

Greater Sydney Landcare Network (GSLN) Streamwatch – Report

Executive Summary

Streamwatch is a citizen science water monitoring program that enables community groups to monitor the quality and health of local waterways. Established in 1990 this water monitoring program initiated by Sydney Water and the Sydney Catchment Authority originally had a focus on curriculum implementation in secondary schools, but quickly extended beyond schools into a citizen science program.

Similar programs were emerging in other states, a Round Table conference in Cobram, Victoria, led to cooperation in developing community water quality monitoring programs. This led to Waterwatch Australia being established as the umbrella coordinating group for developing community water monitoring.

Since inception, there have been over 1,100 Streamwatch groups who have monitored water quality at over 1,060 sites and have contributed almost 11,000 data sets to the online database. These groups have been spread across greater Sydney, the Blue Mountains, Illawarra and Southern Highlands regions. This data has now been uploaded to the NSW Governments SEED database and is publicly available online.

There are an estimated 130 volunteers testing at 160 sites in Sydney, the Blue Mountains and the Illawarra.

Valid water quality data, collected by Streamwatch groups helps inform the wider public, landowners, land managers, local councils, universities, research organisations, catchment and water management authorities on the health status of local waterways.

The Greater Sydney Landcare Network (GSLN) has taken responsibility for development and delivery of the Streamwatch programme from the Australian Museum as of July 1, 2019.

This report has been developed by GSLN in consultation with 40 of the Streamwatch Programme volunteers at two Streamwatch Volunteer workshops held in June and July. The workshops sought feedback on 'where to from here'. GSLN also sought to capture and record participants concerns and ambitions for the programme, as well as potential ways to improve it and fund it.

Landcare is a volunteer run community wide endeavour, across Australia, to better manage land and environment. Waterways in Australia are key to this management and GSLN is excited at the possibility of expanding the programme across its network, to empower and educate all land carers and at the same time build the reputation of Streamwatch and quality of water monitoring.

A series of recommendations have been developed for the 12-month transition phase and they have been developed from the feedback at the two (2) workshops, ongoing discussions with senior water ecologists and engagement with other catchment management groups including Local Land Services and the Parramatta River Catchment Group. Short and medium-term funding is the key focus for the current financial year to ensure the growth and development of the programme.

GSLN / Streamwatch Workshops

Informal and formal discussions took place at two workshops held by GSLN with Streamwatch volunteers, some of whom have been in the programme for over 25 years. Obtaining direct feedback and connecting Landcare staff and the Committee with the Streamwatch programme, was viewed as essential to encourage good relationships. These two events were also viewed as a way to develop a shared understanding of how both organisations operate. Feedback was considered a good way to help GSLN map a way forward and conduct a gap analysis. This report captures all of the formal comments and attempts to inform on the way forward here for both organisations and groups of volunteers.

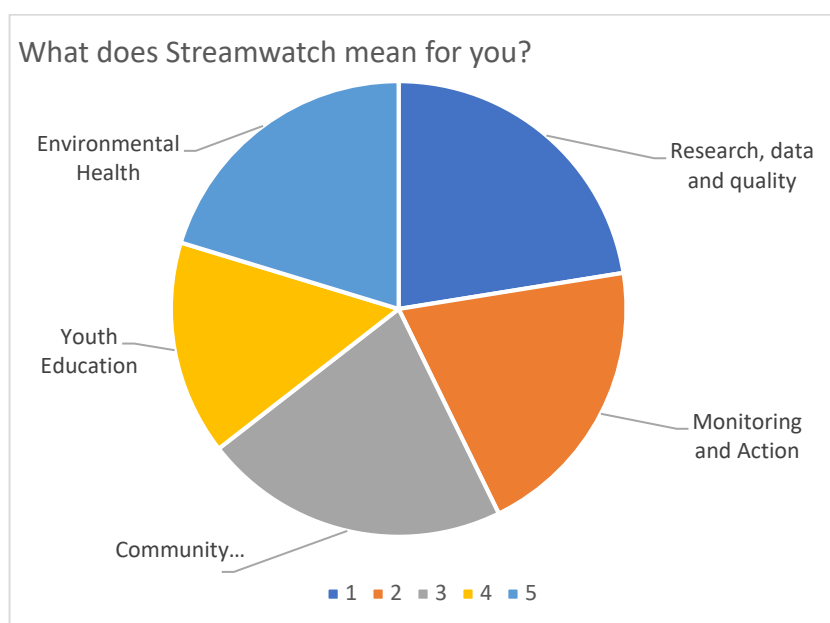
Three questions were asked at each workshop. The questions were developed to seek the participants view by asking them to reflect on where the programme has come from and its meaning to them as individuals; where they see the programmes value (individually and collectively) and where it could or should go from here with suggestions as to how get it there.

