

Marine Litter Report 2020

KEEP
NORTHERN
IRELAND
BEAUTIFUL



MARINE
SURVEY

Executive summary

This report summarises the key findings on marine litter observed on twelve reference beaches around Northern Ireland in 2020. Data has been collected since 2012 using the internationally recognised OSPAR methodology.¹

Marine litter is a topic that has been researched since the late 1960s with the discovery of plastic pieces in the stomachs of several albatrosses.²

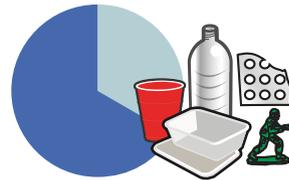
Despite this, it is only in recent years that marine litter has been recognised as a serious global issue and has become a much more prominent feature in public discourse. This increased recognition has been partly brought about following the production of David Attenborough's Blue Planet Two, which helped to showcase the issue to a worldwide audience. In 2021 we still don't know the full scale of the impact marine litter has on both people and our natural environment, but it is clear that much work is needed to address this very serious issue.

In 2010 the OSPAR protocol was adopted in the North east Atlantic area to assess the impact of marine litter.³ This report

Key facts from 2020

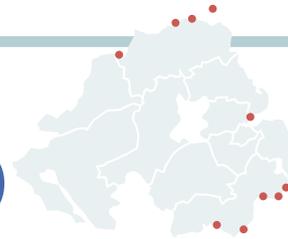
375

items of litter, on average, were recorded per 100 metres of beach surveyed



67%

of all litter was plastic



13,118*

items of litter recorded throughout 2020 on survey beaches



419

heavy duty gloves were recorded

details the amount of litter observed on 12 reference beaches in Northern Ireland during the 2020 calendar year.

The challenges presented by the COVID-19 pandemic have seen many businesses and individuals relying on using Single Use Plastics as a safety precaution to reduce the spread of the disease. The global monthly demand for PPE by healthcare workers alone was estimated at a staggering 89 million medical masks, 76 million gloves, and 1.6 million goggles.⁴ Despite the challenges presented over the last 12 months there is still room for optimism. This report shows that there has been a reduction in the amount of litter and in particular the amount of plastic we have

seen on Northern Ireland's beaches from previous levels. Although it may still be too soon for optimism.

In 2020 plastics were still the most commonly recorded items making up 67% of all litter counted during surveys (down from 78% in 2019). On average 37 drinks containers and 48 caps and lids were found per 100 meters surveyed. Additionally, short pieces of string, cord and rope were found across the beaches with an average of 70 lengths of string (<1cm diameter) and 44 lengths of ropes (>1cm diameter) counted per survey. 419 heavy duty gloves were recorded in 2020 less than half of the 1,189 gloves recorded in 2019. These are most commonly associated with fishing gear.

**Due to COVID-19 pandemic a normal year of surveys were not able to take place. In 2020 the Spring survey period which happens in April were not able to take place. The marine litter survey on Rathlin Island could not take place in Summer either due to restrictions on travel to the island. If all surveys were able to take place in throughout 2020 we can estimate a total of 18,767 items of litter would have been recorded with an average of 391 items of litter per 100 metres of beach surveyed.*

Foreword

I hope you are not sitting too comfortably.

This report once again starkly demonstrates the continuing pollution of Northern Ireland's seas and shores. As a 'developed' nation with some of the best infrastructure anywhere in the world for capturing waste, our behaviour is indefensible. No-one can now say they are unaware of the consequences, yet during lockdown we have seen littering increase as shown in the 2020 Cleaner Neighbourhood report. The impact on marine life, of this almost entirely preventable behaviour, is now only too well documented. David Attenborough's book 'A Life on Our Planet' and films such as Seaspiracy and Plastic Ocean have all noted the serious impact of plastics from both land and the fishing industry on marine life. Local fishing must play its part in tackling this issue but is itself increasingly threatened by the removal of most large fish by fleets of super-trawlers.

Our oceans provide employment for tens of millions; seafood is the primary (and often only) source of protein for one billion of us; marine plants produce more than half (maybe as much as 80%) of the oxygen we breathe; they remove much of the carbon dioxide we breathe out; and in Northern Ireland they play a major role in regulating our climate. In essence, our oceans are critical in maintaining our way of life. That is how important they are.

Please don't just read this report – use it to change the way we do things. Join the growing movement of people making a real difference. Be brave, be bold, be the difference.

How well do people really understand this fundamental truth? How clearly are these facts being imparted during our formative years? How can this knowledge help change the way we, as individuals, businesses and governments, reduce the demands we are placing on the vast, yet fragile, marine environment?

Thankfully, the tide is turning. The media has at last put the environment centre stage, as the scientists increasingly raise the alarm. Local activities to protect our environment are also on the rise. The pandemic has given people pause for thought and Live Here Love Here has provided the means for thousands of people to actively engage with the outdoors. Litter picking is establishing itself as a popular new hobby.

Government is playing its part too with active consultations on extended producer responsibility and a deposit return scheme as well as a climate bill in the offing. The players often absent right now are businesses whose products are causing the problem and it is time for them take their fair share of responsibility now, ahead of the legislation. Here too, some companies are already doing just that, investing in anti-littering initiatives and committing to reducing plastic use as they sign up to the Plastic Promise.

This report has shown the scale of the marine litter issue in Northern Ireland for many years. The information it contains is a reminder of how destructive our current consumer habits are. Please don't just read this report – use it to change the way we do things. Join the growing movement of people making a real difference. Be brave, be bold, be the difference, live here love here.

We have shown how we can care for the vulnerable in society. Now we must extend that care to our vulnerable environment, including the seas on which we rely so heavily.



Dr. Ian Humphreys

CHIEF EXECUTIVE,
KEEP NORTHERN
IRELAND BEAUTIFUL

What is the Marine Litter Survey?

In 2012 Keep Northern Ireland Beautiful started recording marine litter on a number of beaches across Northern Ireland. The survey method was designed by OSPAR to help set a standard for monitoring litter on beaches across countries bordering the North Atlantic. Currently 12 beaches are being surveyed in Northern Ireland for all types of litter (see page 9).

