



TALLEBUDGERA CREEK, GOLD COAST, QLD

STATE OF MARINE DEBRIS REPORT





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ACKNOWLEDGEMENTS

Positive Change for Marine Life gratefully acknowledges the support of the Queensland Government through their *Community Sustainability Action Grants* program for the Tallebudgera Creek *River Warriors* initiative and associated Reportcard.



**Queensland
Government**

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EXECUTIVE

SUMMARY



Plastic pollution and other forms of marine debris have been gaining increasing attention in Australia. Once thought of as an issue predominantly affecting developing countries - recent changes in China's international recycling legislation, coupled with increasing population growth and associated development has increased the visibility of the issue¹. A 2016 United Nations study² found that more than 800 animal species were negatively affected by litter in our seas, representing a 23 per cent increase in the total number of species affected since 2012. In Australia, marine debris is recognised as a *Key Threatening Process* by the Australian Commonwealth Government under the Environmental Protection and Biodiversity Conservation Act 1999³ and this key threatening process has also been identified by the Queensland Government as a priority for Queensland's ecological health. With South East Queensland experiencing one of the fastest urban growth rates in Australia⁴, action needs to be taken now to mitigate the impacts that growth is having on our waterways and their unique variety of habitats.

Phase I of our *River Warriors* initiative aims to address the impacts of marine debris and pollution through a series of kayak-based on-water surveys to collect, record and dispose of marine debris in waterways across New South Wales and South East Queensland. The inaugural Tallebudgera Creek River Warriors project consisted of 24 weekly surveys covering the accessible length of the creek 6 times over a 7-month period. The surveys collected baseline data on type, quantity, source and presence of marine debris, with 22,925 pieces of debris collected in total. Weather and tidal conditions, the presence of injured / dead wildlife and dates and times of collection were all incorporated into our results, which highlight ongoing management strategies and community engagement programs in order to mitigate the issue at its source. This report highlights our findings and aims to serve as a model for determining waterway health based on key variables; giving communities, businesses and governments a framework to improve marine-debris related threats and ensure cleaner, healthier and safer waterways across Queensland and beyond.

Phase II of the project focuses on community engagement and practical source-based solutions; including awareness programs, educational signage, public-facing clean-ups, as well as further exploration of strategic bins, litter mitigation devices, enforcement & monitoring programs, as well as a flood response plan. A second report will be compiled at the completion of Phase II, highlighting successes and challenges and determining ongoing actions to ensure that the creek can move toward an 'A' rating on our Report Card (page 25).

For more information on our River Warriors initiative and our work across NSW and QLD, please contact Karl Goodsell (Project Manager) via k.goodsell@pcfml.org.au



Two of our volunteer survey crew Sophie (back) and Suzette (front) on their way back to sort results from one of our surveys on Tallebudgera Creek.



INTRODUCTION

Positive Change for Marine Life's (PCFML) *River Warriors* initiative commenced in July 2017 when PCFML sponsor, *The Byron Bay Cookie Shack* drew our attention to a large amount of debris and pollution in the Brunswick River in northern NSW. The business offered us their support to run a kayak-based clean-up in order to collect the debris and find out exactly what was there and where it came from, whilst raising awareness to the issue throughout the broader community.

In just one public-facing clean with project partners *The Byron Bay Cookie Shack*, *Go Sea Kayaks*, *Byron Bay Eco Cruises and Kayaks* and *Mullum Cares* we managed to collect over 1.5 tonnes of debris - with 34 volunteers covering a 12km section of the river. Over the course of the following 6 months we developed a plan of action to address this issue at its source through ongoing surveys and engagement programs. We called the initiative *River Warriors*.

Reaching out to like-minded community groups, organisations and individuals in specific regions across northern NSW and SE QLD (which were both home to diverse species and where debris levels were noticeably high), we commenced Phase I of our first full-time *River Warriors* project on Tallebudgera Creek, QLD in May 2018.

The main focus for our *River Warriors* projects is to:

- 1) Run consistent kayak-based surveys from source to sea (or as close to these areas as accessible) collating and recording data on type, quantity, presence and source of marine debris in order to mitigate it;
- 2) Upload data into our ongoing marine debris database, as well as Tangaroa Blue's *Australian Marine Debris Database* in order to keep a record of findings, as well as to feed into and support ongoing research into debris patterns and solutions;
- 3) Produce a Marine Debris Report Card, the first of its kind to not only highlight the issue of debris in waterways, but also to develop realistic and ongoing management solutions and a marine debris rating system for waterways based upon key variables outlined in our findings;
- 4) Utilise the Report Card to assist us in Phase II of the project, which aims to engage the community in our work through: awareness programs, educational signage, regul-



ar on-water clean-ups, as well as the exploration of strategic bins, litter mitigation devices, enforcement and monitoring programs, as well as a flood response plan;

5) Produce a subsequent report at the completion of Phase II, highlighting successes and challenges and determining ongoing actions to ensure the creek can continue to move toward or maintain an 'A' rating in the Report Card.

Since we were awarded with a Queensland Government *Community Sustainability Action Grant* to support the Tallebudgera Creek project in early 2018, we have been awarded subsequent funding to roll the project out across the Brunswick River (Byron Shire) and Terranorra Creek (Tweed Shire) in northern NSW, as well as on Tingalpa Creek in the Redland City region (SE QLD). We hope to continue gathering baseline data from waterways in need across NSW and QLD, whilst engaging local stakeholders in practical, hands-on solutions to address marine debris at its source - creating long-term behavioural change and a culture of stewardship for these places of incredible ecological, recreational and economic importance.



The team sorting through our findings post-survey.



RIVER WARRIORS SURVEY METHODOLOGY



Tallebudgera Creek (Figure 1) is located in south-east Queensland within the Gold Coast City Council region. It is a tidal estuary with salt and brackish water giving way to freshwater in the upper reaches. The creek covers 98km² and extends around 25km from source to sea⁵. While the creek faces a number of threats from bank erosion; mangrove degradation; and chemical / fertiliser run-off, marine debris is a known factor that influences the health of the waterway and comes from a variety of land and water-based sources. While some monitoring and collection programs have taken place in the past, including the incredible work undertaken by Healthy Land & Water⁶ to our knowledge no consistent weekly surveys have been undertaken to date.

Our team utilised a quantitative approach to data collection through ongoing weekly surveys - collecting marine debris across 4 transect areas from the estuary mouth to as close to the source area as possible (Samuel Drive Park):

- **Survey transect 1** (Figure 2): Tallebudgera Creek Park, Palm Beach (28.098601 / 153.457840) to Creekside Park, Elanora (-28.120656 / 153.450206) - 5.64km.
- **Survey transect 2** (Figure 3): Creekside Park, Elanora (-28.120656 / 153.450206) to 19th Avenue Reserve, Elanora (-28.129914 / 153.445450) - 1.5km.
- **Survey transect 3** (Figure 4): 19th Avenue Reserve, Elanora (-28.129914 / 153.445450) to Scotty Logan Lane, Tallebudgera (-28.135955 / 153.425258) - 2.46km.
- **Survey transect 4** (Figure 5): Samuel Drive Park, Tallebudgera (28.13806035 / 153.415338490) to end of accessible area (-28.136990 / 153.411039) - 0.45km.

Surveys were conducted using two Viking Tempo II kayaks with collection bags, litter grabbers and specially designed tow-rafts to assist with our collection. Our weekly team was made up of between 2 and 4 team members, with all accessible debris on the surface of the transect areas and along the banks collected with litter grabbers and by hand. Post-survey completion; found debris was weighed, dumped onto a tarpauline, sorted, categorised and uploaded into our marine debris database - contributing to PCFML debris records, as well as Tangaroa's National Marine Debris Database. Debris was then either recycled or taken to the tip for disposal.

In total, our team ran 24 surveys over a 7-month period, covering the full accessible length of the waterway 6 times. Commencing at the same entry point and time for each survey. Tide heights, prevailing wind / weather conditions and recent storm/flood events were all noted in our data to determine impact (if any) on our findings.



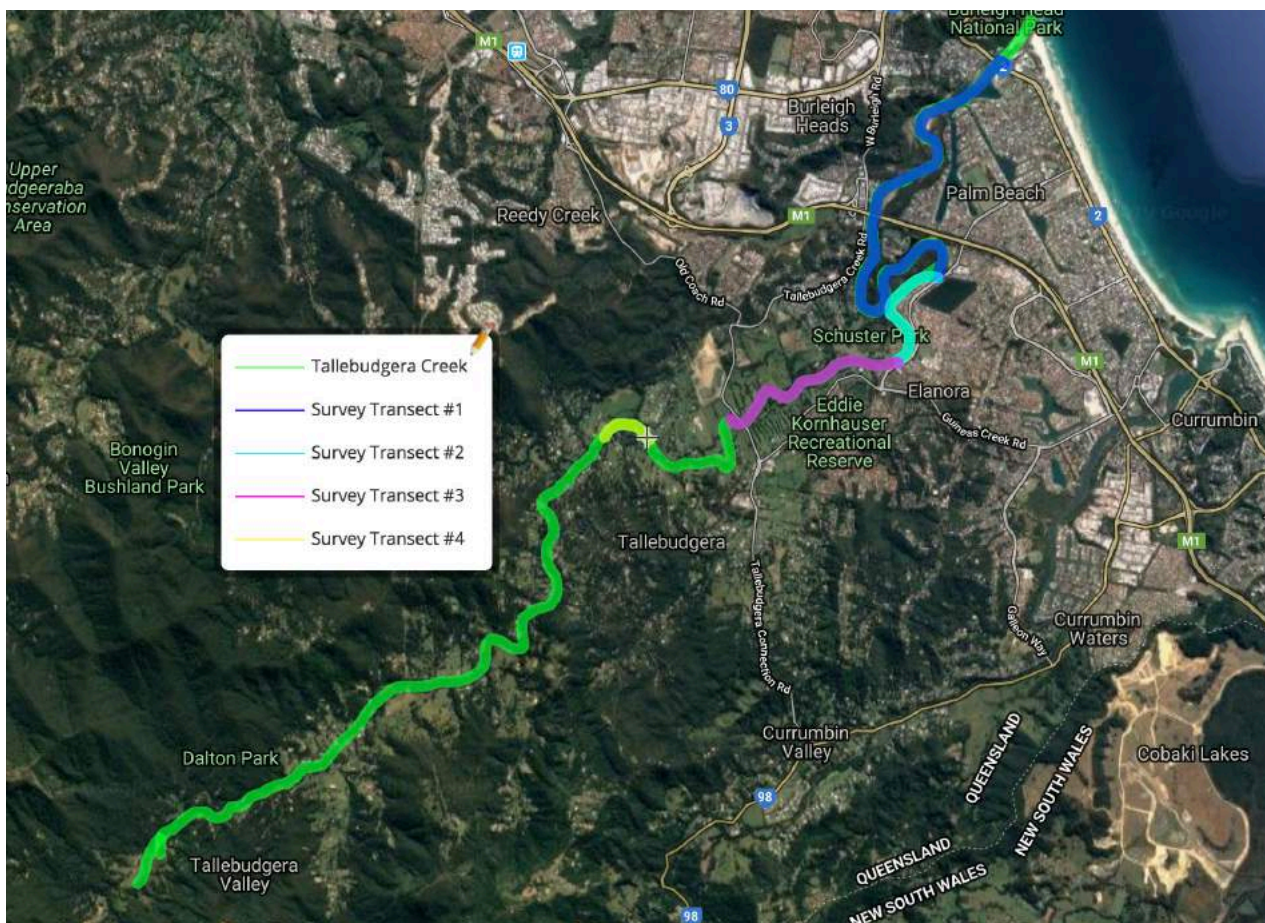


Figure 1. A map of Tallebudgera Creek, Queensland, Australia (showing transect areas 1-4): covering ~25km from estuary mouth to the Tallebudgera Creek Dam. The creek covers a total area of 98km².

