WASTE IN OUR WATERS:
A COMMUNITY TOOLKIT FOR AQUATIC LITTER REMOVAL

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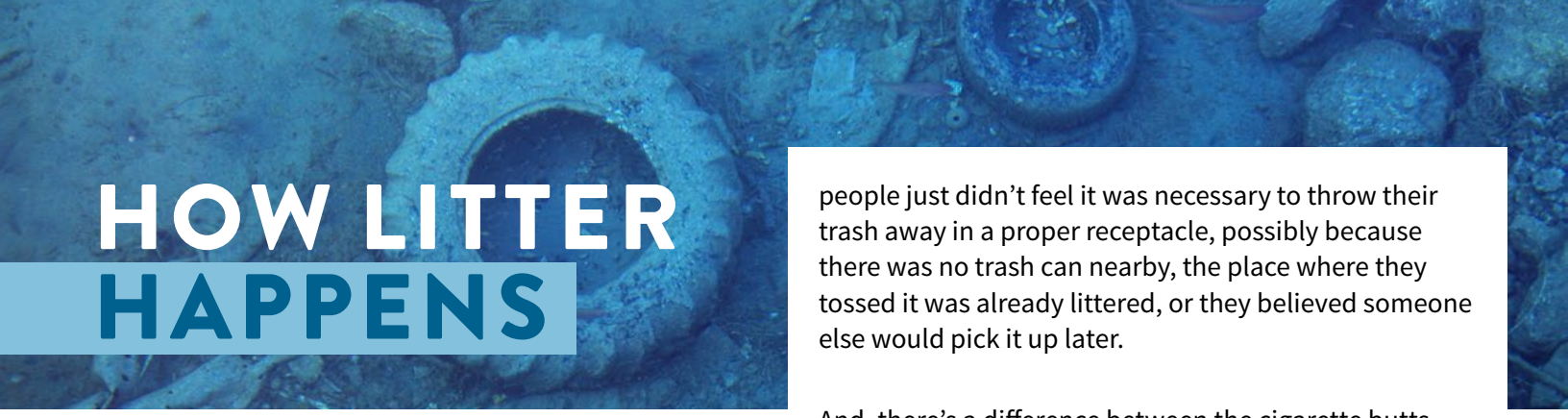
The trash problem in the world's marine habitats is **well documented**. Experts of all stripes, from marine scientists to civil engineers, see a need for immediate actions to curb the deluge of garbage pouring into our oceans. The evidence is everywhere: from the video of a researcher **gingerly pulling a straw out of a sea turtle's nose** and stories about whales dying of starvation because **their guts are full of trash**, to reports about the **garbage patches** in the world's oceans ensnaring marine life, concentrating toxic chemicals in their tissues, and transporting invasive species.

Where is this trash coming from? From cans, bottles, and plastic cutlery to foam food containers, chip bags, and cigarette butts, litter is finding its way into our waterways via roadsides and parking lots and the tops of mountains. It comes from garbage cans overturned by the wind and event venues that don't have enough trash receptacles. It flies out of uncovered truck beds and is dropped on the ground by people who think one bottle cap is surely too insignificant to bother bending over for. It becomes exponential when we all take this view and end up collectively adding to existing debris by the truckload.

According to an estimate **released in 2017**, if we don't change our ways, the amount of plastic alone clogging up the world's oceans will exceed the mass of all our oceans' fish combined by the year 2050. Approximately 300 million tons of virgin plastic is produced globally each year, and only about 9 percent is recycled, according to another **2017 study**.

Although the litter that endangers our ocean ecosystems often migrates downstream from rivers, streams, and estuaries, trash pollution is dangerous for freshwater systems, too. Imagery of drink bottles and run-away foam coolers bobbing along the surface of your local river might be so common that you hardly notice it, but considering much of today's packaging is made of plastic, the litter you see in the water today could be wreaking havoc in the environment for up to 1,000 years.

People all over the world often view litter as a purely aesthetic problem rather than an ecological one, that is, until it collects in such vast quantities in our waterways and oceans that the scope of the problem can no longer be ignored or diminished. We have reached this threshold.



HOW LITTER HAPPENS

Trash is generated by people, or entities that involve people. But not all litter comes from careless people—a lot can happen between the moment you finish the last drop of coffee in your disposable cup and when it's fished out of a wetland by a cleanup crew. You might have thrown it away in a trashcan, but then a raccoon came by a to tip the whole thing over looking for a late night snack, emptying your cup and 75 others into the street. You didn't intend to litter, but litter happened with your trash all the same.

But not all of us feel a personal obligation to throw trash into a trash can. According to 2009's **Keep America Beautiful (KAB) National Visible Litter Survey and Litter Cost Study**, people do still litter with impunity. The study found that while 83 percent of observed trash disposals happened in a proper receptacle, nearly 1 in 5 total disposals did not. Some people just didn't feel it was necessary to throw their trash away in a proper receptacle, possibly because there was no trash can nearby, the place where they tossed it was already littered, or they believed someone else would pick it up later.

