prepared that has been used at community events and is on display at House 44.

Publicity has been very important for the project as it keeps awareness of the programme and associated issues in the public eye.



Figure 6: Photo run in the Nelson Mail as part of the Waimaori/Family fun day held at Orphanage Stream January 2012.

4.4.3 Contact with Industrial Operators

Unfortunately this has not occurred due to issues with the Environmental Inspections (EIL) arm of the Council wishing to undertake this themselves.

Contact and a site visit occurred in Year 2 with Fulton Hogan and phone contact was made with Alliance Concrete but the site visit did not occur due to staffing issues that the company was experiencing at the time. Some contact also occurred with Heslops Engineering with regard to a small planting along Saxton Creek.

The direction given from EIL and Council consents staff was that this is an issue that needs to be addressed, but they would implement their own programme (although there was discussion about preparing a flyer similar to that delivered to residents to explain the issues and offer solutions prior to a more regulatory approach being taken). Due to staffing issues within EIL, this process has not yet commenced.

4.5 Progress check – project management

A midway report was submitted at the end of Year 1 and the final report will be completed in September after the results of the second survey have come through.

A total of 564 hours were spent by the project manager in Year 1 and Year 2 is currently tracking at around 460 hours with a further 40 estimated for the second survey and final report. The Project Manager's hours were reimbursed at a rate of 50% NCC salary and 50% through MFE.

GIS services for the Catchment Reports totalled 125 hours, partially reimbursed by MFE.

Council staff have also contributed towards publicity, working with schools, monitoring and administration for the residents survey.

5. Meeting the project objectives

Four project objectives were outlined in the Project Plan, actions implemented, achievements, comments and recommendations relating to these are detailed below.

5.1 Improve water quality in four Stoke streams

KPI's - Evidence of increased numbers of whitebait in one creek.

Freshwater grade from E (very degraded) to D (degraded) improved within five years by June 2016

The fish translocation as part of the December 2011 storm remediation has given a very clear indication of the number and diversity of fish species present in the Stoke streams – especially Orphanage and Poorman Valley Stream. Of particular note was the discovery of a giant kokopu in Orphanage Stream and a short jawed kokopu in Poorman Valley Stream. Although water quality in all Stokes streams was showing as E at the commencement of the project, it would seem that native fish are more tolerant of water quality than was first expected. In saying that, the diversity and numbers of fish found in Jenkins Creek and Saxton Creek are considerably less. On a positive note, inanga spawning sites and reasonable numbers of adult and juvenile fish have been found in the lower reaches of these

streams indicating the potential to improve biodiversity and enhance our urban waterways by following up actions outlined in the catchment management plans.



Figure 7: The community gets stuck in to help with fish recovery

Stoke Stream River Ecology Monitoring

A total of four rounds of additional monitoring were implemented over the two years of the project. This was carried out in conjunction with the SOE monitoring that Council already undertakes. Site visits were made in November 2011 & 2012 and May 2012 & 2013.

A number of water quality parameters were measured at selected sites along each stream for the purpose of identifying key land use and water quality issues within the catchments that may be contributing to the poor water quality of these streams. This information will be used in conjunction with the first flush monitoring and management plans to target community engagement and actions towards improving water quality, and provide a benchmark for measuring future water quality trends.

Overall, there was a very slight improvement in water quality results for some of the additional sites over the course of the extra monitoring, but more importantly the SOE sites have shown a small improvement over the two years that the project has been underway. Water quality parameters are reported using the NCC river ecology classification A to E (Excellent to Very Degraded)¹.

¹ Cawthron (2007). Updated Freshwater Classification for Nelson. Report No. 1349.



Figure 8: Stoke area showing monitoring sites. SOE sites blue, additional monitoring sites green.

5.1.1 Saxton Creek

SOE site gradings 2010 – E, 2011 – D, 2012 - D

Overall, an upgrade from E to D for the duration of the project.

Recent sampling for the upper catchment (below the farm dam) was compromised by a succession of wet periods and flooding events; with the November 2012 round being the most representative of 'typical' flow conditions. High sedimentation rates were evident here and this was magnified by the May 2013 results where recent

flooding had resulted in vast amounts of sediment accumulating in the farm dam which was slowly releasing into the tributary.

High E.coli and suspended solid levels were evident at Site 44 (right branch) which is indicative of the dairying operations carried out in the vicinity. This is opposed to Site 43 which has a semi-rural land-use. E.coli levels remained relatively high at the lower site with very high nitrate readings occurring here. This may be attributable to the dams and reservoirs upstream, which attract waterfowl.

This catchment was badly impacted by the April 2013 floods.

Recommendations – Implementation of riparian fencing and planting along stream margins – particularly on the dairy platform (work was proposed to commence this winter, however, flooding has meant that this is now on hold). Investigate impacts that high concentrations of waterfowl may be having on water quality. Continue to work with the community towards achieving best practice.

5.1.2 Orphanage Stream

SOE site gradings 2010 – E, 2011 –D, 2012 -D

Overall, an upgrade from E to D for the duration of the project.

Site 49 in the upper catchment shows overall good water quality against most parameters, as can be expected from a waterway exiting bush/forest, however the phosphate levels were high. Sites 47 and 48, separate branches at similar distance from the stream mouth, exhibit quite different characteristics and water quality results. Site 48 is partially rural and partially runs through the old hospital site where there is no stock access and in many places good riparian cover. Where stock do have access to the stream from the neighbouring property, numbers are relatively low. Water quality at this site is moderate to very good. In contrast Site 47 is degraded with higher E coli and suspended solid loadings and lower invertebrate counts. This branch of the stream has less riparian cover and stock (although relatively low in number) have access throughout.

Site 46 at Suffolk Rd improves a little, although a high suspended solids reading occurred in May 2012, attributable to gravel removal nearby. The site at Saxton Rd (SOE) has had improved E coli readings over the last two years, however nitrate loadings are high and invertebrate counts not particularly good.

This catchment was badly impacted by the April 2013 floods with a number of property owners flooded out of their homes and businesses affected.

Recommendations – Time will be required to allow recovery from the April floods but in the future continue to work with the community to encourage good practice. Work with the landowners of the left branch to encourage fencing and planting.

5.1.3 Poorman Valley Stream

SOE site gradings 2010 –E, 2011 –D, 2012 – E

On paper no improvement, however the 2012 grading of E was more than likely affected by the gravel removal occurring in the vicinity of the sampling site and impacting negatively on the invertebrate count.

Overall water quality parameters were Very Good in the upper catchment but declined to Degraded at the coast. Phosphate levels were high at the upper site - possibly an impact from the nearby quarry. E. coli bacteria and nitrates were elevated (Degraded) in the lower catchment, whilst nitrates and phosphates were present (Moderate) at other sites but not at significant trigger levels. Macroinvertebrate communities reflected excellent water quality in the predominantly 'rural-exotic forest' upper catchment, but declined (Degraded) at the coast.

Recommendations – continue to work with the community towards improving water quality in this stream. Poorman Valley Stream has the most potential of Nelson's urban waterways to be used as a flagship site for what can be achieved through community and organisations working together towards best practice. It has four schools in close proximity, little grazing in the upper catchment, an active trapping group working in the native and exotic forest headwaters and the most diverse and highest number of fish species (as identified through the fish relocation aspect of storm recovery work). There are some issues, in particular with bacteria loadings, as identified in the first flush monitoring section of this report.

5.1.4 Jenkins Creek

SOE site gradings 2010 – E, 2011 – E, 2012 – E

This is the only stream to show no improvement over the course of the project at the SOE site which is located within the industrial zone.

At the upper site (land use rural), one high bacteria reading was obtained, however high nitrate concentrations were evident. Invertebrate counts were excellent.

Downstream at Site 53, high E. coli bacteria concentrations were evident on two occasions which would indicate the presence of livestock (land use is rural and lifestyle). This was also reflected in the first flush monitoring (see below).

E. coli levels remained high at Site 52 and NCC06 on both occasions noted above. Site 52 captures predominantly urban land use - elevated suspended solids and high nitrate levels were evident at this site. At one sampling, the water appeared quite 'milky'. The lower site at Pascoe St had high nitrate and ammonia loadings and very poor invertebrate counts. Land use in this reach is urban and industrial.

Recommendations – Work with landowners in the upper catchment to encourage fencing to exclude livestock and planting for shading, habitat, erosion control etc. Investigate the mid-reach as to why and where contamination is occurring. EIL to work with industry to improve practice to reduce contaminants entering waterways. This needs to be by way of education and regulatory enforcement if necessary.

5.2 Improve riparian habitat in four Stoke streams

KPI's – 1,000 additional native plants, 1-2 community planting days over two years.

As outlined in 4.1.3, riparian planting was implemented in both years of the project but it is expected that it will take several years for this to have an impact on habitat for wildlife. A total of over 1,500 eco-sourced native plants, appropriate for the locations and eco-systems were planted by the community over the duration of the project with an estimated 80% success rate.

Severe weather events have had some impact on riparian margins, both on the success of some of the plantings but also erosion has occurred along the banks of all of the streams (perhaps older established plantings may have prevented some of this from occurring).

The local schools in particular are leading the way with community plantings and this encourages pupils to adopt sections of the stream that they have been involved with. The Waimaori programme and other initiatives taken throughout the project have helped to foster this behaviour.

The next step is to encourage landowners, particularly in the upper catchments, to fence and plant riparian margins on their land. Council assistance is available for this by way of fencing subsidies and provision of plants. While discussion with landowners has been positive, weather events are impacting on attitudes, in some cases making it quite difficult to ensure 'buy-in' of the concept.



Figure 9: Community planting day at the mouth of Orphanage Stream.

5.3 Create behaviour change to support improved water quality and riparian habitat in four Stoke streams

This has been one of the more difficult aspects of the project, particularly as the results of positive behaviour change will not be evident for some time ie improvements to water quality. The survey has indicated around half the respondents will, or are, taking actions to improve water quality. The goal for the future is to get that number to 90% which is in line with the number of people who responded that they think water quality is important.

Increased riparian habitat is easier to gauge and the two community plantings and school planting can be readily measured by distance of planted streambank and successful plant establishment and growth.

The project has prompted council staff to work towards improving spawning habitat and fish passage, and contacts were made with two property owners of large tracts of land in the upper catchments who are interested in implementing riparian fencing and planting. Council will continue to work with these and other land owners to ensure progress is made with this.

5.4 Trial an environmental community engagement project

This project has been a new approach for Nelson City Council, and while some aspects of community engagement have been utilised in the past, never has such a co-ordinated and wide reaching approach taken place.

The survey has returned some interesting results, notably that in spite of a varied and comprehensive campaign that the message is still not getting through to as many people as we would have hoped. This highlights two areas:

1. That the campaign itself and associated messages need to be ongoing, and;
2. That other approaches should be explored to engage with the community and to help get the desired behavioural change from local residents and businesses.

It can be assumed that people take on board only what they want to, however it can be noted that although a number of people who responded to the second survey claimed that they did not know much about their local waterways – at least half were still taking actions such as washing the car on the lawn, not tipping chemicals down drains etc, showing they still have some awareness around the issues and must be getting the message from somewhere.

6 Cawthron Trust

In September 2011, the Cawthron Institute Trust Board offered to contribute \$10,000 of 'in kind' services to the project (\$5,000 per year for two years).

After meeting with Cawthron staff, it was agreed that the best use of Cawthron services would be by way of support from Cawthron's Education Officer to provide assistance with community engagement and also laboratory analysis which would allow further monitoring to occur. The additional monitoring enabled two extra rounds of testing in conjunction with the SOE monitoring, and a total of four first flush samples to be analysed for sediment and E. coli bacteria. This has helped inform the project of the extent that these contaminants are entering streams during the early stages of rain

events. The additional monitoring has provided more data to the project which has assisted with understanding land use issues and pinpointing contamination sources within urban streams.

The Cawthron Education Officer brought an extra dynamic to the presentations, providing more interest and expertise. In addition, she has co-ordinated some of the fish on drains activities.

6.1 First Flush Stream Monitoring

Surface run off from rainfall events produce fluxes of diffuse pollutants (notably fine sediment, phosphates and microbial contaminants) that lead to contaminated plumes in downstream waters and coastal areas. Routine monitoring does not capture these hydrological events and thus extent of land use impacts.

First flush sampling was undertaken to assess the timing and extent of diffuse pollutants (fine sediment and E. coli) from surface run off in Orphanage Stream at Suffolk Rd and Saxton Field on 26 April 2012 (Figures 10 & 11), Poorman Valley Stream at 2.4km and Seaview Rd on 5 June 2012 (Figures 12 & 13) and 17 March 2013 (Figure 14 & 15) and Jenkins Creek at Newman Drive and Pascoe St on 17 March 2013 (Figure 14 & 15).

Peak flows for Orphanage and Poorman Valley Streams in 2012 were 560l/s and 450l/s respectively and for the Poorman and Jenkins sampling in 2013, peak flow was 90l/s. Note the significantly lower flow rate during the March 2013 sampling for Poorman Valley Stream and Jenkins Creek, however, this was the first rainfall after an extended dry period. The duration of rainfall for the first sampling for Orphanage Creek occurred over a very short time frame, whereby, the two later rounds occurred over two or three days and samples were collected over the extended time frame.

NB Figure 14 depicting E. coli results from March 2013 is in logarithmic format to depict the high E. coli readings. Flow is indicated in l/s for figures 14 & 15 and cumecs in the other graphs.

6.1.1 Orphanage Stream - April 2012.

(Figures 10 & 11) This was an intense rainfall event, the majority of rain falling over a period of around 5 hours.

Concentrations of both Total Suspended Solid (TSS) and E. coli fluctuated between sites, (as to which was higher) and no trends could be observed.

Of interest is that the highest readings for both sediment loading and bacteria were most elevated after peak flow and E. coli concentrations were still elevated (>4,000 cfu/100ml) seven hours after rainfall had ceased.