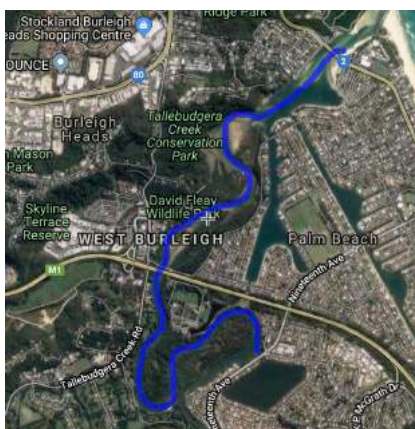


Figure 2. Transect area 1.

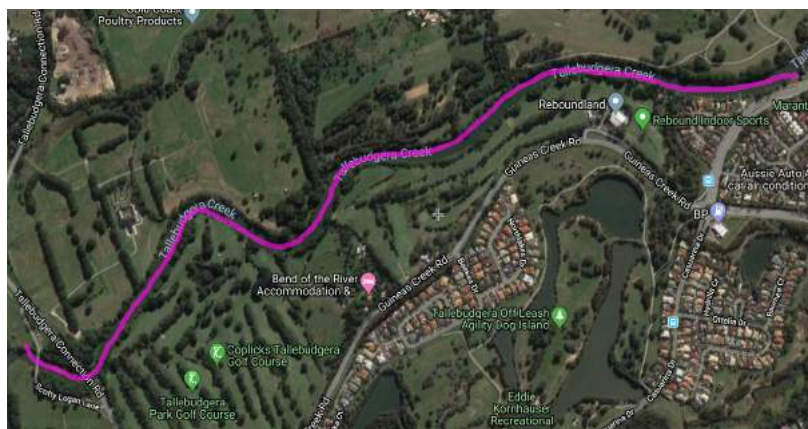


Figure 4. Transect area 3.

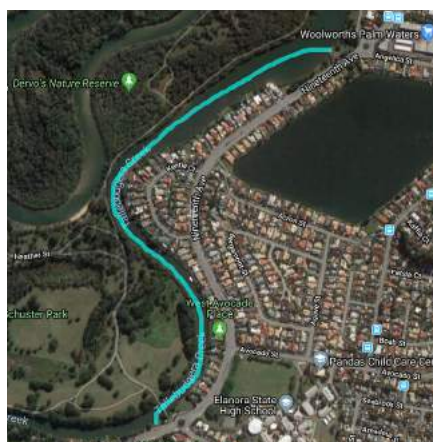


Figure 3. Transect area 2.

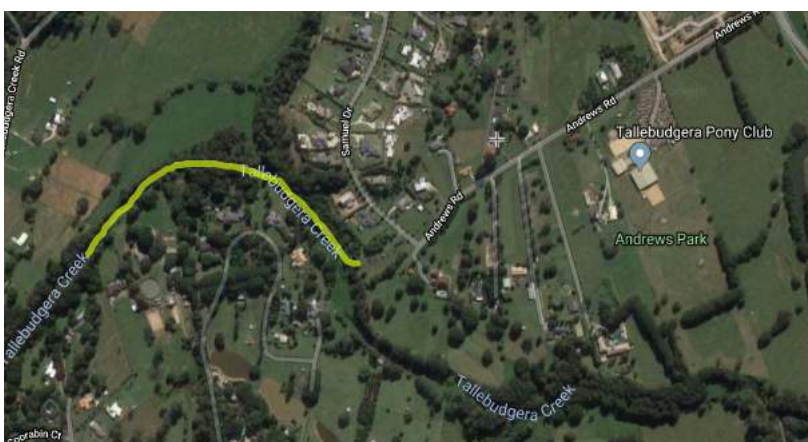
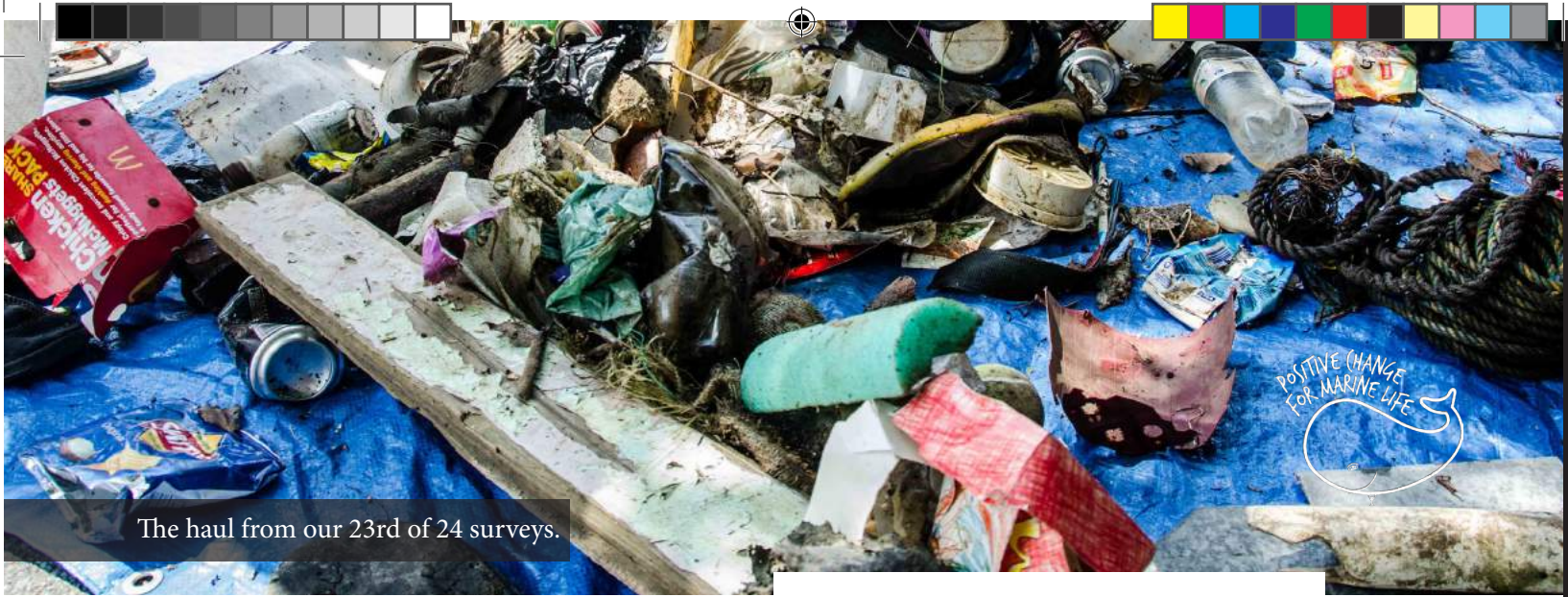


Figure 5. Transect area 4.





The haul from our 23rd of 24 surveys.

"PLASTIC AND POLYSTYRENE MADE UP 86.2% OF OUR FINDINGS - 60.6% POLYSTYRENE AND 39.4% PLASTIC"

RESULTS

Over the course of 24 kayak-based surveys on the Tallebudgera Creek, our team traveled 40.2km collecting 22,925 pieces of debris (Table 1), which weighed in at 1,539kg. Plastic and polystyrene made up 86.2% of our findings (60.6% polystyrene and 39.4% plastic). From these two categories, the most found individual items were **polystyrene balls** (89.13% of total polystyrene), with **plastic bits and pieces (not film)**, **lightweight plastic bags** (including biodegradable bags), **cigarette butts and packaging** and **plastic film remnants** accounting for 70.83% of total plastics found (Figure 6). In total 19 volunteers contributed 429 hours over almost 7 months to collect our baseline data and ensure that Phase I of the program was a success!

Table 1. Total findings by category and items of interest.

CATEGORY	TOTALS	ITEMS OF INTEREST	TOTALS
Plastic	7781	Foam Insulation & Packaging	976
Polystyrene / Foam	11988	Polystyrene Balls	10685
Glass	1784	Plastic Bits & Pieces (Not Film)	1909
Cloth	130	Plastic Film Remnants	1080
Metal	561	Cig Butts and Packaging	1186
Paper	310	Lightweight Plastic Bags	1336
Rubber	152	Heavyweight Plastic Bags	40
Wood	74	Plastic Straws / Confection Sticks	186
Other Items	145	Plastic Drink Bottles	318
		Plastic Food Packaging	587
		Rubber Balloons	27
		Mylar / Foil Plastic Balloons	15
GRAND TOTAL	22925	GRAND TOTAL	18345

Percentage (%) Representation of Total Debris Found (24 surveys)

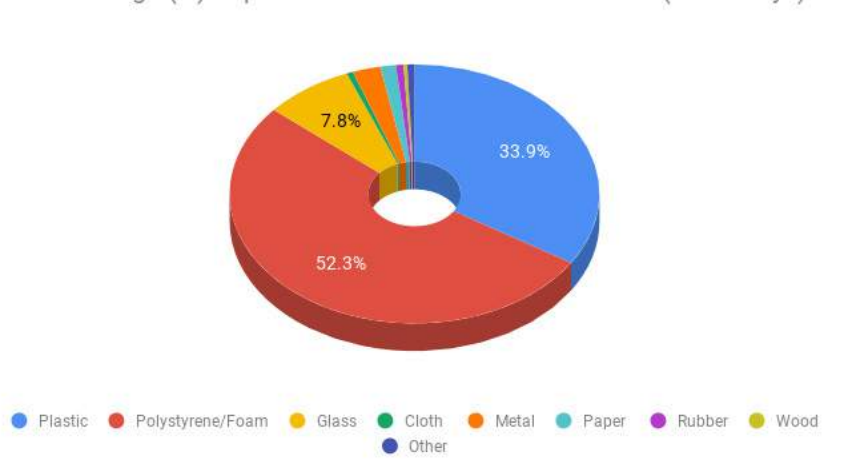


Figure 6. Total debris found - represented as a percentage.