And, there's a difference between the cigarette butts you find on the ground and the piles of tires you stumble upon in a gully in the forest. The former is commonly called "littering" and the latter is "illegal dumping." Sometimes businesses, industries, and even private citizens consider the costs associated with proper waste disposal prohibitively expensive. For instance, the owner of a tire shop pays a disposal fee to recycle each tire, but they can avoid the fee if they dump a big load of tires on the side of the road in the middle of the night. Local fines (the amount differs state by state or county by county) may reduce these instances, but both the fee and the enforcement needs to be significant enough to serve as a deterrent.

In addition to the litter people drop or dump, trash gets into waterways through other channels as well: industrial waste discharges, plastic microbeads from personal care products, improperly managed landfills, stray shipping containers, and toilets in businesses and houses all over America.

HOW LITTER IS REGULATED

We know what we're looking at when we see litter, right? For instance, most of us would agree that litter is defined as discarded human-made stuff that makes its way into the natural environment—or in some cases, even into the human-constructed environment. So, solid waste, or "trash," becomes litter the moment a takeout box or spent battery is no longer contained and released into the environment.

Litter can muss up an otherwise beautiful vista and is as out of place in the environment as the more obviously dangerous stuff: broken glass fragments, medical waste like hypodermic needles, as well as industrial waste and household trash like lightbulbs, insecticides, and medicines that can be toxic to people and wildlife.

But litter can also include the improperly-discarded biodegradable trash that's not obviously dangerous or even very ugly: the byproducts of landscaping, agriculture, mining, or logging can be considered litter when it's on land, although this classification changes a bit when you're talking about litter in waterways. Laws and regulations offer one avenue for reducing trash and litter.

Federal & International Laws Regulating Trash

Trash is a regulated pollutant in the United States, and international organizations like the United Nations have set **Sustainable Development Goals** to manage waste worldwide. However, in most of the world there is currently very little enforcement that keeps waste out of aquatic and marine ecosystems. The US Environmental Protection Agency (EPA) uses the Clean Water Act (CWA) as an enforcement tool under the **Combined Sewer Overflow (CSO)** and **Municipal Separate Sanitary and Storm Sewer (MS4)** programs, and also in establishing **total maximum daily loads** (TMDLs) to maintain the quality of the receiving waters. However, the CWA isn't the only law that regulates trash on US soil.

The **Resource Conservation and Recovery Act** (RCRA) regulates handling and disposal of solid waste. For example, the operation of a landfill adjacent to a river would likely be regulated under RCRA, though anything that goes wrong at this site might include CWA violations as well. To complicate matters, almost all states have "delegated authority" from EPA to regulate these matters in their own states. The criteria for delegated authority includes the provision that regulations in the state must be as stringent as the federal rules.

There are **a few regulations under state laws** for derelict fishing gear, as well as federal programs such as the **National Oceanic and Atmospheric Administration's Office of Response and Restoration**. The Federal Bureau of Land Management (BLM) also regulates **litter and dumping on federal lands** like campsites and parks. The **Marine Protection Research and Sanctuaries Act**, and US compliance under the **International Convention for the Prevention of Pollution from Ships (MARPOL)**, relate to dumping and discharge as well.

State & Local Litter Laws

All US states have **some form of litter regulation in place**, but the laws vary from state to state, and sometimes even between counties and municipalities. Breaking litter laws usually involves fines and occasionally jail time, mandatory cleanups, community service, or even the suspension of the litterer's driver's license, depending on the severity of the offense. In some states, littering is considered a petty misdemeanor, while in others it's a felony, although the stakes are generally higher with each subsequent conviction.

Penalties for littering also vary by location. For instance, in Massachusetts, an individual caught dropping trash on the ground can incur a fine of up to $25, while someone engaging in the same offense in Oregon might get slapped with a fine of $6,250. Similarly, in Idaho a prison sentence for littering might land you in jail for 10 days, but in Tennessee that prison term could be more like six years.

Some states are more concerned with the type of litter—furniture and large appliances are a focus in North Dakota—while others focus on the volume of trash or the reason for littering, like whether the trash was dumped for commercial or financial gain.

HOW LITTER IMPACTS OUR COMMUNITIES

Although properly disposing of garbage might seem difficult or expensive, the fallout of mismanaged trash is actually much harder to handle. Sure, finding a trashcan that's not overflowing at a music festival is a pain, and paying a fee to get rid of all the construction debris from a work site seems onerous, but the implications of litter can extend beyond what seems obvious at first.

Environmental Costs

Trash changes things in aquatic ecosystems as much as it does in marine systems, altering light levels, dissolved oxygen, and critical animal habitats. Aquatic animals are just as likely to mistake litter for food as marine animals. This can cause problems associated with ingestion of plastic, which can include internal and external harm to the animal, digestive system blockages, inability to escape predators because of decreased mobility, and even starvation. In addition, some studies suggest **the chemicals associated with plastics** can accumulate in the bodies of organisms—especially those at the top of the food chain—and those chemicals can be quite toxic in high concentrations.

Social Costs

Litter can inconvenience humans, as well as animals. Trash damages human infrastructure and the US spends millions each year responding to flooding due to trash-induced blockages in storm drains and sewage plant pump station failures. Trash can interfere with navigation equipment on vessels of all sizes and nets and fishing line can get caught up in boat propellers. Escaped fishing nets, or "ghost nets," can kill estuarine and marine life, ensnaring and dragging animals with them as they drift along in the current. This takes a toll on commercial fisheries as well as sport fisherpeople.