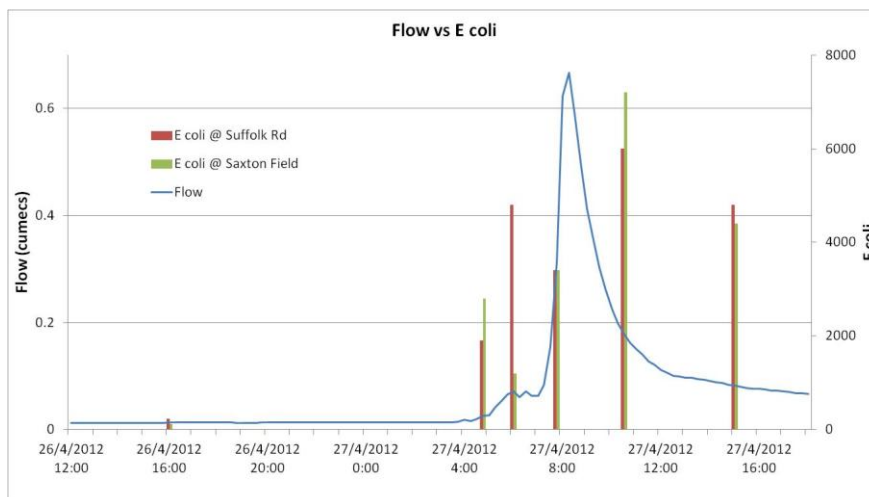


Figure 10. Orphanage Stream: Changes in *E. coli* bacteria (cfu/100ml) concentrations at Suffolk Rd and Saxton Field with respect to discharge resulting from an intense rainfall event.

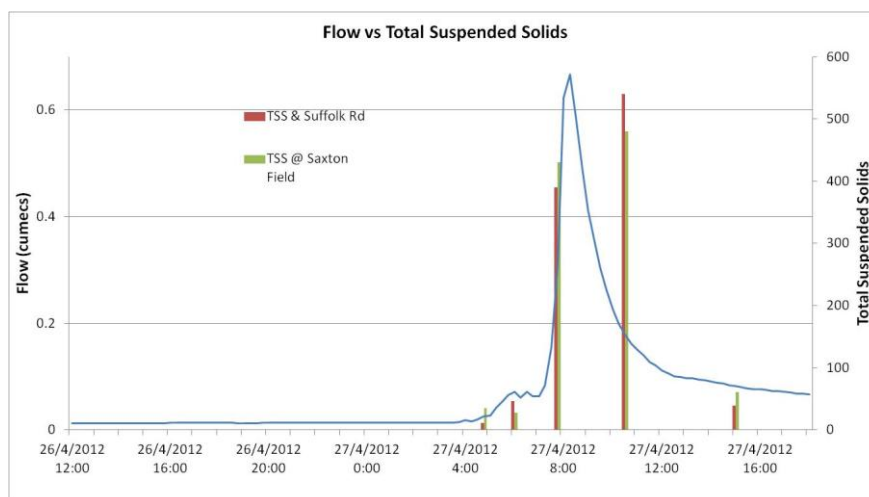


Figure 11: Orphanage Stream: Changes in Total Suspended Solid (g/m^3) concentrations at Suffolk Rd and Saxton Field with respect to discharge resulting from an intense rainfall event.

6.1.2 Poorman Valley Stream– June 2012

E. coli concentration (**Figure 12**) is high in the upper catchment at the first high flow (probably attributable to livestock, although stock grazing occurring in this part of the catchment is very light). There is another relatively high reading in the upper catchment at the second higher flow rate (330l/s) in similar vein to the TSS and a high reading at peak flow, especially in the lower catchment. Readings between the two sites fluctuate (as to which is higher), therefore, no trends are evident.

(Figure 4) shows two spikes in **TSS**, one at the first high flow level of 200l/s and the second almost 20 hours later as flow reached approximately 300l/s. At peak flow (440l/s) TSS had dropped by around 50% of the previous concentration. There is a trend towards an input of sediment between the upper and lower sites. Land use in the mid section of the catchment is largely urban.

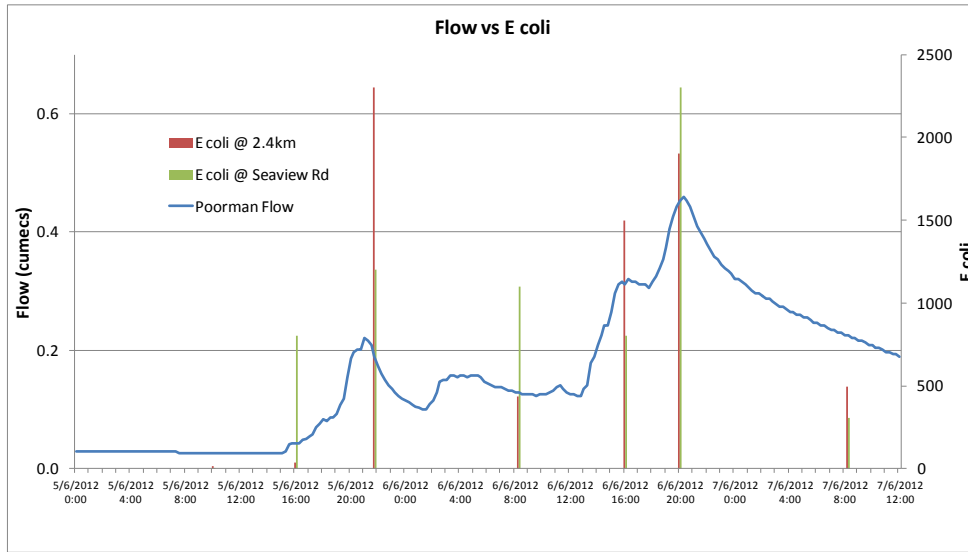


Figure 12. Poorman Valley Stream: Changes in *E. coli* bacteria (cfu/100ml) concentrations at 2.4km and Seaview Rd with respect to discharge resulting from a moderate and prolonged rainfall event.

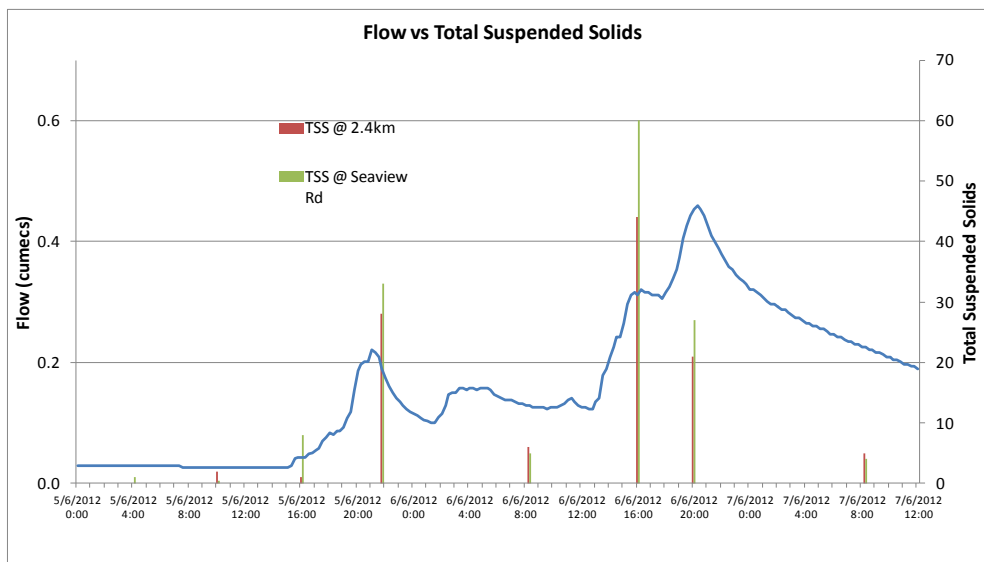


Figure 13: Poorman Valley Stream: Changes in Total Suspended Solid (g/m^3) concentrations at 2.4km and Seaview Rd with respect to discharge resulting from a moderate and prolonged rainfall event.

6.1.3 Poorman Valley Steam March 2013

E. coli (Figure 14) levels at both sites are within acceptable levels prior to rainfall but increase dramatically as rainfall commences, with higher concentrations at the lower site on four occasions. Concentrations at the lower site taken in the upswing of peak flow were of extreme concern (280,000cfu/100ml) and would indicate stormwater infiltration from a nearby sewer. Subsequent readings were also very high at both sites 8,000cfu/100l and 6,000cfu/100ml but concentrations dropped off from there.

These high readings are partly attributable to the long dry period before rainfall. Although this was a low to moderate rain event it appears to have mobilised faecal

matter. In addition, flow remained relatively low, therefore affecting dilution. There is potential that faecal matter may have collected in stormwater pipes during the dry spell, some of the high bacteria count could be attributable to waterfowl, possibly livestock in the upper catchment or potentially a cross connection of waste/stormwater pipes immediately upstream of the lower site. This needs to be investigated further.

TSS (Figure 6) As a relatively low rainfall event, suspended solid concentrations were relatively low, and for four of the readings there was no noticeable increase between upper and lower sites, however, there were two readings during peak flow where there was an increase in TSS at the lower site. This is similar to the June 2012 first flush and again indicates that sediment is entering the stream in the urban part of the catchment.

6.1.4 Jenkins Creek March 2013

E coli (Figure 15) concentrations were high particularly in the upwards swing of peak flow 6,600cfu/100ml and 5,800cfu/100ml and remained high for the next three samples, with a noticeable increase at the downstream site. This mid section of the catchment is largely urban with some industry in the lower reaches and there appears to be at least one source of contamination within this area which needs to be further investigated.

The high concentrations can be partly attributed to low dilution and other factors noted above for Poorman Valley Stream.

TSS (Figure 6) As above for Poorman Valley Stream, being a low rainfall event, it did not trigger a lot of sediment movement, although the sample taken at peak flow at the upper site had markedly elevated TSS concentrations compared to the other samples. This can most likely be attributed to forest harvesting that had recently been completed immediately upstream of the site with just enough rainfall to mobilise soil particles.

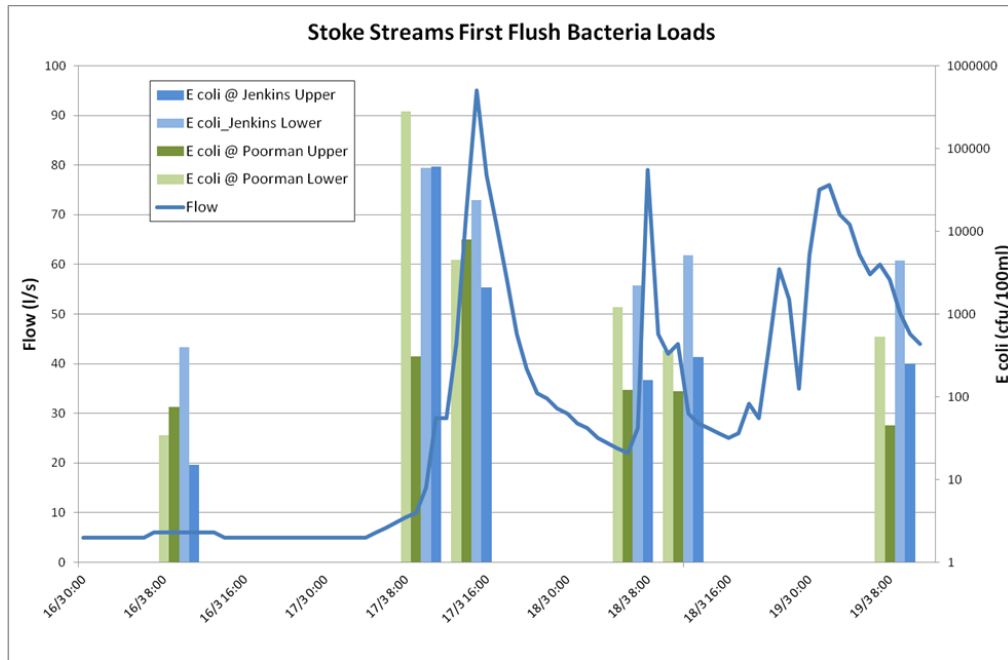


Figure 14: Poorman Valley Creek and Jenkins Creek: Changes in *E. coli* bacteria (cfu/100ml) concentrations at upper and lower sites with respect to discharge resulting from a low to moderate rainfall event.

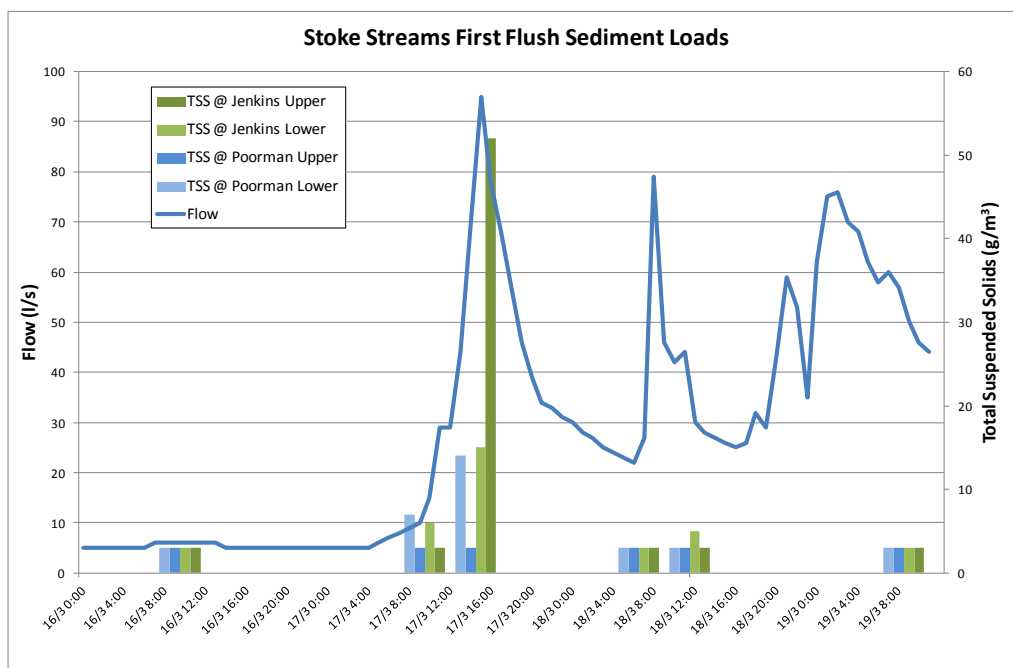


Figure 15: Poorman Valley Creek and Jenkins Creek: Changes in Total Suspended Solid (g/m^3) concentrations at upper and lower sites with respect to discharge resulting from a low to moderate rainfall event.

