



TINGALPA CREEK - REDLANDS, QLD

STATE OF MARINE DEBRIS REPORT



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ACKNOWLEDGEMENTS

Positive Change for Marine Life gratefully acknowledges the support of the Redland City Council through their *Community Grants* program for the Tingalpa Creek *River Warriors* initiative and associated Reportcard.

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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 Environment Protection and Biodiversity Conservation (EPBC) Act 1999³. 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.

Our River Warriors initiative addresses the impacts of marine debris and pollution through a series of kayak-based on-water surveys to collect, record and properly dispose of marine debris in waterways across New South Wales and South East Queensland. The Tingalpa Creek River Warriors project consisted of 6 transect areas covering the accessible length of the creek 2 times (12 surveys) over a 10-month period. The surveys collected baseline data on type, quantity, source and presence of marine debris, with 5,164 pieces of debris collected in total. The project also included two public surveys, education programs and a public-facing event to officially launch the Report and associated Report Card, highlighting our findings as well as ways for the public to get involved in order to mitigate the issue at its source.

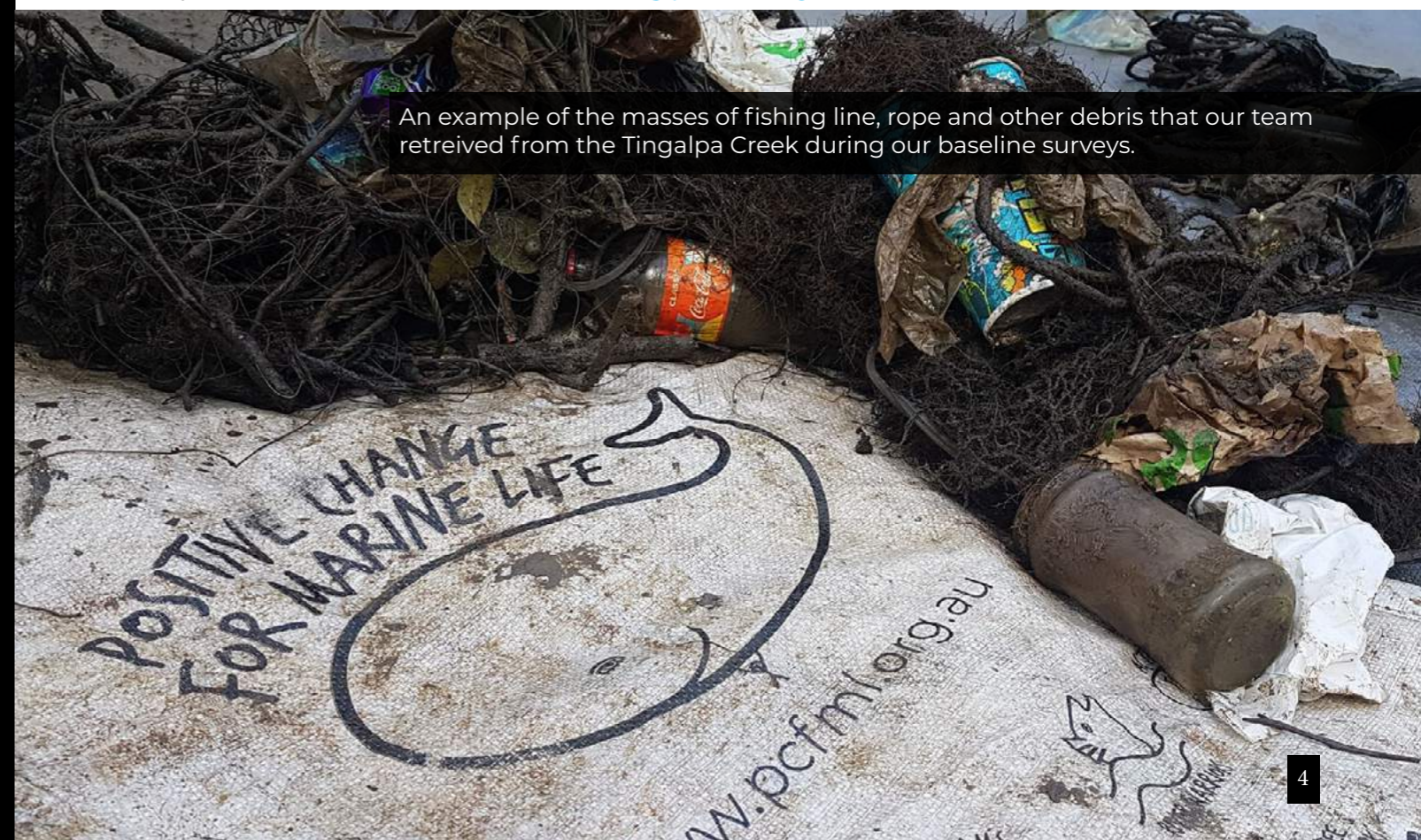
Weather and tidal conditions, the presence of injured / deceased wildlife and dates and times of collection were incorporated into our results, which highlight ongoing management strategies and community engagement programs as the project moves forward beyond the initial funding period.

This report and report card 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 Australia. Post-data collection, our team implemented Phase II of the project - focusing on community engagement and outreach in the form of educational programs and public-facing on-water surveys highlighting our findings, as well as source-based solutions to the issue. This allowed access to students, members of the public, and a range of stakeholders to connect directly to the issue.

Our team will be seeking further funding post-grant acquittal to continue this project into Phase III - focused on broader mitigation through source-based measures such as stormwater traps, booms and nets; increased public access to, and monitoring of, bins; design and installation of educational signage and litter 'voting booths'; business source-reduction programs; enforcement and monitoring, as well as continuing education programs and comparative data surveys and analyses across the waterway.

We would like to thank the Redland Shire Council for funding and supporting our River Warriors project on Tingalpa Creek and for their continuing efforts to help combat marine debris at its source.

For more information on our River Warriors initiative and our work across NSW and QLD, please contact our team via info@pcfml.org.au.



An example of the masses of fishing line, rope and other debris that our team retrieved from the Tingalpa Creek during our baseline surveys.



RIVER WARRIORS

TINGALPA CREEK

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 data on type, quantity, presence and sources of marine debris;
- 2) **Upload data into our ongoing marine debris database**, as well as Tangaroa Blue's Australian Marine Debris Initiative (AMDII) database in order to keep a record of findings, as well as to feed into and support ongoing research into debris patterns and solutions Australia-wide;
- 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 and III of the project**, which aim to more broadly engage the community, government and local businesses in our work through: awareness programs, educational signage and active mitigation measures - including the exploration of strategic bin placement, installation of litter mitigation devices, enforcement and monitoring programs, as well as the development of a marine debris flood response plan (based on each waterway that we are working on);
- 5) **Produce subsequent reports at the completion of Phase II and III** (pending funding), highlighting successes and challenges and determining ongoing actions to ensure the creek can continue to move toward or maintain an 'A' rating on 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, in addition to the Tingalpa Creek project.

This project is our 4th River Warriors initiative over the past 18 months and we are excited to see the project growing to waterways across the east coast of Australia - engaging local stakeholders in practical, hands-on solutions to address marine debris

at its source through the creation of long-term behavioural change. River Warriors aims to develop a culture of stewardship for these places of incredible ecological, recreational and economic importance.



Our Redlands River Warriors Coordinator Kyle, getting dirty in the mud to retrieve abandoned crab pot and fishing line from survey section F of our study.

Tingalpa Creek (**Figure 1**) is located in south-east Queensland within both the Redlands City Council and Brisbane City Council region. It is a tidal estuary with salt and brackish water with the occasional release of fresh water from the Tingalpa Reservoir after heavy rain. From the base of the reservoir the creek is 13.15km long.



Figure 1. Tingalpa Creek - Redlands, QLD.

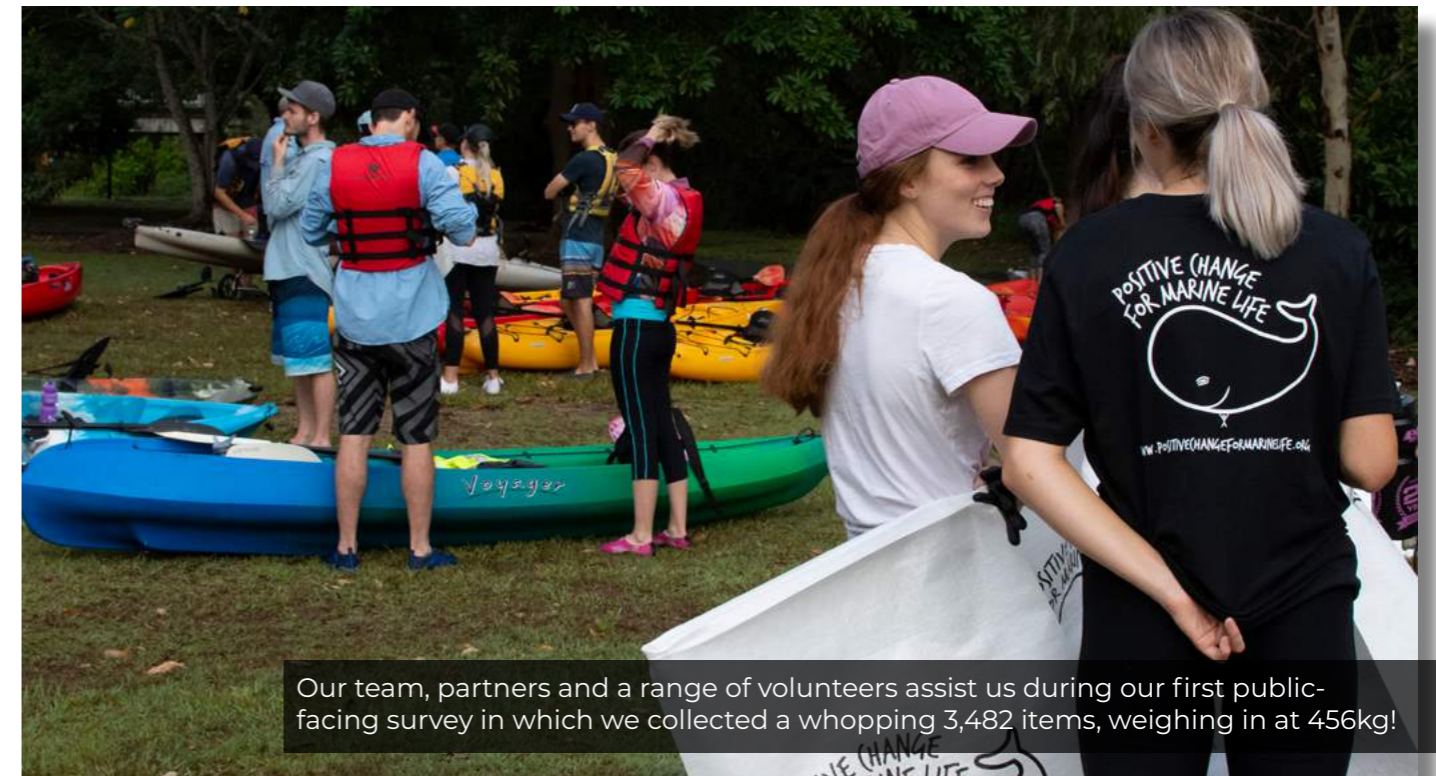
While the creek faces a number of threats including bank erosion; mangrove degradation; chemical / fertiliser run-off, and encroaching development - marine debris is also a major threat, which influences the health of the waterway and comes from a variety of land and water-based sources. While Redland Kayak Tours has been holding annual clean-ups to address the issue, to our knowledge no consistent monitoring or collection programs have taken place.