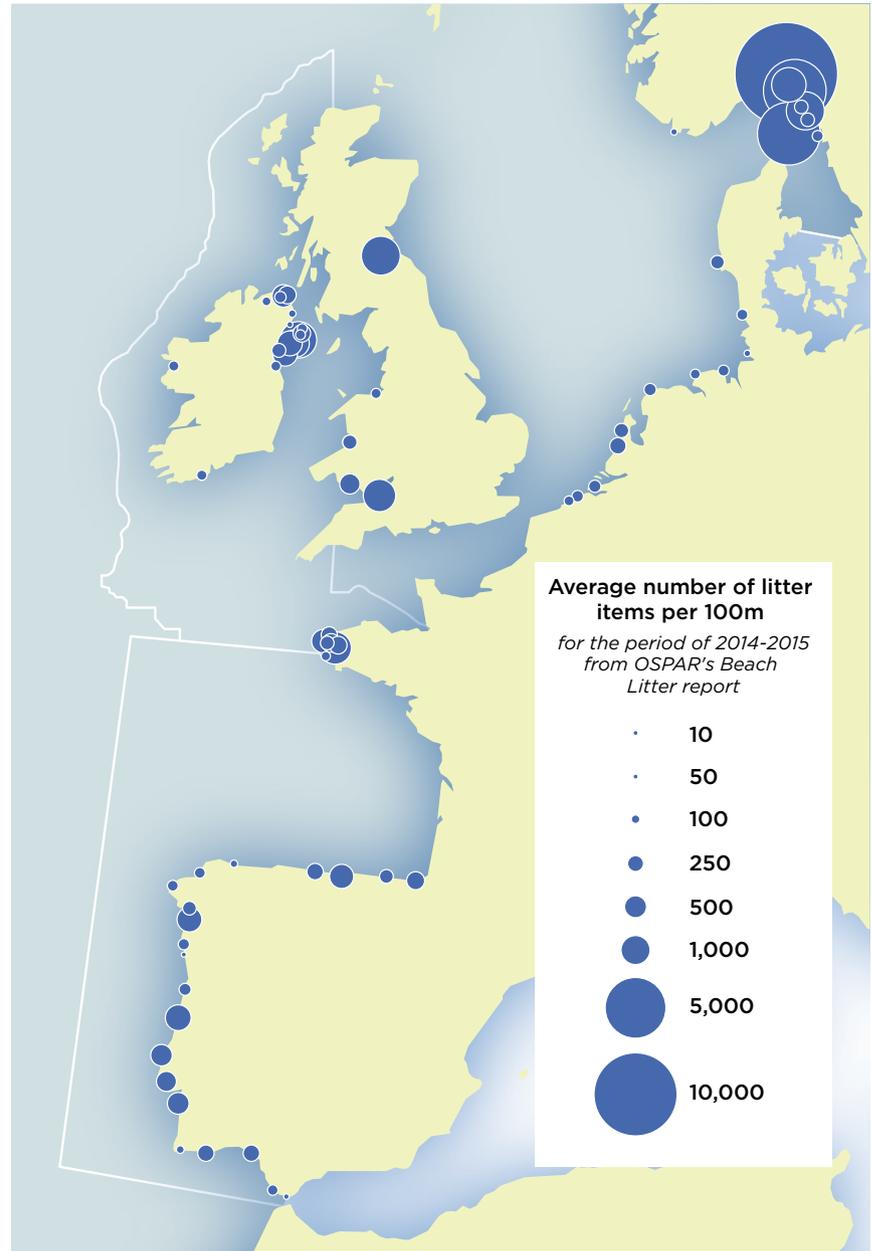
OSPAR is the mechanism by which 15 Governments and the EU cooperate to protect the marine environment of the North-East Atlantic.

OSPAR has a stated aim to substantially reduce marine litter, in the OSPAR Maritime Area, to levels where the properties and quantities of marine litter do not cause harm to the coastal and marine environment.

You can view the data for all OSPAR sites by visiting <https://odims.ospar.org/>

The long term aim is that updated assessments of all the OSPAR marine litter indicators will be included in the next OSPAR Quality Status Report in 2023.

Although the UK has now officially left the European Union we will still be working towards the goals of OSPAR and continue to work with other European Countries to report on marine litter.



Methodology

The OSPAR Commission designed the marine litter survey guidelines to assist countries with recording and tackling the marine litter problem on both a local and North East Atlantic level.

The information collected from each beach is fed into a central database which shows trends in the types of litter found in the marine environment. Surveyors record all litter found on the beach under different categories to help describe the different groups and items of litter observed.

When selecting beaches to be surveyed the following criteria was used. The beach must:

- Be composed of sand or gravel and exposed to the open sea;
- Be accessible to surveyors all year round;
- Be accessible for ease of marine litter removal;
- Be a minimum length of 100 metres and if possible over 1 kilometre in length;
- Be free of 'buildings' all year round; ideally not be subject to any other litter collection activities

Two sampling units are used to measure a fixed section of the beach between the water's edge and the back of the beach. These units are:



- 100 metres: for identifying all marine litter items;
- 1 kilometre: for identifying objects generally larger than 50 centimetres.

The survey periods are as follows:

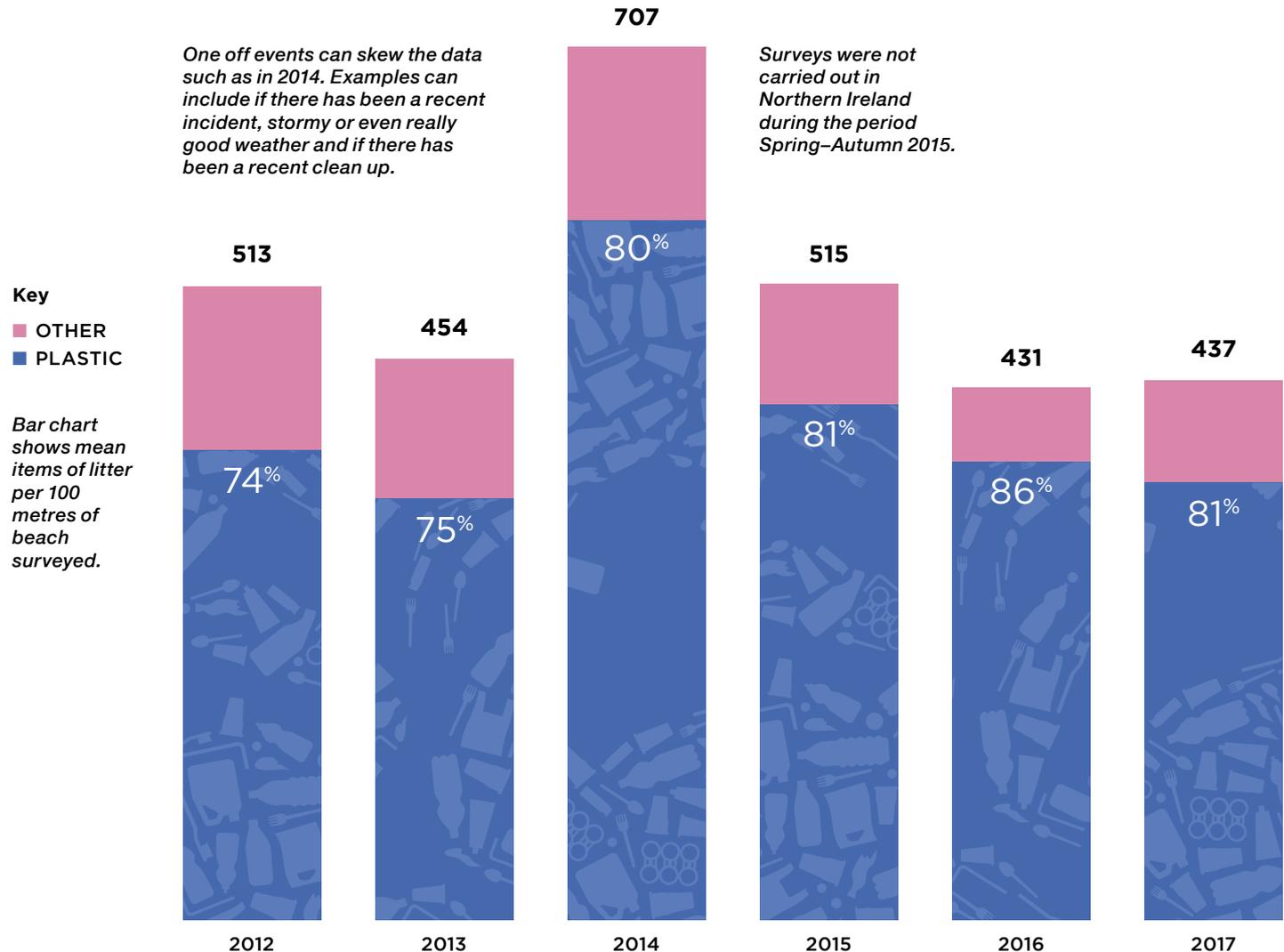
- Winter: mid-December – mid-January
- Spring: April
- Summer: mid-June – mid-July
- Autumn: mid-September – mid-October

To ensure that the marine litter being recorded during each of the surveys isn't duplicated the survey beaches are cleaned within two weeks of the survey.