7 Impacts of Flood Events

The weather was identified in the project plan as a 'potential risk' (although more related to the possibility of delaying the riparian planting) it was later identified as having the potential to impact on riparian plantings through erosion and raised water levels in streams.

What no one could have predicted was the extreme weather events that have been experienced in Nelson over the last 18 months and the impact this would have on the project. While damage to riparian plantings were relatively minor, the remedial work that was required after the December 2011 floods to remove thousands of tonnes of debris and gravel from streambeds was a massive undertaking and has not been experienced in Nelson before (other than routine maintenance). This had an effect on wildlife and stream morphology, although every attempt was made to ensure streams were restored to good condition (creation of meanders, riffles etc) and fish recovery was implemented throughout the entire process. The December 2011 event and the more recent April 2013 flash floods have impacted on attitudes of the residents who were affected by the flooding. The December 2011 event was considered a 1 in 100 year episode and the April 2013 a 1 in 500 year episode.

These weather events will have an ongoing impact and are possibly an indication of what can be expected in the future as changes to weather patterns are predicted as part of the climate change expectations.

These types of events will also have an effect on how Council plans for future subdivision and developments and how stormwater will be managed in the urban environment. Maintaining water quality and stream ecology are an important aspect of urban streams, however, these will more than likely take second place when it comes to ensuring that infrastructure, public assets and private property are protected against the ravages of nature.



Figure 16: Three days after the April 2013 flood – note that the true right branch of Orphanage Stream has not been impacted to the same level as the right branch showing just how localised these events can be.



Figure 17: Orphanage Stream three days after the April Flood

8 Evaluation of Project Benefits

Outlined in the Project Plan and reported back with each milestone, the evaluation of the project benefits are summarised below.

8.1 Environmental

The project has already had a positive environmental impact as shown in the improvement in SOE data in two of the streams, and Poorman Valley Stream also showing an improvement in the first year of the project with results for Year 2 more than likely compromised by gravel extraction at the time of the invertebrate monitoring.

The Catchment Improvement Plans focussing on each of the four catchments have identified areas of concern and given recommendations to remedy these.

The flow on impact of improving water quality in the Stoke streams will be improvements to the receiving waters (the Waimea Inlet). One of the initial drivers of the project was to improve water quality in the Waimea Inlet, as identified in the Waimea Inlet Strategy and Waimea Inlet Charter. For Nelson, one of the main contributors to water quality issues in the Inlet was identified as the streams in the Stoke area.

It is vitally important to the long term success of the project that the 'clean streams' message is maintained well into the future. This will ensure that people

continue to consider their actions and the impacts of what they do (or don't do) on the quality of their local waterways.

8.2 Economic

Volunteer contributions have contributed towards the economic cost of the programme. This has been mainly by way of community planting but also small contributions towards litter pick-up and raising awareness through drain painting activities. The Council's residents' survey was delivered into the wider community by local community groups and as such was a good fund raiser for these organisations. By working with community groups the cost of completing the first survey was less than one third that of employing professional companies to carry out. This method will be used again for the second survey.

The contribution of \$10,000 'in kind' services from the Cawthron Institute Trust Board has also provided positive economic benefits in that it brought another expert in community engagement to the programme and also allowed additional monitoring to occur which has been extremely useful.

The Department of Conservation and Fish and Game have also contributed expertise, particularly with regard to native fish.

As outlined in the Project Plan, long term economic benefit is difficult to measure. Assuming that the successful delivery of all aspects of the project have already had (and will continue to have) the effect of reducing stream contamination, then it should be less costly to maintain this in the future.

8.3 Social

The co-ordinated approach was intended to encourage a broader and shared responsibility and sense of ownership of local streams. However, this does not appear to have been particularly successful. Attendance at events and meetings was low and attempts to bring together stream care groups did not result in good numbers of attendees.

Perhaps the scope was too broad (the entire Stoke area, capturing four catchments) and may have resulted in a watered down ability to reach people. As the future focus is expected to turn to Poorman Valley Stream, an attempt will be made to reinvigorate residents to become more involved with this stream and it is hoped that as improvements to water quality and the number of sensitive (and rare to Nelson) fish species improve that a sense of pride and ownership will emerge from the local community.

8.4 Cultural

The Waimaori partnership has brought a number of benefits throughout the project and has been an integral part of the programme through its connection with iwi, work with schools, and the community workshops that were delivered.

The programme has reinforced the ecological message in a way that is easy to understand and connects across the wider community. In addition, it highlights to

all members of the community, the importance that iwi place on clean and healthy freshwater.

The whitebait habitat report was also a major contributor towards strengthening understanding and knowledge. This provided advice and recommended actions towards improving whitebait habitat. This is an issue that is not only very important to iwi but many throughout the community consider whitebait a special delicacy that is part of their heritage and ensuring their availability into the future needs to be worked upon.

8.5 Other

It was intended that this project provide an example for other councils to copy and adapt and to strengthen NCC resolve to work with other communities in other catchments.

Overall, the approach has been reasonably successful and Council (staff resources allowing) should be replicating a number of aspects elsewhere in Nelson. There was strong feedback from the survey that education is key, but after two years, the project has not reached as many people as was hoped. The most important factor is not ceasing to engage with the community just because the project has drawn to a close. Examples such as the ongoing safe driving and stop smoking campaigns suggest that it will take longer than two years to see real and sustained behaviour change.

The local schools are receptive to learning and addressing the issues and it can be assumed that the children will take this knowledge into their adulthood, however, educating the wider community to make changes 'today' remains the pressing concern and needs to be a priority for Nelson's environmental good.

9 Risk management

A number of risks were identified prior to the project commencing and some have become apparent as the project has commenced. As mentioned in Section 7, the major impediment to the success of the programme has proved to be flooding and the impact this has had not only on riparian margins but more importantly attitudes of residents.

The remediation process of the December 2011 flood was well managed (particularly the fish recovery) and due to good communication and delivery of the works, the impact of this was not considered to be damaging to the overall success of the project.

The April 2013 floods however, affected many more people and businesses and is expected to have a longer and more negative influence over the success of the project.

Another risk that was not identified early on in the project was the deliverable of working with industry operators to improve contamination of stormwater run-off. This will be addressed by Council in the near future but is unlikely to be something that can be reported back as part of the project.

Throughout the project, due to various reasons, some of the deliverables were required to be carried over to the next Milestone. This was always discussed with the MFE Fund Analyst prior to deferment.



Figure 18: Members of the Stoke Scout group investigate life in Jenkins Creek.

10 Feedback from stakeholders.

Much of the feedback throughout the project has been verbal although the final survey will provide feedback from residents.

Written feedback is as follows:

Waimaori

The Stoke Stream project has provided an opportunity for community groups to be informed and involved in monitoring and restoration work for their local streams and creeks. The Waimaori program will continue to be an avenue to educate students and communities to look after our waterways.

Two volunteer groups were created as a result of this project for Orphanage Stream and Poorman Valley Stream. However, these groups will need support and help with resources.

Future resources should include stencil kits for marking stormwater drains.

Tiakina te Taiao and Nelson City Council have an excellent working relationship and we were able to work together on this project to deliver educational workshops to our local communities. This project aligned with the aims of the Waimaori program and complemented our educational sessions with students and teachers. The overall project has raised the profile of our local streams and the issues and challenges that face all communities and councils in freshwater management. Informative and interactive workshops provided a forum for families and communities to learn about their local streams and creeks. We aim to continue this work through the Waimaori program and to source further resources and funding to support the volunteer groups.

Peter Lawless – The Lawless Edge

The Stoke Streams Rescue Project has been a great initiative and one that deserves to be followed through. By taking technical information and putting it in a form that people can understand it gets at the root of the issues that face these streams. In practice the remedies for the gross pollution are simple: stock fencing and planting in the upper catchments and elimination of episodic toxic discharges in the lower industrial and residential sections. This can be readily implemented with a mix of incentives and penalties together with increased public awareness.

The key things that could be improved are to bring all of the contractors together periodically to share information and ideas and to get commitment from Council decision makers to follow through on the recommendations from the work.

I regard the overall project to have provided excellent value for money.

Department of Conservation (1)

- was great to get urban dwellers focussed on their responsibilities to protect and identify with local watercourses-good pick up by some schools and the whitebait spawning stuff in the streams was a good hook and point of interest
- with further resourcing could progress the concept towards long-term establishment of stream care groups -- ie maintain the gains and momentum
- the vulnerability of these urban streams in extreme floods and how that might limit environmental remediation is an interesting one - we need some techniques to maintain channel capacity and be able to create some fish habitat - maybe seek Envirolink medium advice grant for some environmental engineering solutions advice on what could be done - see picture of one idea.

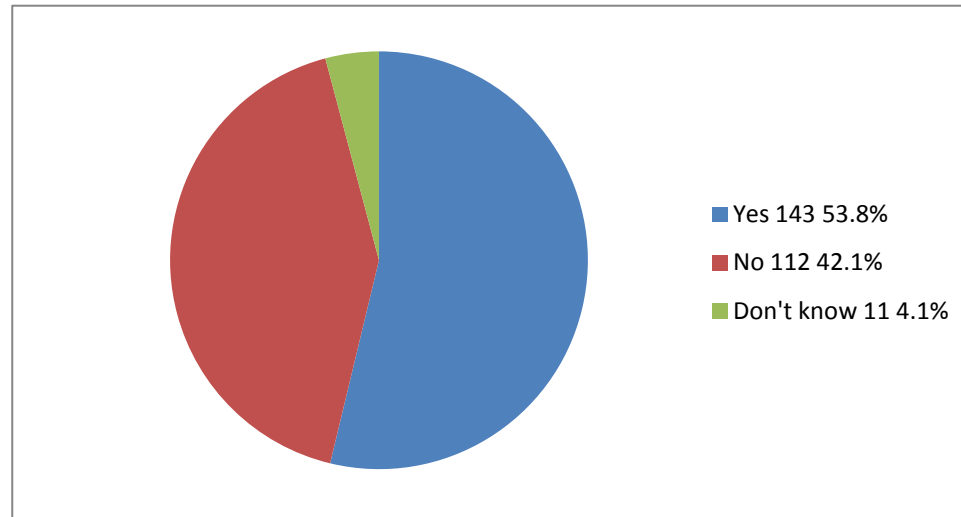
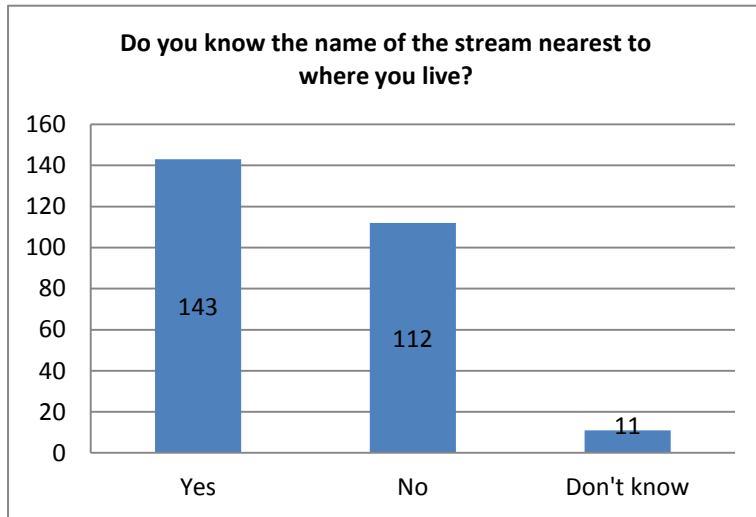
Department of Conservation (2)

- raising awareness of the value of urban streams, and the threats that they face;
- getting local communities (including schools) involved in looking after their streams;
- bringing different agencies together to share expertise with each other and the local community; and
- enhancing aquatic and riparian habitats in the streams concerned.

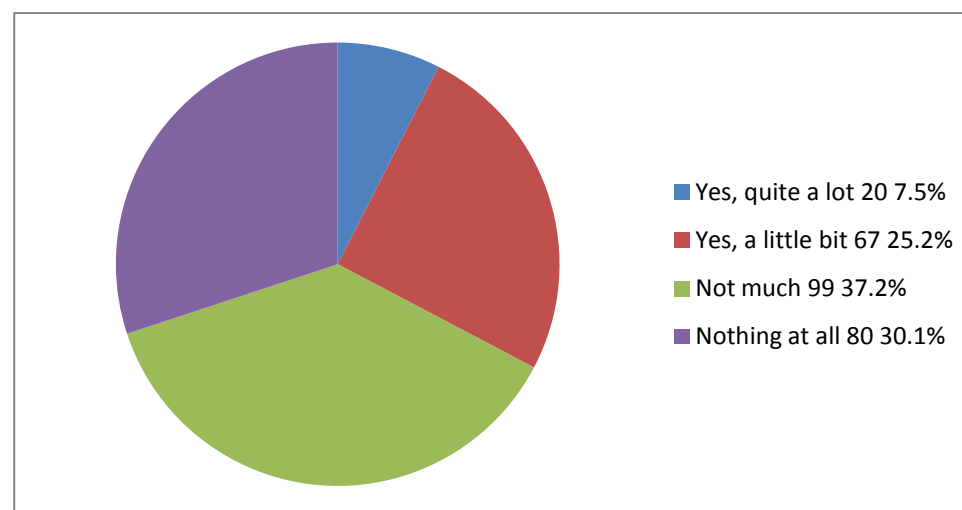
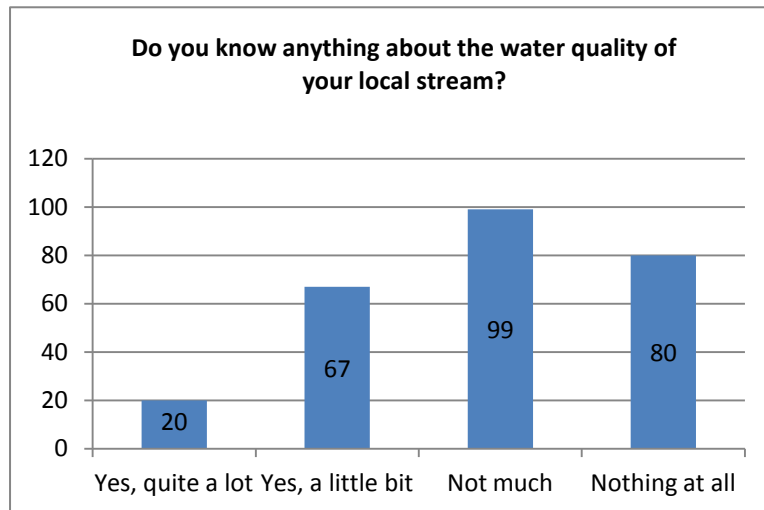
As said above, the challenge now is to maintain this momentum once the initial funding runs out; and making sure that any response to the recent flood event is respectful to the ecological function of these streams.