Our Tingalpa Creek River Warriors initiative commenced in February 2019 after articles and letters of complaint written by locals highlighting the creek's ecological value, coupled with high pollution/marine debris levels were noticed by some of our staff members in the region. After further investigation and a brief discussion with Redland Kayak Tours, PCFML decided to apply for a small grant to commence a pilot River Warriors project on the Creek in order to further understand the scope of the problem and implement measures to address it at its source.

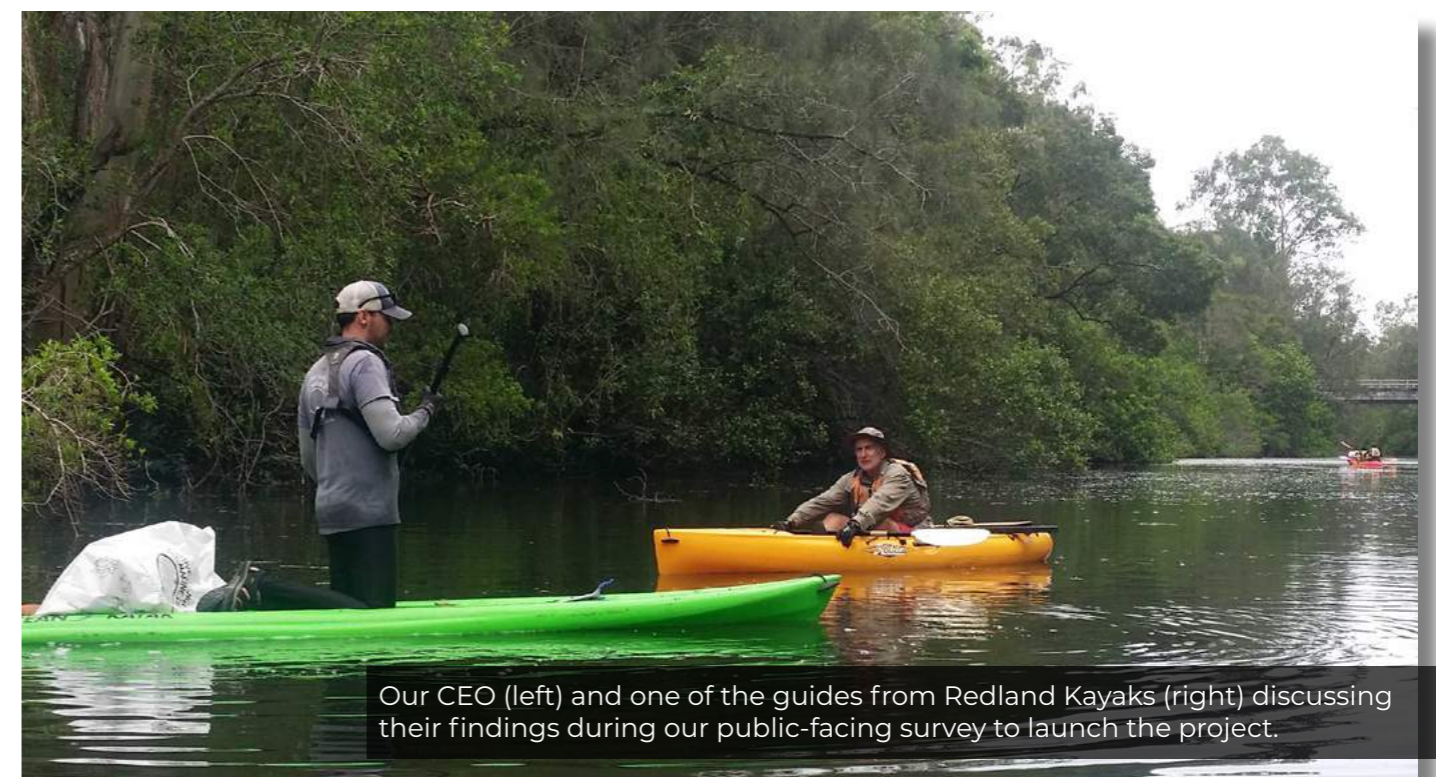
We were successful in our grant application to Redland City Council and our River Warriors Tingalpa Creek initiative commenced on Clean Up Australia Day on March 3, 2019, alongside our partners at Redland Kayak Tours.

In just over 3 hours, 61 volunteers, PCFML and Redland Kayak Tours staff collected >456kg of rubbish from the upper reaches of the Tingalpa Creek!

Over the following nine months we ran ongoing surveys of the waterway in order to understand patterns of debris across the entire accessible length of the creek (from source to sea). Our methodology, findings and recommendations are listed in this report and serve to highlight the issue, as well as a range of management solutions in order to address it at its source.



Our team, partners and a range of volunteers assist us during our first public-facing survey in which we collected a whopping 3,482 items, weighing in at 456kg!



Our CEO (left) and one of the guides from Redland Kayaks (right) discussing their findings during our public-facing survey to launch the project.

RIVER WARRIORS SURVEY METHODOLOGY



Our team utilised a quantitative approach to data collection through ongoing fortnightly surveys – collecting marine debris across 7 transect areas from the base of the Tingalpa reservoir to the mouth of the creek (**Figure 2**).

These survey areas are listed below:

Survey A: Tingalpa Reservoir to John Frederick Park - Capalaba (1.3km);

Survey B: John Frederick Park to Jones Road - Capalaba (2.4km);

Survey C: Jones Road to Tingalpa Creek Reserve - Ransom (2.25km) - **please note: this survey was not conducted due to accessibility issues;**

Survey D: Tingalpa Creek Reserve to Chadwell Street Canoe Ramp - Ransom (2km);

Survey E: Chadwell Street Canoe Ramp to Rickertt Road - Thorneside (2.7km);

Survey F: Rickertt Road upstream and back - Thorneside (1.58km);

Survey G: Queen Victoria Boat Ramp downstream and back - Lota (2.2km).

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 team was made up of between 2 and 5 team members at a time, 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 tarpaulin, sorted, categorised and uploaded into our marine debris database – contributing to PCFML debris records, as well as Tangaroa Blue's National Marine Debris Initiative (AMDI) Database. Debris was then recycled or disposed of correctly in council bins or at the local tip.

In total, our team ran 12 surveys over a 10-month period, covering the full length of the waterway twice, with the exception of Survey C**.

**This particular survey area was not operationally feasible due to restricted access in terms of 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.

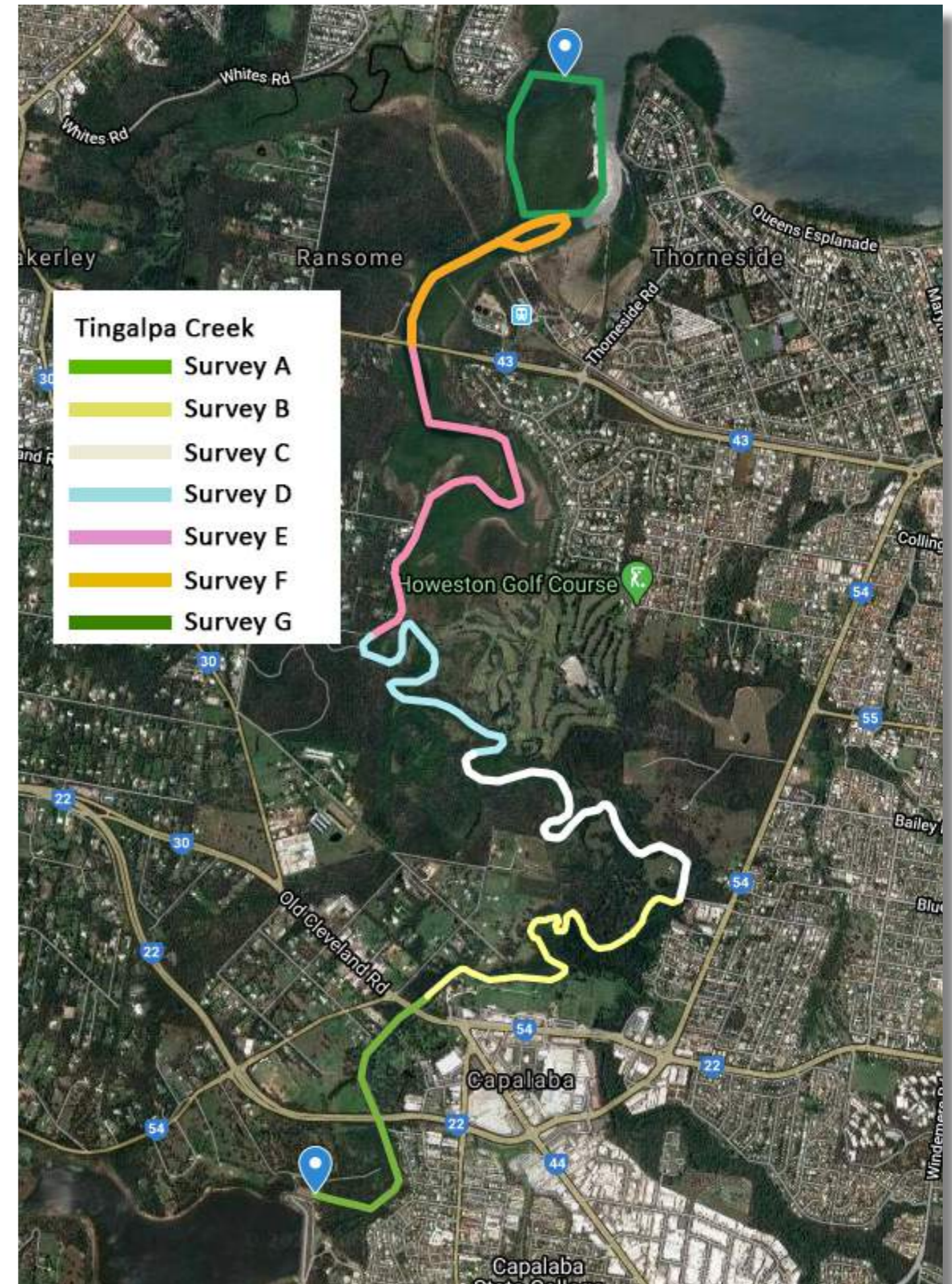


Figure 2. Our 7 survey transect areas covering the length of Tingalpa Creek..



A standard haul from Transect A shows a high amount of food and beverage items.

"PLASTIC AND POLYSTYRENE MADE UP 78.8% OF OUR FINDINGS - 63.9% PLASTIC AND 14.9% POLYSTYRENE"

RESULTS

Over the course of 12 kayak-based surveys on the Tingalpa Creek, the team travelled 25.1km collecting 5,164 pieces of debris (Table 1), with an overall weight of 745.25Kg of debris.

Plastic and polystyrene made up 78.8% of our findings (63.9% Plastic and 14.9% Polystyrene). Glass came in as the 3rd highest category found at 12.1% (Figure 3). From these categories, the most found individual items were fishing line, plastic film remnants, glass bottles and plastic bits and pieces (not film).

In total 11 volunteers contributed 108 hours over 10 months to collect our baseline data. Each survey was completed twice, although section G was split into 2 sections during our final survey as a result of poor weather conditions.

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

CATEGORY	TOTALS	ITEMS OF INTEREST	TOTALS
Plastic	3304	Fishing Line (m)	1007
Glass	627	Foam Insulation & Packaging	707
Polystyrene/Foam	769	Rope (m)	506
Metal	162	Plastic Film Remnants	356
Other Items	160	Glass Bottles	346
Cloth	66	Plastic Bits & Pieces (not film)	332
Rubber	44	Broken Glass	276
Paper	30	Plastic Food Packaging	237
Wood	6	Plastic Drink Bottles	162
		Other/additional items	161
		Plastic Straws	61
		Cigarette butts and Paraphanalia	60
		Commercial Fishing	50
		Heavy Plastic Bags	43
		Recreational Fishing	43
		Lightweight plastic bags	29
		Foam buoys	17
GRAND TOTAL	5168	GRAND TOTAL	4393



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 monofilament (fishing line) and discarded fishing gear, polystyrene insulation and packaging, rope, plastic film remnants, plastic bits & pieces, plastic food packaging, plastic drink bottles, plastic straws and other plastic and polystyrene items in order to address them at their source.