People can also be caught and injured by trash: walking in a river can lead to injuries from stepping on metal, glass, or other sharp discarded objects like hypodermic needles. There are also reports of **SCUBA divers** being ensnared in castoff fishing nets.

Aside from the dangers litter can pose, the aesthetics of a garbage-strewn landscape are depressing, at best. In a time when the less immediately visible effects of climate change and steep declines in worldwide species diversity make headlines, litter is an environmental problem we can see with our own eyes. Because trash-free waterways are more attractive to visitors—and therefore draw in more tourism revenue—municipalities feel pressure to clean up rivers and beaches, often at significant cost.

Economic Costs

Although it is much cheaper and less difficult to address a litter problem at the source rather than in a waterway or ocean, cleaning up visible litter in the US **costs about $11.5 billion dollars each year**. The majority of this cost is paid by businesses, and the rest by state taxpayers, educational institutions, and community groups. One **2013 study** found that California communities were spending $428 million per year keeping litter out of waterways and off beaches to preserve the environment, tourism, and other economic activity.

Trash pollution also has impacts for local economies: littered neighborhoods are less desirable to potential homeowners and businesses, and less enticing to tourists. According to a **2009 study** by Mid Atlantic Solid Waste Consultants, 36 percent of business development officials say companies take the pervasiveness of trash pollution into consideration when deciding whether to locate their headquarters in a given community. Similarly, 93 percent of homeowners said a littered neighborhood decreased their assessment of a property's value and would influence their purchasing decisions, while 55 percent of realtors thought litter reduced a property's value by 9 percent and 66 percent of property appraisers said visible litter reduced a home's value.

MUNICIPAL FINANCE FOR LITTER COLLECTION 101

Unless there's a bag fee or other tax that directly addresses litter in your community, local governments (city, county, and sometimes at the state level) often take money away from other programs such as recycling, or even safe drinking water or education to pay for litter management. Here are some ways your local governments might fund litter management:

General Funds This means that while an activity may be budgeted for in a fiscal year, it is possible to move the money around as needed during the year, allowing for funding of unanticipated expenses, sometimes at the expense of "optional" or pet projects, such as park improvements or community grants. Often, even if a fee is collected and earmarked for litter collection—like a landfill tipping fee, for example—that fee could be used to fund the fire department, if its operation is in the general fund.

Special Funds Possibly dedicated to a specific purpose such as public health. Sometimes "bag taxes" are put into a special fund for recycling or litter control.

Special Benefit Tax Districts Governments may allow certain parts of the city to collect special taxes from the constituents or businesses within the district boundary. For example, a "downtown business district" may provide funding for extra litter control efforts, security, a free trolley service, or other initiatives.

ASSESSING LITTER IN YOUR COMMUNITY

When garbage escapes, where exactly does it come from and where does it go? In order to significantly reduce the amount of trash entering waterways, the first step is to evaluate how much litter your community produces, what items are most commonly discarded, and where the most litter is being generated. It's possible that some well-placed garbage cans or extra weekly visits from a waste management team would go a long way in preventing trash and debris from escaping into the environment. It's also helpful to monitor your community over time: What most people notice after a heavy rain is how clean everything seems, especially the roadways. This phenomenon—streets and parks seeming clean after a rain—might give the public the mistaken impression that there is no litter problem in their community. One great way to assess a community's litter problem in a way that helps the public understand the nature and extent of your community's litter problem might be to organize stream or roadway volunteer cleanups before or after heavy rains, in different seasons, or even after cultural events that are centered on buying and discarding: Christmas Day or Super Bowl Sunday, for instance.

Because there is no single point from which litter escapes into local waterways, assessing your community's litter problem is easier said than done. However, unlike most other nonpoint source pollutants, trash doesn't abide by the axiom "dilution is the solution to pollution." Plastics, for instance, are as persistent in the environment as they are ubiquitous, and they tend to inundate freshwater systems during large rain events. The average person might not notice a single piece of litter floating on the surface of the river on an average day, but after a big storm carries trash and debris off hard surfaces and into storm drains, the same river might be covered in a blanket of floating plastic, and the shoreline will appear more littered when the water level recedes.

A variety of tools and technologies exist for evaluating the dimensions of your community's trash problem, some of which require only taking a pencil, clipboard, and your eyes for a walk in a stream or along a roadway, while others require a drone and some high-tech imaging software. Regardless of which route you choose in diagnosing your community's litter problem, here are a couple of considerations to weigh before you begin:

1. **Get the Lay of the Land:** Watershed maps are available for most areas in the US, and can be useful in identifying the different land use types in your area, and the characteristics of each. For instance, where in your community are there large swaths of impervious or semi-pervious surfaces (like parks, arenas, large parking lots, and school grounds)? Where might these drain to stormwater outlets? Where are the rivers and streams in your area? This stage of planning is also a good time to look for opportunities for easy and efficient trash interception.

2. **Pay Special Attention to Weather:** Because litter consolidates during storm events, it's a good idea to assess your community's litter status in both dry weather *and* after a big storm.

   In much of the US, the first big spring rain storms (usually in April and May) really move some trash, especially in the parts of the country that freeze or snow. Therefore, springtime cleanups are a good option for intercepting litter before it gets in the water.