The list of raw written responses can be found in Appendices 1-3. Participants responses were collated and grouped in this report (where possible) in topical areas in order to identify key issues or problems and guide thinking and actions for the transition phase. Where there were significant outliers that could inform a better understanding or the gap analysis they have been noted in the report.

Question one - What does Streamwatch mean for you?

Question one allowed for more personal responses to be included and it was clear that the programme not only makes a contribution via the Citizen Science component but that is enjoyed by participants. Comments such as “meeting likeminded people, fun activity, engaging with community, connecting with others, upskilling and educational were common. The Streamwatch programme is a good balance of science and citizens and current participants see it has potential to grow. The programme has the potential to deliver a balanced, cost effective service for better environmental health, enhanced community engagement, citizen and youth water education as well as value to local government and water quality agencies.

Responses varied, however once all data had been collected from both workshops the following five themes emerged:



Graph 1: Feedback grouped into five main areas

Value to Participants

A Word Cloud of feedback from question one (1) provides some insight into the importance of the programme to the workshop participants and ranks the reasons for their engagement. “Local water health” is the key driver for all the environmental data collection and testing – see below:

Value and Quality Issues in 'Scientific Monitoring' in Streamwatch

When Data and Monitoring is combined in the above graph it shows the dominant focus for the participants, which was also dominant in the informal discussions. Criticism of current tests were explored, and challenges highlighted, as well as pathways to improving the programme to achieve higher value data sets.

Eight ideas for **securing the quality of the programme** are sited below:

1. Secure involvement of environmental science community – particularly universities
2. Establish a Steering Committee with input from universities to guide future activities
3. Create an expert advisory group to ensure scientific currency - university based water institute, EPA, Sydney Water, + 2 Streamwatchers
4. Engender a continuous development mindset for scope, tests, techniques and equipment
5. Improve QA, technical support, data collection and training
6. Become a credible institution with a reputation that can be trusted
7. Partner with an organization that has close ties to "professional water testers" to compare results / share ideas
8. Improve people management – this includes training for water testers.

Programme Delivery and GSLN

The strength of GSLN is as a well-established network of environment groups, council. volunteer land and bush carers, participant suggestions as to how GSLN could potentially improve programme delivery of 'water carer' activities were explored - key suggestions are sited below:

Short to Mid Term:

1. Provide overall guidance to the programme, encourage and recruit new volunteers.
2. Provide technical support, overall administration and access to funding.
3. Improve communications to enable groups to share information and learn from each other.
4. Facilitate regular contact between streamwatch groups – workshops, events and training.
5. Improve networks (connectivity) for individual groups - perhaps thru catchment-based Councils, Regional Council groups such as Georges River Catchment Group, Parramatta River Catchment Group, Universities, Greater Sydney Local Land Services.
6. Secure involvement of environmental science community – universities in particular
7. Publicize Streamwatch to the public, politicians and business to encourage funding and support

Long term:

1. Help develop a rating system – that can be used for each site (possible rapid assessment tool)
2. An integrated institution that informs government at all levels – with focus on online media and sharing information
3. Streamwatch to be developed with a view to it being part of decision making for land use and development
4. Focus and prioritise regions and sites including development (areas) i.e. where there are potential threats
5. Support Streamwatch to be a dynamic organization with a head that will analyse and give direction to the organization
6. Ensure that all groups of volunteers feel a sense of belonging and are aware of being part of a team - not just an individual.

Question three - GSLN needs to explore the practicalities of continuing Streamwatch in its current form.

What components or tests should we keep/ drop? Add new tests/ measures?

This question was developed to help inform GSLN on participant views around **potential changes** to the programme that GSLN could make, especially in the short term, to manage costs during the transition period. Data is in Appendix three.