AP1 Stoke Streams Rescue Baseline Survey Results September 2011

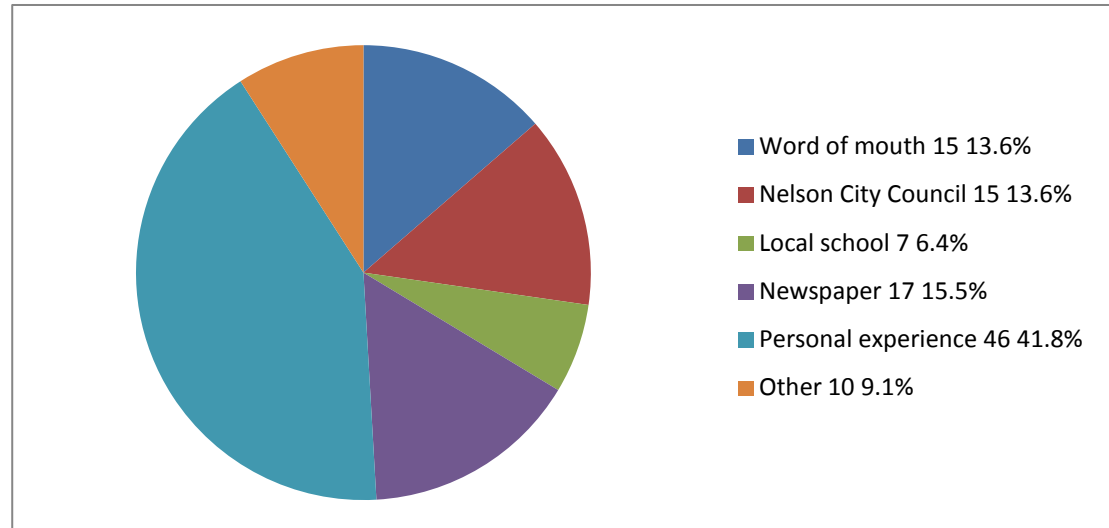
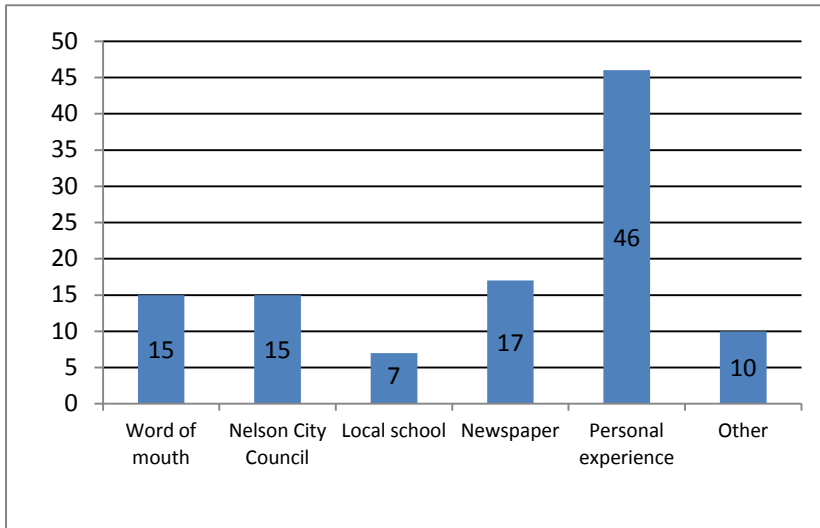
Q1. Do you know the name of the stream nearest to where you live?



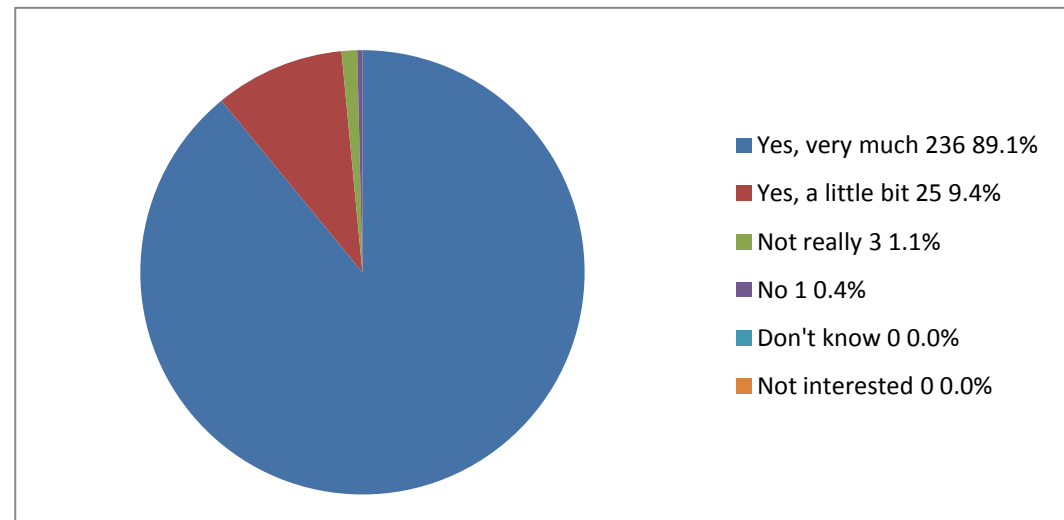
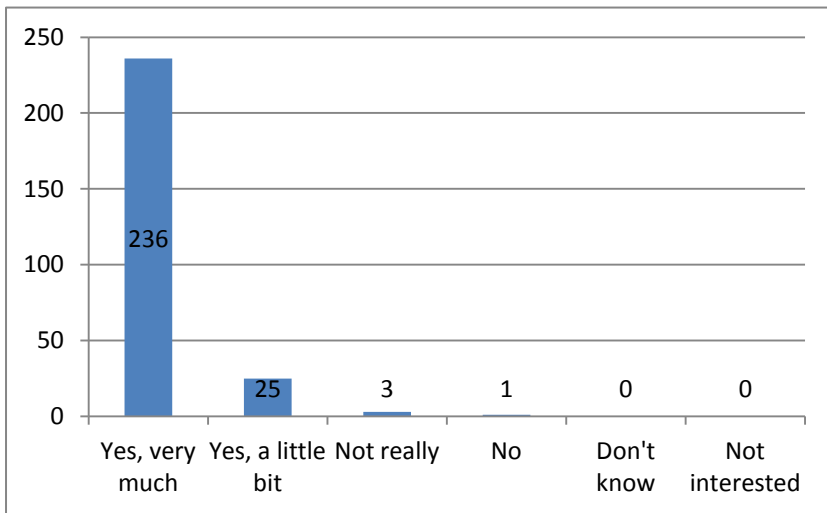
Q2. Do you know anything about the water quality of your local stream?



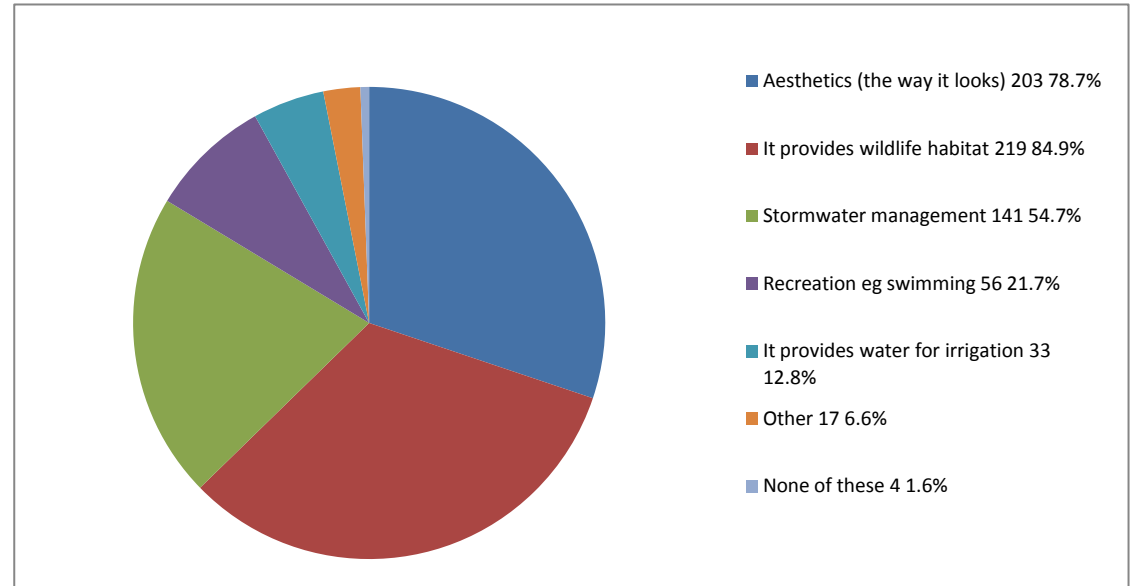
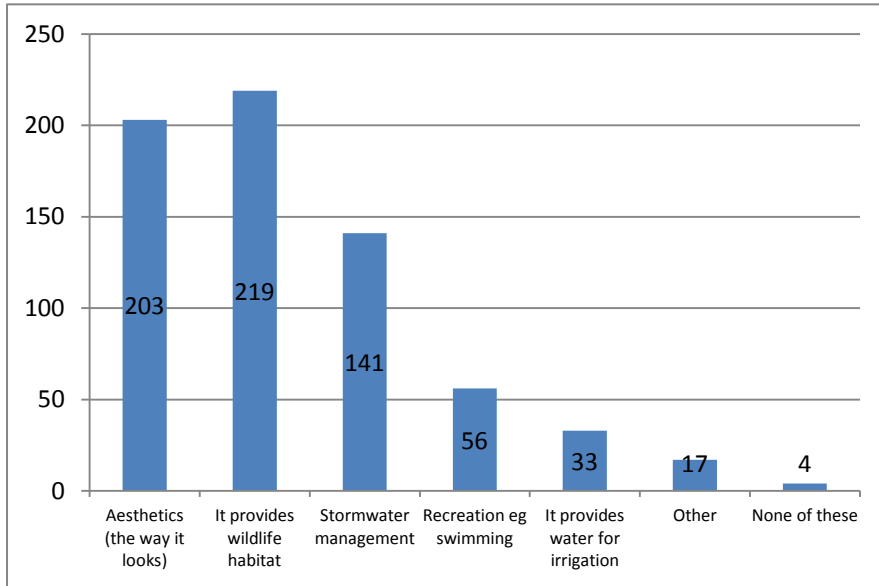
Q3. If you answered 'yes' to the question above, please tell us how you found out about this.



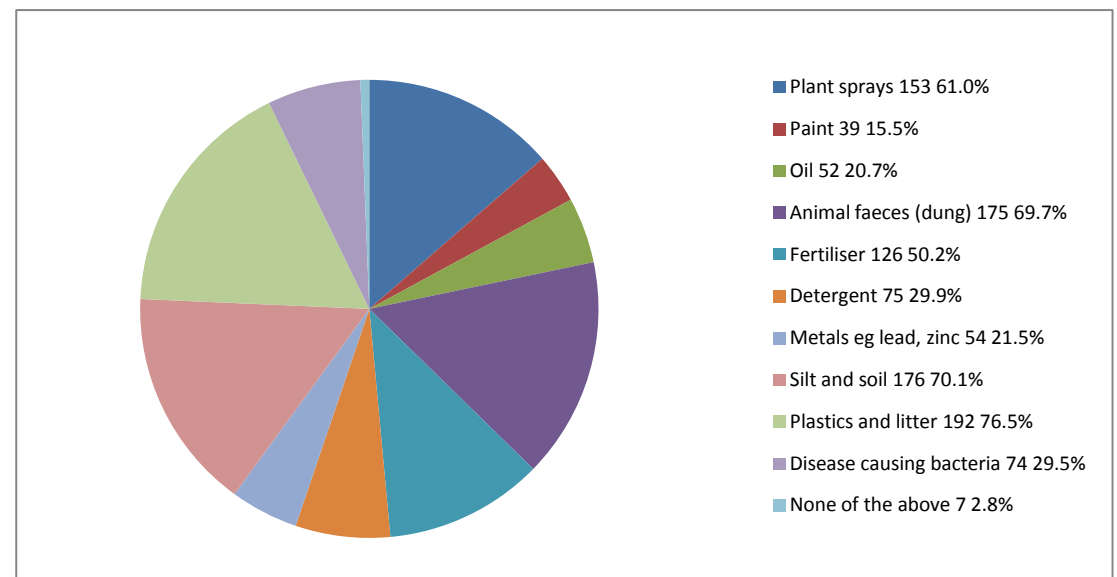
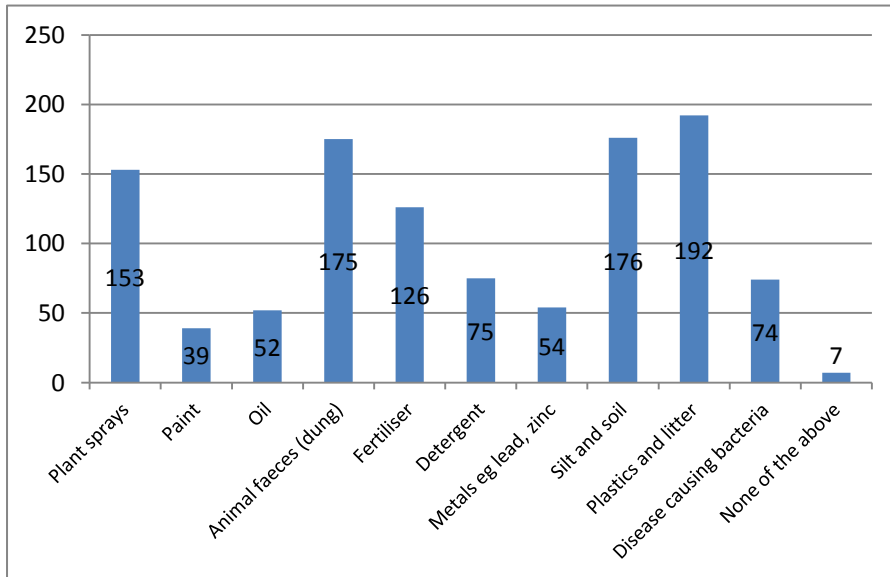
Q4. Do you think that it matters whether the water in our streams is clean or polluted?