3. **Get Creative as You Explore:** As you're researching the scope of your community's litter problem, be thinking of ways to deal with it, either through education or incentives to spur behavior change, or by instituting enforceable local policies and regulations—some cities have had success with polystyrene and plastic bag bans, bottle bills, taxes, and other programs and policies.

Establish Partnerships

Whether you're a member of a watershed group, a local business leader, the director of your city's sustainability office, or a private citizen interested in cleaning up local waterways, you can't go this alone. Partnership is key to the success of any plan to capture escaped trash and community buy-in is essential both at the local government level and in the specific neighborhoods that require extra trash capture strategies.

To begin assembling a team, first check in with your local stormwater or sustainability offices or parks and recreation departments. Ask what is already being done to assess and address local litter on a regular basis and what other projects and initiatives community groups are occasionally rolling up their sleeves to make happen. Once you've identified your partners, you can work together to find potential sponsors and explore educational opportunities.

Evaluate Your Community's Litter Profile

Various agencies and companies have produced manuals and products to provide a framework for characterizing your community's escaped trash problem. Some of these tools require a team of volunteers to go out into the community and visually identify hotspots, categorize the types of litter that collects at each site, and assess the underlying reasons for the litter—lack of receptacles, poor signage, or a nearby special events venue, transit hub, or high density of buildings. Other tools use drones and open image datasets, or even machine learning, to assess what kinds of litter escape into the environment and where it is collecting.

One thing most of these protocols have in common is the use of a relative and subjective density index, basically a scale ranging from "good" to "bad." You can easily develop one of these tools for your own trash assessment crew by taking five photographs

of varying amounts of litter on a roadway, beach, or streambank and grading them "A" to "F." To do this, first find the areas in your community that serve as the obvious best and worst case scenarios, and fill in the intermediate "grades" based on these extremes.

It's also important to take a look at the condition of the trash you find in your waterways, catalog what types of materials you're finding, the level threat, if any, they pose to human health and the environment, their probable origination spots, and the condition of the trash itself (how long it seems to have been sitting outside). Knowing these things can aid in capturing garbage before it makes its way downstream. Estimating the apparent age and condition of garbage you find in your litter assessment can help clarify whether there is an ongoing problem in a certain area (in the case of an ongoing stream of "new" trash), as opposed to "old" trash showing up after rain events, which would point to the possibility of an old dumping spot nearby that could be a good candidate for a deep clean.

Identifying brands can be also helpful in engaging with companies about where their waste is ending up and finding a particular item like plastic grocery bags or styrofoam containers might provide important data in a campaign to ban those particular items. Similarly, if a site is littered with scores of cups from a particular restaurant or gas station, the problem might be easily remedied by working with these businesses to place more lidded garbage cans on their property.

Here are some examples of tools that can help you get started understanding the parameters of your community's litter profile:

California Water Boards Rapid Trash Assessment: A comprehensive visual assessment tool designed to help you identify trash sources and management measures at instream trash accumulation areas.

Ellipsis: Software that takes visual information—stills or video—gathered from drones, satellite, video surveillance, and the like, and creates a map from which their models can identify plastics (from bottle caps to toothbrushes) and even discern specific plastic type (PVA, PET, styrofoam, etc).

Litterati: An app used to track data on litter and connect efforts around the world.

TACO Dataset: TACO is a constantly-expanding image dataset of waste in the wild, containing photos of litter taken in different environments, from cities to streams. You can contribute your own photos of litter to TACO to help expand their models in order to improve the future of machine-assisted litter assessment.

US EPA ETAP Escaped Trash Protocol: A visual survey tool created by the EPA that provides a standard for collecting and assessing litter data.

CAPTURING LITTER IN YOUR COMMUNITY

Before It's in the Water

Often stormwater runoff carries mismanaged trash from land into water bodies, so it's important to focus efficient remediation efforts as close to the source as possible, to save money if nothing else. The farther from the source the litter gets, the more costly and less efficient the cleanup becomes. Of course, the cheapest option often involves installing more lidded, secure trash cans in the areas where people congregate. There are many methods of capturing trash before it gets to the water, from **street sweeping** to **cigarette butt receptacles** to **operation and maintenance at green infrastructure sites**, so it's important to consider the local environmental and social contexts, as well as the available waste disposal options after the litter has been collected.

By pairing stormwater management with trash capture, communities can develop a holistic plan for managing their escaped trash. No trash management system is foolproof, but thinking through how to collect and remove trash that has escaped from other solid waste management systems will create a noticeable difference in water quality. Please see **Table 1** for a list of trash capture techniques and devices and their best applications.