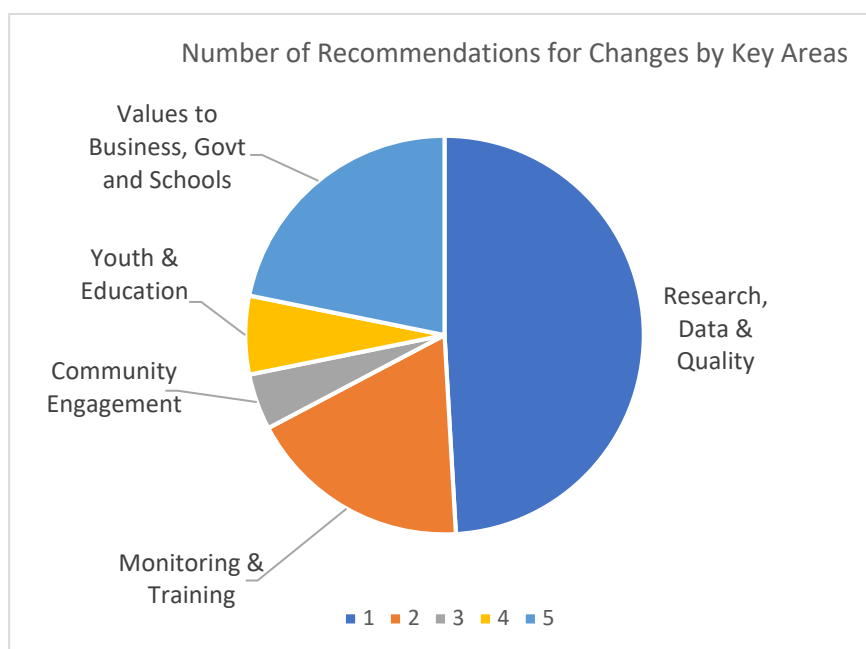
Responses to this question indicated a strong preference to increase the range of tests available and to expand the number of waterways tested. It was recognised that not all tests were needed for all sites, and some expressed the view that testing could be adapted to meet the requirements of each site or waterway. Faecal coliform and macroinvertebrate testing were popular, and a few groups currently conduct these tests. Three potential funding and growth options are sited below:

- **Develop a Sound Business Case** - in order to put before potential funders, the community and researchers. There were few recommendations or **silver bullets** for the funding, but cost savings via independent purchasing of chemicals was recognised by several groups, some which conduct fundraising to buy reagents.
- **Volunteer Guidance from Universities** and experts in water and environmental science - increasing the ability for the programme to boost its value to governments and lift its reputation. Broader marketing was identified as a key component to its success.
- **Recruitment of Young Volunteers** - Recognition that the Streamwatch volunteer base is aging was across all groups in both workshops. Expansion and indeed survival of the programme was seen by most as dependent on getting younger people involved.

Changes to Streamwatch - areas of interest from participants

Close to 50% of written recommendations for change focused on **increasing water testing** – type, data collection, areas and quality. This appears to reflect the focus of the programme on the importance of the **accuracy of findings**. The programme needs to maintain and improve its testing rigour in order to maintain the value of the data. When combined with the emphasis placed on training and monitoring about 65% of the change ideas fall into quality, data, research, training and monitoring aspects.

The broader citizen aspects of the programme such as youth, education and value of the programme to business, government, community and schools has received less attention to date.



Graph 4 – suggestions for change by field of interest

Specific issues / problems around 'data collection' in Streamwatch

As in Question one data collection issues dominated both the discussion and comment - current and potential issues (and challenges) for data collection within the programme were articulated:

1. Academics should be leading decisions around testing.
2. The data may not be in a usable form or continuous and reliable enough for scientific use
3. Need to improve equipment options - the basic kit is decades old - but still is satisfactory
4. Some streamwatch volunteers might want to take on advisory roles (and retire from field monitoring)
5. There is a new approach to testing according to Council. More holistic, less focus on chemicals. Need to explore further by talking to local Councils. What can we do to make our data acceptable to them?
6. Wholistic teaching for water health – to include environmental factors, biodiversity etc
7. Compare data from previous years to identify which tests show most variation and therefore prioritise needs for continued monitoring
8. Components and tests must relate to the purpose testing is being done
9. Database needs to be marketed to authorities
10. Quality of data is essential to gain credibility and authority in planning and managing land use
11. Confidence to collect baseline data from "historic" sites but look at introducing flexibility to test other sites

Costs and Business Case for Streamwatch

Surprisingly, some groups felt that the business case for Streamwatch had not yet been articulated and that the programme had no clear drivers for the testing other than data collection and incident reporting.

Groups did not on the whole know what the costs of the programme were, although one or two did and purchased reagents independently. Several participants made suggestions as to how to potentially reduce the running costs of Streamwatch.

On the whole groups would prefer to increase testing regimes and test for other water contaminants including Algae, Bacterial pollution, Chlorophyll, E- Coli, Estuarine Macroinvertebrates, Faecal coliform, Freshwater macroinvertebrates, Iron, Microbiology, Microplastics, Water bugs, and Sewerage. Several potential options for reducing costs are listed below:

1. Develop supply contract / arrangements to control costs
2. Suppliers could be offered opportunities to "sponsor"
3. Better target tests - some tests may not need to be done as regularly. This could reduce costs of chemicals.
4. Share costs and supplier information with all groups so they could perhaps preserve the more expensive ones better
5. If new tests are too costly, collaborate / share data with the other groups collecting same or similar data e.g. Councils
6. Approach Australian companies to see if they could put a Streamwatch Kit together and supply chemicals. They could have free advertising etc. in return.
7. Support groups in procuring their own equipment
8. Devise a cheap set of tests for schools
9. GSLN to develop budgets based on personnel and costs of components (consumables)
10. No business case for its existence – GSLN to develop one.
11. No clear drivers for testing other than data collection and incident reporting – GSLN to explore drivers.