An in-depth look at our findings...

In this section we examine weight and item type found as a percentage of each survey section, whilst comparing survey section results, which will inform management strategies to mitigate the environmental impacts of problem items.



Our in-depth results give a greater understanding of the proliferation of harmful items such as foam insulation & packaging, polystyrene balls, plastic bits & pieces, plastic film remnants, cigarette butts, lightweight & heavyweight plastic bags, plastic straws & confection sticks, as well as rubber & foil plastic balloons in order to address them at their source.

ITEM TYPE AND WEIGHT

As survey section lengths differed, we used the average number of items and weight per kilometre (km) traveled to identify the true numbers of debris per section (Figure 7 and Figure 8). We also calculated total number of items and weight per km across the full length of the total area that we covered along our 24 surveys. This area was 40.2km in total and resulted in **an average of 570 items per kilometre**, and **an average of 38.3kg per kilometre** being found across the total length covered.

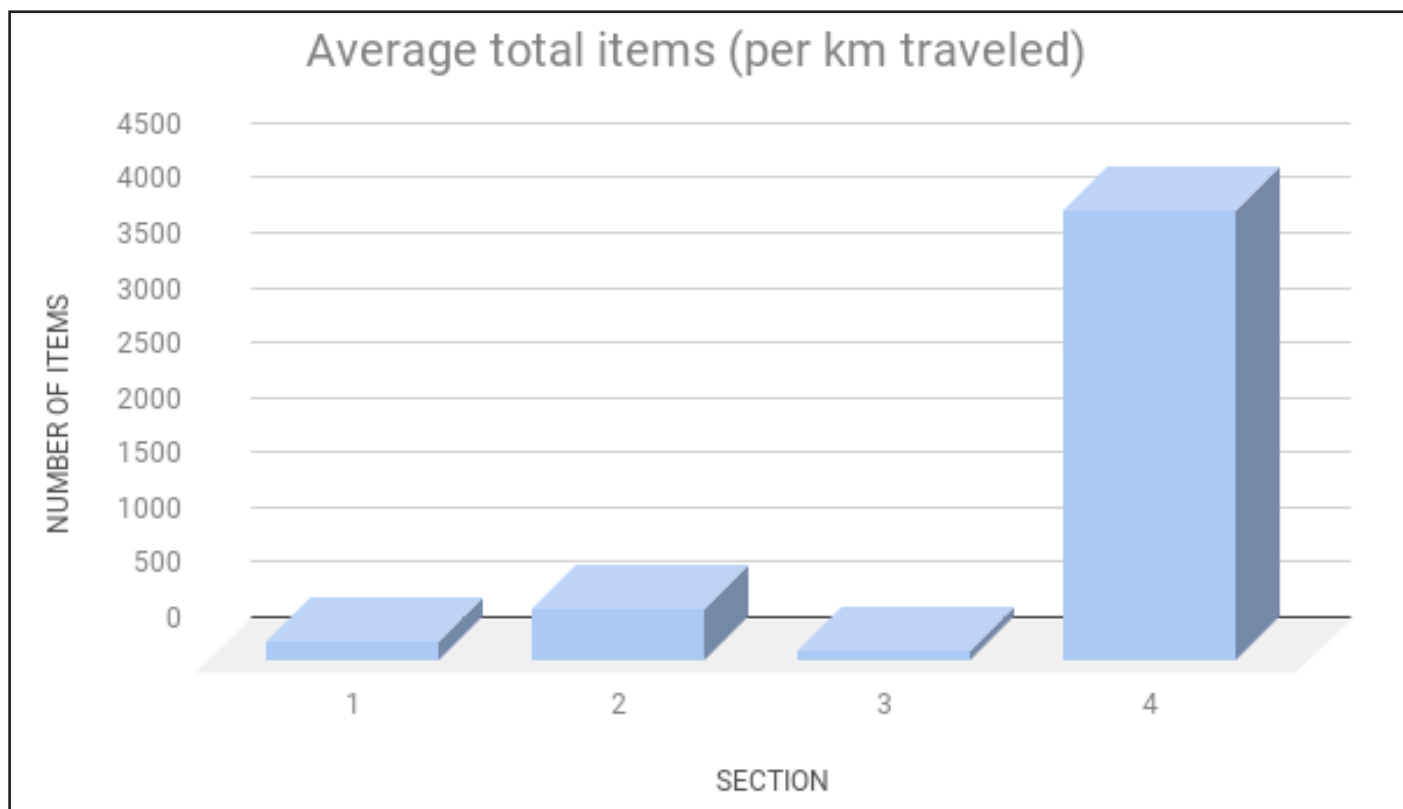


Figure 7. Average total items by section (per km traveled).

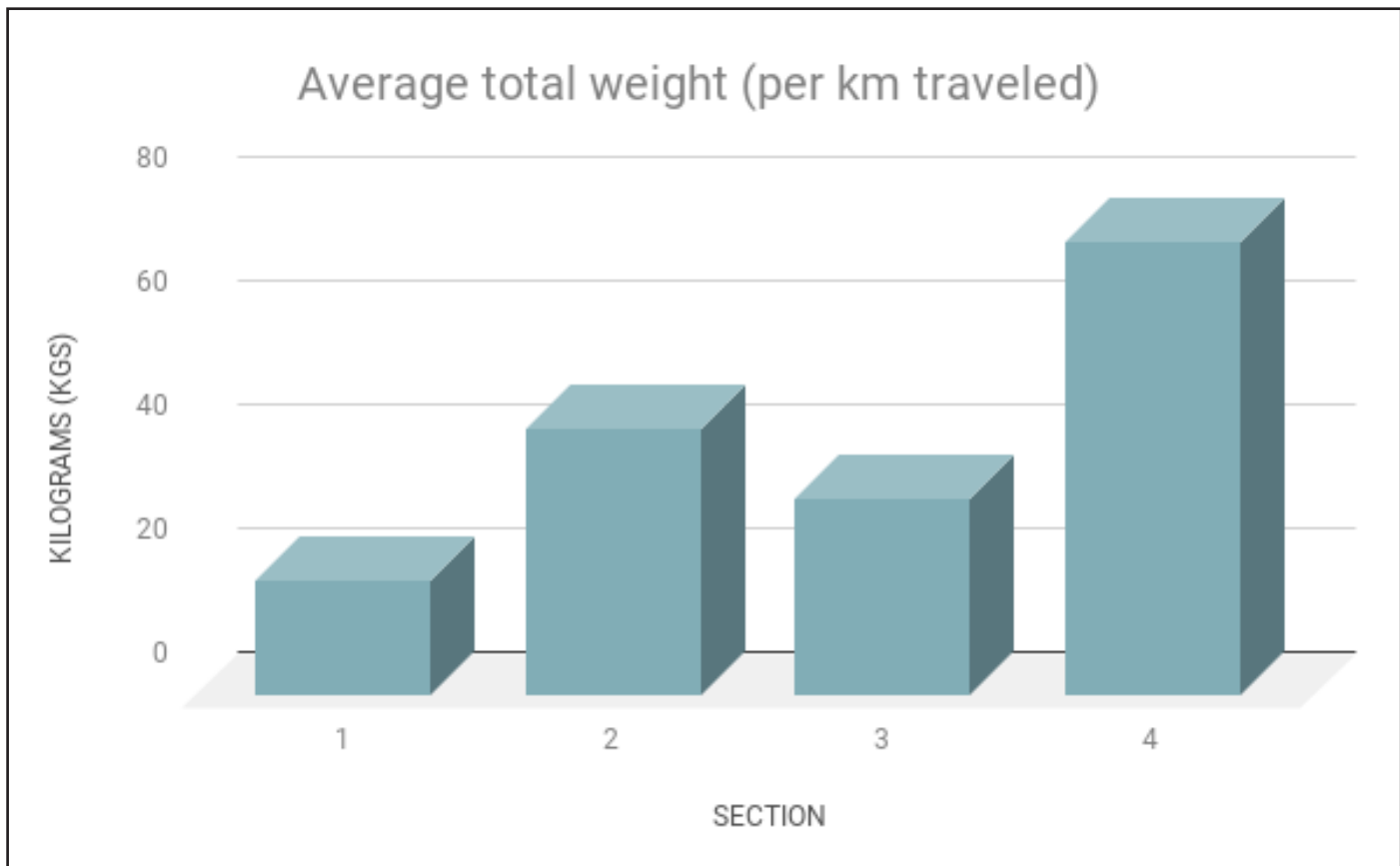


Figure 8. Average total weight by section (per km traveled).