TABLE 1: LITTER CAPTURE DEVICES IN CONTEXT

CONTEXT	DEVICE TYPE	
ON LAND	Lidded/secure trash cans	StormX netting
	Item specific/butt huts*/monofilament	Street sweeping
	Smart bins	WWTP, separation of solids from combined sewers
	Storm drain/catch basin covers*	Household wastewater filter
	Gutter Bins	M&O at green infrastructure sites
IN STREAM	Trash booms/dams	Trash wheels/interceptors
	Plastic Fischer	SeaBin/water pump
	Litter Gitters	Skimmer boats
	Bandalong Trash Traps	
OPEN WATER	Skimmer boats	Fishing for Plastic
	Fishing for Energy	The Ocean Cleanup

After It's in the Water

Because trash is so often a nonpoint source pollutant, it's difficult to know what to do about your community's litter problem, even once its parameters are better understood. Although it is generally less expensive to deal with trash closer to its source than farther down the line, land-based trash collects in pinch points—often in the mouths of rivers and streams—after large rain events. In this way, a nonpoint source pollutant can be dealt with at identified collection points in a watershed soon after it's become waterborne. It can be tricky figuring out the most efficient place to pick up escaped litter in an aquatic ecosystem, because while there are benefits to letting the water carry most of the floating litter to a pinch point, it's also important not to let a plastic bottle cap knock around in the water any longer than it needs to. The longer it's in the water, the more fractionalized it becomes, grinding into smaller and smaller pieces, creating a different kind of environmental hazard. That said, trapping the litter where it aggregates in a stream, collecting it, and properly disposing of it, can be accomplished with a variety of different litter capture devices.

As soon as it is installed, a litter capture device immediately begins collecting floating trash and debris. Some attempts have been made to figure out how to collect submerged litter; for instance, an aquabot called **Hector the Collector** has been designed to pick up submerged drink containers and plastic bags off the seafloor. However, there's so much visible trash on the water's surface, that many litter capture device companies focus on this. Also, if an item sinks, it is more likely to stay put and not be tumbled around and fractionalized by the current.

PLANNING A LITTER MANAGEMENT PROJECT IN YOUR COMMUNITY

Assemble a Project Team

When placing a litter containment device in a waterway, it's important to remember that the device is only as effective as the group of partners involved in the program's creation and maintenance. Much of the time government agencies, private landowners, NGOs, and community organizations will need to work together. The adage "too many cooks spoil the broth" might seem applicable here, but collaboration and cooperation is actually often vital to the long-term success of the project.

That said, many stakeholders require patience, planning diplomacy, and good leadership. For instance, working with government organizations can mean that bureaucracy will slow things down, but without government participation, it may be difficult to get access to necessary access areas, funding, maintenance crews, and other important resources. It helps for regulatory agencies to be on board to help the whole process run smoothly.

Identify Potential Funders:

Some examples of funding sources that are often used to pay for these devices include federal agencies (e.g. EPA and NOAA), corporations (e.g. **Coca-Cola Foundation** and National Geographic Foundation), large national foundations (e.g. **Pew Charitable Trust** and **Plastic Ocean Project**) and local community and family foundations in your area.

Choose a Device

Although some litter containment technologies are patented, others can be found in different iterations, and many are a combination of different parts that look familiar individually, but work together in a unique way. Some companies offer full-service programs that design a trash collection device for your site, obtain necessary permits, install and maintain the device for a fixed yearly price, and collect hydrology and trash load data; others simply sell the device and leave the rest to you, including installation and maintenance. There are also options in between. What follows is a toolkit to help you determine which device will work best in your community and waterway, given the unique sets of circumstances surrounding stream velocities, potential trash loads, budget requirements, and maintenance abilities.

Other considerations might include:

- How will your team deal with the stuff you may not want to collect, such as leaves, vegetation, and fallen trees? Some operations completely break down when these considerations are ignored during the planning stages.
- How will you choose a site that provides the most value for trash capture, while also considering other aspects such as opportunities for community education?
- How will your team collect and use data about how much trash is being collected?
- How will you dispose of the waste once it's collected? Will you separate recyclables, and have you checked with your local recycling facilities to make sure they are able to accept these materials?
- How are you ensuring the safety of the people collecting the trash? For instance, a litter trap might contain hypodermic needles and shards of metal or glass. Similarly, manually handling waste contaminated by combined sewer overflow is unhealthy. Your volunteers and workers will need safety gear and training.
- How resilient does your device need to be, given the expected magnitude and frequency of storm events? Will operations be possible during these events?

What we provide here is a breakdown of the most popular trash collection device types and a few examples of each, including information about price, best applications, necessary permits, maintenance, and other considerations. **Table 2** on the following page provides an overview of preliminary considerations like cost, stream size, and capacity. **Table 3 (see Appendix)** provides additional specifications and more technical details that are helpful in discerning which device might be best suited to your local needs.

This list of devices is by no means an exhaustive, nor does the inclusion of a device in this toolkit certify it in any way. There are certification programs for trash capture devices like those published by the **California Water Boards** that provide standards for the design and installation of trash control devices and lists of products that meet those standards (at the time of this publication, it was most recently updated in 2018). Similarly, the **National Stormwater Testing and Evaluation for Products and Practices Initiative** (STEPP) is working toward "establishing a common framework for testing and evaluating both public domain and proprietary stormwater control measures." Although this program is not yet up and running, the **Water Environment Federation Stormwater Institute** is an excellent resource for stakeholder groups interested in managing waterborne trash in their communities.

DON'T FORGET ABOUT PERMITTING

Depending on your location and the size and permanency of your litter capture device, permitting could be as simple as a check-in with your local stormwater agency or as complicated as securing a variety of different county, state, and federal permits.