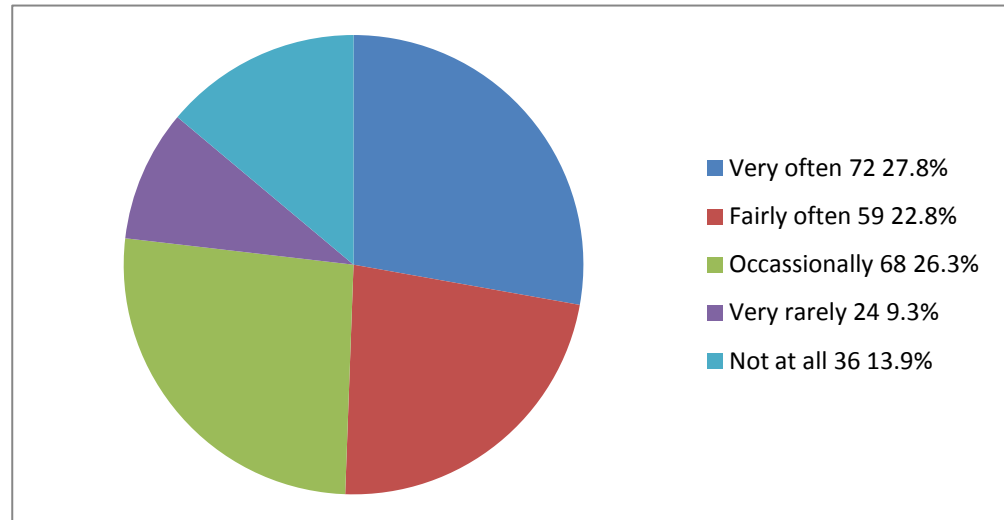
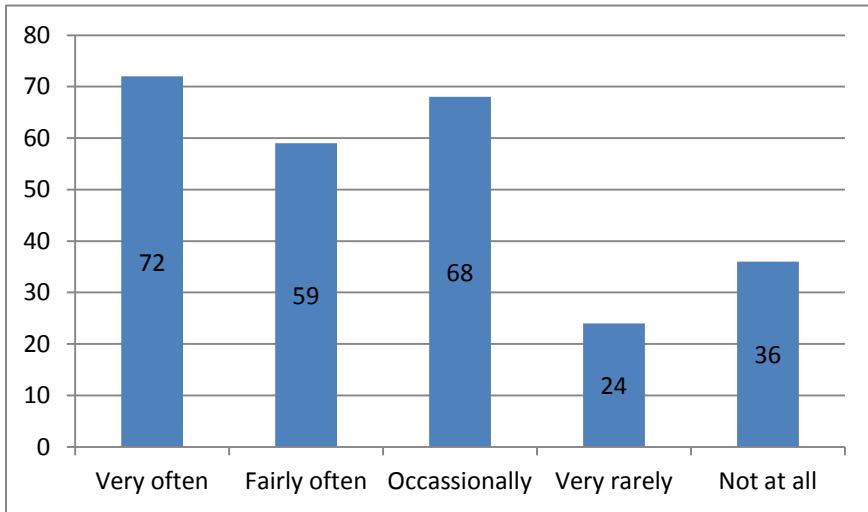
Q5. What do you value about your local stream? Tick an many as you like



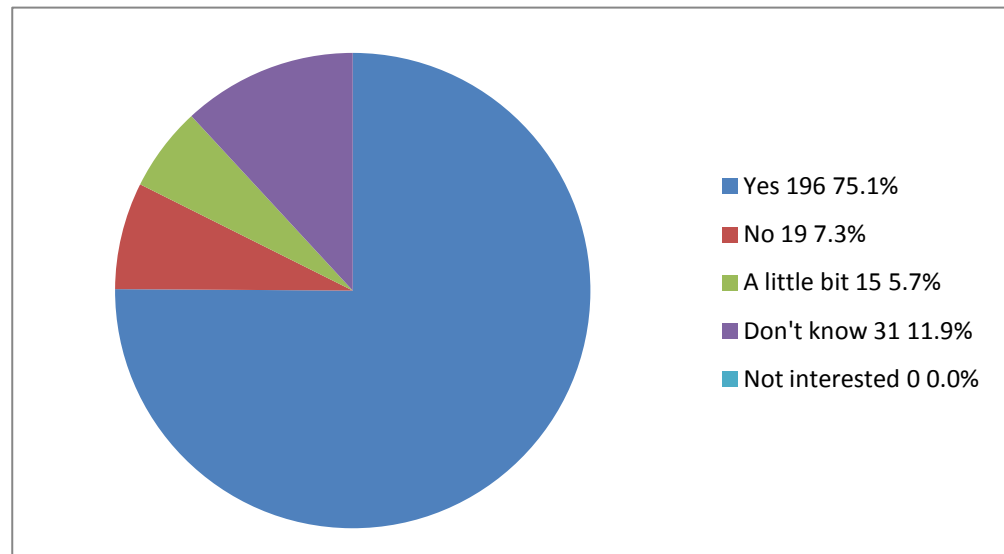
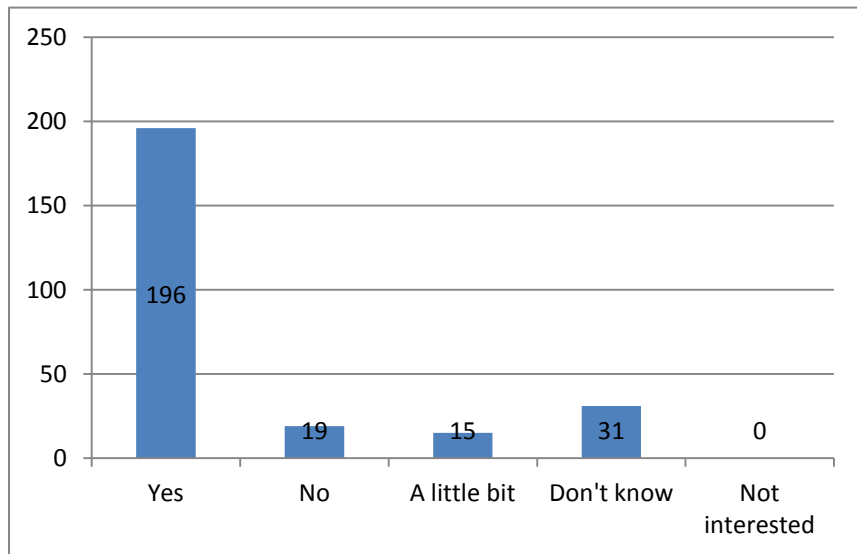
Q6. Do you think any of the contaminants listed below might be present in your stream? Tick a many as you think *Refer to end of survey for numbers ticked



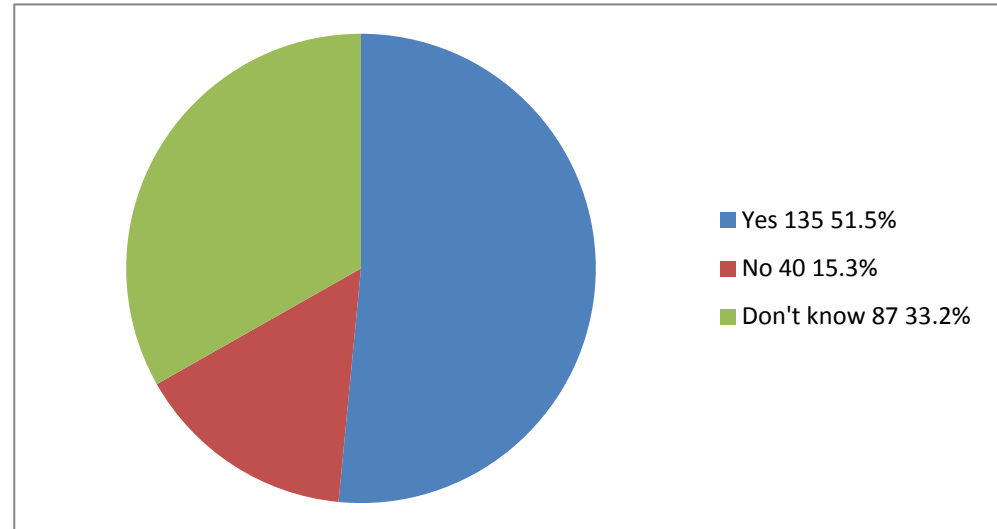
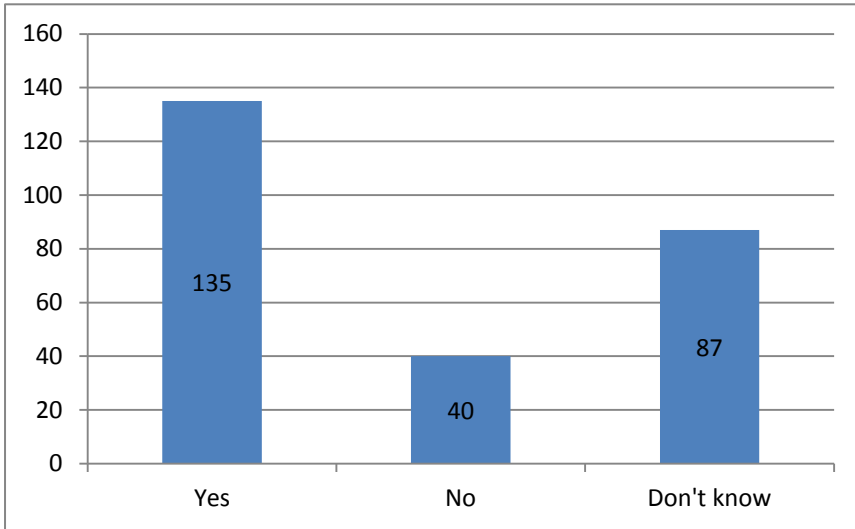
Q7. Do you ever use any of the streams in the Stoke area for recreation, including the walkways alongside any of the streams?



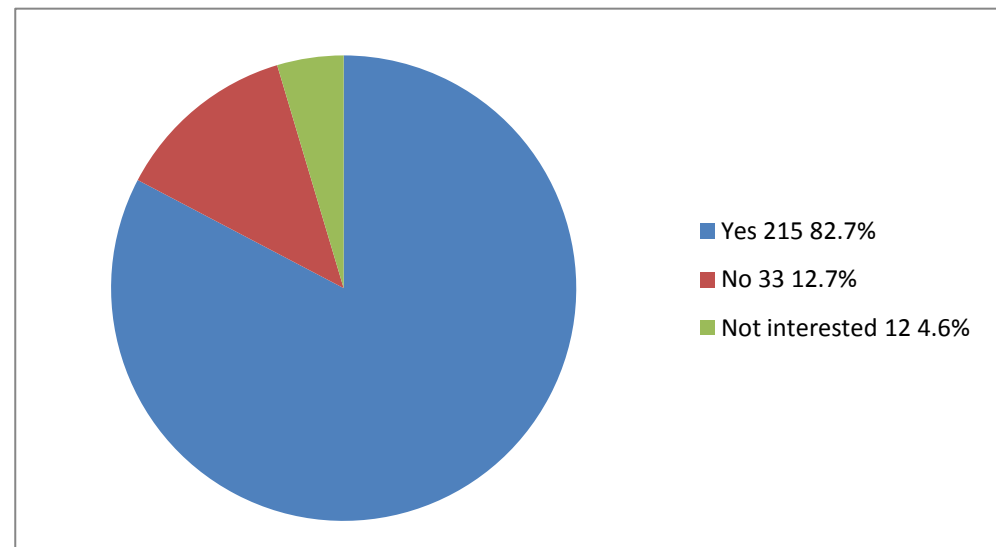
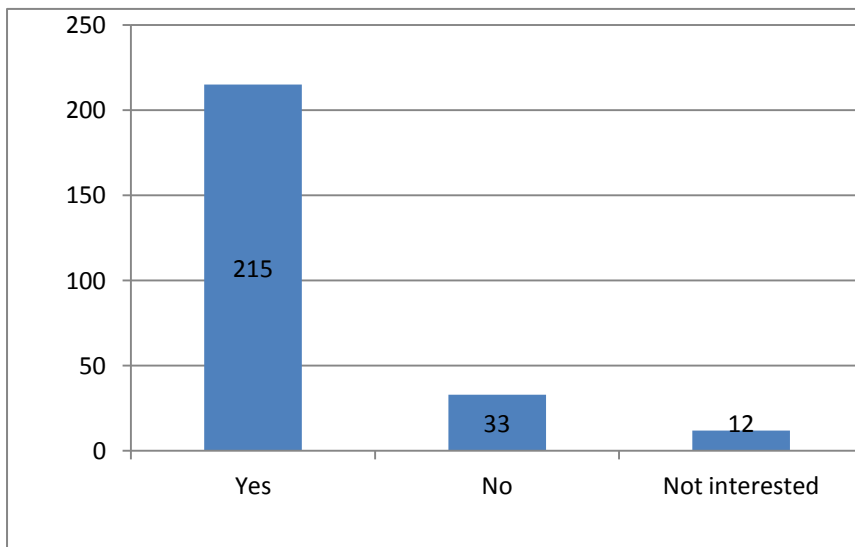
Q8. Do you think that the water quality in the Stoke streams has any impact on the Waimea Inlet?