Transition funding - Outline and Interim budget

Both workshops were briefed on the change in financial support from Sydney Water and the capacity and willingness of GSLN to continue to seek funding going forward. Transition funding of \$50,000 has been made available for the next 12 months by Sydney Water. The Australian Museum contributed retained funds of \$10,000. Increased testing and new kits are not anticipated in the current transition period but should be held over for discussion with Councils to develop an alignment with their current testing and monitoring regimes.

Table one below has been developed post the workshops to further inform on spending for last financial year and predicted "bottom line" consumables for the current financial year as at commencement. There is an increase in budget estimate for consumables (reagents) in this financial year because the carryover of from 2018/19 was lower than previous years. Costed reagent requests from groups will be sent directly from supplier to the groups. Assumption that all 43 currently active groups will continue with GSLN

The following budget has been established for allocation of the transition funding only.

Item	2018/19	2019/20?
Wages	96,465.08	50,000
Consumables	2,139.76	5,000
Waterbug training & equipment	1,706.30	2000
Travel	1,500.00	500
Conferences/ Training	3,607.31	
Promotion & Marketing		2500
Total	\$105,418.45	\$60,000

Table 1 – Budget and proposed expenditure for 2019/20120

Current Membership (as at mid-July 2019)

Streamwatch volunteer contact details were not able to be transferred to GSLN due to NSW Privacy Legislation. The Australian Museum has written to all groups and participants with information on registering with GSLN. 43 Streamwatch groups were active in 2018 to 2019. 21 groups have registered with GSLN as at July 2019 as follows:

Bidjiwong	Larool Creek
Blakehurst High School	Lawson Streamwatch
Bronte Gully Streamwatch	Mitsubishi
Camden	Oatley Streamwatch
Cattai Hills Environment Network	Pittwater
Cooks River	Still Creek Landcare
Cowan	Streamwatch Wallaroo Mulgoa
Elouera Reserve Cabramatta Creek	Tudor Road Wetland
Fitzgeralds Creek	Wallacia Streamwatch Group
Hawkesbury Landcare Network	Wollondilly Anglican College
Hornsby Heights Streamwatch	

Recommendations for Action During 12-month Transition Phase

1. Secure funding for the management and administration of Streamwatch in the short to medium term; via the Landcare Network, Councils, Government Grants (In particular the Environment Trust Education Grants) and Corporate funding.
2. Develop website and marketing material for promotion to potential Funders
3. Explore with partners the options and scope for a Scientific Advisory Steering Group
4. Establish key events for promoting the Streamwatch programme to potential funders, including the Local Government Conference in October 2019
5. Improve transparency, communication and flexibility across the programme
6. Share the good news stories on social media and other platforms
7. Look for funding to develop, market and implement a School entry level Streamwatch program
8. Look for funding to develop, market and implement an entry level Streamwatch program to make Streamwatch more accessible to youth in particular.

Mid to Long Term

9. Draft a business case for long term viability and funding in the post transition phase.
10. Implement a review of all tests being conducted by the Programme via the Streamwatch Scientific Advisory Steering Committee

Appendix One:

Workshop question 1 – What does Streamwatch mean for you	
1	Determine level of degradation 'is it changing and why'
2	Point of contact for local community
3	Providing a "face" to the community to show there are people who care
4	Providing correct data to Councils / developers prior to planning future developments
5	Biodiversity, health, waterways
6	15 years of local water quality data (factual) and perceived (anecdotal) knowledge
7	An opportunity to train my students (over 150) in sample testing and testing of water
8	Warning system
9	Provides meaning for our efforts
1	A fun activity to engage young interested greenies
11	A connection to the Australian Museum
12	A way of measuring our catchment health
13	Raising awareness of citizen science opportunities
14	Evidence based decision making
15	Teaching young people about science
16	Student involvement in environment
17	Reaction to quality impact
18	Improvement in water quality
19	Community involvement
20	Educating local landowners and landholders to improve environment and reduce pollution
21	Sustainable future development involves young people in the process - encourage "science" to be fun
22	Data
23	Influencing government agencies - local and state
24	Sustaining environmental activists
25	Improving the environment for birdlife, animals and their survival
26	Having bench marks for improving water quality
27	A standard to collect, test, store results making data consistent
28	Benchmarks for the environment (land development impacts)
29	An opportunity to engage and educate the community
30	Improve our testing procedures to have cutting edge technology going forward
31	Should be mandatory in urban areas. Residents should know what is in their waterways.
32	A unit in Cert 11 CLM.
33	A way to get kids out into nature interested in science
34	Something that is hard to find information on