If you have hired a company to install your device, they often have a good idea of what types of permits are required for their specific devices, and some provide professional services to obtain these permits for you. If you're installing the device yourself, it's important to check with the following agencies beforehand to ensure your device is good to go and won't interfere with streamflow gauges or data loggers:

- Local Stormwater Administrator
- Local US Geological Survey (USGS) office
- Army Corps of Engineers
- US Fish and Wildlife

TABLE 2: PRELIMINARY CONSIDERATIONS TO ASSESS VARIOUS DEVICES*						
Name	**Ease of Integration with Volunteer or Workforce Development Initiatives****	**Optimal Stream Size**	**Capacity to Collect (Volume of Trash)**	**Initial Cost of Device*****	**Potential for Additional Costs to Consider?********	**Annual Maintenance Costs**
Bandalong (Storm Water Systems products)						
Bandalong 320	Medium	Small waterways	Medium	Medium	Yes, extensions are available	Medium
Bandalong 920	Medium	Medium to large waterways	High	High	Yes, additional options available	Medium
Bandalong 922	Medium	Medium to large waterways	High	High	Yes, additional options available	Medium
Bandit (a Storm Water Systems product)	Easy	Small waterways	Low	Medium	Yes, extensions are available	Low
Elastec Brute Bin/Booms	Easy	Small to large waterways	Medium	Medium	Yes, specialized installation labor	Medium
Elastec Super Swamp Boom	Easy	Ponds and wetlands	Medium	Low	None, if self-installed	Low
Frog Creek Partners Gutter Bin	Easy	Stormdrain inlet	Medium	Low	Yes	Low
Litter Gitter (an Osprey Initiative product)	Medium	Customized for site	Low	Medium	Maybe, consulting expenses	Medium
StormX (a Storm Water Systems product)	Difficult	End of pipe	Medium	Low	Maybe, consulting expenses	Low
Trash Cage (a Clearwater Mills product)	Difficult	Storm drain outlet (end of pipe capture)	High	High	None	High
Trash Trout Jr.	Easy	Small waterway	Low	Low	Maybe, consulting expenses	Low
WaterGoat	Easy	Lakes and streams	Medium	Low	Yes, specialized installation labor	Low
Water Wheel (a Clearwater Mills product)	Difficult	Small to large waterways	High	High	None	High

* The field of litter trap technology is rapidly changing. This table is not exhaustive, but includes the most common, commercially available devices on the market at the time of publication. ** This rating is based on the how easily the device can be maintained by community members or workforce development program participants, given the needed training, safety protocols, and more. Please note that local authorities may have particular requirements or limitations on who can conduct this work; always check with relevant local government departments or special districts with authority over the waterway. *** High = $100K+; Medium = $10K-$100K; Low = up to $10K. See more detailed description of initial costs of device in Table 3 in Appendix A. **** High = $80K+; Medium = $20K-$80K; Low = up to $20K. See more detailed description of potential additional costs of device in Table 3 in Appendix A.

A NOTE ABOUT PRICING

Although we have done our best to address the question of pricing with each device, there aren't always straightforward answers. One reason for this is that full-service installation and maintenance operations often charge more if their staff has to travel farther from their headquarters to work on your devices, and less if the device is closer or if yours is one of several that are geographically clustered.

Maintenance costs fluctuate depending on things like the size of the drainage the device services, how often the device requires emptying, and labor costs in the site's geographical area. Furthermore, a device costs less if you build or install it yourself, without the professional services of the manufacturer.

Consider Maintenance Needs

Litter containment devices are tools, and as with any tool, there are correct and incorrect ways to use them. One requirement of every device, no matter the manufacturer, the design, or level of permanence, is routine maintenance. The device cannot work to collect trash from the waterway if it is not emptied on a regular basis, and especially after storm events. Although some devices are permanent or semi-permanent and others can be removed or re-sited with relative ease, they all require a long-term vision for how they will be maintained and paid for into the foreseeable future. Which stakeholders take responsibility for this task and who will pay for it must be decided before installation.

It's important to note the more temporary devices need just as much maintenance as the larger, more permanent structures. When a litter capture device fills with trash, it must be emptied. Even with solutions like these, it's important that a variety of stakeholders are invested in the planning and implementation of the plan to ensure the device does as much good as possible.

Dispose of Collected Trash

Litter trap devices capture everything floating in a waterway: sticks, bottles, dead animals, old coolers, beach balls, and more. As mentioned before, looking at the condition of the trash you've collected is essential to addressing the problems at their source. Old trash might require deep cleanups, while new trash necessitates an investigation into its source and patterns of release.

What's more, you must make decisions about whether you will separate plastics and other human-generated floating material from woody debris, and landfill-bound trash from recyclables. Make sure your local recycling facilities will accept the recyclables, and have a conversation with them about the condition in which they will accept items like drinks containers. Find out which companies will pick up their own branded trash (for example, Bridgestone Tires will often pick up loads of discarded tires). Depending on what you're finding in your litter traps, you might discover your community is in need of a regular community event that facilitates the recycling of hard to recycle materials.