ITEM TYPE AND WEIGHT

Our results in Figure 3 highlight the total percentage that each category made up within our overall findings, as well as the percentage of debris found by transect area (Figure 4) and total weight by survey section (Figure 5).

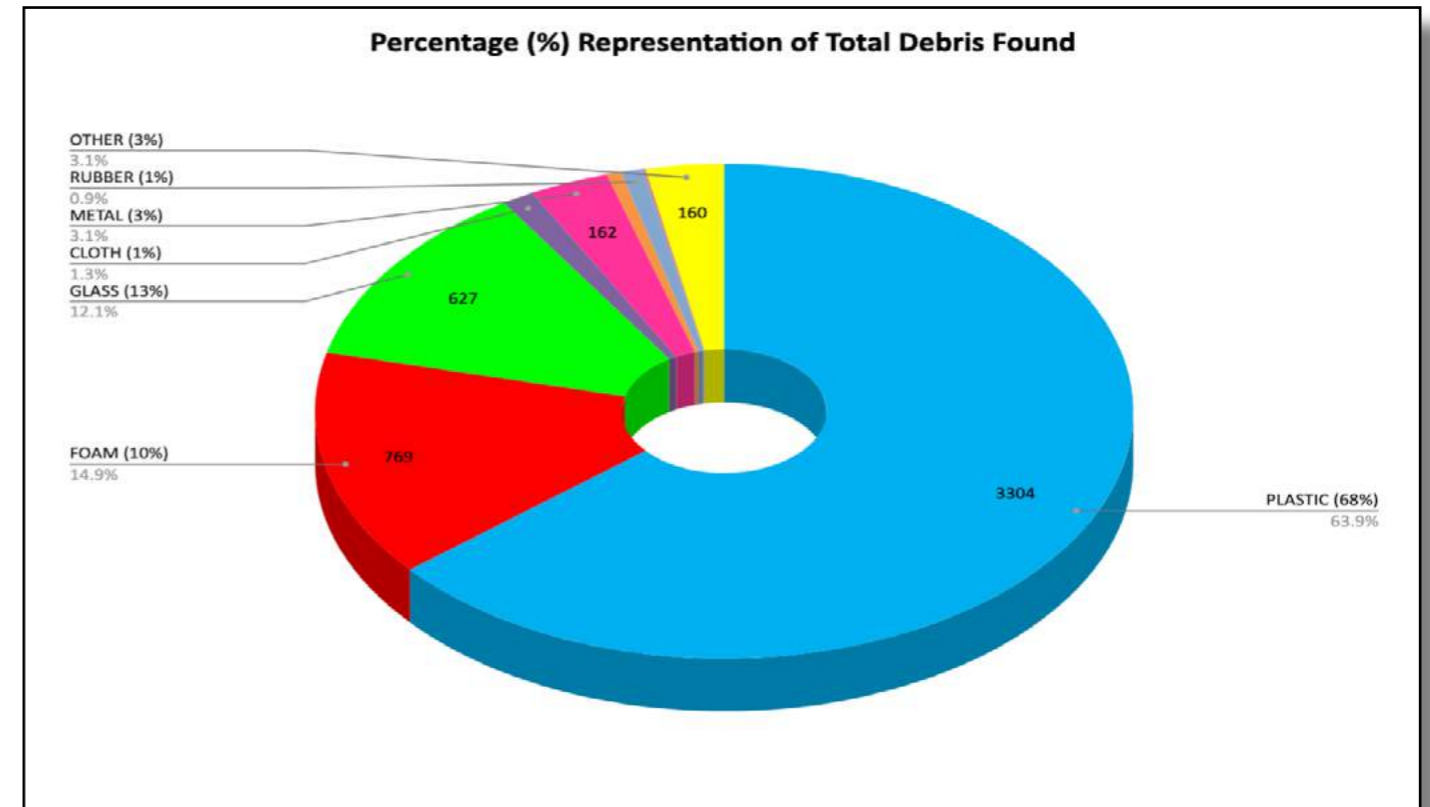


Figure 3. Total debris found - represented as a percentage.

Transects F and G were responsible for a cumulative 45% of the total debris found across our 12 surveys, with transect E making up only 6.3% of total debris. These stats

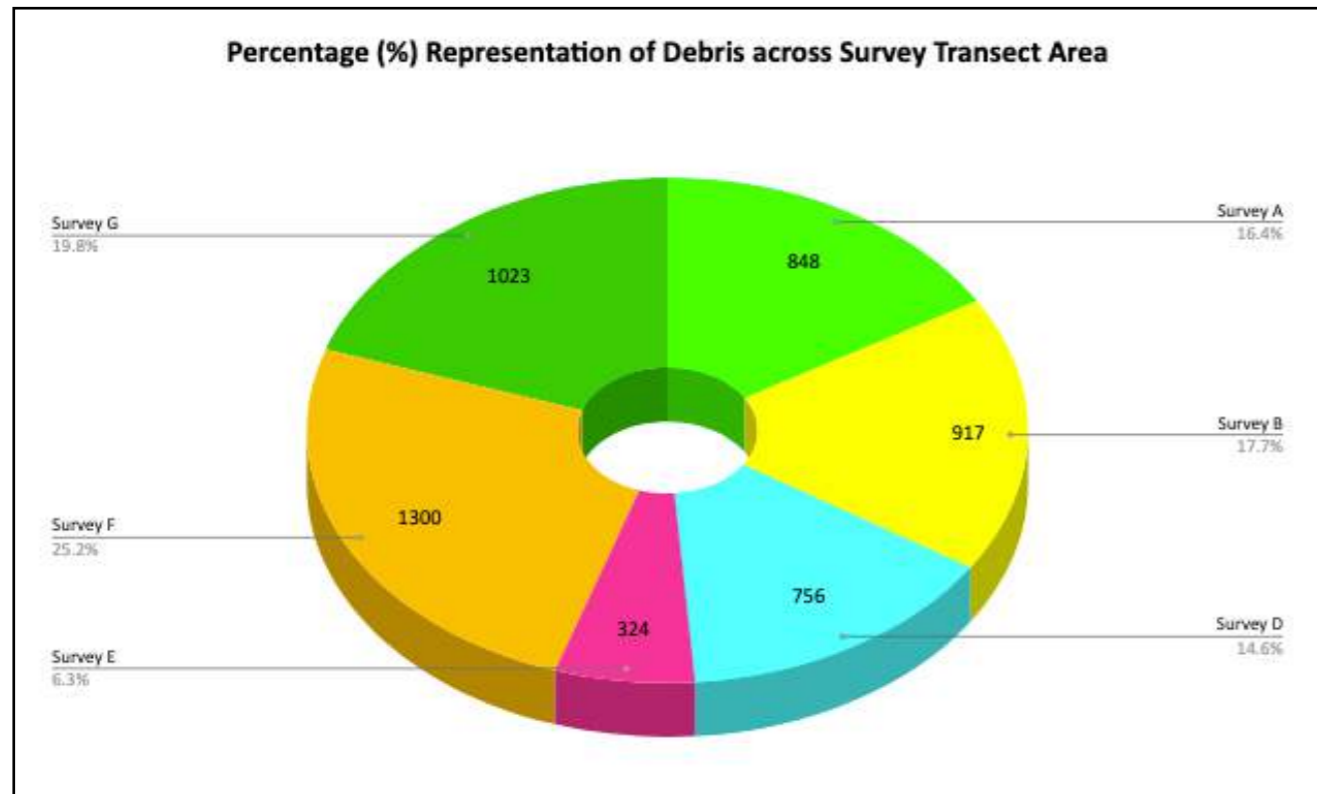


Figure 4. Percentage (%) of debris found by transect area..

will be explored in more depth in the Items of Significance section of this report. In terms of total weight found across our surveys, transects F & G also had the highest weight found, with 48.1% between the two sections (Figure 5). Although this weight represents totals found, it is statistically biased due to the variations of length of each

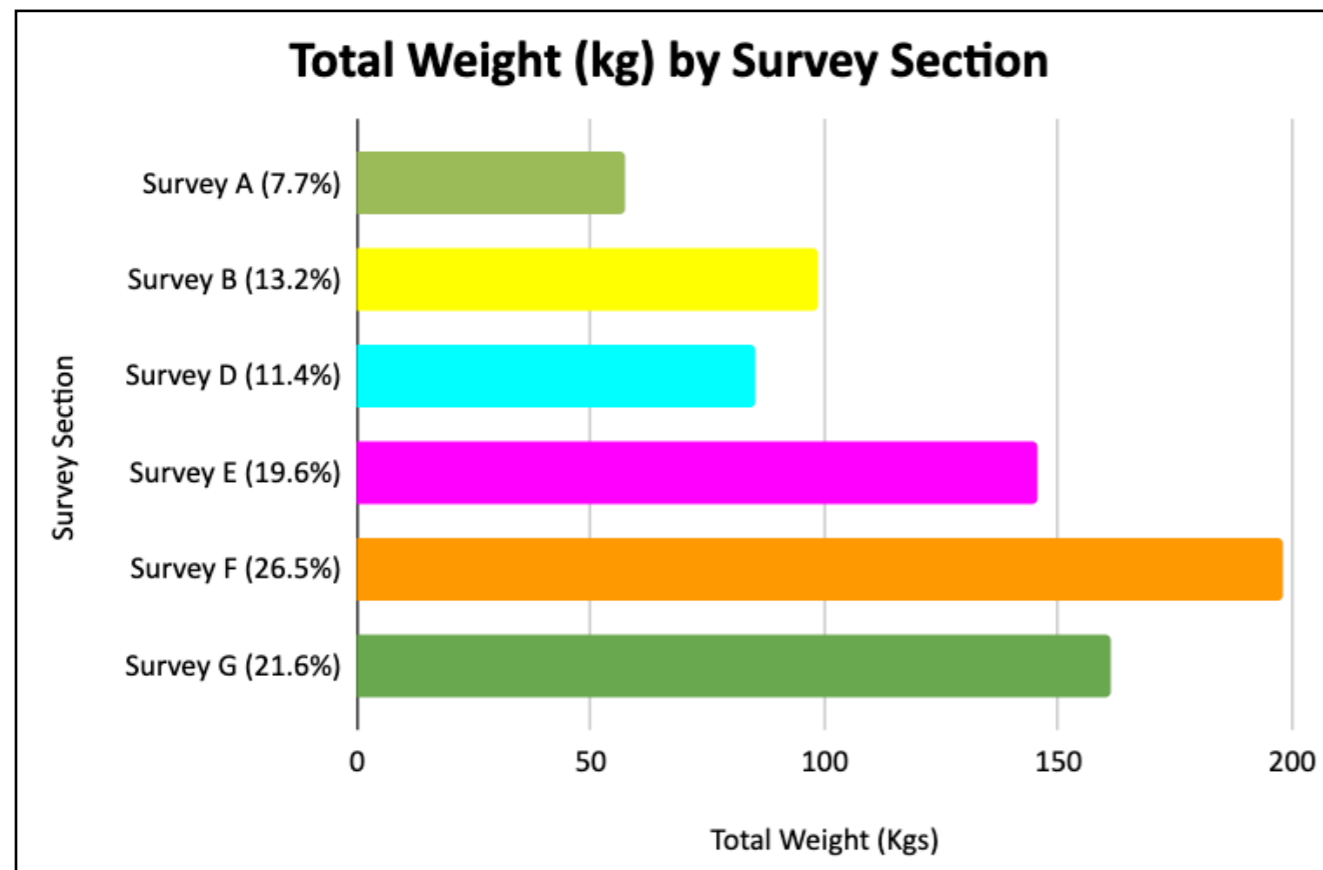


Figure 5. Total weight (kg) by survey section..

survey section. Figure 6 is therefore more representative with weight standardised to reflect weight per survey area based on the number of items found per kilometre (km). Percentage (%) of debris across each transect area has also been standardised to reflect the total percentage per kilometre travelled (Figure 7). From these updated results, the total weight has shifted to A, B and D being respectively 4th, 5th and 6th highest weight when standardised, whilst the total percentage per transect area has changed to pushed A to 2nd, G to 3rd and B to 4th place.