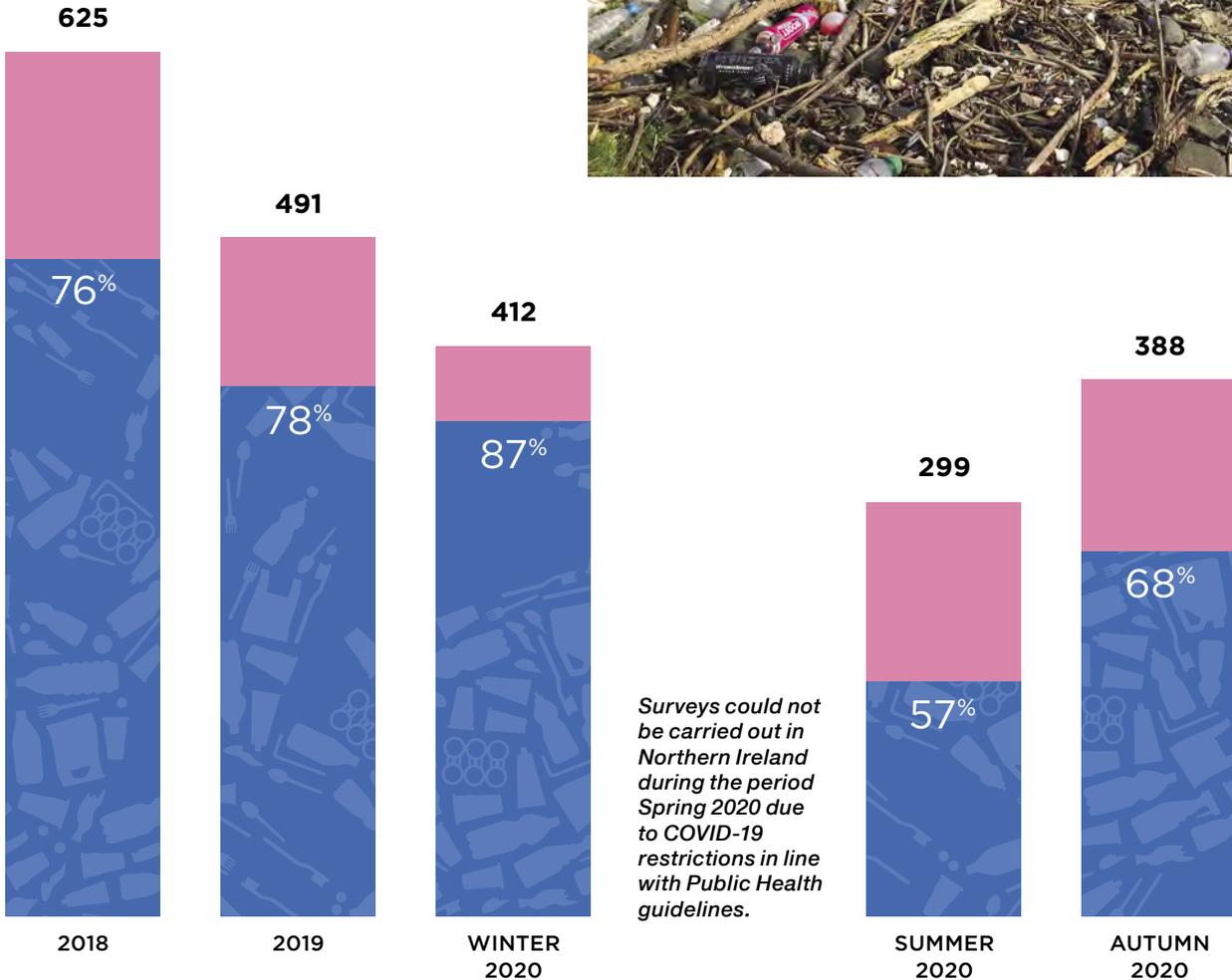
Once all data has been collected it is collated together into one form and uploaded to the OSPAR database. This data is also uploaded to the Keep Northern Ireland Beautiful website and can be viewed at: **[www.keepnorthernireland beautiful.org/marinelitter](http://www.keepnorthernirelandbeautiful.org/marinelitter)**

The plastic problem

In 2020, 67% of the visible litter found on the beaches in Northern Ireland was made of plastic. As the volume of plastic being produced grows every year, we need to become more responsible with how we dispose of it and more aware of the impact it has on our environment.



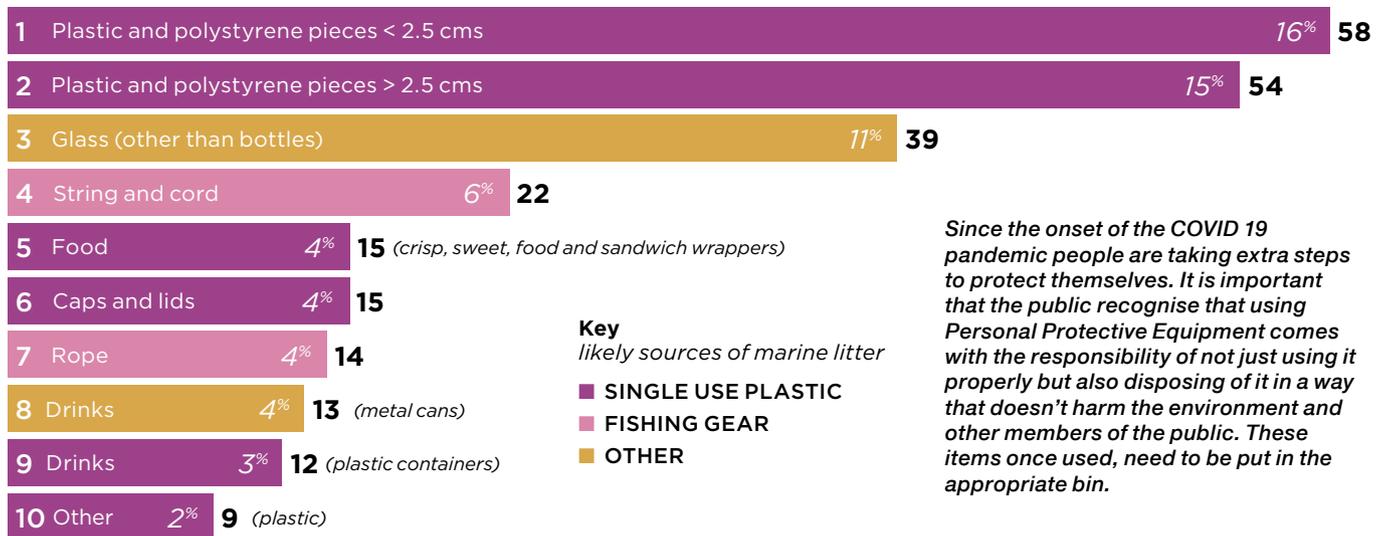
Beach near Kilroot Power Station.



2020 Terrible Ten

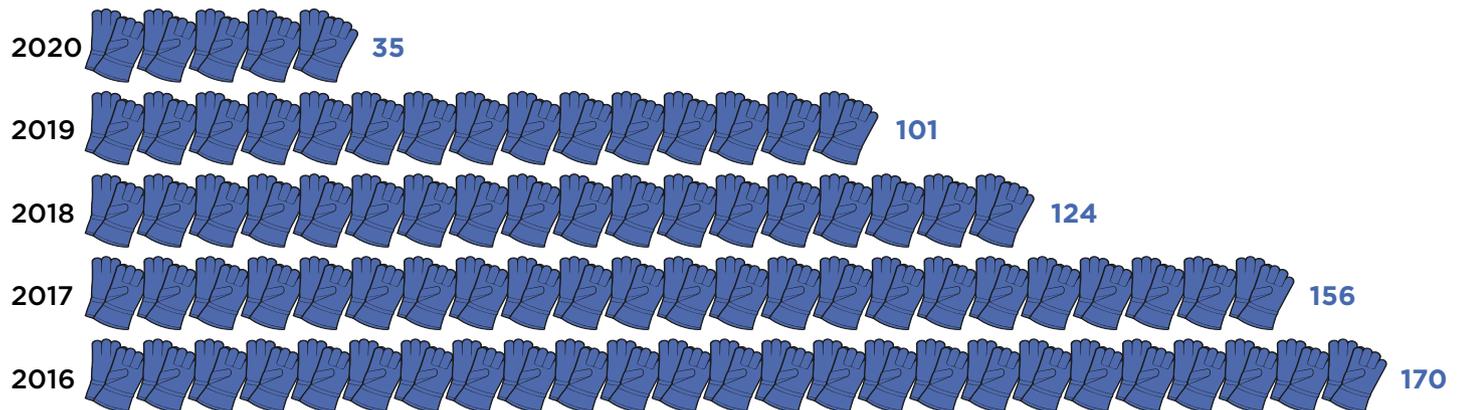
Plastic continues to dominate the most common items found on the survey beaches both as Single Use Plastic such as food and drinks containers and in the form of string, rope and cord.