ITEMS OF SIGNIFICANCE

In examining items of significance, our team assessed items that were the biggest threat to marine ecosystems. Foam insulation & packaging, polystyrene balls, plastic

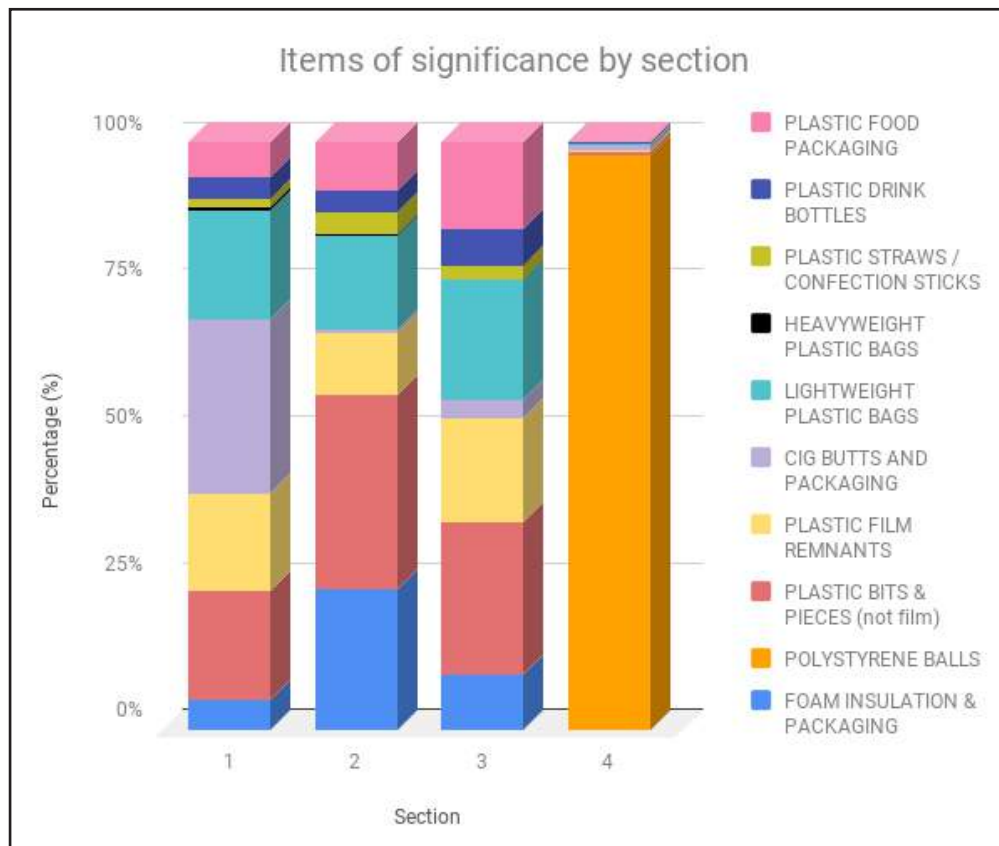
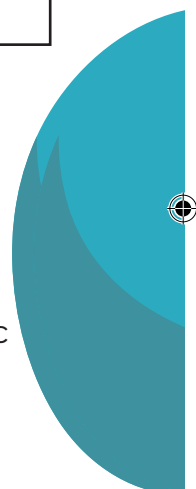


Figure 9. 10 items of significance by section.

bits & pieces, plastic film remnants, cigarette butts & packaging, lightweight plastic bags, heavyweight plastic bags, plastic straws/confection sticks, plastic drink bottles, as well as plastic food packaging made up the top 10 most harmful items found, given their abundance and environmental impact (Figure 9).



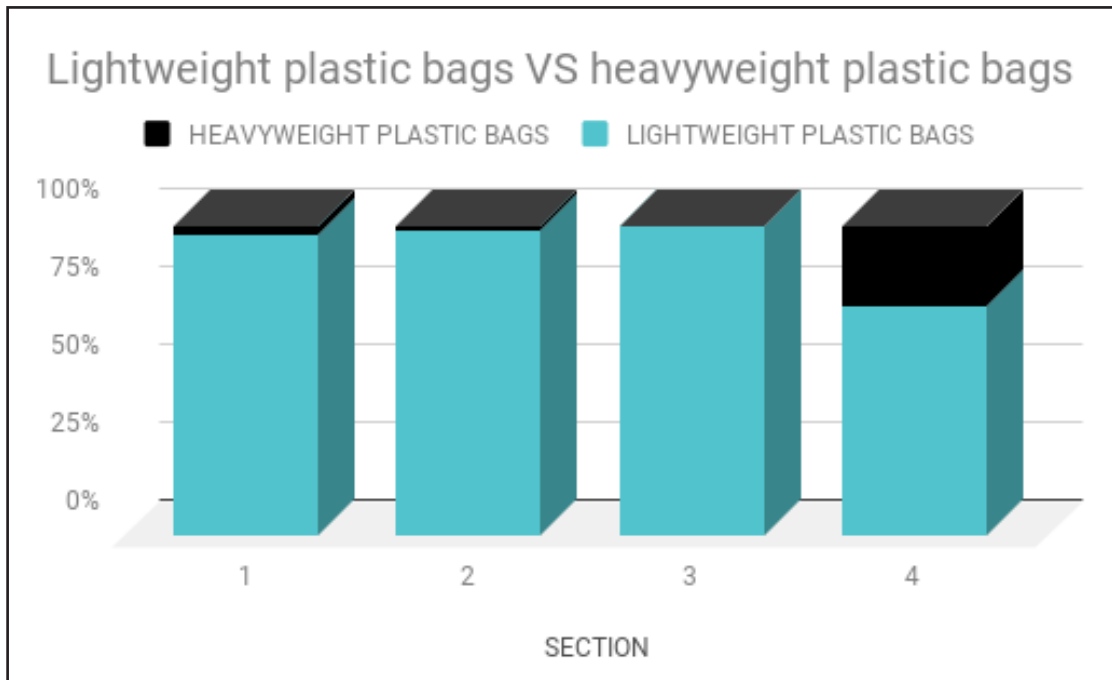


Figure 10. Proliferation of lightweight plastic bags VS heavyweight plastic bags.

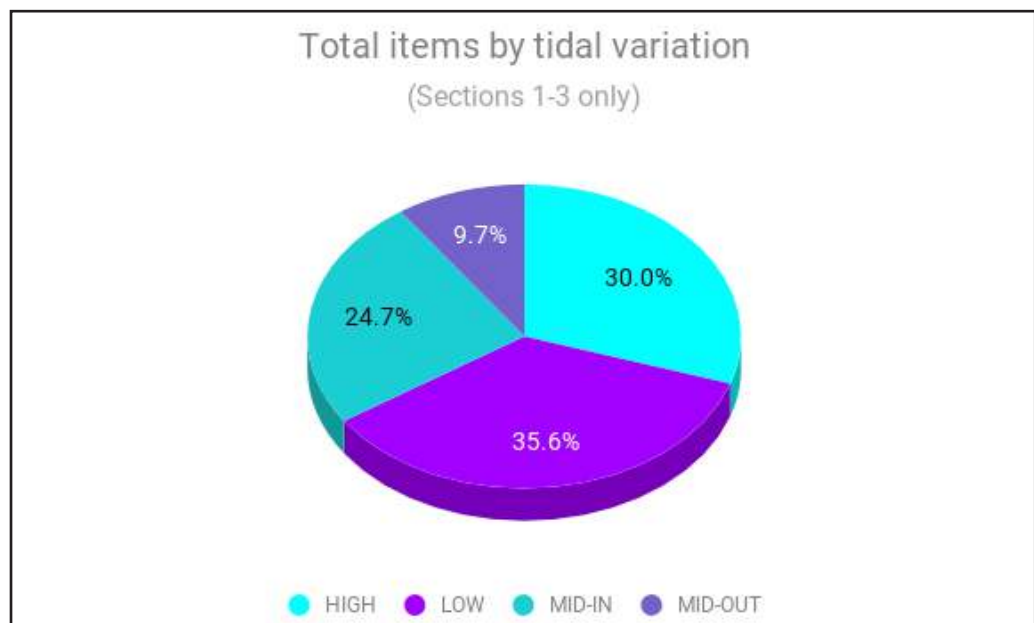
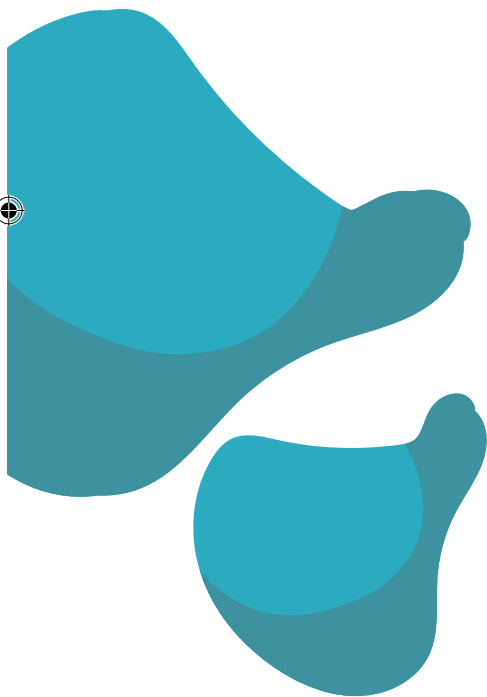


Figure 11. Total items by tidal variation (excluding section 4 - non-tidal section).

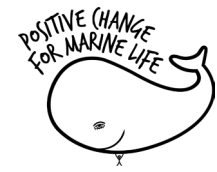
Figure 10 reflects the proliferation of lightweight plastic bags versus heavyweight plastic bags by section, whereas Figure 11 shows the impact that tidal variations had on the amount of items that we found in sections 1-3 (as section 4 was not influence by tidal fluctuations).

Tides here have been added for interest only, as we determined that greater survey numbers are needed to correlate a trend between tidal variation and total items found.

State of Marine Debris Report - Tallebudgera Creek, 2019 - © Positive Change for Marine Life 2019



MANAGEMENT SOLUTIONS



SECTION ANALYSES & BREAKDOWN OF FINDINGS

It's clear from our results that a lot of work needs to be done in order to mitigate the impacts of marine debris on the Tallebudgera Creek. This section of the report explores our findings and highlight patterns and sources of debris by section. The main aim of our report is to address the most problematic items, which have the most significant impact on marine life, water quality and habitat. In order to do this, we predominantly focus on items made from polystyrene/foam and other plastics.