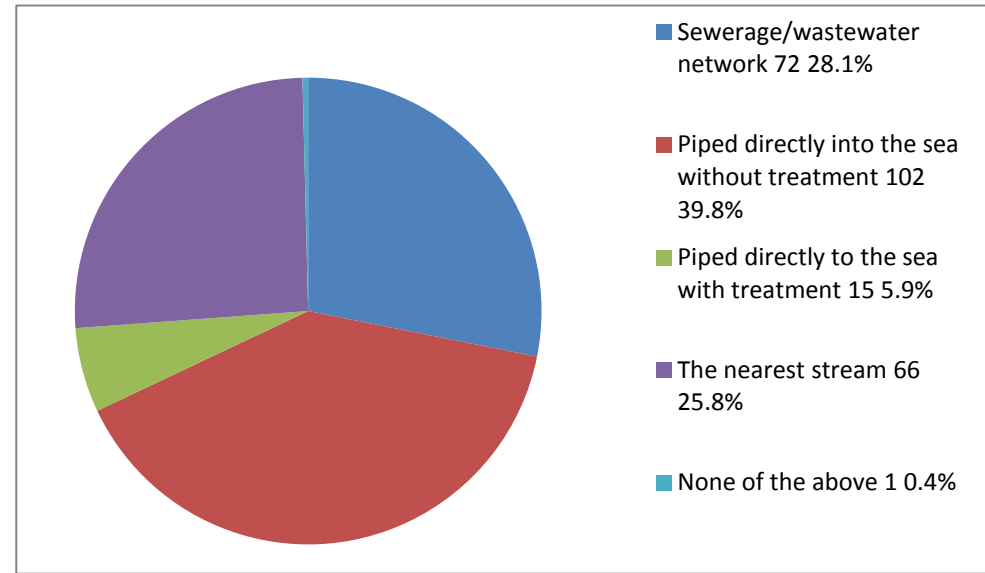
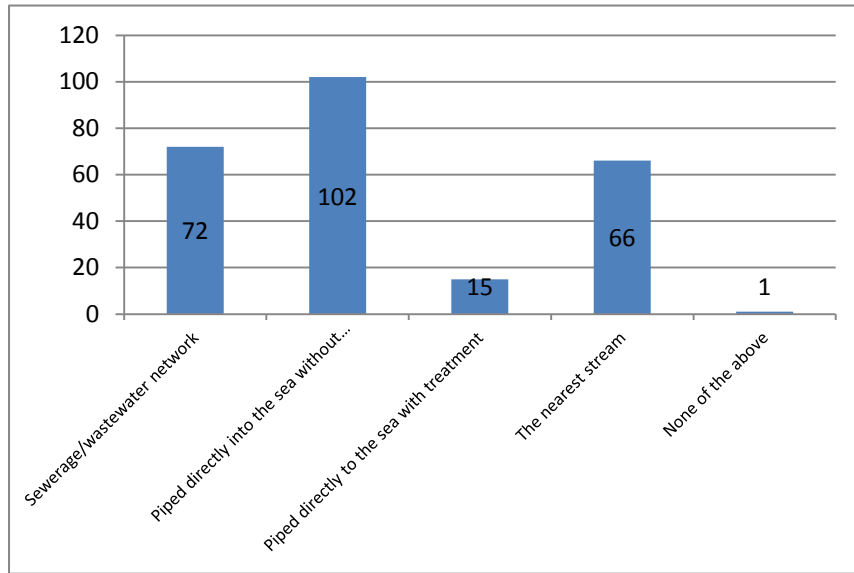
Q9. Do you think that native fish live in your stream?



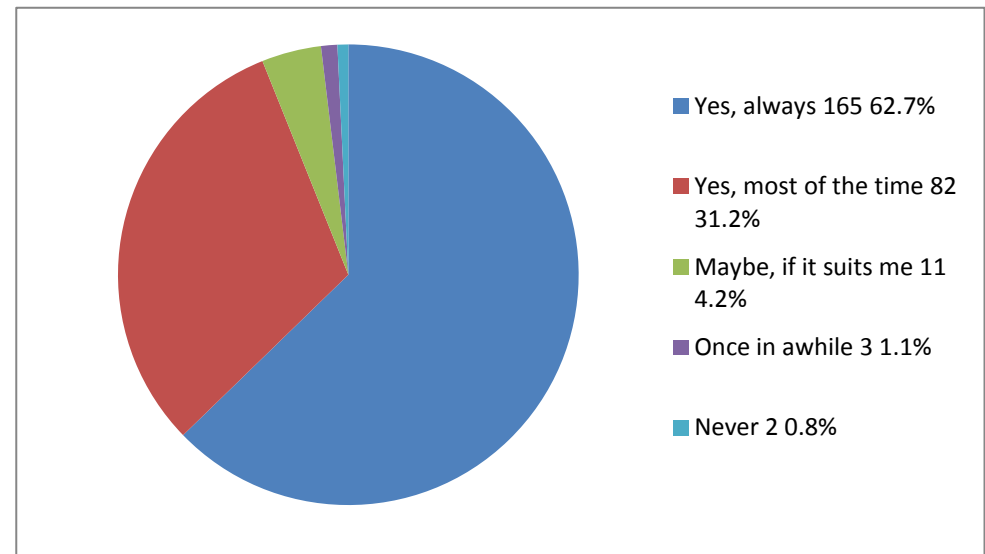
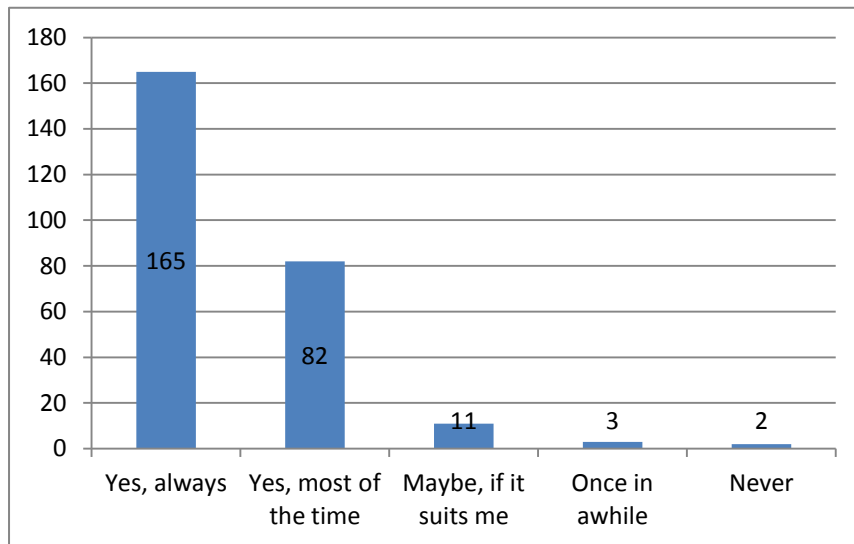
Q10. Do you think that Nelson's streams should be safe for swimming and other recreational uses?



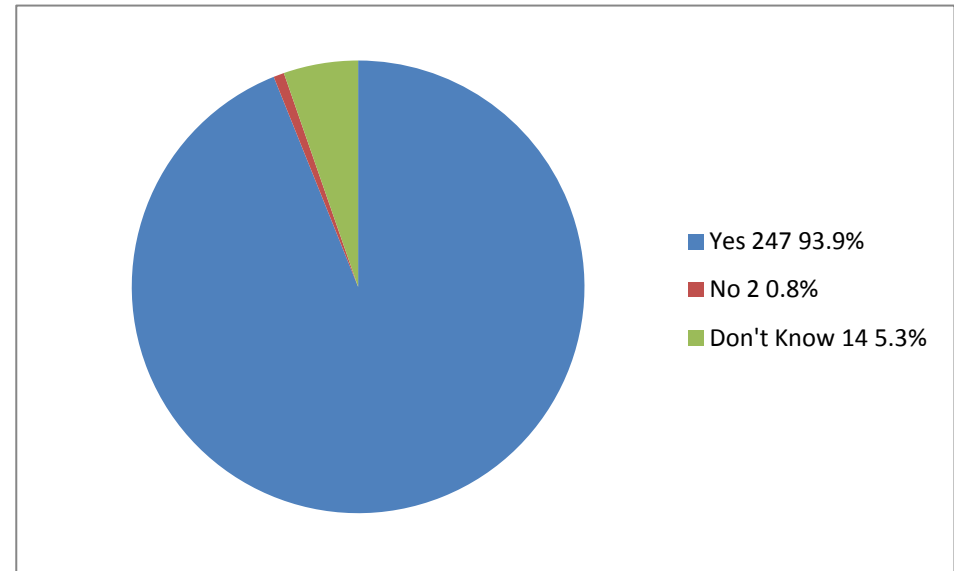
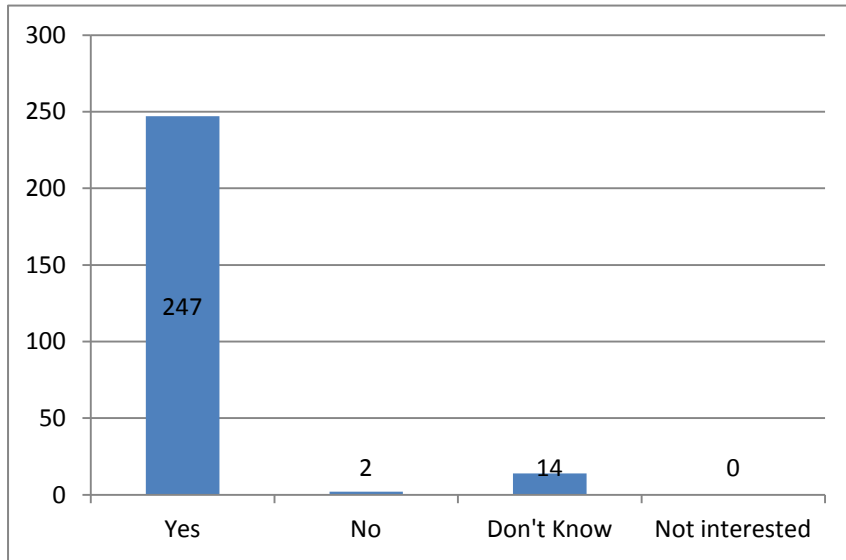
Q11. Where do you think that the water that flows down the roadside drains end up?



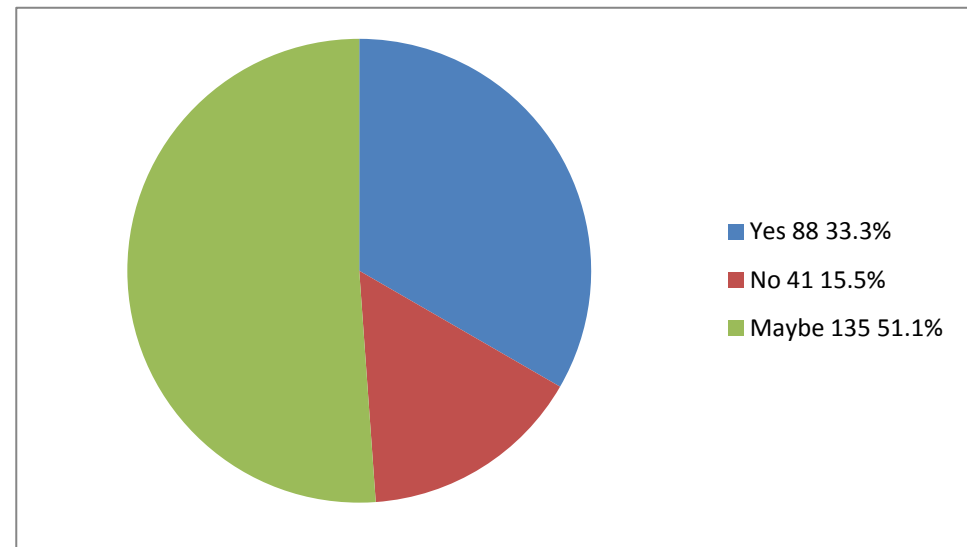
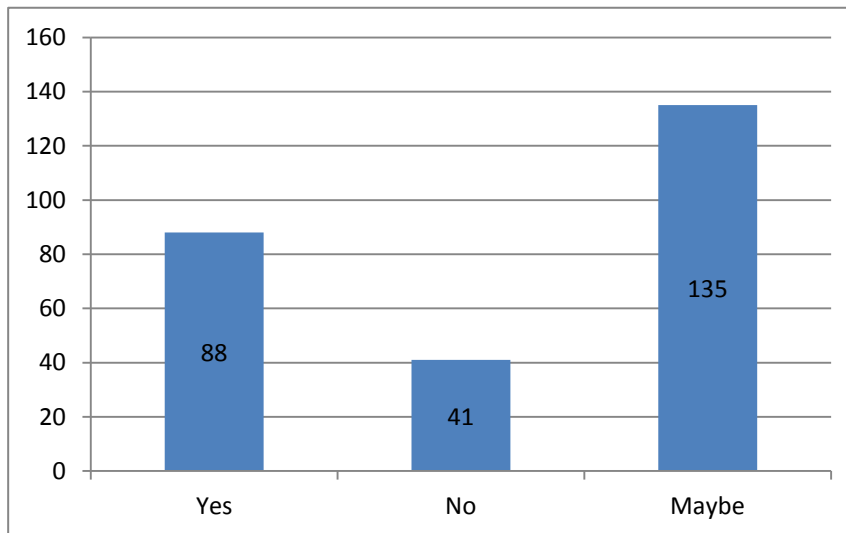
Q12. If you were aware that any of your actions were contributing to poor water quality of your stream, would you avoid doing these things?