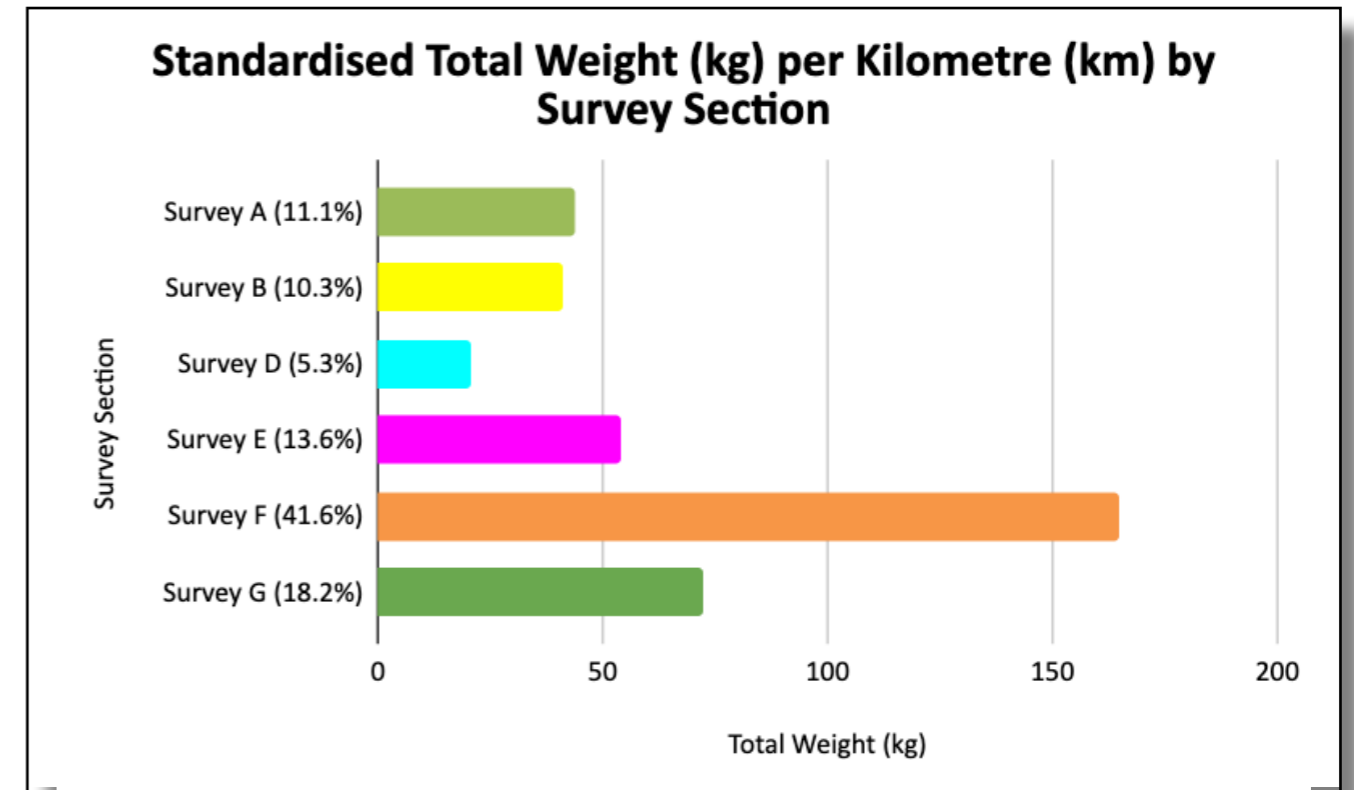


Figure 6. Standardised weight (kg) per kilometre (km) of each survey section travelled.

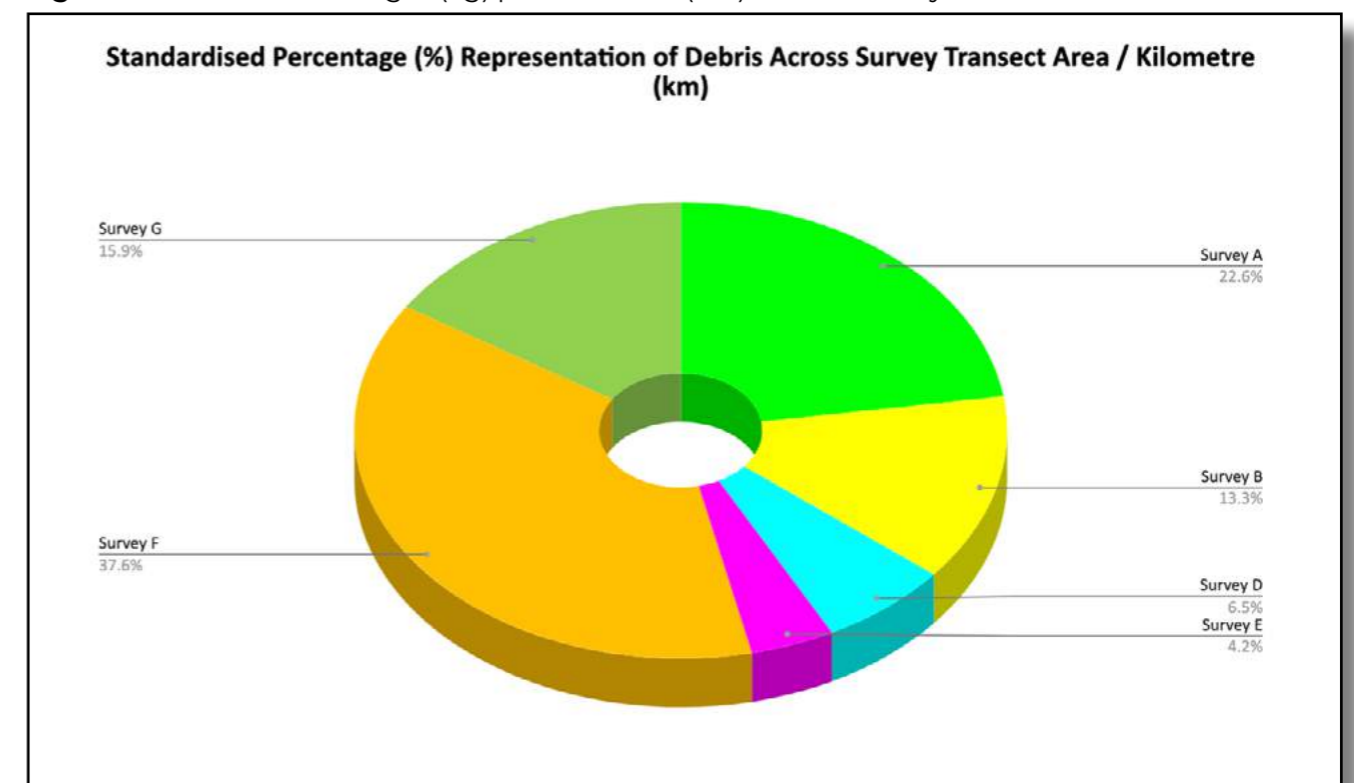


Figure 7. Standardised percentage (%) of debris per kilometre (km) by survey section.

ITEMS OF SIGNIFICANCE

In examining items of significance (Figure 8 & 9), our team assessed items that had the highest abundance and were deemed to be the biggest threat to marine ecosystems. Fishing line was the most abundant item found throughout the survey. Commercial and recreational fishing gear and fishing-related rope were also present within our top 10 items found, as well as a range of plastic and polystyrene items (with insulation and packaging (foam) being in highest abundance for polystyrene, and plastic film remnants being in highest abundance for polystyrene, and plastic film remnants the second highest plastic item (after fishing line).

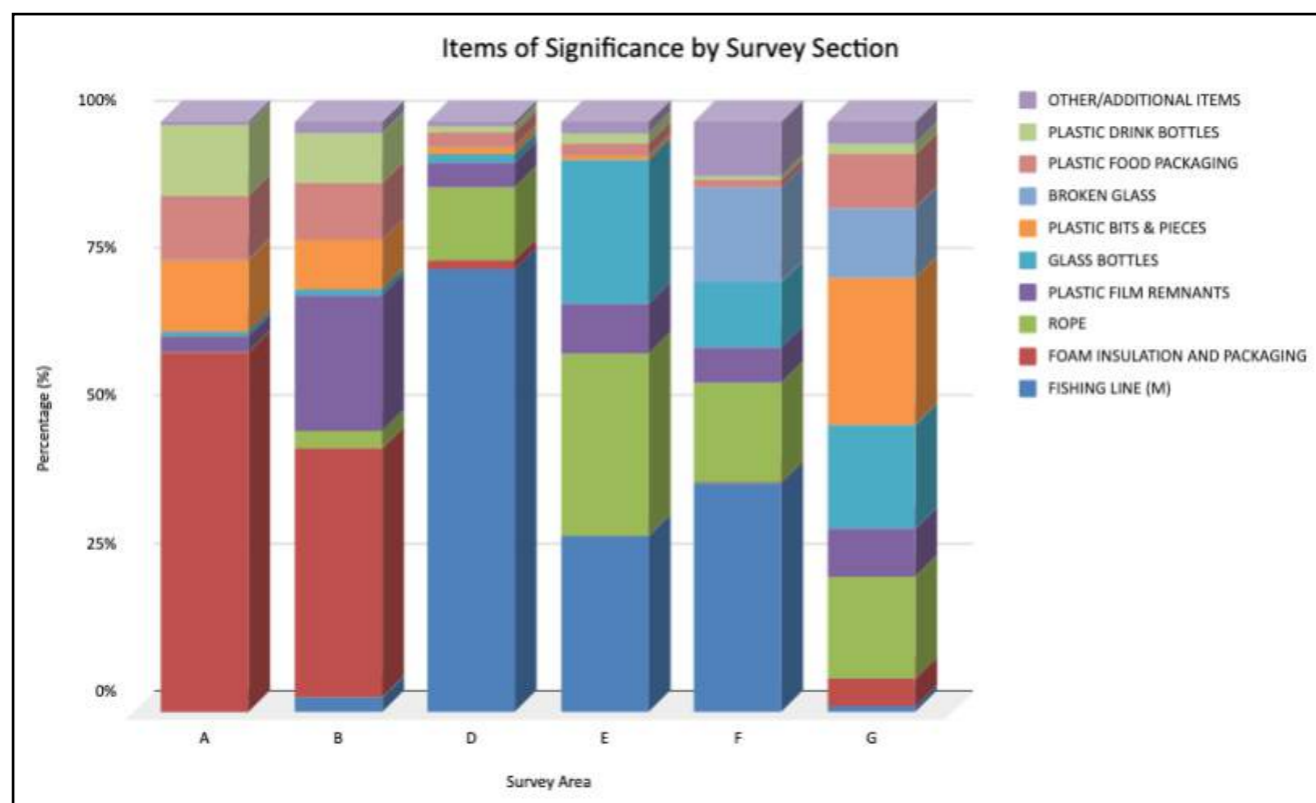


Figure 8. 10 items of significance by survey section.