The graph below details the average number of pieces of each type of litter found within the 100m survey.

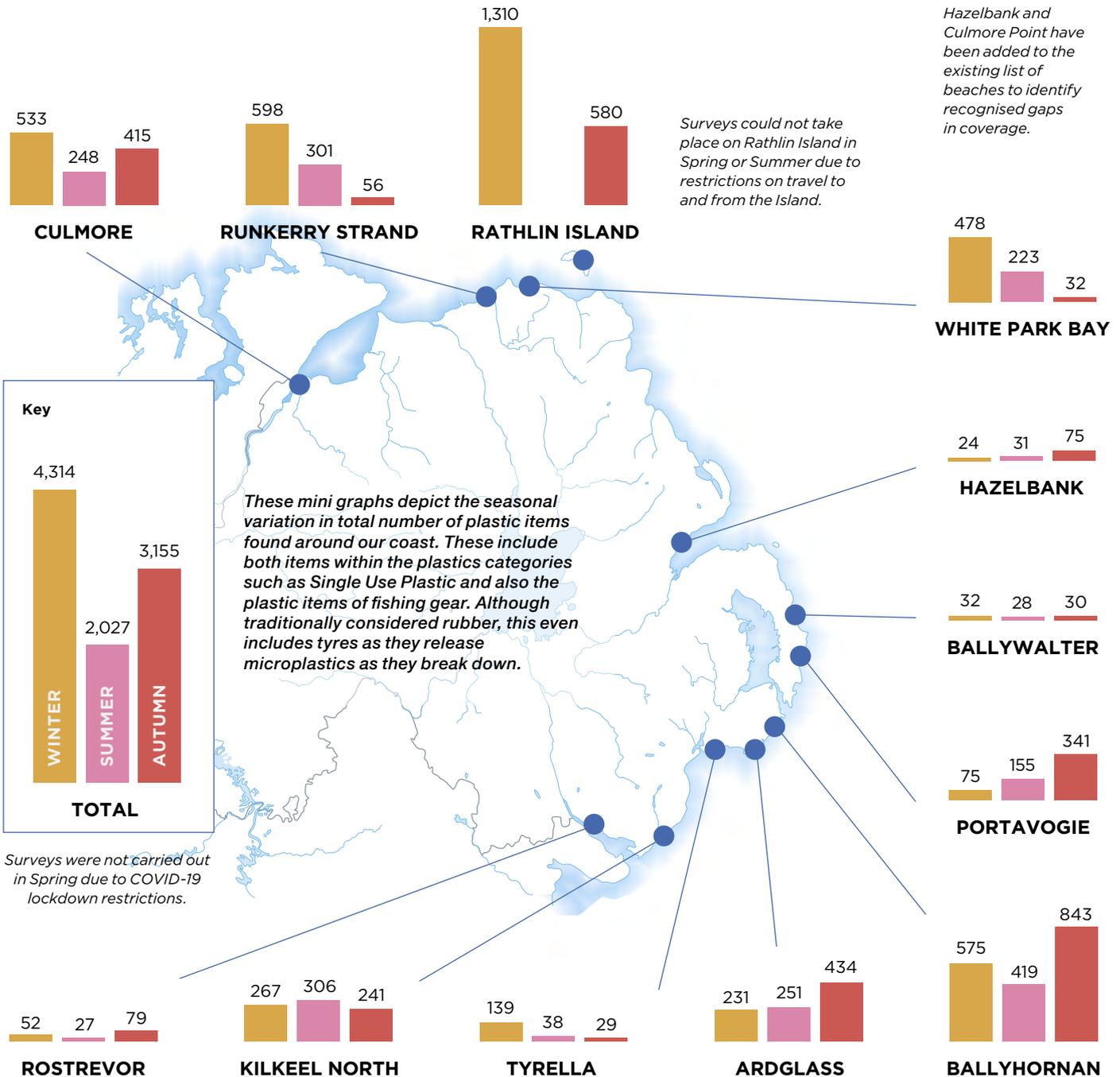


Heavy duty gloves found per 1,000 metres of surveyed coastline.

From 2016 – 2019 there has been a steady decrease in the number of heavy duty gloves found on our surveys, however the numbers are still high. In 2020 we saw a further large decrease in the number of heavy duty gloves. This may have been due to less fishing activity due to the pandemic. We would hope for the number of heavy duty gloves to continue to decrease.



Plastic around our coast



Marine litter in Northern Ireland

2020 saw the fewest number of items counted since recording began back in 2012, with an average of 375 items recorded per 100 metres. This equates to approximately 4 pieces of litter per step.

2020 has been a difficult year in many regards but the results from the marine litter surveys paint a positive picture with large reductions in the levels of litter observed across all survey beaches, especially in summer 2020. However the number of items observed rose again in the Autumn.. These reductions may be due to a number of reasons; from fewer people being out due to lockdown restrictions, to more people carrying out clean-ups of their local beaches, perhaps inspired to do more in their local area while they couldn't travel further.

Whatever the reason, this appears to be a big step in the right direction. It is worth noting that this year has been an unusual one, and we will therefore need to see this trend continue over the next few years before we can say with certainty that the levels of marine litter on Northern Ireland's beaches are beginning to reduce significantly.

Although we are seeing some signs of positive change we can also see that the types of litter we consider the 'usual suspects', mainly Single Use Plastics (SUPs), still pose a significant problem.



Of the top ten types of litter shown on page 8 six were single use plastics and two of the categories are considered to be commonly used as fishing gear.

This demonstrates that there is still a need to change the attitude of the population towards single use plastics, and in particular when it concerns to plastic food and drink containers. Like

many other plastics these items are not just an issue when discarded as a whole but they persist in the marine environment as they break down into smaller pieces of plastic. On average small pieces of plastic and polystyrene that are less than 2.5 centimetres make up 16% of all litter we record. These small items are very difficult to manage and cannot simply be removed from the environment, often leading to them being ingested by wildlife.

Throughout 2020 while completing the surveys we have had more people than ever before come and speak to us about what we are doing and how they have been inspired to do something about the litter on their local beach. One individual at Rostrevor beach had even told us how they had spent a lot of time collecting all of the tyres across the beach and bringing them to a more accessible area so that the council could collect these (above left).

This has been the lowest record of litter since the beginning of the surveys in Northern Ireland, but due to the circumstances of 2020 we would like to see this trend continue before we could be confident there has been a true change. As already mentioned, there has been an upsurge of people collecting litter, and this may have impacted on the figures for this report. There is a lot of work that is still to be done and a need for local and central government, NGOs and the public to continue to work together to tackle the problem.

The plastic problem – the human impact

Humans play both direct and indirect roles in the accumulation of plastic in the environment.