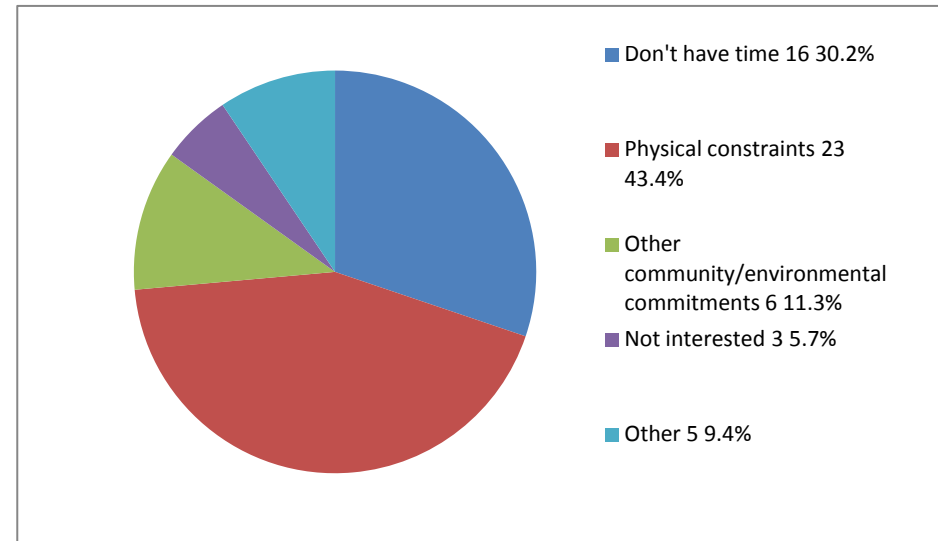
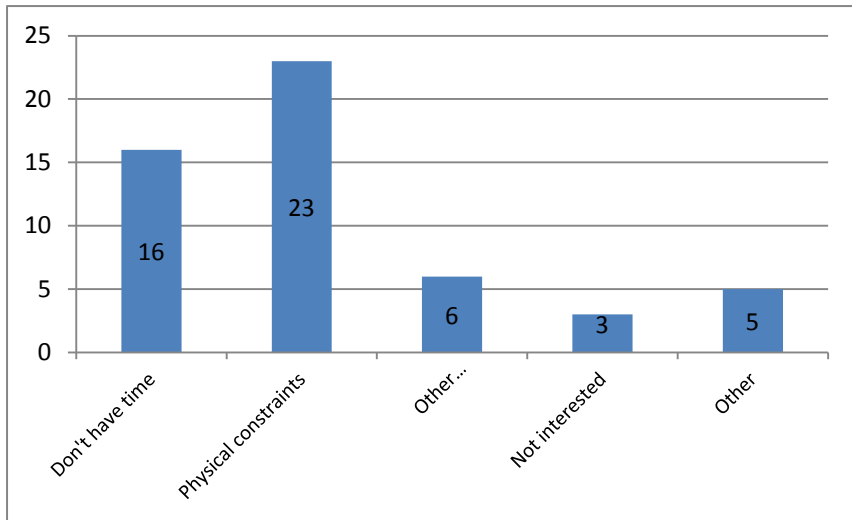
Q13. Do you think that local people, organisations and businesses should work together to help improve and maintain water quality in their streams?



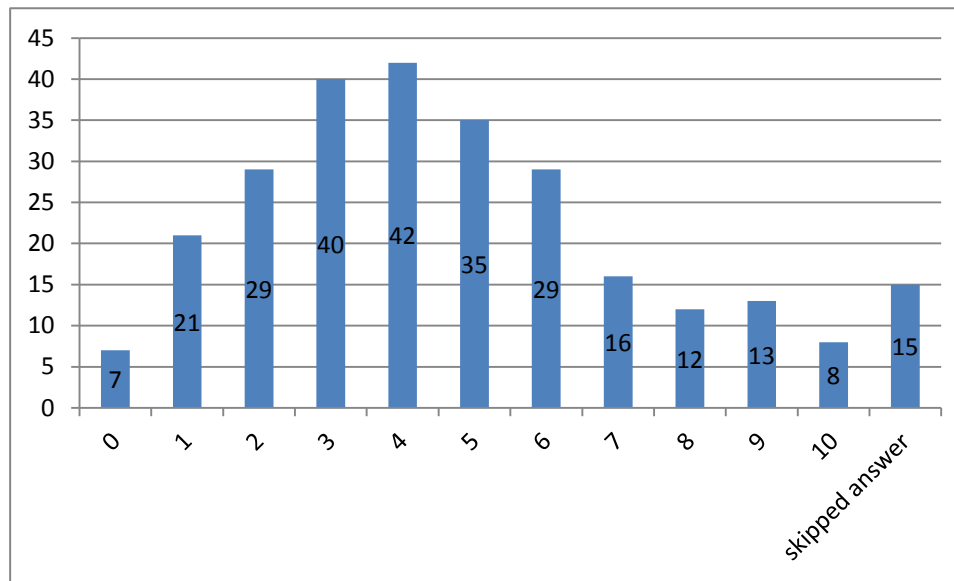
Q14. Would you get involved with any community actions that help improve and maintain the water quality of your stream?



Q15. If you answered 'no' to the question above, please tell us why.

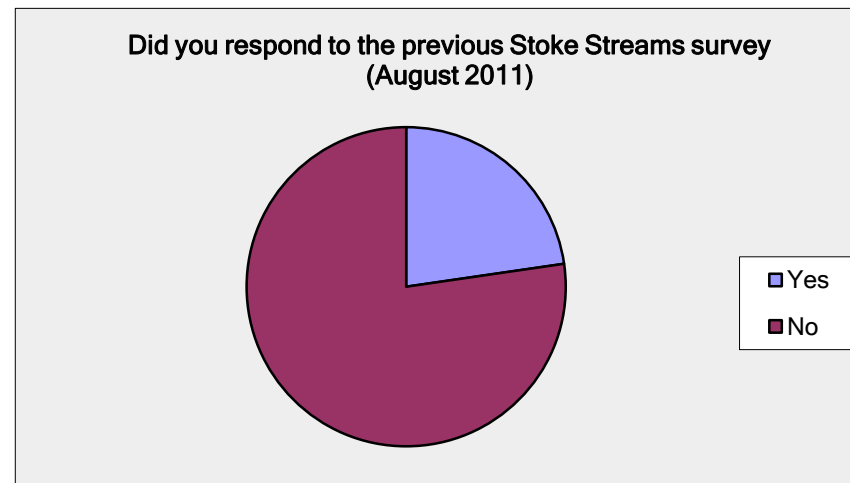


Q6. Do you think any of the contaminants listed below might be present in your stream? Number of responses ticked

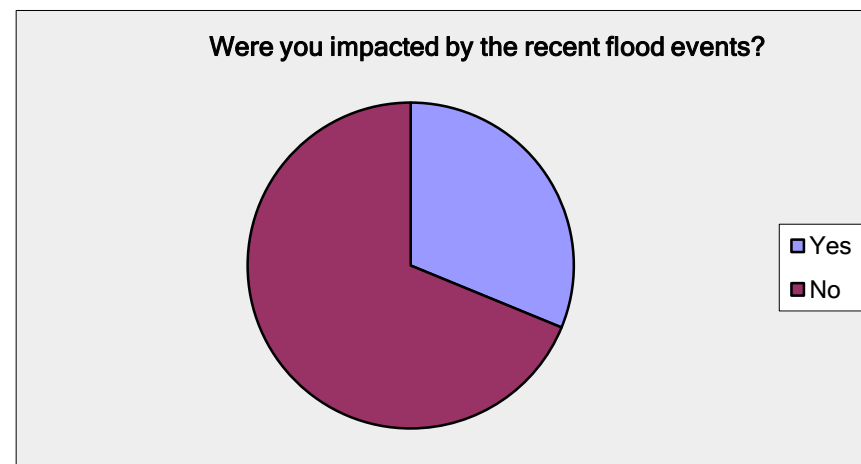


APII Stoke Streams Second Survey Results September 2013

Did you respond to the previous Stoke Streams survey (August 2011)		
Answer Options	Response Percent	Response Count
Yes	22.7%	46
No	77.3%	157
<i>answered question</i>		203
<i>skipped question</i>		2

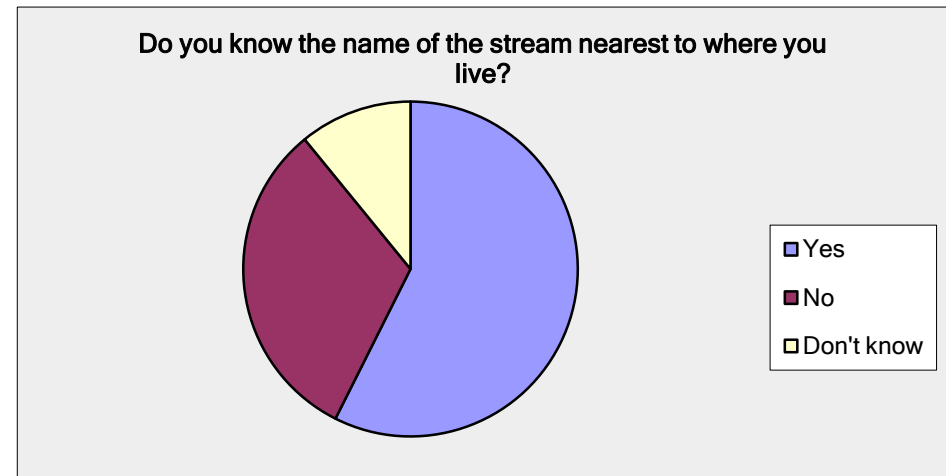


Q2. Were you impacted by the recent flood events?		
Answer Options	Response Percent	Response Count
Yes	31.2%	64
No	68.8%	141
<i>answered question</i>		205
<i>skipped question</i>		0



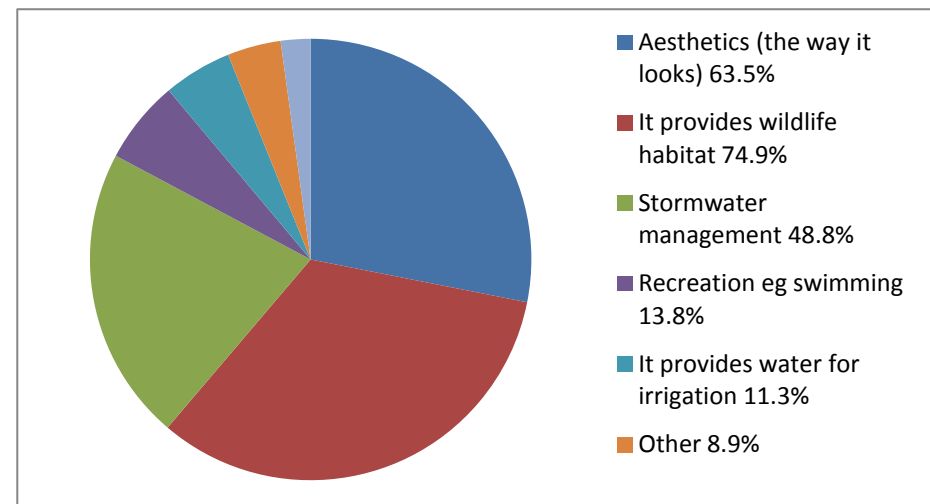
Q3. Do you know the name of the stream nearest to where you live?

Answer Options	Response Percent	Response Count
Yes	57.4%	116
No	31.7%	64
Don't know	10.9%	22
<i>answered question</i>		202
<i>skipped question</i>		3



Q4. What do you value about your local stream? Tick an many as you like

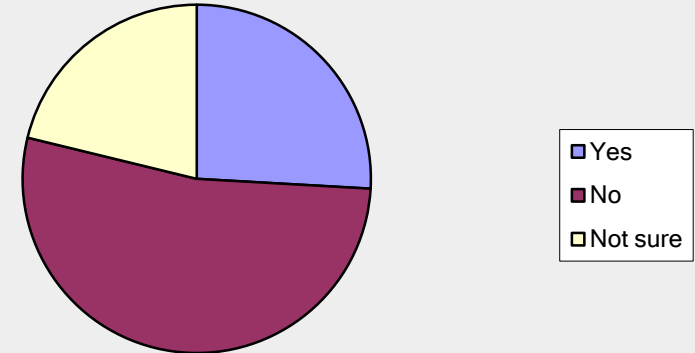
Answer Options	Response Percent	Response Count
Aesthetics (the way it looks)	63.5%	129
It provides wildlife habitat	74.9%	152
Stormwater management	48.8%	99
Recreation eg swimming	13.8%	28
It provides water for irrigation	11.3%	23
Other	8.9%	18
None of these	4.9%	10
<i>answered question</i>		203
<i>skipped question</i>		2



Q5. If you answered yes to Q2 (were you impacted by the recent flood events?) has this changed how you think about your local stream?