Two items which showed up within our top 5 highest accumulation items that weren't made from plastic or polystyrene were rope and glass bottles. These items were interesting to note, as usually the top 10 items across our River Warriors project locations have all fallen within either the plastic or polystyrene categories. This will be explored further under the 'Further Insights' section on page 16, where we will draw conclusions from the data in order to understand debris trends, potential causes and mitigation measures across the waterway.

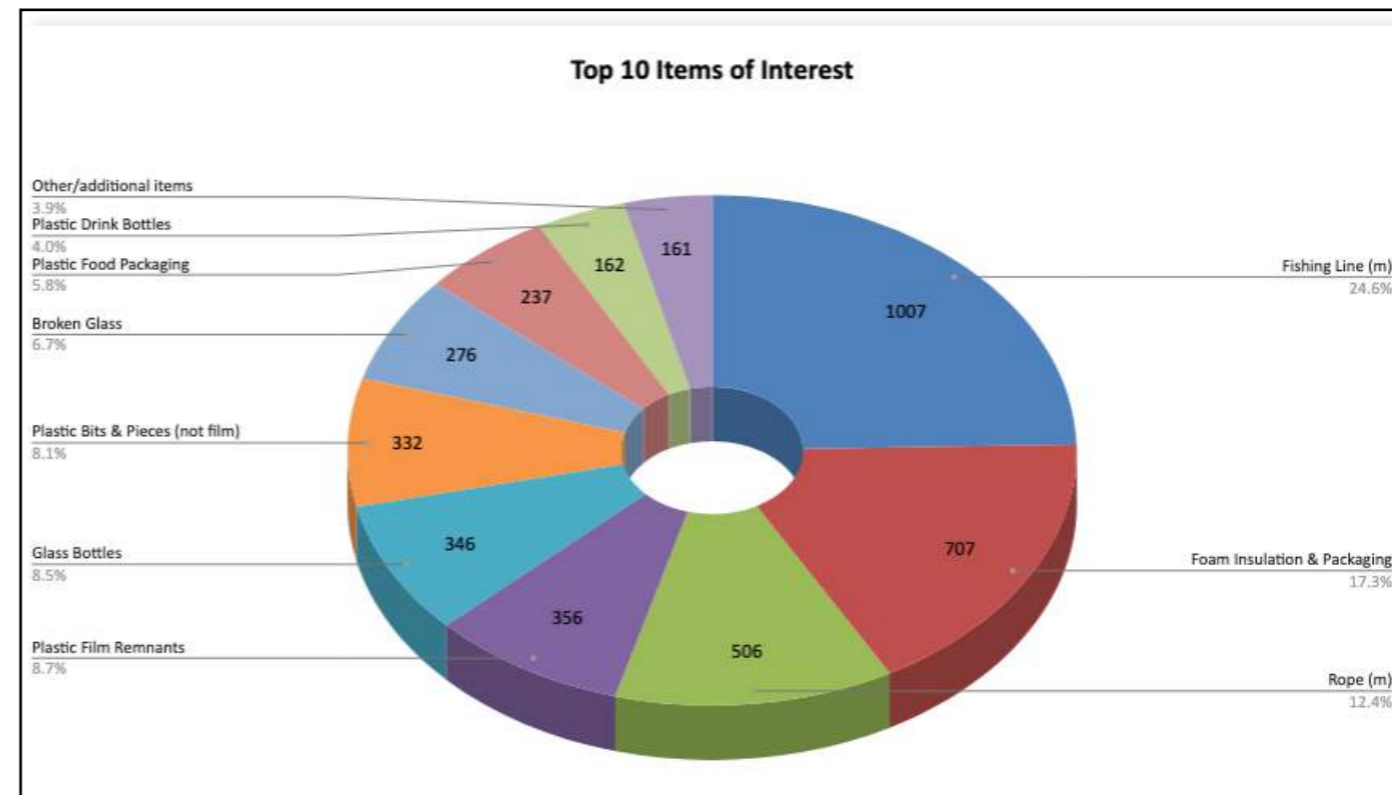
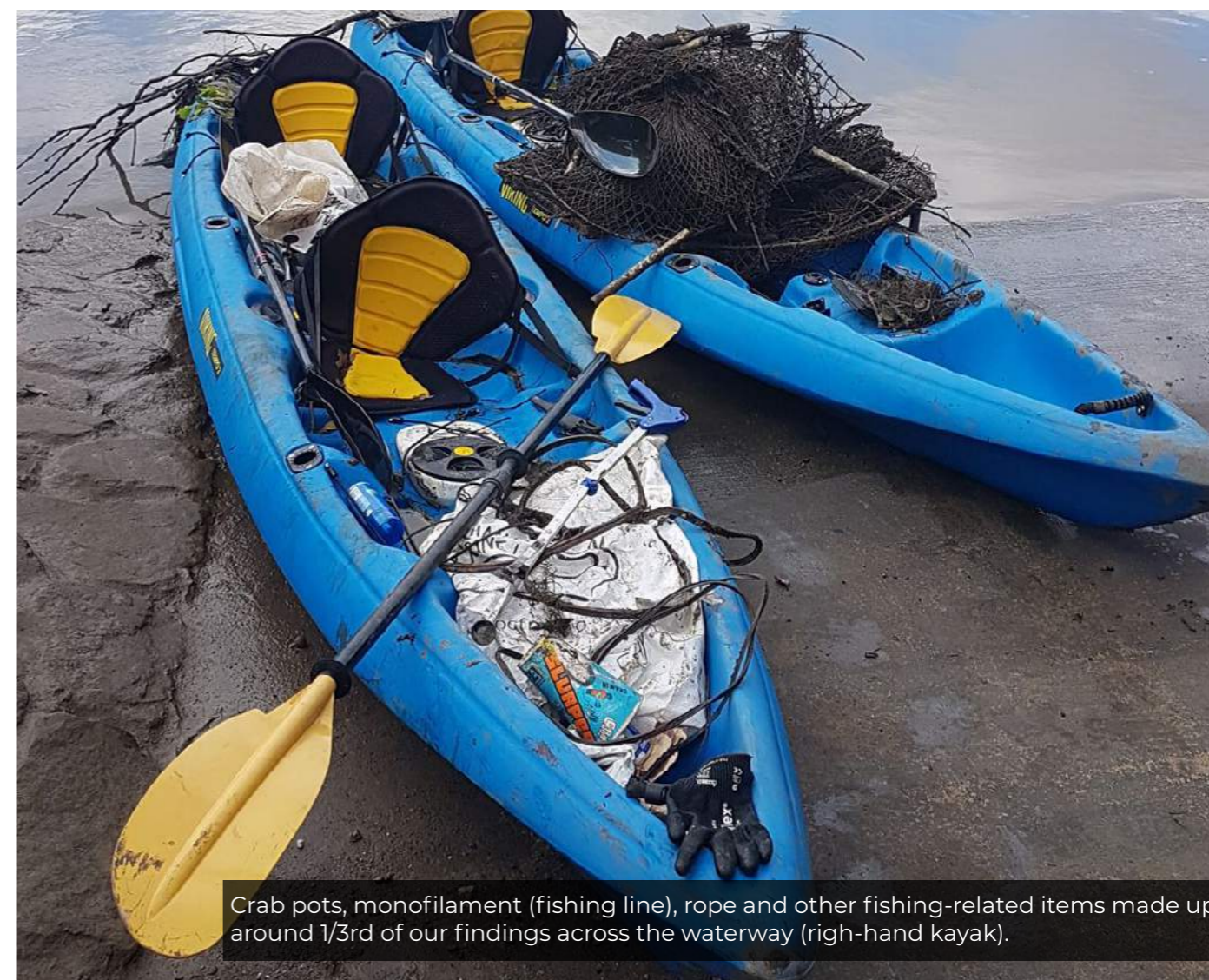


Figure 9. Top 10 items of interest across our 12 surveys.



Crab pots, monofilament (fishing line), rope and other fishing-related items made up around 1/3rd of our findings across the waterway (right-hand kayak).

FURTHER INSIGHTS INTO OUR FINDINGS



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 flow and impact of marine debris on Tingalpa Creek. This section of the report explores our findings and highlights patterns and sources of debris by transect area. 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 focus on how transect areas differ in terms of found debris. We then hypothesise where the debris is coming from based on those findings, as well as observational evidence which may link the items to certain activities or sources.

We predominantly examine items made from polystyrene/foam and other plastics due to their negative impacts (ingestion, entanglement, bioaccumulation). With that being said, these items tend to dominate our Top 10 most found items across all of River Warriors programs.

SURVEY SECTION A - FOAM (POLYSTYRENE) INSULATION & PACKAGING + PLASTIC BITS & PIECES

The Transect Area

Survey section A marks the source-point of Tingalpa Creek. It begins at Tingalpa Reservoir (a section of Leslie Harrison Dam) and continues for 1.3km downstream. Many of the banks in this section have incredibly dense mangrove vegetation and steep banks, making accessibility to these areas extremely difficult. An upside to collection in this transect area is the area's depth which, due to the lack of flow from the dam wall of the Tingalpa Reservoir, meant that our team could access the creek floor by foot during low tide. This gave us access to items both on the banks and on the river floor.

Our Findings and Potential Sources

Overpasses

Survey section A predominantly consisted of 'foam insulation and packaging' (polystyrene) at 60.9%, as well as 'plastic bits & pieces', 'plastic food packaging' and 'plastic drink bottles', which combined made up 35% of this survey area. There are two busy overpasses across this section of the creek. They make up 2 of 3 overpasses across the length of the waterway. Through observational data and research from this, and past River Warriors initiatives, we know that overpasses are enormous hotspots for marine debris due to direct dumping, stormwater overflow and/or congregations of

people gathering under the overpasses and who leave their litter behind. We infer that a large number of items entering this section of the waterway are due to these overpasses, with further research needed to trap litter in these areas (recommended later in this report).

Industrial Estates, Shopping Precincts and Densely Populated Residential Areas

Positive Change for Marine Life's CEO, Karl Goodsell, was recently the co-author of a study into expanded polystyrene (EPS) leakage in the Yarra River in Victoria. The report highlighted that EPS is the main form of polystyrene found across Australia and is used in white and brown food packaging, general retail packaging, within products (such as bean bags), as well as at building sites across the country. The report uncovered that the building industry, alongside manufacturers and retailers, were responsible for the vast majority of expanded polystyrene 'leakage' into the environment and subsequently into the Yarra River, with an estimated 38,000kg collected during the project over a 10-month period. This is estimated at billions, if not trillions of pieces of polystyrene. Far too much to quantify (Barmand, *et al.* 2020).⁵

Given the findings of this report, as well as our own research into this issue, we estimate that the other source of polystyrene insulation and packaging (after overpasses) is no doubt coming from local building sites, retailers and manufactures in close proximity to the area, where leakage of this material is occurring.

Other plastic items found across this transect area highlighted direct dumping of litter within close proximity, or transportation from other areas via roads (as aforementioned) or perhaps through high tides that push this material upstream, with nowhere for it to go once it reaches the dam wall. Further investigation into the exact source points of all of the items found across our transect areas was beyond the scope of this report, however we aim to undertake an investigation into this as the project progresses



Polystyrene (foam) insulation and packaging and a range of single-use plastic items were the two most prevalent items found across transect section A.