THE BEAN BAG ANOMALY

In assessing our results, we noticed an anomaly in our findings - a bean bag and its associated contents (polystyrene balls), which were collected in section 4 of our first survey length

(adding 10,685 items to our total findings - found across 7/24 surveys). The removal of the polystyrene balls from our results had a dramatic impact on our data and thus, separate

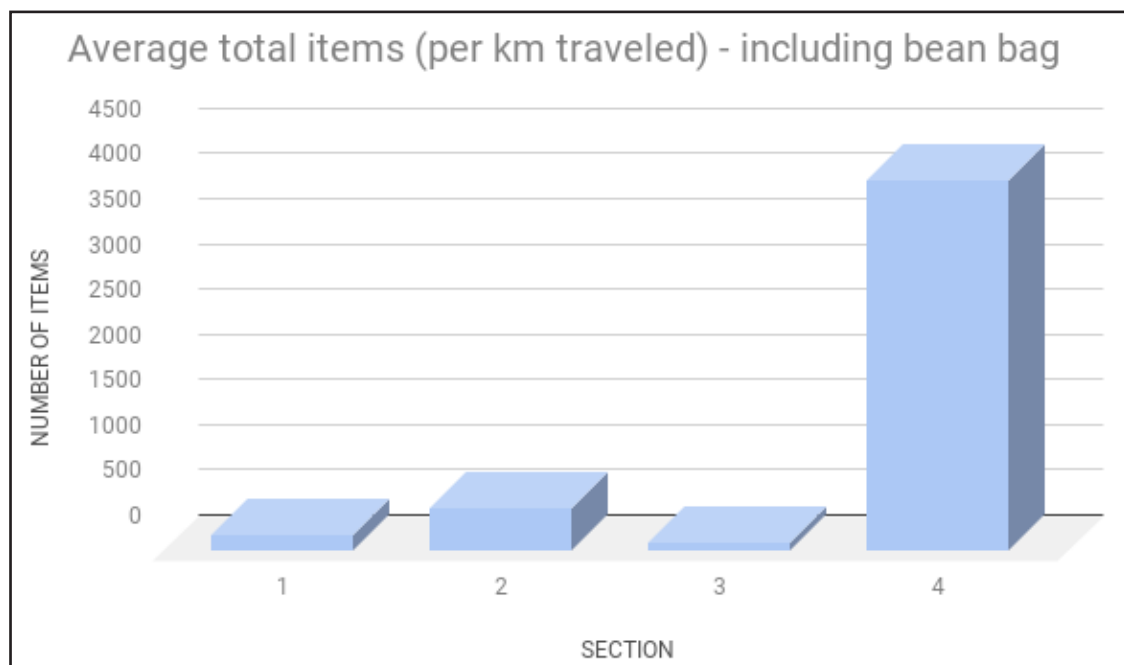


Figure 12. Average total items by section (per km traveled) including bean bag and polystyrene ball data.

datasets were created both including the polystyrene balls and excluding them from our results. Figure 12 and Figure 13 reflect average total items per kilometre traveled including and excluding the polystyrene balls. This reflects a clear change in results in section 4, with Figure 13 highlighting a more standard results trend, which could be expected given the absence of the bean bag and associated polystyrene balls in future surveys. With the polystyrene balls removed from section 4, our total number of items for that section would have been only 385, instead of 11,078. With them removed from the total survey length we would have found an average of 304 items per kilometre, instead of the average of 570 per kilometre found.

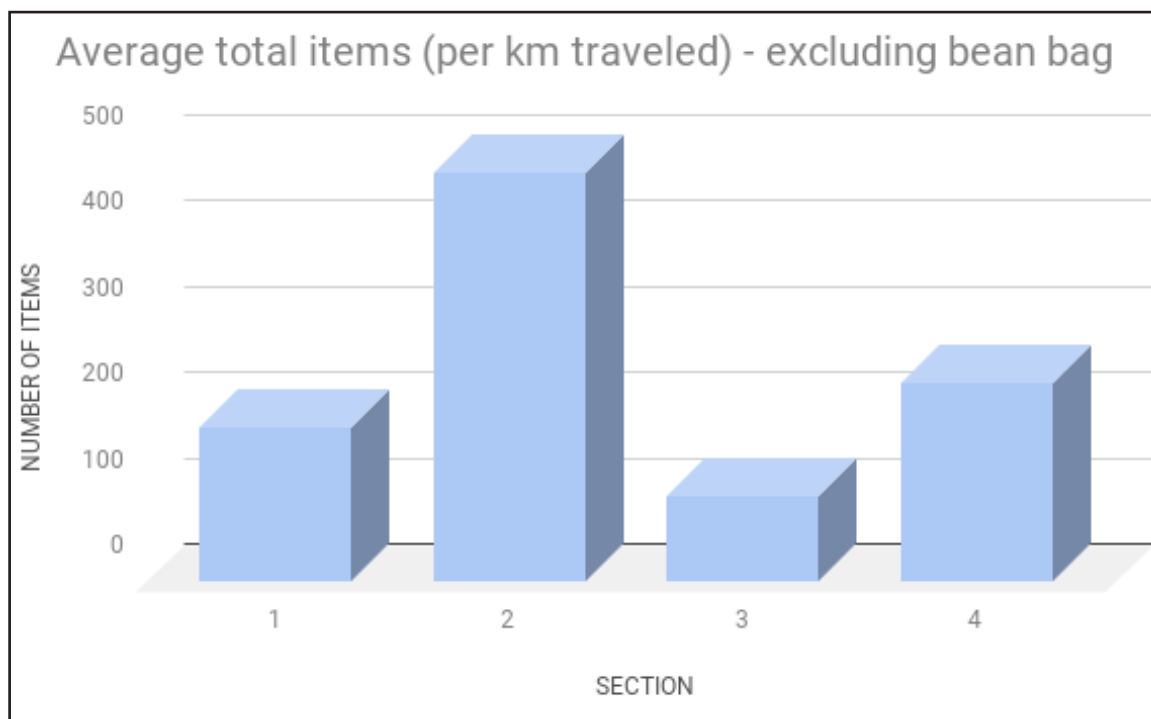
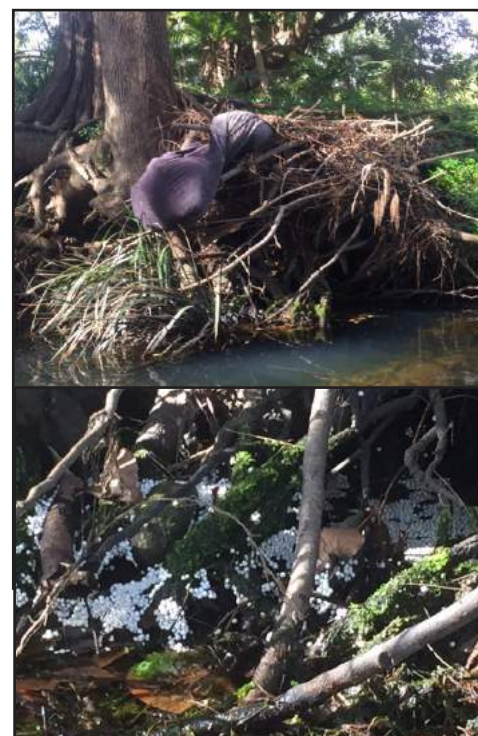


Figure 13. Average total items by section (per km traveled) excluding bean bag and polystyrene ball data.

In terms of total weight, the bean bag and polystyrene balls had a negligible impact on weight and thus, only one dataset outlining total weight by km was needed (refer to Figure 8, page 11). Figure 14 and 15 also reflect the changes that the beanbag and polystyrene balls made to our results. Figure 14 shows that >96% of items found across section 4 surveys were polystyrene balls, whereas Figure 15 highlights that cigarette butts and packaging would have most likely made up the bulk of items in section 4, given the absence of this anomaly.

ITEMS OF SIGNIFICANCE

Excluding the polystyrene balls as the most abundant item in our survey data, we can see that plastic bits and pieces (not film); plastic film remnants; cigarette butts and packaging; lightweight plastic bags; and foam insulation & packaging made up the bulk of items across our 4 survey sections. We can also see that sections 2 and 3 had markedly higher rates of foam insulation & packaging, as well as plastic bits & pieces (not film), whilst in sections 1 and 4 cigarette butts & packaging were far more abundant than in sections 2 and 3. Heavyweight plastic bags also made up a stronger percentage of total items found in section 4. Although this data is interesting to take note of and gives us an idea of item abundance in each section, it is not so relevant when it comes to total items found, as



The infamous bean bag. Its polystyrene balls were found in 7/24 survey sections and caused havoc with our data, not to mention the enormous threat that they posed to marine life.



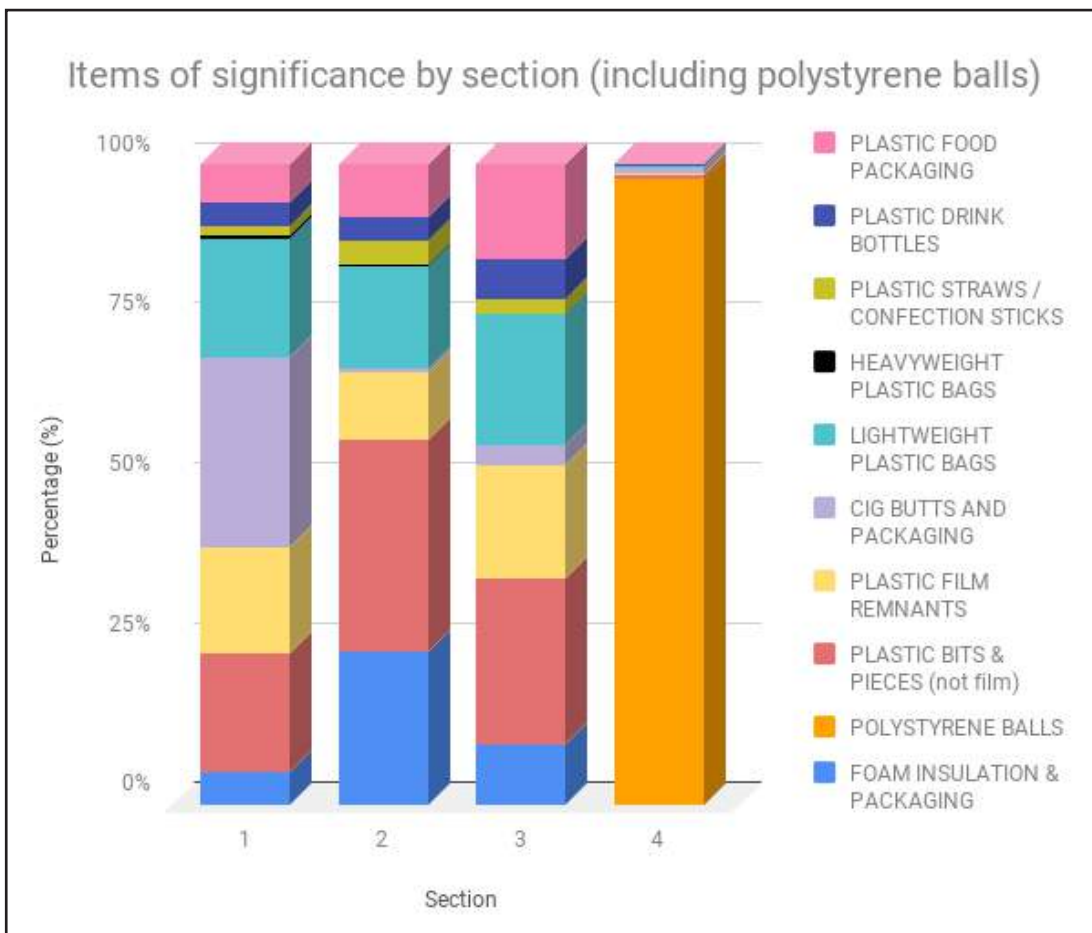


Figure 14. Items of significance represented as percentage (%) of each section (including polystyrene balls).