Answer Options	Response Percent	Response Count
Yes	25.9%	22
No	52.9%	45
Not sure	21.2%	18
<i>answered question</i>		85
<i>skipped question</i>		120

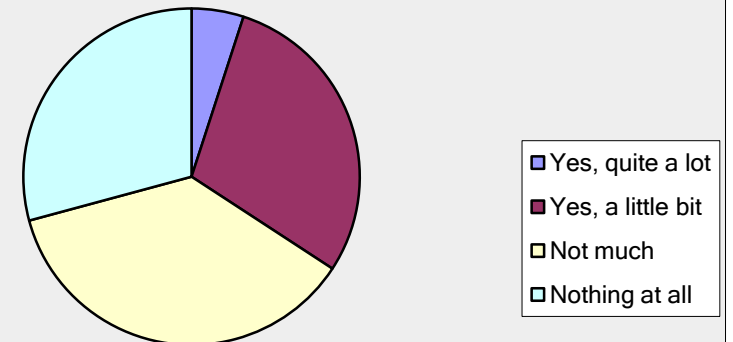
If you answered yes to Q2 (were you impacted by the recent flood events?) has this changed how you think about your local stream?



Q7. Do you know anything about the water quality of your local stream?

Answer Options	Response Percent	Response Count
Yes, quite a lot	5.0%	10
Yes, a little bit	29.2%	59
Not much	36.6%	74
Nothing at all	29.2%	59
<i>answered question</i>		202
<i>skipped question</i>		3

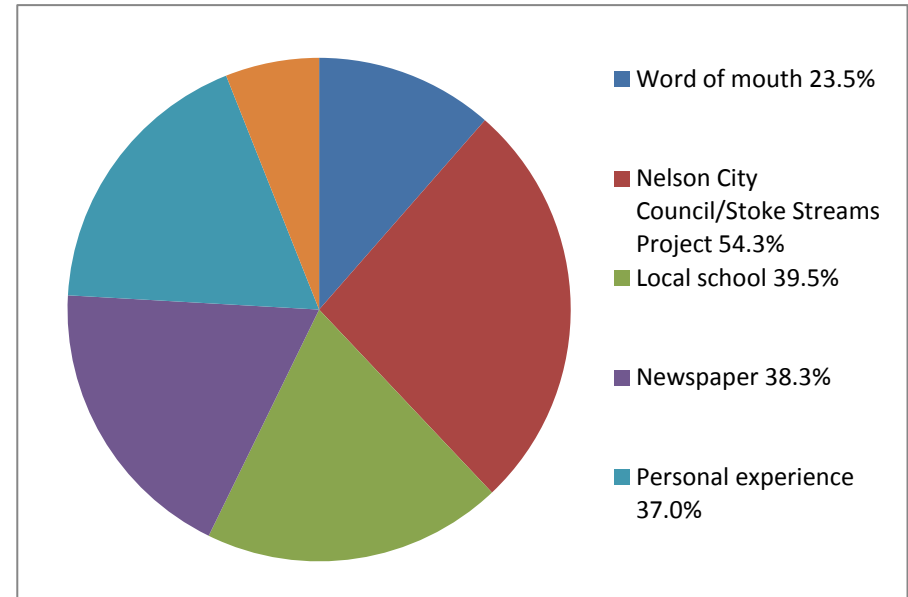
Do you know anything about the water quality of your local stream?



Q8. If you answered 'yes' to the question above, please tell us how you found out about this. Tick as many as you like

Answer Options	Response Percent	Response Count
Word of mouth	23.5%	19
Nelson City Council/Stoke Streams Project	54.3%	44
Local school	39.5%	32
Newspaper	38.3%	31
Personal experience	37.0%	30
Other	12.3%	10

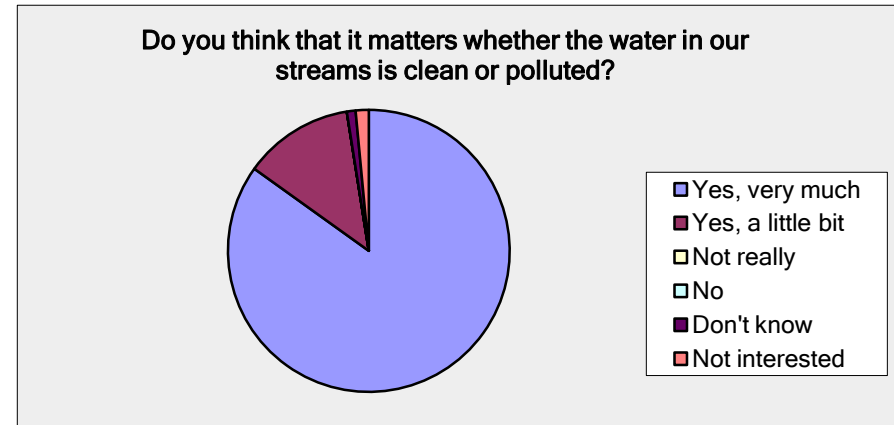
answered question **81**
skipped question **124**



Q9. Do you think that it matters whether the water in our streams is clean or polluted?

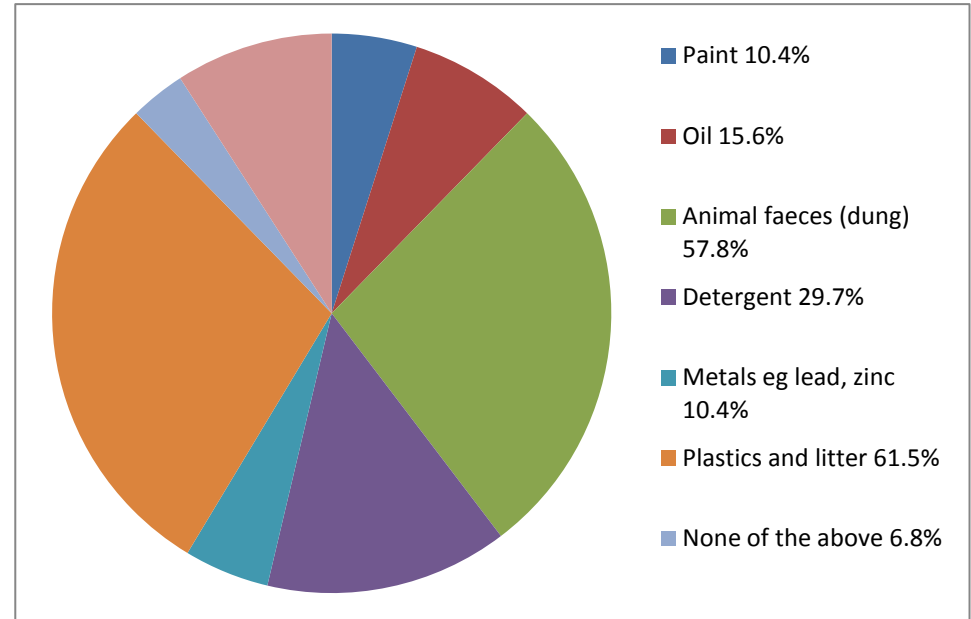
Answer Options	Response Percent	Response Count
Yes, very much	84.9%	169
Yes, a little bit	12.6%	25
Not really	0.0%	0
No	0.0%	0
Don't know	1.0%	2
Not interested	1.5%	3

answered question **199**
skipped question **6**



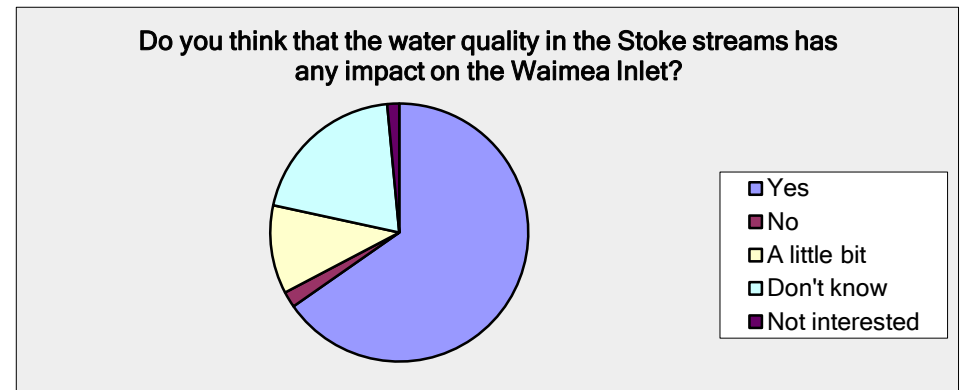
Q10. Do you think any of the contaminants listed below might be present in your stream? Tick a many as you think

Answer Options	Response Percent	Response Count
Paint	10.4%	20
Oil	15.6%	30
Animal faeces (dung)	57.8%	111
Detergent	29.7%	57
Metals eg lead, zinc	10.4%	20
Plastics and litter	61.5%	118
None of the above	6.8%	13
All of the above	19.3%	37
<i>answered question</i>		192
<i>skipped question</i>		13



Q.11 Do you think that the water quality in the Stoke streams has any impact on the Waimea Inlet?

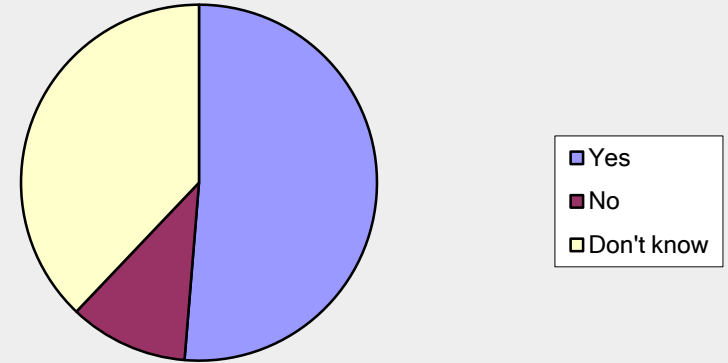
Answer Options	Response Percent	Response Count
Yes	65.3%	130
No	2.0%	4
A little bit	11.1%	22
Don't know	20.1%	40
Not interested	1.5%	3
<i>answered question</i>		199
<i>skipped question</i>		6



Q12. Do you think that native fish live in your stream?

Answer Options	Response Percent	Response Count
Yes	51.3%	100
No	10.8%	21
Don't know	37.9%	74
<i>answered question</i>		195
<i>skipped question</i>		10

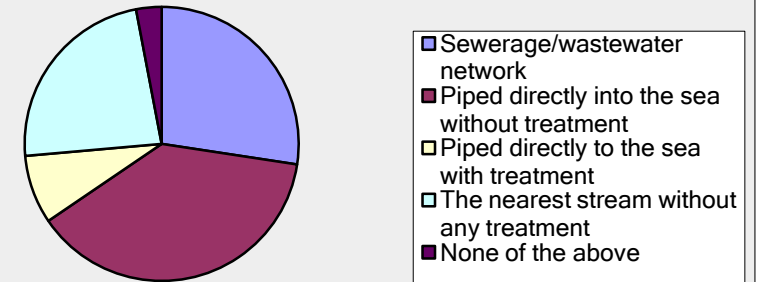
Do you think that native fish live in your stream?



Q13. Where do you think that the water that flows down the roadside drains end up?

Answer Options	Response Percent	Response Count
Sewerage/wastewater network	27.4%	54
Piped directly into the sea without treatment	38.1%	75
Piped directly to the sea with treatment	8.1%	16
The nearest stream without any treatment	23.4%	46
None of the above	3.0%	6
<i>answered question</i>		197
<i>skipped question</i>		8

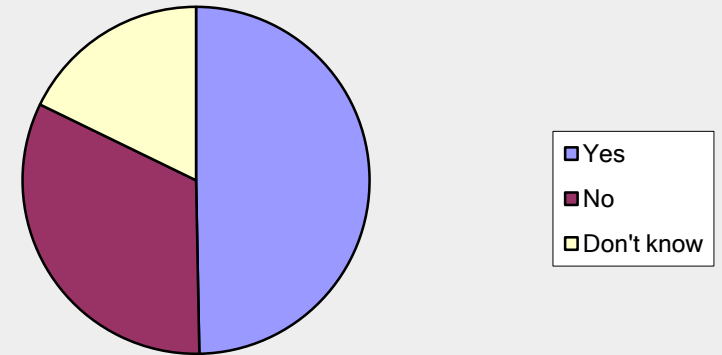
Where do you think that the water that flows down the roadside drains end up?



Q14. Are you aware that some of your actions may be contributing to poor water quality of your stream?

Answer Options	Response Percent	Response Count
Yes	49.7%	98
No	32.5%	64
Don't know	17.8%	35
<i>answered question</i>		197
<i>skipped question</i>		8

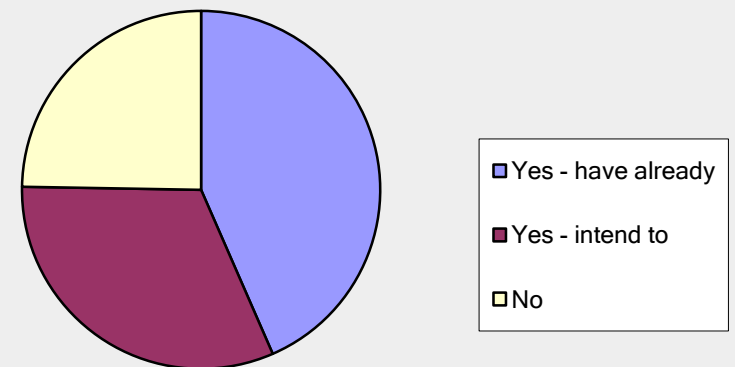
Are you aware that some of your actions may be contributing to poor water quality of your stream?



Q15. Have you, or would you change your actions to help improve water quality of our streams

Answer Options	Response Percent	Response Count
Yes - have already	43.4%	86
Yes - intend to	31.8%	63
No	24.7%	49
<i>answered question</i>		198
<i>skipped question</i>		7

Have you, or would you change your actions to help improve water quality of our streams



Responses to the following questions are on the accompanying spreadsheet.

Q6. If yes to the above question (Q5 - Have you, or would you change your actions to help improve water quality of our streams if you were impacted by the recent floods and now feel differently about your local stream), please tell us in what way

Answer Options	Response Count
	26
<i>answered question</i>	26
<i>skipped question</i>	179

Q16. If you answered yes to the above (Q15 - Have you, or would you change your actions to help improve water quality of our streams) what are the actions that you would, or have changed?

Answer Options	Response Count
	129
<i>answered question</i>	129
<i>skipped question</i>	76