The success of producers, who often see their role as generating demand, has resulted in the top three markets for plastic being in packaging, building and construction and the automotive industry.⁵ Plastic is an important material for the global economy, with almost all aspects of daily life involving some form of plastic. From clothing and footwear, to use in public health applications such as surgical equipment and aseptic medical packaging, plastics have many benefits.⁶ However, increasing plastic consumption and its misuse are accompanied by serious environmental problems.

Increasing human population and associated economic growth has also led to an increase in the demand for plastic goods. To cope with this increased demand, manufacturing companies have been producing a higher volume of plastic products. These include disposable plastic products and packaging. Since the 1950s, global plastic production has grown by around 9% every year⁷ and packaging such as food containers,

wrappers, straws, bottles and eating utensils account for one-third of plastic production worldwide.⁵

Single Use Plastics (SUPs) are the largest proportion of general plastics manufactured in many places around the world, with polyethylene used in packaging, being the leading polymer in use today.⁵ However, by creating this increasing amount of disposable packaging, we are only adding to our litter and waste management problems. These items are typically used only once before they are thrown away, with most ending up in landfills or being incinerated. As a result of the demand for these materials, it is no surprise that SUP items like bags and bottles are some of the most abundant items found in global waste streams.⁸

Our 'throw-away' attitude means that these items have a short lifespan. In contrast to how short their purpose is. SUPs are known to degrade slowly over a long period of time, eventually breaking down into smaller pieces called secondary microplastics via sunlight and wave action.⁹ SUP litter has been perniciously accumulating in our oceans, rivers, soils and even wildlife over many decades, with the adverse effects only slowly becoming apparent.

However, we also add to the litter problem by not taking correct measures to dispose of waste that has already been created. Too few countries have adequate legislation and/or infrastructure to prevent waste entering the environment, and the low cost (and low value) of plastic products¹⁰ does little to discourage their purchase. Globally, recycling rates need to be improved. The circular economy model requires further investment. For many countries, there is no waste economy in existence, meaning no drivers to prevent huge quantities of plastic pollution entering the environment daily. A lot of littering today is deliberate, with people intentionally littering due to a lack of perceived consequences. In a 2020 Cognisense survey conducted for Live Here Love Here, 45% of on-line participants admitted to littering, compared to just 24% of face to face participants. This suggests people know it is wrong to litter but still do it anyway. Studies have shown that the decision to litter is based on the actions of those around us. Unclean environments will encourage people to care less about littering, whilst clean and litter-free environments will influence them to carry on using bins to dispose of their litter.¹¹

Impacts of plastic on wildlife

Marine litter is defined as any persistent, manufactured or processed solid material that is discarded, disposed, or abandoned in marine and coastal environments.¹²

Marine litter consists primarily of plastic compared to other types of litter such as glass, paper, cloth and rubber. Plastic is shown to be the most persistent in marine environments, as it is easily transported by water currents and is slow to degrade.¹³ More than 693 species have been described interacting with marine litter, with 92% of these encounters involving plastic.¹⁴ The harmful effects that plastic has on marine ecosystems have been brought to attention recently, with many studies showing how it can affect entire food webs and ecosystems.

Macroplastics

Macroplastics (20-100mm) are larger size plastics that can be seen by the naked eye.¹⁵ Entanglement and ingestion are the most common issues associated with macroplastic fragments. Fishing gear such as pieces of rope and net that, if discarded or lost can cause marine mammals to become accidentally entangled and unable to escape (known as 'ghost-fishing'), leaving them to drown or die from related injury and starvation.¹⁶ Ingestion of macroplastics by wildlife can cause ulcerations and gastric blockages, leading to disrupted digestion and general debilitation.³³ In seabirds,



attention is paid to the contents of the stomach as a range of plastic types have been found in specimens recovered such as the northern fulmar (*Fulmarus glacialis*).¹⁷

Microplastics

Macroplastics eventually break down into microplastics (<5mm) by UV light and physical abrasion through wave action. Microplastics can be found throughout the water column and are easily ingested by organisms, either directly themselves or by eating other prey that have already ingested microplastic.¹⁸ They can mimic food particles and when ingested can obstruct parts of the digestive system.¹⁴ A study by Naji et al.¹⁹ discovered that molluscan shellfish in Persian coastal waters take in microplastics, with very high levels found in predatory species, indicating transfer of microplastics throughout the food chain.

Microplastics also cause different chemical effects in organisms, due to their ability to adsorb and accumulate certain kinds of contaminants.²⁰ They can act as vectors of persistent organic pollutants (POPs) to marine organisms. POPs such as phthalates can cause chronic effects, damaging circulatory and excretory systems and can impact reproductive success.²¹ A study by Crump et al.²² displayed how microplastic pollution negatively affects behaviour and cognition in European hermit crabs (*Pagurus bernhardus*). Results showed that exposure to microplastics impacted their ability to choose an optimal shell, disrupting essential survival behaviour.

Microplastics from textiles

The term 'Microplastic' refers to small pieces of plastic debris that are less than 5mm.⁹

Microplastics are a growing concern for the manufacturing industry, with microplastic fibres or 'microfibres (MFs)' originating from carpeting, clothes, synthetic fishing nets and rope, all accounting for more than 90% of microplastic pollution in "the marine environment."²³

Microfibres have been shown to detach along every step of a textile's lifecycle, from the beginning during production and also in the making of other products. The majority of primary microfibres found in the environment are released from washing our clothes, in particular clothes made of synthetic fibres, like polyester and nylon.²⁴ During the washing process, clothing undergoes mechanical and chemical stress in washing machines, releasing thousands of microfibres. The first study to investigate the quantity of MFs being released estimated that just one load of washing (6kg) when washed in a machine could cause over 700,000 microfibres to detach.¹⁴ Since then, more research has been conducted on this, using filters with a finer mesh size to capture smaller MFs. De Falco et al.²⁶ using a 5 micrometre mesh pore size, discovered that over 6 million microfibres could actually be released from a 6kg wash.

Wastewater treatment plants (WWTPs) have been identified as a pathway to aquatic environments for these



microfibres. As a result of washing, the plastic fibres are released into wastewater.²⁷ Sewage sludge is a by-product of wastewater treatment and studies have shown that around 75-80% of microfibres in WWTPs are found in the sludge phase.²⁸ This sludge can be used in agriculture to improve soil fertility by adding essential nutrients. However, this is just adding the MFs back into the environment. A study by Ziajahromi et al.²⁹ evaluated the abundance of microfibres throughout the treatment processes of three WWTPs in Australia. Data concluded that the majority of microplastics (69-79%) were removed by screening and grit removal in preliminary treatment. However, the microplastics captured during screening are then taken to landfill sites, where they can be released back into the environment through leaching or carried by wind.

Actions can be taken to reduce the amount of plastic in the environment by reducing the microplastic load before the sewage reaches a WWTP. Buying fewer clothes, or if possible, clothes made from organic materials creates fewer microfibres in the first place. Textiles created from natural polymers like cotton or wool are compostable and can be readily broken down by micro-organisms.³⁰ Washing clothes at cooler temperatures for shorter periods of time, and using liquid detergent can significantly reduce the shed of microfibres.³¹

Nurdles

What are Nurdles?

Nurdles are small plastic pellets approximately 5mm in diameter that serve as a raw material in the manufacturing and packaging of nearly all plastic products.³² They can be made of polyethylene, polypropylene, polystyrene, polyvinyl chloride, or other plastic types and are melted down and then moulded into items like bottles, cups, shopping bags etc. Accidental spillage and mishandling during the plastics supply chain means billions of them are washed out to sea and can end up on beaches, adding to the huge amounts of plastic waste already present and creating countless problems within marine ecosystems.



The nurdles above were collected over time on the Ballyholme Beach in Bangor. All nurdles are between 3 and 5mm in diameter and often shaped like a lentil.