35	Quite a complicated system when there is a whole class involved
36	A tool for engaging local communities
37	Undervalued and underpromoted program
38	Volunteer driven - little Council support
39	A way to monitor water quality
40	Need to engage community and publicizing data and activity
41	To be able to show that there is pollution or excessive sediment
42	Need feedback from Council when report problems i.e. sediment
43	Originally understood it was to collect data to create a baseline for water quality in creeks
44	An important program that is useful for assessing the health of site, ecological communities
45	Streamwatch means working with likeminded people so there is a social element to it as well as reinforcement of my environmental values
46	Streamwatch means: The ability to help educate the community on the value of their local environment
47	A tool for the public to better understand the health of their local waterways and events that are occurring nearby
48	A way to engage the local community. Streamwatch means checking the water quality of our local streams to enable lobbying for improvement to catchment practices / stormwater.
49	Streamwatch means having to focus my mind on the rigor of the testing process to give the results integrity
50	Raising community awareness about environmental issues through involvement in the program
51	Third sector knowledge and expertise for better planning
52	Supporting NSW EPA to discharge its responsibilities under the POEO see OBJECT 3(b)
53	Credible data that can be used to engage Councils etc. in solving nutrient and pollution problems
54	Through water testing and invertebrate testing Streamwatch results demonstrate the health of our environment
55	Involvement of young people that open their eyes to the importance of and the value of environment
56	A way of having fun with like-minded people in the environment
57	Data support for political lobbying
58	Data support for programs of environmental improvement
59	A way to make data publicly available
60	Community stewardship of environment
61	A way to create habitat for native species
62	An opportunity to work with others to educate them on water quality
63	A way to interact with Councils, Sydney Water
64	Creeklines not drains
65	Data sets may be compared with other areas as a quick measure of our local waterway health
66	A way to measure water quality and creekline health
67	Rigorous and meaningful citizen science - requires skill and judgement, unlike many other initiatives
68	A way of connecting with other people interested in water quality
69	"water" health as a compliment to "land" health (a measure of)
70	Advice on how to restore a creekline
71	Involvement of local community in their environment
72	To provide data which can be used by authorities - local - government etc. in planning developments
73	To establish a base line for future

74	Ability to see if there are local land disturbances
75	Provides evidence to back up complaints to authorities of pollution issues
76	A change to engage with local residents who value good quality of waterways
77	Means to test pollution in local creeks
78	Linking with customers who use the data
79	Doing work only that is useful
80	A chance to monitor water quality which can point out any contamination issues in the future
81	Ability to track deterioration or improvements in long-term water quality
82	Community participation
83	Community ownership
84	Reliable data
85	Part of a broader environmental suite - weeding, regeneration, replanting, education
86	Maintain water quality, ongoing monitoring to prevent pollution
87	Checking quality of water entering Georges River via 2 creeks. Monitoring any pollution especially from local shops.
88	Identify areas of pollution, toxic run off by measuring along stream
89	Networking with like-minded people
90	Involving communities in environmental issues
91	Feedback to local Councils, governments to influence environmental policy / actions
92	Measuring health of stream / water course - including changes both positive and negative
93	Results / data - influence actions of restoration work along riparian corridors
94	Educating youth through involving them in Streamwatch
95	Upskilling volunteers through education
96	keep up with lab skills
97	education - sharing ideas
98	empowering and engaging communities to look after their environment
99	learning to respect our waterways
100	impart knowledge
101	engagement of community including youth in understanding importance of healthy waterways
102	an awareness of what not to put down the sink
103	engaging young people in the streamwatch programme which creates an awareness of the natural world and its functions
104	community education and involvement
105	exposure to learning about looking after our waterways
106	it can be used to teach or show others what the waterway is all about
107	education and environmental awareness on our impact on environment we live in
108	it is educative in that it shows us the state of the water and what's in it
109	engaging communities with caring for our environment
110	meeting people with similar interests
111	community building people getting to know each other and their environment
112	meeting like-minded people
113	shows someone is caring and hoping to keep a stream clean

114	feeling in charge of the health of the environment
115	the importance of maintaining our waterways
116	chance for a cleaner environment
117	solving pollution problems i.e. streamwatch groups have identified issues and located the source of problems
118	it causes angst to see that the 30-40 metre riparian zone is ignored in many places - not sure how to fix this
119	appreciation of beautiful places where testing is done
120	robust data
121	many groups addressing localized issues monitoring resulting in widespread of detailed data
122	credible results that can be taken seriously by councils etc.
123	compilation of data for analysis and action
124	monitoring water health with interesting techniques
125	can be integrated into council, state etc. monitoring
126	streamwatch for me is keeping an eye on not only our rivers and creeks but on the authorities, who are supposed to be doing this
127	provides a connection with surrounding bushland - how good it is - waterways as a gauge
128	monitoring health of waterways to identify degradation and improvement in health and to give feedback to key authorities when needed
129	it indicates the state of the health of the waterway compared to previous results
130	it indicates the state of health of the waterways - measured against defined morays
131	recording data long term