SURVEY SECTION B - INSULATION & PACKAGING + PLASTIC FILM REMNANTS

The Transect Area

Survey section B is very similar to survey section A (except for the fact that there are no overpasses within the section). Our findings in this section were almost identical, except for the prevalence of fishing line and rope (5.5% combined), which were in very low abundance in section A. The increase in the prevalence of these two items would suggest that fishing activity increases in this section, perhaps due to the deeper water allowing better boat access. The very high increase in 'plastic film remnants' could be attributed to the much thicker and more extensive mangroves found across this transect area, which trap the softer plastics in their roots and branches.



SURVEY SECTION D - FISHING LINE + ROPE

The Transect Area

Having been unable to survey transect area C due to accessibility issues, transect section D tells a very different story to transects A and B. None of this area is residential or within close proximity to human development, except for the Howeston Golf course, which bounds the eastern side of the creek when travelling north. It is bounded by very extensive mangrove ecosystems on both sides and is much deeper and wider than survey sections A and B, allowing for much easier motorboat access.

Our Findings and Potential Sources

Fishing Line and Rope

Given that 75.1% of all debris found across this transect area was fishing line (monofilament) and that a further 12.4% was rope (87.5% in total) it is easy to understand the source of this debris, especially given that there was a hotspot of fishing-related gear underneath and around the fishing platform in this area. We estimate that over 95% of mangrove roots in the area were entangled in fishing line and/or rope, leading us to believe that line is getting caught in the mangroves and either comes free naturally or has to be cut free by fishers. This is one of only two sections (transect F as well) that has a dedicated fishing platform.

Considering that the next highest item found in this area was plastic bait bag remnants (4%), almost all of the debris found here was fishing-related. We will discuss

solutions to this issue in the 'Management Solutions' section of this report.

SURVEY SECTION E - ROPE & FISHING LINE

The Transect Area

Similar to transect areas A and B, transects D, E and F reflect land use similarities, as well as in the accumulation of items found, namely fishing line and rope. Survey section E is bounded by extensive mangrove ecosystems on both sides of the creek and, except for a few low density acreage properties in some sections of the western side of the creek (when traveling north), the remainder of the survey area is natural.

Our Findings and Potential Sources

Fishing Line and Rope

Much like transect D, transect E reflects fishing line and rope only in reverse order, with rope making up 30.8% and fishing line making up 30.1% of our findings. Glass bottles were also very prevalent here at 24.4% and, given that they were almost all beer bottles, we would infer that they could be linked to recreational activities on the water, especially fishing given the high amounts of fishing-related debris.

Plastic Film Remnants

Transect E also had a much higher number of plastic film remnants (8.3%) compared with Transect D. This could be from a number of factors with further research needed.

SURVEY SECTION F - ROPE & FISHING LINE

The Transect Area

Also showing similarities to transect areas D and E, transect F reflects mangrove ecosystems along both sides of the creek, again, with little to no development nearby except for a waste treatment plant and a highway overpass (Rickert Rd).

Our Findings and Potential Sources

Fishing Line and Rope

Much like transects D and E, transect F reflects fishing line and rope as the two highest items of accumulation, with fishing line making up 38.8% and rope making up 16.9% of our findings. Glass bottles were once again very prevalent here at 11% and broken glass was also present in very high numbers at 16%. Again, >90% of the glass were old beer bottles - XXXX beer in particular. Our team noticed many of the broken glass bottles in piles in certain areas were very old (different shape to new bottles) and all in the same location. This makes us wonder whether bottles used to be dumped here for some reason or another in times gone by.

Plastic Film Remnants

Once again found in the top 5 items in transect F, although lower than E at 5.9%.

SURVEY SECTION G - PLASTIC BITS & PIECES, GLASS BOTTLES AND ROPE

The Transect Area

Survey section G widens out in the northern sections and is also a lot deeper than other transect areas. Although in abundance, the mangroves are not as thick here as they are in the other survey areas. This could be due to larger tidal movements and/or stronger boat wash. The area here is in close proximity to human development with high-density housing and boat ramps in the north eastern and north western sections of the survey area.

Our Findings and Potential Sources

Plastic Bits & Pieces

Plastic bits & pieces were the most prevalent item in transect G (25%). We believe this is due to photo-degradation of plastic debris in the ocean, which makes its way into the creek with the incoming tide through the estuary mouth.

Fishing Line and Rope

It's interesting to note that fishing line in this section is far less prevalent than transect D, E and F. This could be due to less line fishing, however the lower density of mangroves could also be a factor as line is not as easily caught in these areas and fishing would more likely be from boats here due to the lack of access from the shoreline.

Rope was still prevalent as one of the most abundant items here (17.2%). This could be due to a number of factors, including the high amount of abandoned crab pots found in the area, as well as the estuary mouth feeding into Moreton Bay, where anglers and larger fishing boat debris could make its way into the creek on high tide.

Glass Bottles and Broken Glass

Both of these items were once again prevalent here, making up a combined total of 29% of our findings in transect G.

AN OUTLINE OF FISHING GEAR ACROSS OUR 6 TRANSECT AREAS

Due to the abundance of fishing line (monofilament) and rope as the two most found items across our River Warriors Tingalpa Creek project, we broke down our findings into a number of graphs to give greater insight into trends when it comes to fishing gear (in terms of survey site and abundance). **Figure 10** shows Fishing Related Gear by Type and Survey section, whilst **Figure 11** reflects Fishing Line Abundance by Survey Section. **Figure 12**, **Figure 13** and **Figure 14** show Rope Abundance by Survey Section and Recreational and Commercial Fishing Gear Abundance by Survey Section respectively .

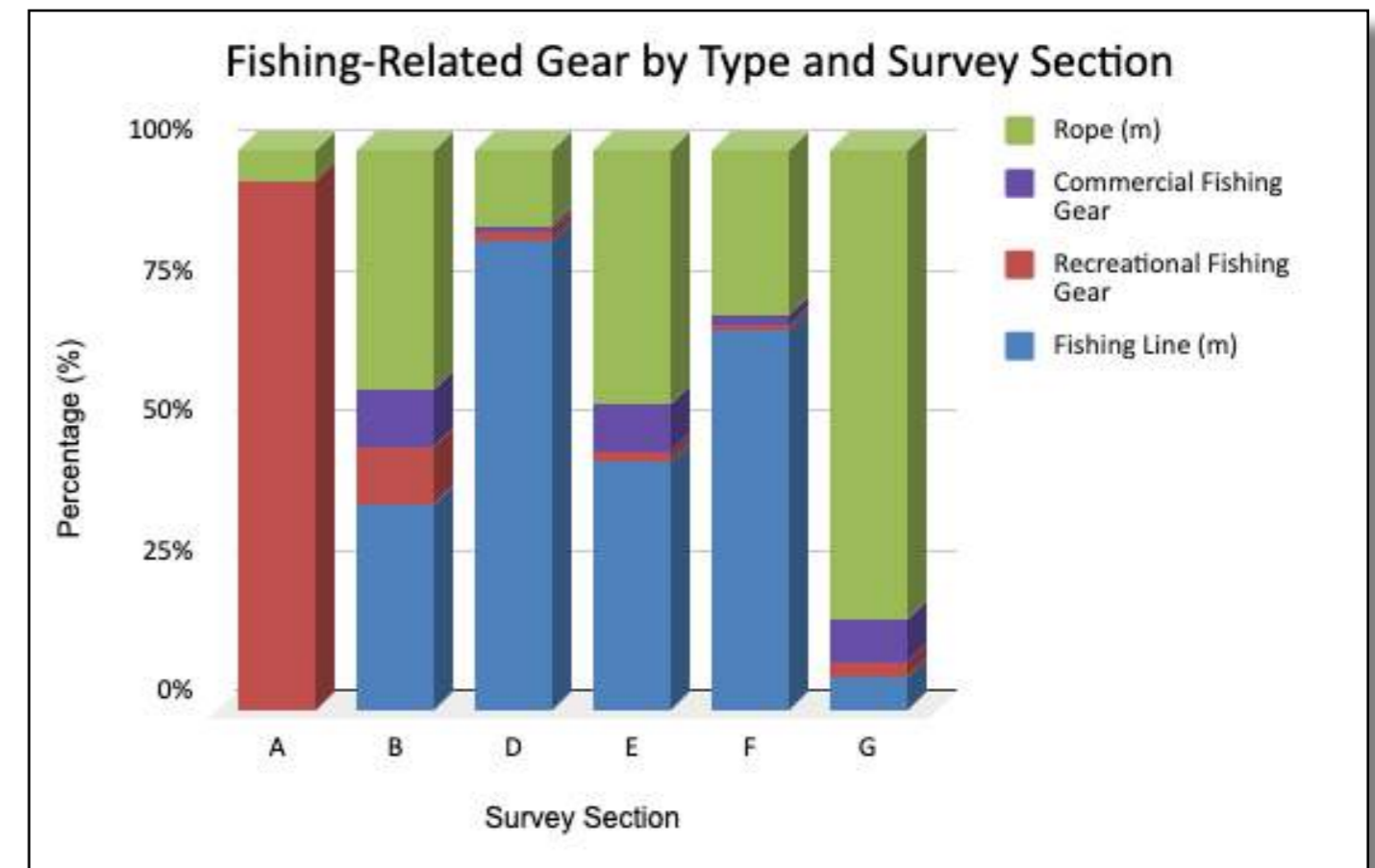


Figure 10. Fishing-related gear by type and survey section.

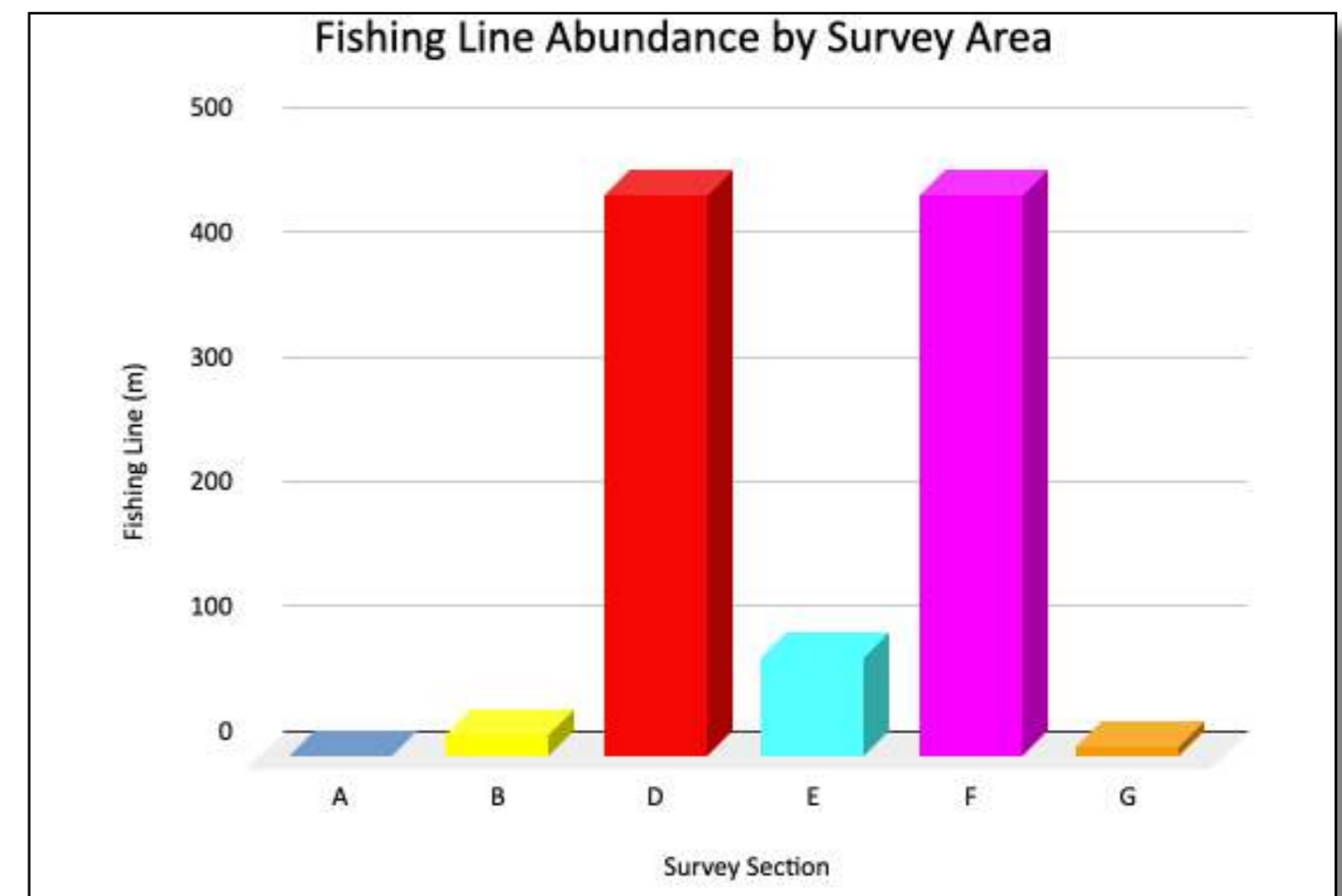


Figure 11. Fishing line abundance by survey section.