DEALING WITH HARD TO RECYCLE MATERIALS

Some materials collected through litter traps and elsewhere are considered hard to recycle either because recycling facilities are hard to find or non-existent. Styrofoam, computers, construction materials, tires, and appliances all fall into this category. These resources can help you move these items out of waterways and adjacent lands and into waste recovery. Explore what your community has to offer:

- Bridgestone's Tires4ward Program
- Center for Hard to Recycle Materials (CHaRM) Facilities
- Construction and Demolition Recycling Association
- Responsible Appliance Disposal Programs

LITTER CAPTURE DEVICE ROUNDUP

CONTAINMENT BOOMS

A boom is a temporary floating barrier that captures trash and other floating debris and uses the movement of the water to concentrate the trash it captures for easy access and collection. These types of devices have been used at least since the Middle Ages, when the Dutch chained together floating logs to force passing ships to stop at toll stations. Over the past century, booms began to be used to contain and absorb oil during spills at sea, and eventually evolved into tools to contain all matter of floating things, from invasive plants to trash.

Many different kinds of booms are available through today's marketplace, and a lot of competition exists between companies. Booms can be used on their own or in conjunction with other devices to help guide litter to a containment structure like a trap or trash wheel.

Because booms are simple, they are often the most cost-effective structures for collecting floating litter. In a stream or river, they're placed at a 30 to 45 degree angle in the current and even without a collection bin, everything floating downstream hits the boom and slides to the point where the boom is attached to the shore. In slower moving water like a lake, wetland, or retention pond, booms are situated according to the current to trap and hold litter in one place.

Booms are generally simple to install and move around if necessary. Permitting is often minimal, though it's a good idea to check with applicable regulatory agencies in your area before installation. Because booms impede navigability in a waterway, it's essential that you investigate the ways in which people use the waterbody for activities like boating and fishing.

WATERGOAT Based in Florida and established in 2006, **WATERGOAT** has 137 trash barriers in the water in five states. WATERGOATs are best suited for use in streams, canals, lakes, and ponds, and come in standard and heavy duty sizes, depending on water velocities, and how much debris is expected to collect. The average WATERGOAT can be cleaned out in less than two hours, and maintenance crews do not need to access the device from the water.

Cost:	WATERGOATs range from $3,000 to $5,000, depending on the length of the boom. Sold in 35 ft connectable sections up to 200 ft. Inquire with WATERGOAT about additional costs associated with professional services, installation and maintenance.
Maintenance:	Not available outside of Florida.
Other Considerations:	WATERGOAT works with schools, municipalities, and environmental nonprofits, and encourages and aids them in finding corporate partners to underwrite the purchase of the devices. WATERGOAT also requires a plan for long-term maintenance of the boom, and asks that you share your trash collection data.
Contact:	Mark Maksimowicz, mark.watergoat@gmail.com

BRUTE BOOM AND SUPERSWAMP BOOM **Elastec** manufactures environmental products of all kinds, from incinerators to portable storage tanks to oil containment booms. Their Brute Boom is a heavy-duty containment boom intended for high velocity waters and large debris—it has a breaking strength of 60,000 pounds, so it can capture something as big as a tree floating downstream. Elastec's SuperSwamp Boom is a lighter-weight trash and oil containment boom, better for collecting floating litter in lower-velocity waters like retention ponds, wetlands, and lakes.

Cost:	Brute Booms are sold in 20-foot sections. SuperSwamp booms are sold by 10-, 25-, 50-, and 100-foot lengths. Elastec is just one of dozens of companies that offer similar products. *Brute Broom:* 20 feet = $1,002 (approximately $50/foot); *Super Swamp Broom*: 100 feet = $740 ($7/foot)
Contact:	Duane Bennish (Florida office of Elastec), dbennish@elastec.com

LITTER TRAPS

Litter traps are floating cages that capture trash and debris as it's guided into the trap, usually by a series of booms. They generally work without mechanical assistance, using the movement of the water to fill the trap. Litter traps can be used in rivers and streams—attached to one side of the channel, or in the middle of a non-navigable stream, tethered to each bank with a containment boom guiding floating debris to the central cage structure. Although they sometimes block boat passage, litter traps do not impede the passage of water. Once the cage device of a litter trap has captured a piece of litter, it generally contains it until the device is emptied.

While litter traps are effective at capturing and securing floating litter and debris, maintaining them can be costly, depending on the site. Emptying a litter trap may require a large crew or special equipment like a boom crane (a vehicle contraption with a lowering arm that lifts the trap out of the water, empties it, and then replaces it).

BANDALONG LITTER TRAPS Bandalong was among the first companies to install litter traps in the United States. Though the company is based in Australia, these devices have been installed all over the world, in Nigeria, Singapore, Malaysia, New Zealand, Australia, and the US. **Storm Water Systems**, based in Cleveland, Georgia, is the company licensed to distribute Bandalong products in the US, and they come in a variety of sizes that can handle a variety of surface water velocities. Bandalongs are permanent or semi-permanent structures, and Storm Water Systems installs most Bandalong devices, but obtaining permits and easements to access the device is the responsibility of the owner.

What's shown here is the price of the device itself; the cost may increase as incidentals are added: installation, freight costs, walkways, boarding ramps, lighting, and site challenges. Yearly maintenance costs generally run between $28,000 and $44,000 per year, though as discussed above, maintenance costs depend heavily upon the volume of trash in the waterway, labor costs in your area, etc. Bandalong booms come with a 10-year warranty.