Impacts of Nurdles

Nurdles are types of primary microplastics and have been shown to cause similar problems. Like secondary microplastics they can be ingested by fish and birds that mistake them for food or prey, due to their buoyancy, size, and colour. This can result in potential obstruction of the gastro-intestinal tract, causing ulceration, making them feel full and stopping them from consuming real food.³³

Nurdles and other plastics are known to transport toxic pollutants to their surface, including Persistent Organic Pollutants (POPs) and other organic chemicals.³⁴ POPs are lipophilic and can have a wide range of chronic effects on organisms if ingested, including endocrine disruption, increased cancer risks and reproductive disorders.³⁵ The use of polychlorinated biphenyls (PCBs) in electrical equipment, although banned almost 30 years ago- still persist at concentrations which are attributed to the continued decline of Orca (Killer Whale) populations worldwide.³⁶

Nurdles might also have indirect effects on ecosystems. It is estimated that 70% of all plastics are believed to eventually sink and accumulate in seabed sediments.³⁷ Higher levels of nurdles and other microplastics can change the characteristics of sand on beaches such as sediment permeability and substrate temperature,³⁸ therefore influencing

duration and hatchling success of marine turtles, having been observed in loggerhead and green turtle species in Cyprus.³⁹

The hard surface of a nurdle also provides an environment on which micro-organisms can form biofilms. Studies have shown that the disease-carrying bacteria, *Escherichia coli* (*E.coli*) and *Vibrio* spp, have colonised nurdles across several public bathing beaches in Scotland.⁴⁰

As part of the Northern Ireland marine litter surveys we are beginning to record nurdles on beaches along the north coast including Runkerry Strand and White Park Bay. Currently these are not washing up in large quantities but there is a fear they will continue to appear.

If you would like to help to tackle the issue of Nurdles you can take part in Fidra's Great Nurdle Hunt and record any nurdles that have washed up on your beach. When you find any nurdles share this on the Great Nurdle Hunt website to help show the plastics industry their impact on our seas.

To learn more information on the Great Nurdle Hunt and how you can get involved visit their website at

www.nurdlehunt.org.uk

Tackling marine litter through environmental leadership

Studying the effect of microplastics in Northern Ireland's marine systems

Through a successful application to the annual DAERA Postgraduate Studentship Competition in 2018, Mánuš Cunningham was awarded a PhD Studentship to study one of the Northern Ireland Environment Agency's priority research needs; microplastics in Northern Ireland's marine systems. Mánuš is based both at Queen's University Belfast and Liverpool John Moores University. His research focuses on where and why microplastic pollution gathers and accumulates in the marine environment, and how this impacts upon marine animals and the fishing industry.

Through data collected during his PhD, Mánuš and his colleagues have shown that abnormally high numbers of microplastics are gathering in the Antarctic and Southern Ocean deep-sea. These values are in some cases higher than marine systems within very close proximity to large populations of people, such as the Mediterranean and North Atlantic. Despite how remote and 'pristine' these Polar systems are meant to be, at least one piece of plastic was found in each gram of seabed sediment, which shows that nowhere on the planet is safe from plastic pollution.⁴¹

Also as part of his project, DAERA is supporting research on microplastic pollution in the Irish Sea, and how this may impact upon some of our most

commercially important seafood. It has been shown in the past that microplastic ingestion has reduced the body mass of langoustines in the Clyde, Scotland.⁴² This is of particular concern to us as langoustines are Northern Ireland's most valuable fisheries resource, so plastic pollution in the Irish Sea is one of DAERA's top priorities.

The project has also shown that microplastic pollution has negative effects on other marine animals, particularly crustaceans such as crabs. When exposing hermit crabs to levels of microplastics typically found in marine systems (< 100/ Litre of water), their basic survival behaviours such as shell selection were impaired significantly.²² This particular study highlights how microplastic pollution can impact upon the conservation of marine species even here in Northern Ireland. Manus is also conducting ongoing research into how microplastics affect the feeding behaviour of common shore crabs, and how the effects of plastics, and also 'biodegradable' plastics, impact on marine fish.

Mánuš has also spent time looking at microplastic ingestion in animals further up the food chain than crabs and fish. He recently showed that high numbers of microplastic fibres, which are generally released from synthetic clothing, are

commonly ingested by barnacle geese. These geese seek refuge during the winter here on the Island of Ireland and the surrounding areas, and are ingesting plastic pollution regularly.⁴³



Above: Mánuš and Judith Hill (UTV) during a recent interview about plastic pollution in Northern Ireland.



YouthStrike4Climate

Mill Strand Integrated PS doing their YouthStrike4Climate in June of 2019 with pupils using the outdoors and their year 4 preparing and writing messages on cotton strips to tie on the railings at West Strand. In the picture (above) they had the pleasure of doing a “Yoga” session on the beach to help them appreciate the environment around them.

Healthy Oceans, Healthy Minds

In November 2020, Keep Northern Ireland Beautiful delivered a new coastal and inland waterways campaign ‘Healthy Oceans, Healthy Minds’ supported by Ocean Conservancy. This included a number of online activities for the public to get involved in, including webinars, social media content, storytelling, podcasts and more.

Whilst the current lockdown restrictions on society are undeniably necessary to flatten the spread of the virus itself, the impact of this new and enforced way of living on health and wellbeing is significant – levels of worry, stress, and anxiety are already showing upwards trends. Whilst nothing is certain, it is fair to anticipate that this ‘period of lockdown’, as we’ve come to know it, will be repeated in future months to tackle the spread of the disease. The Healthy

Oceans, Healthy Minds campaign has encouraged key actions people have taken that contributed to the health of our oceans and ultimately people’s health and wellbeing.

At a time when normal community clean-ups and gatherings could not take place as usual, this forced hiatus has however given people pause for thought about what really matters in our lives and how we can change the way we work, live and interact with our natural environment for the better.

“When we see and understand the benefit the outdoors can have on our personal health then we’ll want nothing more than to protect it.”

Visit www.liveherelovehere.wixsite.com/healthyoceans to find out more.



Volunteers

The COVID-19 pandemic has made volunteering much more challenging throughout 2020 due to travel restrictions and additional safety measures put in place to ensure all volunteering was in line with public health guidelines.

Despite all these additional challenges Keep Northern Ireland Beautiful have still been able to call upon our amazing team of dedicated volunteers to ensure the continued collection of marine litter data across the survey beaches.

We asked our volunteers how they have felt about volunteering for the marine litter surveys and what motivates them to support the programme.

"I volunteer for the Marine Litter Survey because I believe that the data we are collecting is there to guide informed policy decision-making for protecting our precious and fragile marine and coastal environments. I believe in the intrinsic value of the beach; and I am grateful to be able to play a small part in protecting it."