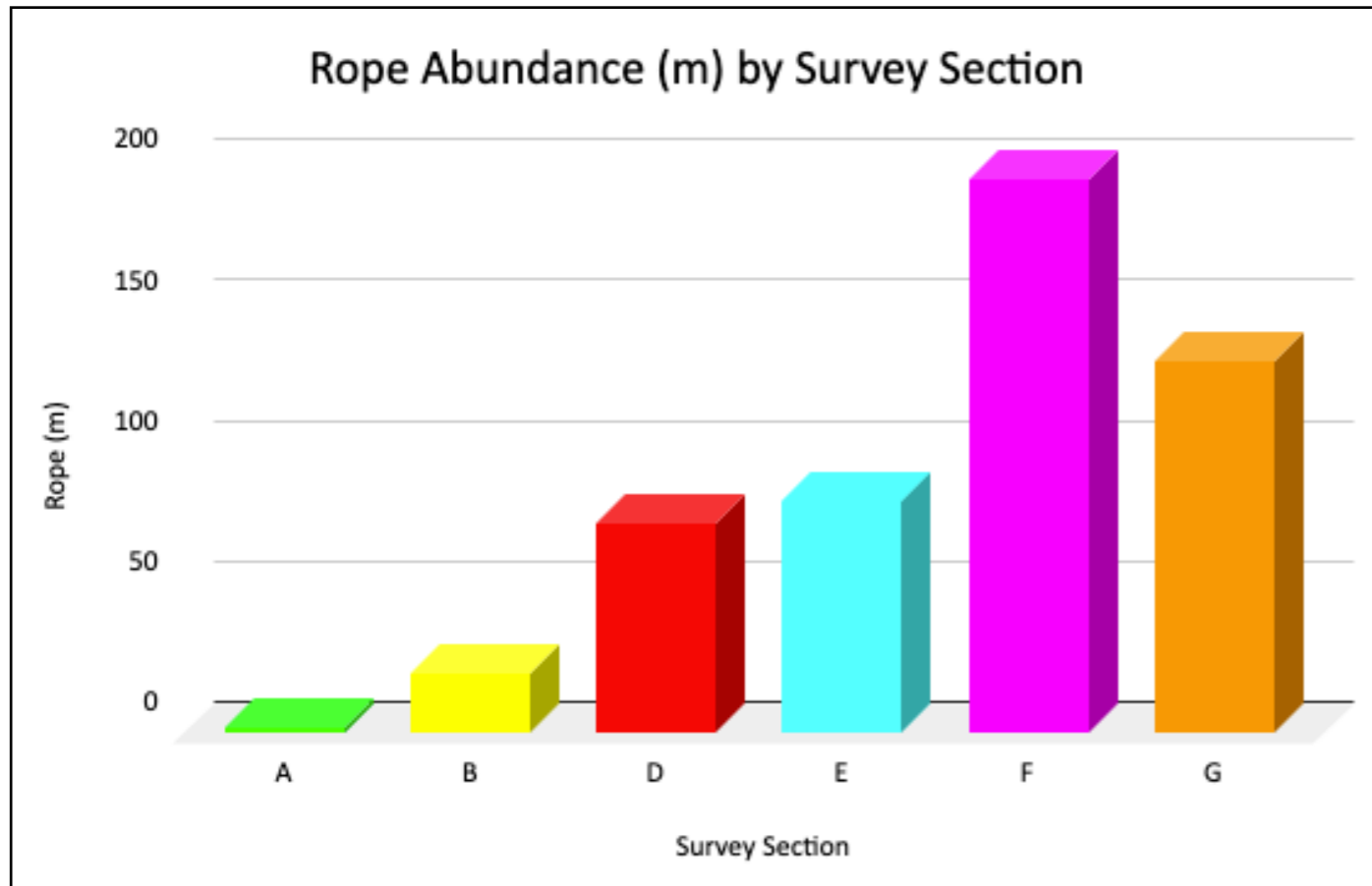


Figure 12. Rope Abundance by Survey Section.

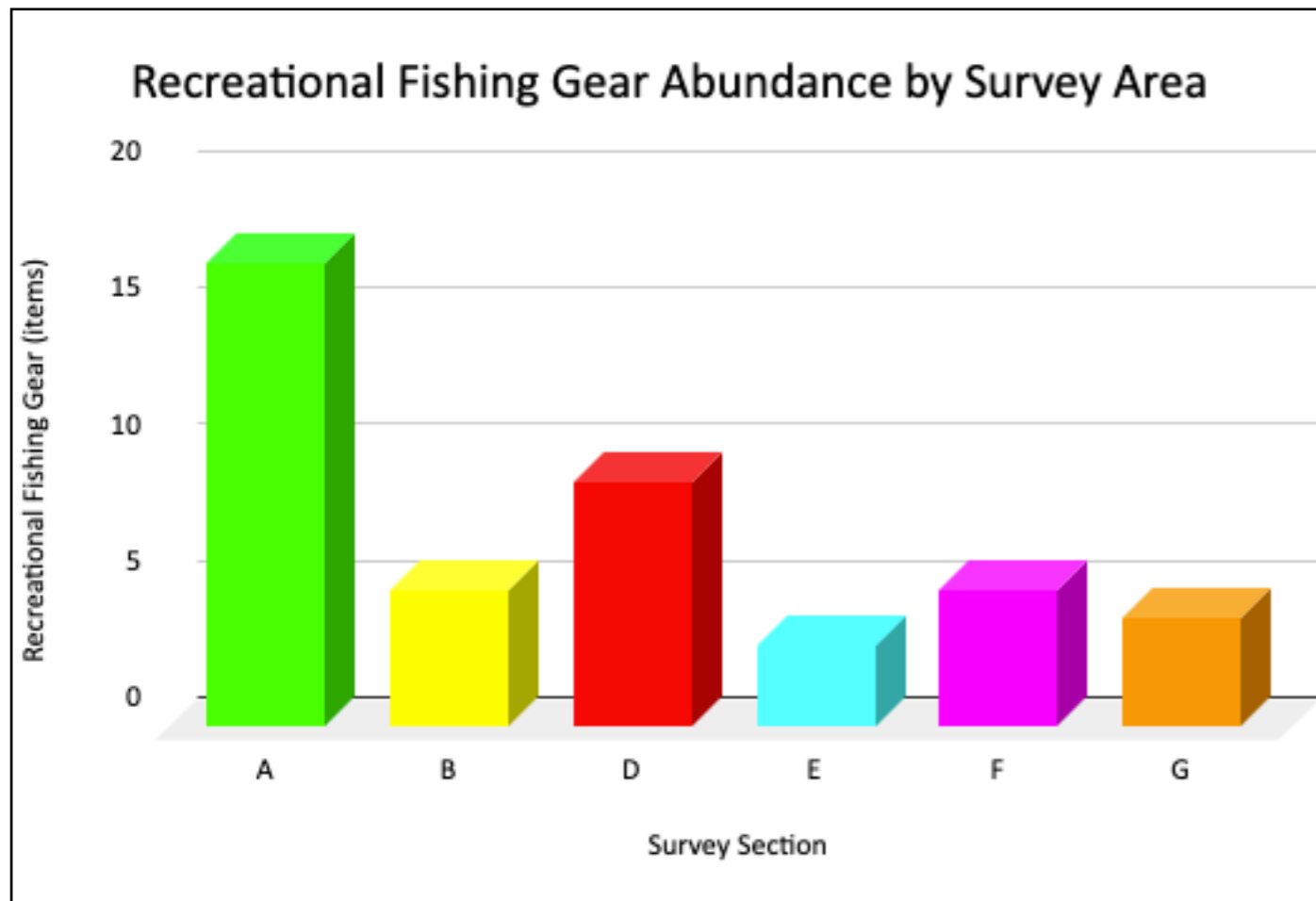


Figure 13. Recreational fishing gear abundance by survey section.

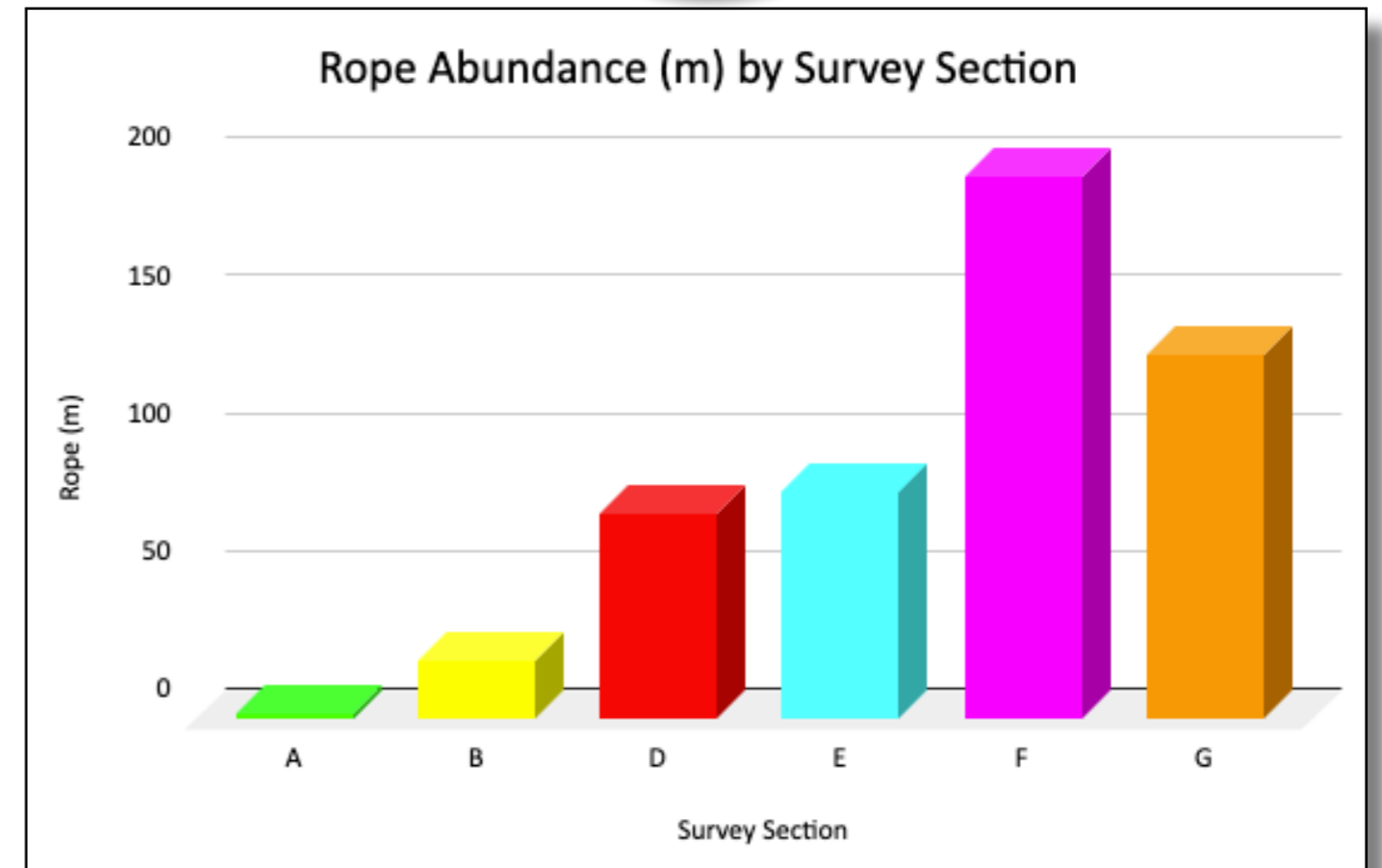


Figure 14. Commercial fishing gear abundance by Survey Section.