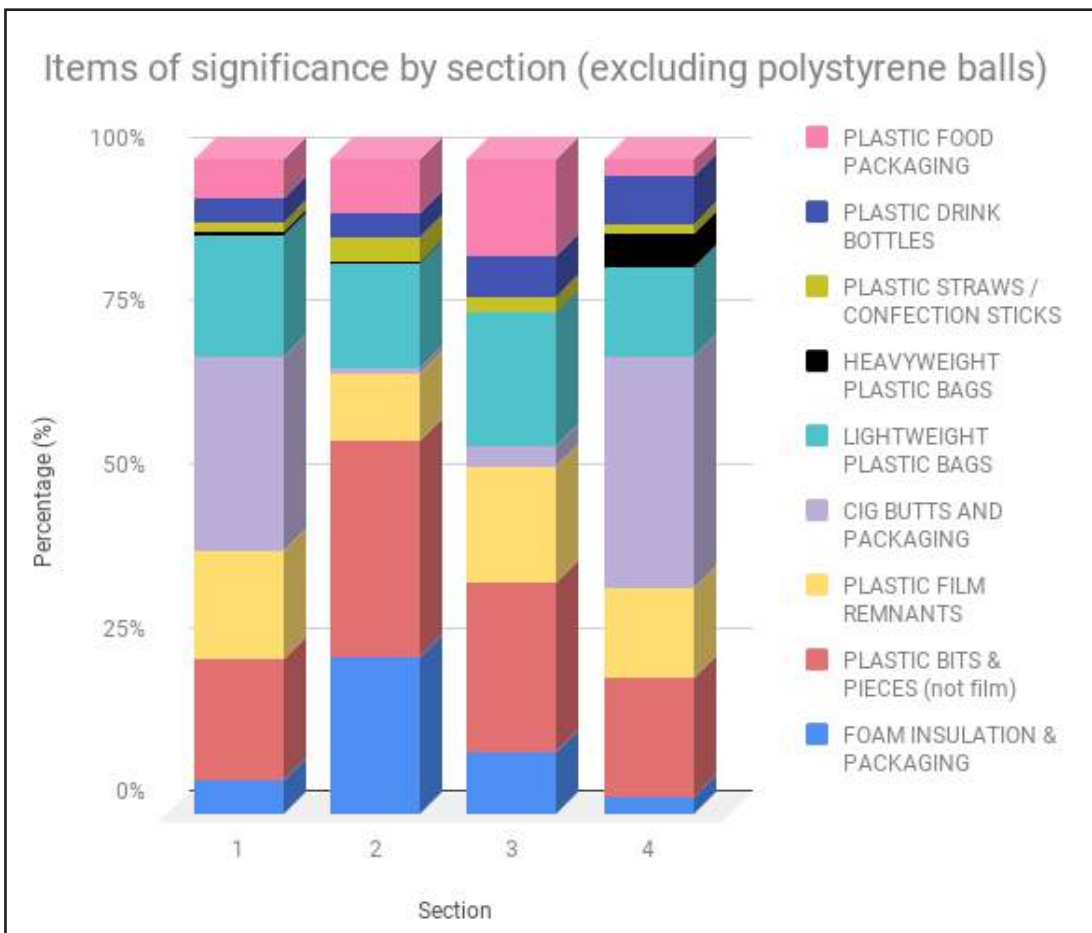


Figure 15. Items of significance represented by percentage (%) of each section (excluding polystyrene balls).



survey section distances and item abundance differs from section to section. This means that while 200 plastic bottles in one section could make up only 6% of the total items found, 10 plastic bottles found in another section could make up 40% of total items found. For this reason we developed Figure 16 and 17, which show total items by section, comparing all four sections to one another. This gives us a comparison of total items found across sections and enables us to compare data to identify where most items are being found and why. Figure 16 shows the data including polystyrene balls, whilst Figure 17 reflects the data without the inclusion of polystyrene balls.

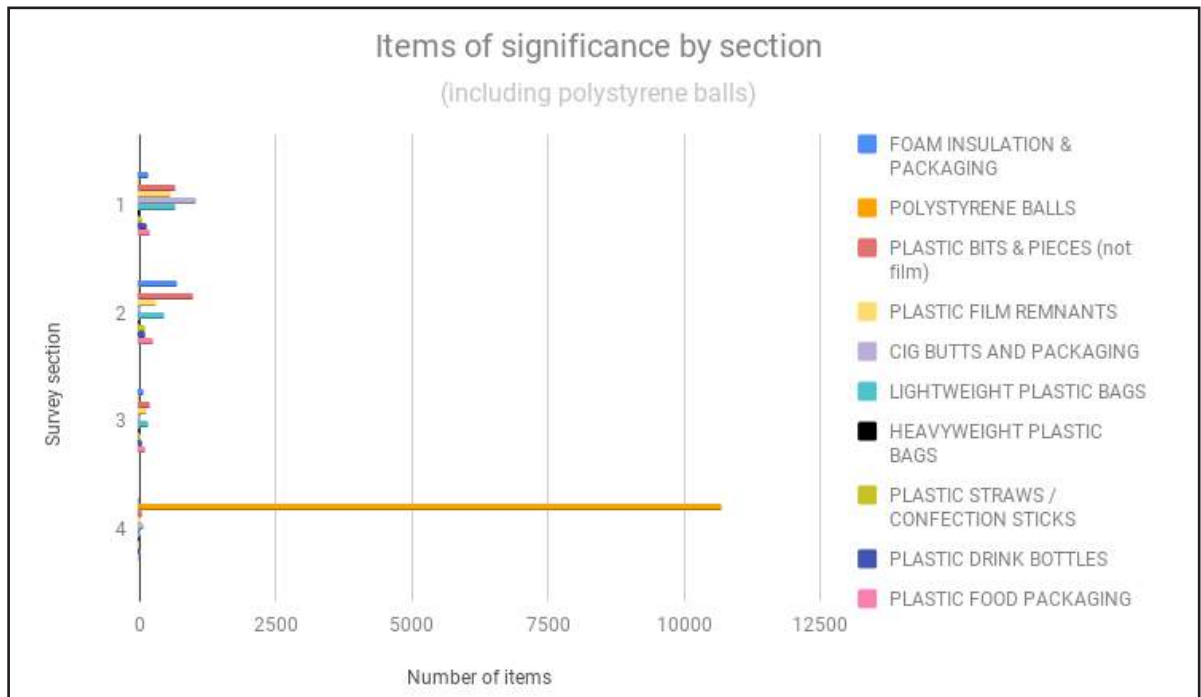


Figure 16. Items of significance represented by total number of items found in each section (including polystyrene balls).

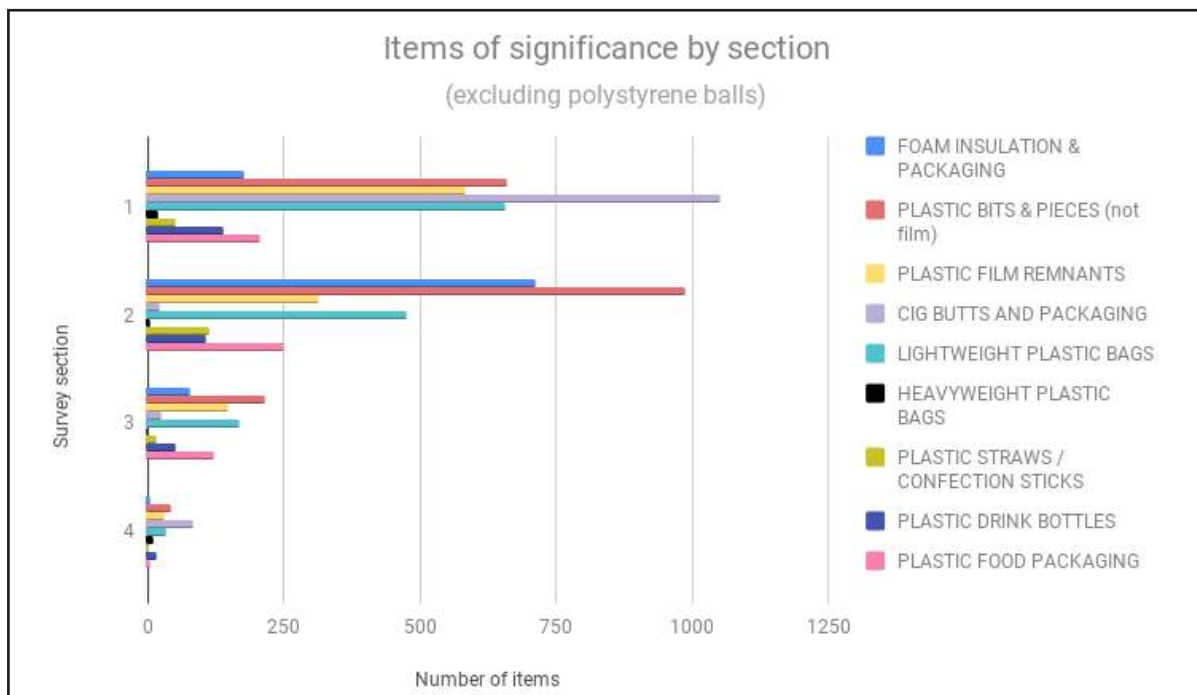


Figure 17. Items of significance represented by total number of items found in each section (excluding polystyrene balls).