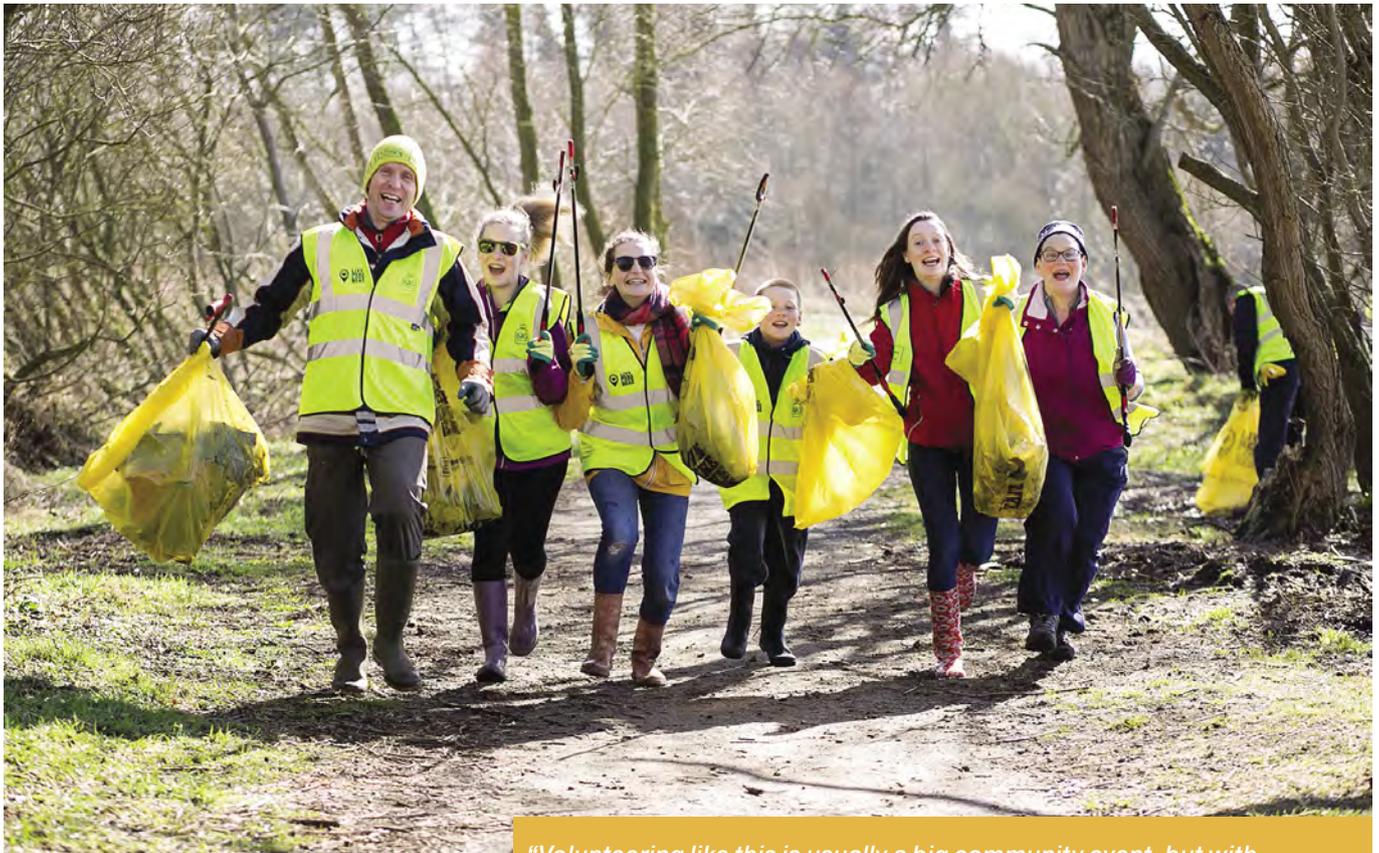
Susann Power

Volunteers can also be those who just want to help do their bit by doing litter picks. Ceira Kennedy (right) is currently doing her Duke of Edinburgh Silver Award and as part of this she has decided to do litter-picking every weekend in all weathers.

"I'm currently on a year's placement with Keep Northern Ireland Beautiful. Helping to coordinate and be involved with the marine litter surveys is something I have really enjoyed over the past few months. It has given me the opportunity to get out of the house (very necessary this year!) and to meet up with staff members and other volunteers on the beaches. I was lucky enough to even spot some wildlife- my first ever survey was on Rathlin, where we saw a pair of seals swimming in the harbour. Getting to see first-hand and record the volume of litter that is dropped or washed up along our coastline has made me realise how heavily items like single-use plastic are relied on, and that there is still a way to go in changing people's behaviour and attitudes towards littering. Taking part in the surveys is something that I'd hopefully like to continue doing in the future."

Joss Glenn Student at Queen's University Belfast





The #notsobigspringclean competition

As part of the initiative, volunteers were in with the chance to win the litter-picking gadget, Handicart, donated by Helping Hand Environmental. This year's winners were the Belshaw Family.

“Volunteering like this is usually a big community event, but with COVID-19, we just did it in our own families. It was a fantastic day, going from Murlough into Newcastle, doing what we can for the environment along the way. We're always a bit horrified by the amount of straws, Q-tips and wipes which are terrible for our coastlines. There did seem to be a lot less plastic cutlery than last year which is a good sign though. We found the lid of a Smarties tube – considering that they haven't had plastic Smarties tubes for nearly thirty years, it certainly caught our eye. My eldest daughter who is 16, even found a crisp packet that is older than her! We're delighted to have won the Handicart, it's been a real treat for us and will make things much easier when we're out volunteering in the future.”