OUR PUBLIC-FACING SURVEY - SECTION A OF TINGALPA CREEK

What Was Our Public Survey?

Prior to the commencement of our baseline data study we joined up with Redlands Kayak Tours to host a public-facing clean up of Transect A and part of Transect B of our survey area. We did this to raise awareness to our presence in the Redlands, as well as to combat the high accumulation of debris from recent storm events and a build up of debris as noted by Redland Kayak Tours, recreational users and locals.

What Was Involved?

The survey engaged 61 people in total and collected 3,482 items over a 3 hour period. The total weight of the collection was 456kg.

Why Was This Data Excluded From Our Overall Findings?

The data from our public-facing survey was excluded from our overall findings due to the fact that it would have created an anomaly in our baseline data (both due to survey effort and the amount of debris collected). Although we explored standardisation of the data, the sheer number of participants and survey effort was too great to allow this standardisation to be effective. The fact that some volunteers walked the banks of the survey area and collected debris deeper into the mangroves also would have made the data inconsistent in regards to our other surveys, as would the fact that the transect area was slightly longer than our regular transect A section.

If we were to host this public-facing survey again we would have done it post-baseline data collection, as doing it prior led to a much cleaner site (survey section A), which could have also reduced other survey areas, given the tidal variations in Tingalpa Creek. **Figure 15** outlines the public-facing survey as a separate data set, allowing us to merge the data with the Marine Debris Report Card at the end of this report, giving an overview of the total amount of debris collected, as well as other vital stats to assist with our ongoing research.

MANAGEMENT SOLUTIONS



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 adapted for each of our River Warriors projects based upon our findings and include: **Community Outreach, Education & Training, and Supporting Infrastructure.**



COMMUNITY OUTREACH

During the course of our surveys on Tingalpa 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 generally a good level of awareness amongst recreational users when it came to the proliferation of marine debris in the creek, with most recreational users who we engaged with well aware of the issues when it came to pollution.

The majority of residents, tourists and local people had either heard of the issue with marine debris in the waterway or were completely taken aback by the amount of litter we had collected. That being said, this generally equated to around 50% being aware of the issue and 50% being unaware and surprised by it. All people who we spoke to mentioned that more needed to be done in order to address the problem.

Although we ran 3 school and general public educational programs as part of Phase I of the project, our community outreach programs will commence post-Phase I (Phase II of the initiative) and will focus on engaging a wider section of the community in the issues affecting Tingalpa Creek, as well as other waterways across the Redland City region. 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 also aim to include 6 **public-facing on-water cleans** on the creek, to practically highlight the

RIVER WARRIORS, TINGALPA CREEK: PUBLIC SURVEY



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. Phase II and beyond will be dependant upon further funding for the program.



EDUCATION & TRAINING

Education and behavioural change are key to mitigating marine debris in Tingalpa 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 **research into the businesses and industries responsible for the issue** (expanding on the findings of this report) and then working with those stakeholders to address the issue at its source through **educating and training business staff, enhancing recycling and waste disposal** and, most importantly, **working towards replacing environmentally harmful items** with sustainable, low-impact alternatives.



The educational component of our program will also extend to the promotion of our **Marine Debris Report Card** (throughout the community across Capalaba, Birkdale and Thorneside in particular, as well as through media outlets across the region. We will also be looking to **engage with various businesses and government bodies to sponsor the program**, ensuring that their staff can get involved in the initiative and that we can work together to develop long-term solutions to tackle the problem and move the waterway towards an 'A' rating on our Report Card.



The mammoth haul from our public-facing survey with Redland Kayak Tours was a great way to engage the community in the issue.



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.

Educational signage is a great start, as well as fishing line, cigarette butt or other waste item **voting booth bins** (as pictured right).

These simple awareness initiatives engage stakeholders in solutions that are educational, fun and inclusive and can be a great way to engage the community in thinking twice before they litter, especially when coupled with a positive message, rather than an authoritarian one.

As part of Phase II of the Tingalpa Creek River Warriors project, we will be looking to install recycled, locally made educational signage and voting booth bins in marine debris hotspots throughout the creek (especially targeted to items that were in highest abundance such as fishing line).



Throughout many of the parks, underpasses and sections of road bordering the creek, we noticed either a significant lack of bins, including cigarette and recycling bins (none present in all areas we surveyed). While these can be costly for local councils, we believe that they are vital to preventing litter from entering the environment. Our work in other shires across Australia and overseas 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

Our goal is to implement these practical mitigation solutions during Phase III of the project (funding dependant).



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.

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 large 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 III of the project. This will include community education prior to and during storm season, specialised litter traps and booms, as well as proactive cleans 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 206 pieces of debris per kilometre** found in Tingalpa Creek is a very concerning statistic and has resulted (along with two other key variables) in a **D score on our Report Card** (page 33). 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 and III of this project and move Tingalpa Creek toward an "A" rating for marine debris health.

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MARINE DEBRIS REPORT CARD

POSITIVE CHANGE FOR MARINE LIFE

TINGALPA CREEK, REDLANDS QLD

2020

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 Tingalpa Creek River Warriors project consisted of 12 surveys covering the accessible length of the creek twice over a 10-month period. We collected baseline data on type, quantity, source and presence of marine debris, with 5,164 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, TINGALPA CREEK: A SNAPSHOT



Marine Debris Report Card - Tallebudgera Creek
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FINDINGS

In addition to the Snapshot on page 1, our data reflects two categories - plastic and polystyrene (foam) make up 78.2% of our findings (63.9% plastic and 14.9% polystyrene). From these two categories, the most found individual items were fishing line, plastic film remnants, plastic

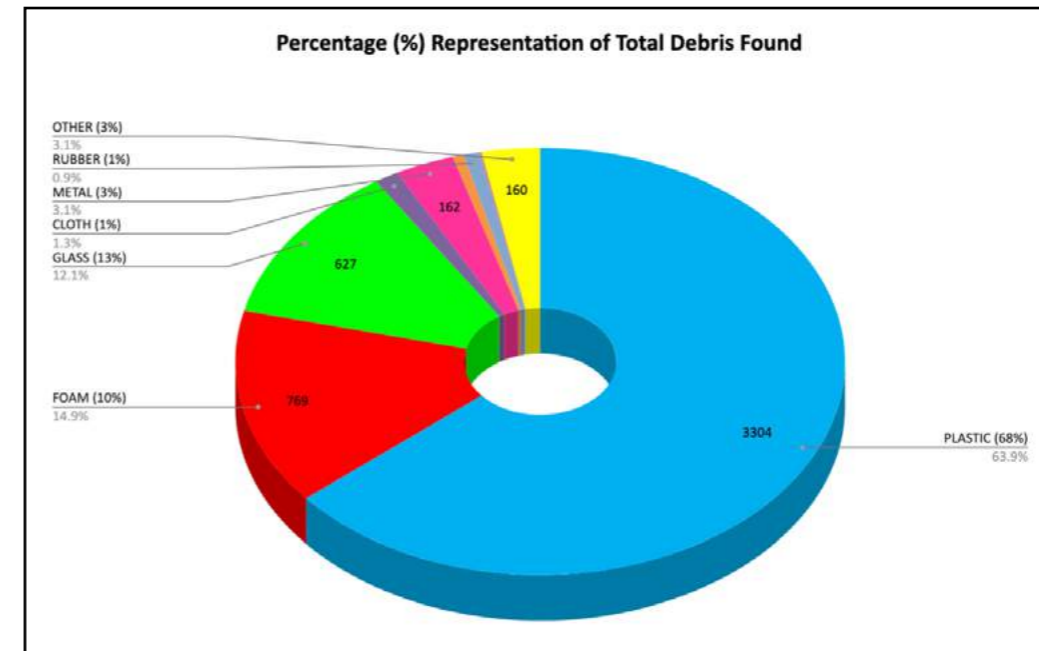


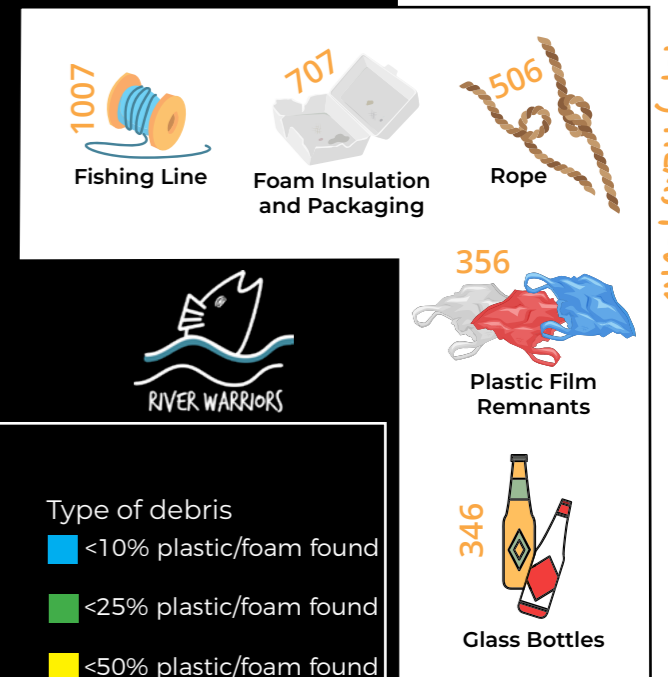
Figure 1. Total debris found - represented as a percentage.

bits & pieces, plastic food packaging and, plastic drink bottles, making up 63.4% of the total plastics found. Polystyrene was largely made up of insulation and packaging at 92% of its total (Figure 1).



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, training and supporting infrastructure (examined during Phase II and III of the program).



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



While a D may seem like a poor result, work addressing waste and marine debris is still in its infancy. Phase II and III of this project will engage stakeholders across the region to mitigate debris at its source and ensure that Tingalpa Creek can move towards an A rating!

Contact: info@pcfml.org.au / Web: pcfml.org.au



Supported by Redland City Council's Community Grants Program



STATE OF MARINE DEBRIS REPORT *2020*

TINGALPA CREEK, REDLANDS 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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Supported by Redland City Council's Community Grants Program with thanks to Redland Kayak Tours for their support.