Appendix Two:

Workshop question 2 - What do you see is the future of streamwatch? (Purpose / Scope / Role / GSLN)	
1	Provide resources for existing Streamwatch groups and training for new volunteers
2	Use Streamwatch results/ data to actively lobby government to take action including legislation to protect environment riparian corridors and catchments / vegetation.
3	Use monitoring to investigate suspicious pollution events and to then approach EPA to investigate
4	Continued watchdog of local streams and feedback to Councils
5	Hold field events to educate and involve school students in understanding threats and solutions to degraded waterways and show how testing is done.
6	Actively advertise and hold events to recruit further new Streamwatch groups especially in areas not currently covered by a Streamwatch group.
7	The possibility of involving school students again in testing & monitoring streams
8	Cross participation e.g. testing other groups sites
9	More volunteers and then more sites
10	To monitor water quality so that any problems can be identified and treated e.g. sewer leaks, chemical spills and building development pollution.
11	To carry on in much the same way as in the past but to engage younger members of the community e.g. schools, high schools
12	To expand the number of Streamwatch groups so that every major creek and river in the greater Sydney catchment is monitored
13	Local environmental stewardship
14	World class reliable, relevant accessible data (for Govt agencies etc.)
15	Focus on regions including development (prioritization of sites)
16	Technical and steering committee to guide activities
17	Improved QA, technical support and training
18	Improved people management
19	Continuous development mindset for scope, tests, techniques and equipment
20	Purpose: Environmental and public health, quality of life
21	Improve the QA (poor over the last 2 years)
22	Improvement of data e.g. bacterial pollution detection
23	Continuation of data collection
24	To better publicize Streamwatch to the public, politicians and business to encourage funding and support
25	Greater use of data, particularly long-term trends
26	Better understanding of relationship between water quality and other land uses e.g. development, sewerage systems, roads etc.
27	More on-site training
28	To improve funding so that activities are not in doubt due to not adequate resources and training
29	More onsite training
30	I want Sydney Water to commit funds to enable Streamwatch to survive
31	Streamwatch needs secure funding so it can plan its activities into the future and provide support for participants
32	Recognition of the importance of streamwatch by government
33	I want Streamwatch groups to be able to speak out publicly about water quality problems without jeopardizing funding
34	Streamwatch should be a good fit for GSLN. Reducing nutrient is essential for reducing the spread of weeds
35	To education Streamwatch participants in a continuing way to the knowledge and ability of the groups expands
36	A Sydney wide assessment leading to a Snapshot, a Report card on our waterways using our data

37	I want to ensure common interests are found between GSLN and Streamwatch. Will frank comments about water quality problems embarrass GSLN?
38	Secure funding for Streamwatch from government donations
39	Effective QA so that the data can be relied upon
40	A rating system for each site
41	The ability for volunteers to connect with each other
42	A steering committee with input from universities to guide future
43	Improved networks for individual groups. Catchment based Councils. ROC's. Universities (whatever closest), LLS
44	Better connection between schools and the general community with Streamwatch to both educate and to appreciation of environs.
45	A review of equipment from experts in the field of water testing
46	To assist in reducing nutrient getting into our waterways by identifying sources of pollution
47	Technical support for Streamwatch
48	To continue as before i.e. working with community, children and support training with chemicals etc.
49	Annual QA
50	Expert advisory group to ensure scientific currency - university based water institute, EPA, Sydney Water, 2 Streamwatchers
51	Targeting hotspots for monitoring before development begins
52	Medium to long term budgets to give certainty (targets)
53	Signs at all sites with QR code to link to information
54	All data accessible; access to research (behind paywalls); connection within networks.
55	A look at latest optical equipment to see if useful for our testing
56	Define the scope of training available to new members / groups
57	An organization that has closer ties to "professional water testers" to compare results - share ideas
58	A way groups can highlight what activities they are up to online
59	A way that we can work with the local Council
60	Dynamic organization that has a Head that will analyse and give direction to the organization
61	A simplified testing kit for schools
62	Piggy back on other community engagement programs - RBGS community Greening, Council sustainability actions
63	A way for local communities to avoid crisis through ongoing monitoring
64	I hope it becomes bigger and better and attracts ongoing funding
65	School networking days throughout local catchments
66	Compiling useful data for monitoring urban development
67	Build and share capacity with other Landcare Networks
68	Increased public awareness - the next big thing
69	An opportunity to spread Streamwatch through Landcare Groups
70	Exploit the mood of the community - prevent Murray Darling type catastrophes
71	I hope to see greater awareness of the program and what it does
72	More community engagement to look at more creeks in the area
73	To make public more aware of conditions of creeks and streams river and harbour
74	To be able to do something to prevent sedimentation, involve schools and younger people to be effective in preventing pollution / sedimentation of creeks to be able to collect water samples when creek is flooded and there is sediment issues for later testing. Problem never happens when doing normal testing.
75	Better ease of access to the data collected so that it is easily understood by the general public → visual