Jenny Belshaw Primary school classroom assistant

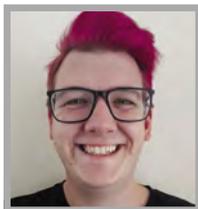
References

- OSPAR Commission (2010) Guideline for Monitoring Marine Litter on the Beaches in the OSPAR Maritime Area. 84pp
- Kenyon and Kridler, 1969 Laysan albatrosses swallow indigestible matter K.W. Kenyon and E. Kridler Ornithol. Adv, 86 (2) (1969), pp. 339-343
- OSPAR Commission, 2010 Guideline for Monitoring Marine Litter on the Beaches in the OSPAR Maritime Area OSPAR Commission (2010)
- WHO, 2020 Shortage of personal protective equipment endangering health workers worldwide WHO [WWW Document]. URL <https://www.who.int/news-room/detail/03-03-2020-shortage-of-personal-protective-equipment-endangering-health-workers-worldwide> (2020), Accessed 25th Jul 2020
- Plastics Europe (2020). Plastics-the Facts 2020. An Analysis of European Plastics production, Demand and Waste data. [online] www.plasticseurope.org. Available at: <https://www.plasticseurope.org/en/resources/publications/4312-plastics-facts-2020>.
- Andrady, A.L. and Neal, M.A. (2009). Applications and Societal Benefits of Plastics. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1526), pp.1977-1984.
- Chen, Y., Awasthi, A.K., Wei, F., Tan, Q. and Li, J. (2021). Single-use plastics: Production, usage, disposal, and Adverse Impacts. *Science of the Total Environment*, 752(141772).
- Carpenter, E. and Wolverton, S. (2017). Plastic Litter in streams: The Behavioral Archaeology of a Pervasive Environmental Problem. *Applied Geography*, 84, pp.93-101.
- Yang, L., Zhang, Y., Kang, S., Wang, Z. and Wu, C. (2020). Microplastics in Freshwater sediment: A Review on Methods, Occurrence, and Sources. *Science of the Total Environment*, 754(141948).
- Barsalou, O. and Picard, M.H. (2018). International Environmental Law in an Era of Globalised Waste. *Chinese Journal of International Law*, 17 (3), pp. 887-906.
- Daniel, J. (2016). Using Behavioural Insights to Reduce Littering in the UK. [online] Available at: <http://www.nudgeathon.com/wp-content/uploads/2016/01/CLUB-REPORT.pdf>.
- UNEP (2009). Marine Litter: A Global Challenge. [online].
- Rosevelt, C., Los Huertos, M., Garza, C. and Nevins, H.M. (2013). Marine Debris in Central California: Quantifying Type and Abundance of Beach Litter in Monterey Bay, CA. *Marine Pollution Bulletin*, [online] 71(1-2), pp.299-306.
- Gall, S.C., and Thompson, R.C. (2015). The Impact of Debris on Marine Life. *Marine Pollution Bulletin*, 92(1-2), pp.170-179.
- Barnes, D.K.A., Galgani, F., Thompson, R.C., Barlaz, M. (2009). Accumulation and fragmentation of plastic debris in global environments. *Philosophical transactions of the royal society B*, 364: 1985-1998.
- Gregory, M.R. (2009). Environmental Implications of Plastic Debris in Marine settings—entanglement, ingestion, smothering, hangers-on, hitch-hiking and Alien Invasions. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 364(1526), pp.2013-2025.
- van Franeker, J. A., Blaize, C., Danielsen, J., Fairclough, K., Gollan, J., Guse, N., Hansen, P.-L., Heubeck, M., Jensen, J.-K., Le Guillou, G., Olsen, B., Olsen, K.-O., Pedersen, J., Stienen, E. W. M. & Turner, D. M. (2011) 'Monitoring Plastic Ingestion by the Northern fulmar, Fulmarus glacialis in the North Sea'. *Environmental Pollution*, 159 (10), pp 2609-2615.
- Choy, C.A., Robison, B.H., Gagne, T.O., Erwin, B., Firl, E., Halden, R.U., Hamilton, J.A., Katija, K., Lysin, S.E., Rolsky, C. and S. Van Houtan, K. (2019). The Vertical Distribution and Biological Transport of Marine Microplastics across the Epipelagic and Mesopelagic Water Column. *Scientific Reports*, 9(1).
- Naji, A., Nuri, M. and Vethaak, A.D. (2018). Microplastics Contamination in Molluscs from the Northern Part of the Persian Gulf. *Environmental Pollution*, 235, pp.113-120.
- Rodrigues, J.P., Duarte, A.C., Santos-Echeandía, J. and Rocha-Santos, T. (2019). Significance of Interactions between Microplastics and POPs in the Marine environment: A Critical Overview. *TRAC Trends in Analytical Chemistry*, 111, pp.252-260.
- Browne, M.A., Dissanayake, A., Galloway, T.S., Lowe, D.M. and Thompson, R.C. (2008). Ingested Microscopic Plastic Translocates to the Circulatory System of the Mussel, *Mytilus edulis*(L.). *Environmental Science & Technology*, 42(13), pp.5026-5031.
- Crump, A., Mullens, C., Bethell, E.J., Cunningham, E.M. and Arnott, G. (2020). Microplastics Disrupt Hermit Crab Shell Selection. *Biology Letters*, 16(4), p.20200030.s
- Koelmans, A.A., Mohamed Nor, N.H., Hermesen, E., Kooi, M., Mintenig, S.M. and De France, J. (2019). Microplastics in Freshwaters and Drinking water: Critical Review and Assessment of Data Quality. *Water Research*, [online] 155, pp.410-422.
- Belzagui, F., Crespi, M., Álvarez, A., Gutiérrez-Bouzán, C. and Vilaseca, M. (2019). Microplastics' emissions: Microfibers' Detachment from Textile Garments. *Environmental Pollution*, 248, pp.1028-1035.
- Napper, I.E. and Thompson, R.C. (2016). Release of Synthetic Microplastic Plastic Fibres from Domestic Washing machines: Effects of Fabric Type and Washing Conditions. *Marine Pollution Bulletin*, 112(1-2), pp.39-45.
- De Falco, F., Gullo, M.P., Gentile, G., Di Pace, E., Cocca, M., Gelabert, L., Brouta-Agnésia, M., Rovira, A., Escudero, R., Villalba, R., Mossotti, R., Montarsolo, A., Gavignano, S., Tonin, C. and Avella, M. (2018). Evaluation of Microplastic Release Caused by Textile Washing Processes of Synthetic Fabrics. *Environmental Pollution*, 236, pp.916-925.
- Sun, J., Dai, X., Wang, Q., van Loosdrecht, M.C.M. and Ni, B.-J. (2019). Microplastics in Wastewater Treatment plants: Detection, Occurrence and Removal. *Water Research*, 152, pp.21-37.
- Talvitie, J., Mikola, A., Setälä, O., Heinonen, M. and Koistinen, A. (2017). How Well Is Microlitter Purified from Wastewater? - a Detailed Study on the Stepwise Removal of Microlitter in a Tertiary Level Wastewater Treatment Plant. *Water Research*, 109, pp.164-172.
- Ziajahromi, S., Neale, P.A., Telles Silveira, I., Chua, A. and Leusch, F.D.L. (2021). An Audit of Microplastic Abundance Throughout Three Australian Wastewater Treatment Plants. *Chemosphere*, 263, p.128294.
- Szostak-Kotowa, J. (2004). Biodeterioration of Textiles. *International Biodeterioration & Biodegradation*, 53(3), pp.165-170.
- Cotton, L., Hayward, A.S., Lant, N.J. and Blackburn, R.S. (2020). Improved Garment Longevity and Reduced Microfibre Release Are Important Sustainability Benefits of Laundering in Colder and Quicker Washing Machine Cycles. *Dyes and Pigments*, 177, p.108120.
- Ellison, K. (2007). The Trouble with Nurdles. *Frontiers in Ecology and the Environment*, 5(7), pp.396-396.
- Brandão, M.L., Braga, K.M. and Luque, J.L. (2011). Marine Debris Ingestion by Magellanic penguins, Spheniscus Magellanicus (Aves: Sphenisciformes), from the Brazilian Coastal Zone. *Marine Pollution Bulletin*, 62(10), pp.2246-2249.
- Wardrop, P., Shimeta, J., Nugegoda, D., Morrison, P.D., Miranda, A., Tang, M. and Clarke, B.O. (2016). Chemical Pollutants Sorbed to Ingested Microbeads from Personal Care Products Accumulate in Fish. *Environmental Science & Technology*, 50(7), pp.4037-4044.
- Tanabe, S. (2004). POPs--need for Target Research on High-Risk Stage. *Marine Pollution Bulletin*, [online] 48(7-8), pp.609-610.
- Noël, M., Barrett-Lennard, L., Guinet, C., Dangerfield, N. and Ross, P.S. (2009). Persistent Organic Pollutants (POPs) in Killer Whales (Orcinus orca) from the Crozet Archipelago, Southern Indian Ocean. *Marine Environmental Research*, 68(4), pp.196-202.
- J. H., Mh, K. and Jr, P. (2012). Plastics in the Marine Environment: The Dark Side of a Modern Gift. *Reviews of environmental contamination and toxicology*.
- Carson, H.S., Colbert, S.L., Kaylor, M.J. and McDermid, K.J. (2011). Small Plastic Debris Changes Water Movement and Heat Transfer through Beach Sediments. *Marine Pollution Bulletin*, [online] 62(8), pp.1708-1713.
- Duncan, E.M., Arrowsmith, J., Bain, C., Broderick, A.C., Lee, J., Metcalfe, K., Pikesley, S.K., Snape, R.T.E., van Sebille, E. and Godley, B.J. (2018). The True Depth of the Mediterranean Plastic problem: Extreme Microplastic Pollution on Marine Turtle Nesting Beaches in Cyprus. *Marine Pollution Bulletin*, 136, pp.334-340.
- Rodrigues, A., Oliver, D.M., McCarron, A. and Quilliam, R.S. (2019). Colonisation of Plastic Pellets (nurdles) by *E. Coli* at Public Bathing Beaches. *Marine Pollution Bulletin*, [online] 139, pp.376-380.
- Cunningham, E. M., Ehlers, S. M., Dick, J. T., Sigwart, J. D., Linse, K., Dick, J. J., & Kiriakoulakis, K. (2020). High abundances of microplastic pollution in deep-sea sediments: evidence from Antarctica and the Southern Ocean. *Environmental Science & Technology*, 54(21), 13661-13671.
- Welden, N. A., & Cowie, P. R. (2016). Long-term microplastic retention causes reduced body condition in the langoustine, *Nephrops norvegicus*. *Environmental pollution*, 218, 895-900.
- Coughlan, N. E., Doyle, S., Baker-Arney, C., Griffith, R. M., Lyne, L., Williams, H., Kelly, T. C., McMahon, B. J., Dick, J. T. A., & Cunningham, E. M. (2020). Ingestion of anthropogenic debris by migratory barnacle geese *Branta leucopsis* on a remote north-eastern Atlantic island. *Marine Pollution Bulletin*, 160, 111588.



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conor.bush@keepnorthernirelandbeautiful.org

028 9073 6920



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