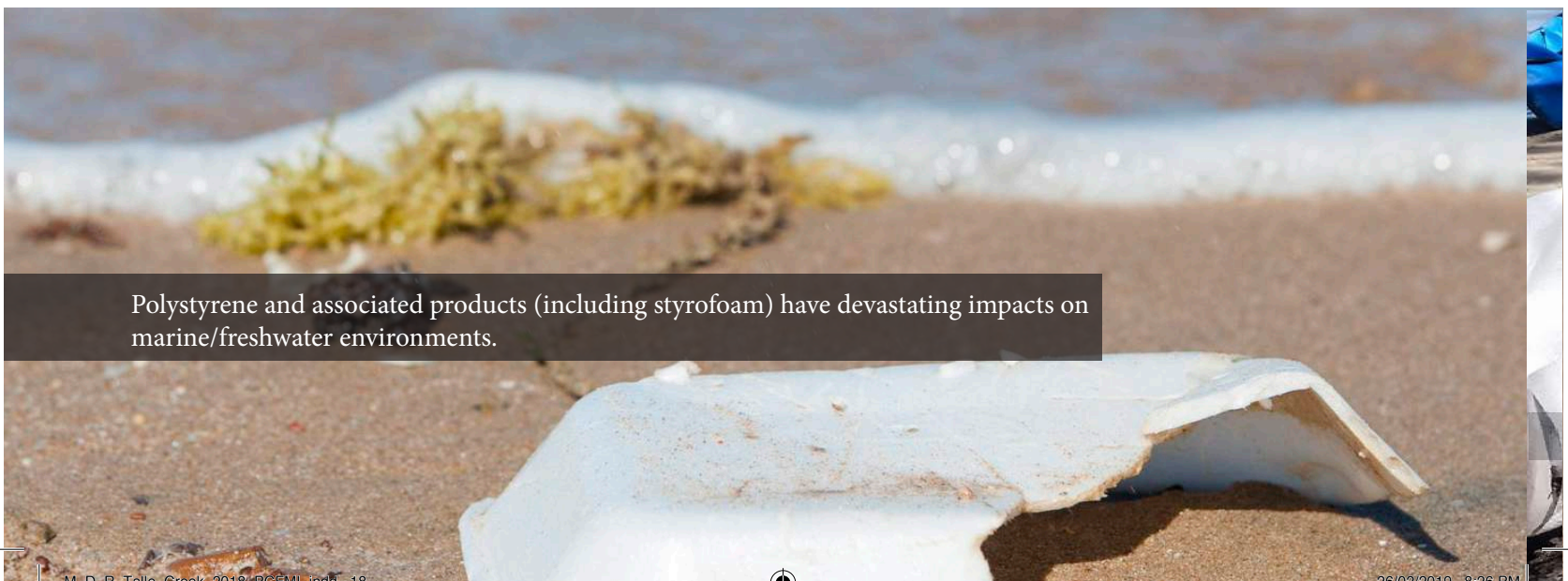
POLYSTYRENE BALLS and FOAM INSULATION & PACKAGING

The presence of polystyrene balls from the bean bag that we found in the first section 4 survey that we completed created an incredible challenge for our team, not just in terms of their environmental impact on the waterway, but also in terms of the impact that it had on our data. These small expanded polystyrene foam (EPS) balls (commonly known as styrofoam)⁷ float, are difficult to collect and are easily mistaken for fish roe or other organic matter, which is a potential source of food for a variety of species. They are a prime example of an item in which ingestion from turtles, fish, crustaceans, birds and other species could be a common occurrence, contributing to sickness or death if consumed in high numbers or alongside other inorganic items.

Styrofoam and other polystyrene items collected, most of which we categorised as 'foam insulation & packaging', are a key threat to marine life⁷. Not only is polystyrene harmful when ingested, it also leaches toxic chemicals into the water, is a known carcinogen to lab animals and is a possible neurotoxin and carcinogen to human beings⁷. The complete extent of its impacts on marine and freshwater ecosystems is yet unknown.

One of our team (during our 3rd last survey) found that one of the private boat ramps along the creek had heavily degraded, with chunks of polystyrene falling into the waterway. In Phase II of our program, we will examine this issue further and ensure that our community engagement programs incorporate this issue. Our *Potential Solutions* section on page 20 explores this in more detail.

We believe that there is no place for polystyrene or styrofoam in our society, given the incredible impact and threat that it has to the environment and human health. The data from this and other PCFML projects, will assist to push for a ban on these harmful items, in collaboration with other organisations and community groups. Across the USA there are a growing number of cities and towns banning polystyrene⁸. This trend is also prevalent in countries like the Seychelles⁹ (with PCFML contributing to this ban) and soon to be across the EU as well¹⁰. It's time that Australia followed suit.



Polystyrene and associated products (including styrofoam) have devastating impacts on marine/freshwater environments.





PLASTICS and CIGARETTE BUTTS & PACKAGING

Plastic bits & pieces (not film) and lightweight plastic bags took places 2 and 3 in terms of being the items in highest abundance during our surveys (with 1909 and 1336 items found respectively). Cigarette butts & packaging were in place 4 (with 1186 found in total), whilst plastic film remnants rounded out the top 5 of the most prevalent items found (with 1080 pieces found in total).

The impacts of plastics on marine life are well documented and, with an estimated 5.25 trillion pieces of plastic in the ocean¹¹ and Australia contributing an estimated 130,000 tonnes of plastic to the ocean each year¹², we need to take urgent steps to address this problem at its source. Our team found 7781 pieces of plastic (including cigarette butts & packaging) in just 6 full-length surveys of the Tallebudgera Creek. Given that large sections of the area that we surveyed are low-density (Tallebudgera Golf Course, Tallebudgera Valley) or undeveloped areas (Fleay's Wildlife Park) this number is alarming to say the least, and highlights a much bigger problem facing waterways across the Gold Coast, throughout Queensland and across the country.

Plastic bits & pieces (the most abundant plastic item found) are difficult to combat, as many are unrecognisable, having broken-down or photodegraded over time from larger plastic items. Their high abundance as the second most prevalent item found overall, reflects the need to eliminate plastic items from making their way to waterways and the ocean in the first place.

As is evident from our data, the majority of lightweight plastic bags were found in sections 1 and 2 of our surveys. This is reflective of the high density of these areas, their proximity to major roads and highway overpasses, as well as the well-utilised parks and suburban homes (many of which with private jetties), that back onto the Creek. Lightweight plastic bags were recently banned in Queensland and, as our beach surveys and River Warriors programs expand, we hope to find a consistent decrease in the prevalence of these items. We are however, now concerned that heavier weighted plastic bags now available at supermarkets will increasingly be found in the -



Plastic bottles and other plastic items are one of the major threats to the health of our waterways.



Our Butt Free Beaches Coordinator in Byron Bay, Zoe involved in our joint community engagement program with Byron Council.

environment. Given this, and the high prevalence of lightweight plastic bags in our findings, we will continue to push for a ban on ALL plastic bags, especially given that Australian's were known to use almost 4 billion bags per year (10 million per day) according to one report¹². We are yet to see the reduction that numerous state bag bans have made to this number, however NSW and Victoria are still yet to ban plastic bags and both have the highest populations in the country.

Cigarette butts make up over 80% of our findings on average across our beach surveys in NSW and QLD. Known to break down in between 1 and 12 years, they also leach toxic chemicals into the water and

are known to be ingested by a number of marine, freshwater and avian species. Across Tallebudgera Creek, the majority of cigarette butts were found in sections 1 and 4. These were in two locations that our team noted - under the Pacific Motorway overpass in West Burleigh (section 1) and in the park on Andrews Rd, Tallebudgera, which borders the upper reaches of the creek (section 4). We will aim to target these hotspot areas alongside Gold Coast City Council and other stakeholders during and post-Phase II of the program.

The introduction of a smoking engagement program, including cigarette butt-bins and enforceable penalties by our team and the Byron Shire Council in 2018, saw a marked reduction in cigarette butt and related-litter found during our surveys. We aim to introduce a similar program that compliments Gold Coast City Council's *Litter Enforcement Strategy* and ensures a significant reduction in the amount of cigarette butt and packaging litter in Tallebudgera Creek, as well as across the greater Gold Coast City region.

The majority of plastic film items that we found were cling wrap or pieces of lightweight plastic bags, rubber balloons or pieces of plastic food packaging. With the plastic bag ban, beeswax wraps, reusable produce bags and a wide-range of other plastic-free items now available, we will be highlighting these items throughout Phase-



II of the program, as well as the simple ways for the local community to choose to reuse.

The exploration of stormwater traps, nets and booms; as well as community engagement programs and increased educational signage, graffiti artworks and neighbourhood stewardship programs can all assist in combating marine debris across the catchment area. We will explore some of these ideas in more detail in the next section of this report.

POTENTIAL SOLUTIONS

From our experience, we find that simple, community-driven models can have incredible success in tackling environmental issues. That's why we've developed three key, inter-connected focus areas to engage stakeholders, tourists and the broader community to address marine debris in Tallebudgera Creek at its source. These are: 1) Community Outreach, 2) Education & Training, and 3) Supporting Infrastructure.



COMMUNITY OUTREACH

During the course of our surveys on Tallebudgera Creek, we engaged with a number of locals and tourists. This included fishers, residents living in close proximity to the creek, recreational users, local business owners and council workers. From our brief conversations we found that there was an enormous lack of awareness when it came to the the proliferation of marine debris in waterways, with most people we engaged with completely taken aback by the amount of litter we had collected. That being said, around 1 in 2 of fishers, recreational users, council workers and people living directly on the creek did seem to be aware of the issue and all mentioned that more needed to be done to engage the broader community in order to address it.

Our community outreach programs will commence in March, 2019 and focus on engaging a wider section of the community in the issues affecting Tallebudgera Creek and other waterways across the Gold Coast. We will be running **survey outreach programs** targeting 6 specific groups of stakeholders - fishers, residents living within 1 block of the creek, recreational groups, high school students and teachers, local business owners and local / state government departments in order to gather more data on thoughts, perceptions and attitudes around waterway health and marine debris. Our outreach programs will also include 6 **public-facing on-water cleans** on the creek, to practically highlight the issues and connect the community directly to them.

We will also be looking to develop a **Waterway Watch program** post-Phase II with residents and business owners whose properties border the creek. This program will be dependant upon further funding.



EDUCATION & TRAINING

Education and behavioural change are key to mitigating marine debris in Tallebudgera Creek. Human beings are the source of these issues and therefore we are the only ones who can solve them. Post-community outreach surveys, we will be running 6 **Source to Sea education and training programs** with the six aforementioned target stakeholders in order to shift perceptions around consumption and highlight the threats that our most found items are having on the marine and freshwater environment. This will include training business staff to engage with customers on the reasons why businesses no longer stock single-use plastic items and the impact that they have on local waterways.



Education, training and outreach will be key to mitigating marine debris and moving the Tallebudgera Creek toward an 'A' rating on our Marine Debris Report Card.