76	Communication networks will be important: newsletters, emails, Facebook, events - group get togethers, workshops, also links with Councils.
77	I hope to see more community engagement → it doesn't seem like there is currently enough.
78	Expansion of the program into more areas e.g. schools.
79	Water quality monitoring of more streams / creeks in addition to current sites
80	PURPOSE: To enable community / volunteers to participate in monitoring the health of their local environment using scientific methods giving the results credibility
81	SCOPE: Use as many tests as can be feasible funded and resourced e.g. physical and chemical parameters including e-coli for sewage pollution; Macroinvertebrates for river health; riparian vegetation assessment
82	ROLE: involve and support a wide range of community groups and members of all ages - particularly young people - not just schools but Girl Guides, Scouts, walking groups.
83	GSLN: Provide 1) Technical support 2) Overall administration 3) Access to funding 4) High volume communications to enable the disparate groups to share information and learn from each other.
84	Increase training opportunities for volunteers
85	Streamwatch must evolve and keep up to date with the technical data required by Councils, business and the community
86	Facilitate regular contact between streamwatch groups
87	The chance to be a trusted source of data collection
88	We should integrate with other organisations to promote our skills
89	The role of GSLN would be to promote "Citizen Science" as a trusted group due to the training and dedication of individuals
90	Ensure that all groups of volunteers feel a sense of belonging and are aware of being part of a team - not just an individual
91	To support the monitoring of water quality and make the results available to interested parties
92	Increase involvement of young people - schools?
93	Maintain existing data sets through website
94	Expand visibility of streamwatch through community
95	Expand type of tests available to streamwatch groups
96	Provide a greater online presence for Streamwatch
97	The purpose is to try to remediate many of the problems we have created in our environment
98	To provide training where needed, Interact with local Councils (sharing)
99	Secure long-term funding - government, Water NSW, Local Councils, corporates, local business
100	Broaden to include flora and fauna impacts
101	GSLN: Resourced to be capable to manage technical services - Scientific; Monitoring; Expertise
102	Become a *credible institution with a reputation that can be trusted
103	Integral part of decision making for land use and development
104	An integrated institution that informs government at all levels
105	Part of Science in Schools
106	Spearhead of Citizen Science
107	To be fully integrated into Landcare
108	Networked and coordinated for a Purpose
109	Secure involvement of environmental science community - universities
110	Reintroduction of Streamwatch into Schools thought Intrepid
111	Explore local funding for individual groups
112	Quality assurance be maintained
113	Connecting with other nearby groups to help support them

114	Be the "go to" organisation for trustworthy, objective advice and data
115	Maintenance of (online) visible and accessible local stream data
116	A fully funded organisation, not reliant on hand to mouth
117	Continued support from relevant experts
118	Ongoing monitoring of water quality variables
119	High Quality data
120	the programme needs to produce results that are scientifically credible
121	hopefully a reason to produce data that is useful to someone, anyone!
122	Reporting back to authorities
123	it will continue to provide a necessary check for quality of waterways
124	provide good reliable data to relevant authorities
125	Supply accurate data for environmental reports and identify issues that need remediation / action
126	no government bodies have resources for estuarine monitoring and compliance monitoring - streamwatch can fill that gap
127	potential to protect high conservation value areas from new impacts
128	youth engagement and education
129	more community engagement
130	definitely needs more young people involved. We are the converted.
131	community engagement
132	GSLN to provide overall guidance to the programme. Encourage and recruit volunteers.

Appendix Three:

Workshop Questions 3 - We need to explore the practicalities of continuing Streamwatch in its current form. What components or tests should we keep/ drop? Add new tests/ measures?	
1	No business case for its existence
2	No clear drivers for testing other than data collection and incident reporting
3	We don't do TSS testing - maybe this could be added
4	Current form without business drives is heading for extinction
5	We must determine which tests are required by business / Councils and drop any that do not provide any real results
6	Consultation with planning bodies could provide a basis to test a site prior to development applications. In others words needs based testing at times.
7	Groups currently are involved in their local areas - perhaps other sites could be allocated to anyone willing to travel from their "comfort zone"
8	Components and tests must relate to the purpose testing is being done
9	Data not in a usable form or continuous and reliable for a scientific use
10	Essential to gain credibility and authority in planning and managing land use
11	For a still water site with seasonal variation in water level (Bushels lagoon) - keep temperature, D.O. and turbidity
12	PH measuring its current form never changes. Turbidity seems to be irrelevant.
13	Promotion! Of the value of the work of volunteers e.g. to residents through Council Bushcare etc.
14	Must maintain online datasets!
15	Do macroinvertebrates, temperature, PH, EC, low phosphates, DO, turbidity - i.e. all except Faecals (although I would like to)
16	Major sponsors
17	Like to expand into macro invertebrates
18	Have most trouble with DO test - needs more training of volunteers
19	Test for water bugs
20	Add test to monitor chlorophyll - a content
21	Add test - fecal coliforms
22	Add test - perhaps iron content for areas used for recreation
23	To be able to coordinate and share data with Council and from Councils tests
24	Our group does not do an e-coli test presently due to : expense (?) and the need to keep the samples at constant temperature (?). I would like the program to include this test in future as we have a lot of sewage overflows
25	If adopting new tests are too costly, collaborate / share data with the other groups collecting same or similar data e.g. Councils
26	Not to drop any tests. Any sewer pollution we notice we report to Sydney Water to follow up.
27	Current form not good. Faecal coliforms
28	There is a new approach to testing according to Council. More holistic, less focus on chemicals. Need to explore further by talking to local Councils. What can we do to make our data acceptable to them?
29	Look into a test using ammonia as a quick way to detect sewerage in the water
30	I love the colorimeters
31	Add faecal coliform testing. Obviously, there are budget constraints however - my opinion is that it is a valued parameter. The parameters tested should be decided on expert advice and current thinking in the field of water quality testing.
32	Include microplastic testing

33	I love the EC meter! I love the ammonia strips!
34	Streamwatch has an awesome combination of both Parameters and Methodologies - nothing should be cut!
35	If you wish to include freshwater macro-inverts, you need to develop a methodology for estuarine ones too maybe!
36	Invertebrate testing important to show continuity of water quality, and it interests children, so this should not be dropped
37	Of course, macro invertebrates should be tested - but do you realize some waterways are dead there aren't any??
38	No tests should be dropped. Testing bacteria is essential. Scan for salts is essential. Phosphate is a nutrient that brings weeds so is essential, oxygen essential for water life so should be tested
39	FC and E. coli are the TESTS that public most interested in
40	This is the type of question for which we need an expert STEERING PANEL
41	Only drop tests that Councils don't do
42	Devise a cheap set of tests for schools
43	Additional tests - microplastics, other bacteria
44	Add bacterial pollution test
45	Program to engage youth needs to be maintained and expanded to make sure streamwatch program continues into next generation
46	Coordinate with River Health Monitoring
47	Continue with current tests
48	Look at better equipment options - the basic kit is decades old but still is satisfactory
49	Compare data from previous years to identify which tests show most variation and therefore needs continued monitoring
50	KEEP nutrient - type of life form living in watercourse to indicate health. ADD - micro as needed & E. coli
51	Include testing for e-coli presence and microplastics and asbestos
52	Don't drop the QA if we want credibility
53	regular training
54	have some idea of test accuracy and validity
55	essential to gain credibility and authority in planning and managing land use
56	essential to keep quality control i.e. calibration consistency of techniques etc.
57	bring in academics to get opinions
58	align test procedures
59	all tests are important but in order to be economical with chemicals each site could be assessed for relevance of test required
60	some sites could target specific measurements only - depending what the risks to the site are
61	algae testing
62	keeping invertebrates. To a family order.
63	E. coli test could be used in say beach environments
64	E. coli to be added
65	testing for metals
66	some test may not need to be done as regularly. This would reduce costs of chemicals
67	microbiology
68	chemical test to include dissolved oxygen. Initially test to be macroinvertebrates. 3 levels of tests. Macroinvertebrates - ongoing tests \$0. Chemical consumables each site test \$3? Faecalis each site is \$10.
69	if we knew the costs of each chemical, we're using we could perhaps preserve the more expensive

70	need to develop supply contract / arrangements to control costs
71	suppliers could be offered opportunities to "sponsor"
72	please let us know where we can procure equipment that we might need so that we can buy them ourselves
73	need to consider how supplies are to be sent to teams in future
74	approach Australian companies to see if they could put a Streamwatch Kit together and supply chemicals. They could have free advertising etc. in return
75	some streamwatch volunteers might want to take on advisory roles
76	Generate Skilled People such as Green Army Trainees
77	Landcare Internship
78	Why not get schools involved again? Or TAFE?
79	Confidence to collect baseline data from "historic" sites but look at introducing flexibility to test other sites
80	Wholistic teaching
81	Identify areas currently tested that need monitoring
82	designated waterways to be tested
83	integrate more closely with bug / water / invertebrate testing / monitoring
84	Streamwatch should continue in the way it has been operating in the past
85	GSLN to develop budgets based on personnel and costs of components (consumables)
86	Database needs to be marketed to authorities
87	Use the media - occasional "good news stories"