The educational component of our program will also extend to the promotion of our **Marine Debris Report Card** (page 25) throughout the community

across Palm Beach, Elanora, Burleigh Heads, Burleigh Waters, West Burleigh, Tallebudgera, Tallebudgera Valley and Reedy Creek in particular, as well as through media outlets across the Gold Coast. We will also be looking to engage with various businesses and government bodies to fund locally made and strategically placed educational signage to engage hard to reach demographics including motorists, rough sleepers and tourists in marine debris hotspots such as under the Pacific Motorway overpass and in the various parks, which border the waterway.

The majority of items we find can easily be prevented from polluting the environment through behavioural change and awareness.



SUPPORTING INFRASTRUCTURE

Addressing the issue of marine debris is incredibly challenging without proper supporting infrastructure. Prevention and disposal of litter before it can make its way to a waterway or the ocean is vital to keeping our sea plastic free, that's why we see infrastructure as a core focus area to support our community outreach and education / training programs. As mentioned previously, **educational signage** can be a great way to engage the community in thinking twice before they litter, especially if it has a positive message, rather than an authoritarian one. Humorous signs, like the one pictured right, can also be effective. As part of Phase II of the Tallebudgera Creek River Warriors program, we will be looking to install recycled, locally made educational signage in marine debris hotspots throughout the creek. The concept of graffiti artworks in areas known for rough sleeping that have abnormally high-levels of litter will also be explored to appeal to those that frequent them.



Educational signs are a great way to shift awareness, especially unique, positive and/or humorous signs like the one above!

Throughout many of the parks, underpasses and sections of road bordering the creek, we noticed a significant lack of bins, including cigarette and recycling bins. While these can be costly for local councils, we believe that they are vital to preventing litter from entering the environment. Our work in Byron Bay has shown that **ample, easy to use bins** can create significant positive outcomes, alongside adequate community education and outreach. We will be exploring opportunities for these bins to be funded / installed alongside our educational signage in high debris areas and hotspots.

Over the past decade, research and development of **booms, nets and traps** to capture litter has significantly improved. We have engaged with a number of businesses who specialise in these areas in order to explore realistic debris capture devices and solutions to trap litter from stormwater drains, high-flow areas and highway overpasses. More research into this area will be completed during Phase II of the project.





Litter traps, nets and booms are still relatively new concepts in Australia, however the USA has been leading the way in this technology for some time (Above: Watergoats, Tampa Bay / below: EPA USA netting system).

From speaking with locals, and from our own experience, it's clear that heavy rain and flooding events have a significant impact on debris flows, adding huge amounts of debris from roads, stormwater drains, industrial areas and properties within proximity to the creek. We would like to explore the development of a **marine debris flood plan**, alongside council and the debris mitigation management groups that we engage during Phase II of the project. This will include community education prior to and during storm season, as well as specialised litter traps and booms to curve the flow of debris into waterways and the ocean during these events.

FINAL THOUGHTS AND NEXT STEPS...

Most people associate pollution with developing countries, which lack the infrastructure and resources to manage their waste. Australia is the lucky country - with an incredibly high standard of living, good education, public services and a relatively low population (especially given our size). Despite this, it's clear from our findings that marine debris is an enormous problem that has gotten way out of hand. If we are struggling to tackle this issue now, what will the future hold, given our projected population growth? An average of 570 pieces of debris per kilometre is a shocking statistic for the Tallebudgera Creek and has meant an F+ score on our Report Card (page 25). Despite this, we need to realise that work in the marine debris mitigation space is still in its infancy, especially in Australia.

We have the knowledge, resources and ability to address marine debris, yet these results reflect the low priority that it has been given over the past few decades. The good news is that increasing amounts of people, businesses and government institutions are starting to take notice. A lot of work is still needed to be done, however we believe that projects like our River Warriors initiative can develop a model of 'best practice' to present to governments, industry, the community and other stakeholders in order to identify positive ways to move forward and tackle this issue at its source.

We are excited to launch Phase II of this project and move the Tallebudgera Creek toward an 'A' rating for marine debris health.

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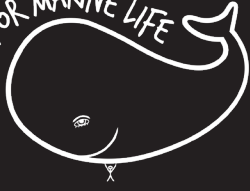
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MARINE DEBRIS REPORT CARD

POSITIVE CHANGE
FOR MARINE LIFE



TALLEBUDGERA CREEK, GOLD COAST, QLD

2019

INTRODUCTION

Plastic pollution and other forms of marine debris have been gaining increasing attention in Australia. A 2016 United Nations study found that more than 800 animal species were negatively affected by litter in our seas, representing a 23 per cent increase in the total number of species affected since 2012. In Australia, marine debris is recognised as a *Key Threatening Process* by the Australian Commonwealth Government under the *Environmental Protection and Biodiversity Conservation Act 1999*. With SE Queensland experiencing one of the fastest urban growth rates in Australia, action needs to be taken now to mitigate the impacts that growth is having on our waterways and their unique variety of habitats and wildlife, which offer a vast array of recreational, cultural and economic opportunities to coastal regions.

Our *River Warriors* initiative aims to address the impacts of marine debris and pollution through ongoing kayak-based surveys collecting, recording and disposing of marine debris in waterways across NSW and QLD. Phase I of our inaugural Tallebudgera Creek River Warriors project consisted of 24 weekly surveys covering the accessible length of the creek 6 times over a 7-month period. We collected baseline data on type, quantity and source and presence of marine debris, with 22,925 pieces of debris collected in total. This Report Card gives a snapshot of our findings and (alongside our *State of Debris Report*) aims to serve as a model for determining waterway health based on key variables; giving communities, businesses and governments a framework to improve marine-debris related threats and ensure cleaner, healthier and safer waterways across Queensland and beyond.

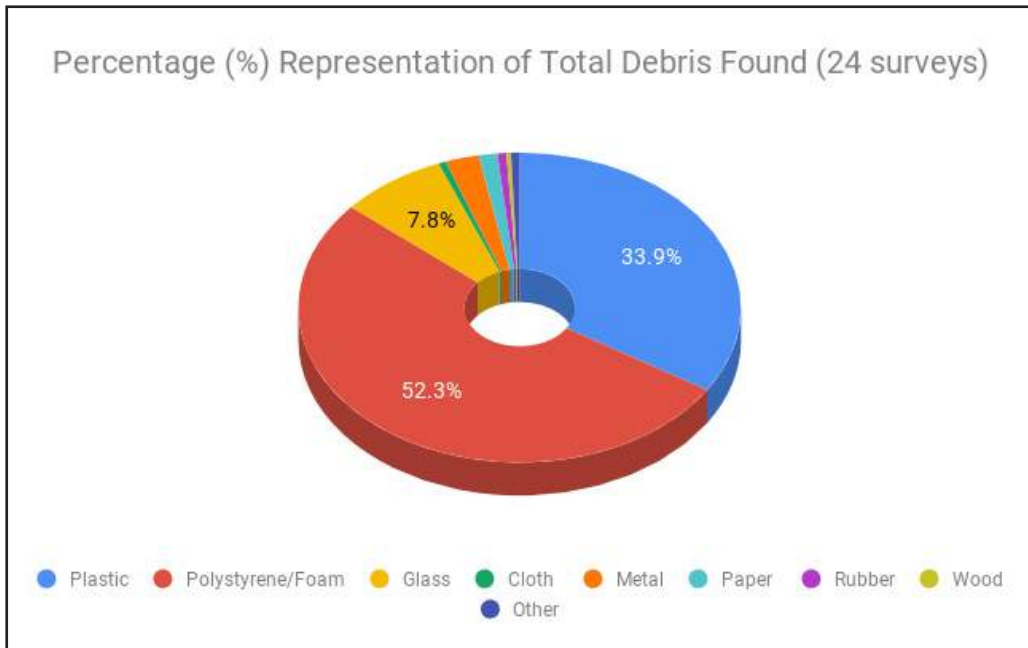
RIVER WARRIORS, TALLEBUDGERA CREEK: A SNAPSHOT



Marine Debris Report Card - Tallebudgera Creek
© Positive Change for Marine Life 2019

FINDINGS

In addition to the Snapshot on page 1, our data reflected that two categories - plastic and polystyrene, made up 86.2% of our findings (60.6% polystyrene and 25.6% plastic). From these two categories, the most found individual items were polystyrene balls (89.13% of total polystyrene), with plastic bits and pieces



polystyrene), with plastic bits and pieces (not film), lightweight plastic bags (including biodegradable bags), cigarette butts and packaging and plastic film accounting for 70.83% of total plastics found (Figure 1).

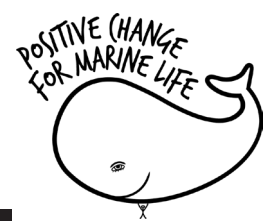


Figure 1. Total debris found - represented as a percentage.

REPORT CARD RANKING

Our Report Card ranking takes into account 3 key variables to determine a grade between A (best) and F (worst). It aims to mitigate problem items through community outreach, education and training and supporting infrastructure (examined during Phase II of the program).

10685

Polystyrene Balls

6061

Plastic Bits & Pieces

1336

Lightweight Plastic Bags

1186

Cig Butts & Packaging

1080

Plastic Film Remnants

TOP 5 ITEMS FOUND

Key Report Card Variables

Source of debris	Quantity of debris	Type of debris
■ No major source	■ <20 pieces per km	■ <10% plastic/foam found
■ 1-2 unmitigated sources	■ 20 - 100 pieces per km	■ <25% plastic/foam found
■ 3-4 unmitigated sources	■ 100 - 300 pieces per km	■ <50% plastic/foam found
■ 4-5 unmitigated sources	✓ 300 - 600 pieces per km	■ <75% plastic/foam found
✓ 6+ unmitigated sources	■ >600 pieces per km	✓ >75% plastic/foam found

REPORT CARD SCORE

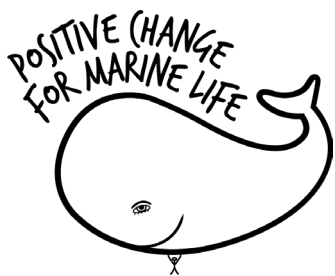
F+

While an F+ may seem like a horrible result, work in the marine debris space is still in its infancy. Phase II of this project will engage stakeholders across the region to mitigate debris at its source and ensure that Tallebudgera Creek can move towards an A rating!

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Supported by the QLD Government's Community Sustainability Action Grants Program



STATE OF MARINE DEBRIS REPORT 2019

TALLEBUDGERA CREEK, GOLD COAST, QLD

For further information on our River Warriors initiatives, or to set-up a meeting and/or presentation you can contact us via:

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