The Bandalong 320 (5' wide X 16–18'long):	Storm Water Systems' most popular and economical trap for flashy urban streams. It measures. Extended collection booms (12" diameter) are available for $325/linear foot. Most fall into the $50,000–$60,000 range.
The Bandalong 920 (13' wide X 30' long) – $145,000	Both of these large litter traps work best in larger streams or rivers with surface speeds of less than 9 feet per second. Additional options include walkways, boarding ramps, and solar powered lights. Extended collection booms (12" diameter) and installation are required to complete the system. Installation is much more costly on the larger traps and can only be priced during site review.
The Bandalong 922 (143' X 50' long) – $225,000	
Contact:	Gary Hopkins at Storm Water Systems, ghopkins@stormwatersystems.com

TRASH TROUT JUNIOR A project of **Asheville Greenworks** in Asheville, North Carolina, the Trash Trout Junior started out as an Eagle Scout project to design and build a trash trap to collect litter and debris in a small stream in the Asheville area. Asheville Greenworks deploys volunteers to empty the trap and collect data from each point, and taps corporate sponsorships to fund the project.

The Trash Trout Junior includes a small litter trap (4' x 2' x 8') and short booms, and is appropriate for small streams. Asheville Greenworks has built a few of these litter traps for other organizations and municipalities. If you would like to purchase the plans to build your own Trash Trout Junior, Asheville Greenworks will sell you the plans for a small fee, as well as provide consulting services about site selection, permitting, community engagement, and sponsorship for an additional fee.

Cost:	Around $3,500 to build.
Contact:	Eric Bradford at Asheville Greenworks, eric@ashevillegreenworks.org

DESIGNING YOUR OWN LITTER COLLECTION DEVICE

Litter collection devices are often very simple, and some groups elect to engineer and build their own. For instance, in 2016 the **Greenway Foundation** in Denver, Colorado, sponsored a **design challenge** to create a new instream trash collection concept. The engineering students who won the contest have created a half-size prototype, **The Nautilus**, that has been busy collecting trash since the beginning of 2020. The pilot project is expected to last at least a year.

STORM DRAIN DEVICES

Since much of the litter that ends up in our waterways originates along roadways, it can be captured with a device at the storm drain or the stormwater pipe to prevent it from ending up in the receiving river or stream. It's a common public misconception that whatever water (and trash) flows into a storm drain is routed to a wastewater treatment plant before making its way back into the environment. This is not the case, and a storm drain protection device can be an opportunity to educate the public about where their cigarette butts and plastic bottles end up if not properly disposed of.

Most of these devices involve a sturdy net affixed to a frame that fits either onto the storm drain inlet or the outlet pipe that empties into the waterway. Inlet protection devices and end-of-pipe solutions are great at capturing trash, in addition to everything that washes into the storm drain, including leaves and dead animals. As with all trash collection devices, maintenance is vital with storm drain devices, especially after storm events, as netting might burst or drains could back up, depending on the nature of the device.

As with booms, there are many different designs for devices that keep trash and debris from escaping into waterways through storm drains, so if the examples outlined here don't work for you, further research will help you find the right design for your site(s).

STORMX StormX is a reusable end-of-pipe capture net distributed by **Storm Water Systems** that captures gross pollutants as small as 5 mm. Steel hubs connect to the end of a concrete pipe and built-in overflows prevent flooding during heavy runoff periods. Full capture or half-pipe units are available in 14" to 62" in diameter, in addition to custom sizes.

The nets come in a variety of sizes, have a one-year warranty, and are designed to be emptied by a two-person crew. You can self-install StormX, although Storm Water Systems also provides installation advice if needed.

Cost:	Pricing is dependent on pipe diameter, but they range in price from $3,665 to $8,960 per unit.
Contact:	Gary Hopkins at Storm Water Systems, ghopkins@stormwatersystems.com

GUTTER BIN & MUNDUS BAG® Based in Casper, Wyoming, **Frog Creek Partners** designs and manufactures creative storm drain filters for curb inlet and drop inlet storm drains. The Gutter Bin and Mundus Bags remove microplastic, trash, sediment, and hydrocarbons from stormwater thereby preventing infrastructure blockages and creating cleaner watersheds. Adjustable inlet filters fit most storm drain types, meet or exceed most regulatory specs, and offer measurable results.

The project owner or trusted third-party can easily install or maintain the filter system a few times per year depending upon pollutant load, infrastructure, and climate. One can hire Frog Creek Partners to install and maintain units in the Rocky Mountain West. A two-person team with or without a vacuum truck can clean a Gutter Bin in less than 8 minutes.

Cost:	Depending on the model, each Gutter Bin can cost between $800 and $5,900. Reusable or single use bags cost between $60 – $125.
Contact:	Frog Creek Partners at heya@frogcreek.partners or 307-797-7720.

TRASH CAPTURE DEVICE SERVICE

Although having a more permanent litter collecting structure in your community can make a huge difference in the health of your local waterways, it's not always financially or tactically feasible. In some cases, a service that designs, installs, and maintains an easily movable and removable trash collection device in a trash-polluted local stream could work better for your situation. For instance, if you are unable to secure long-term funding for maintenance, if your organization or stakeholder group doesn't have the bandwidth to pull together volunteer crews or sanitation teams to clean traps regularly, or if there is a short-term land use change that creates particular litter challenges in a particular area (a public park becomes a venue for a music festival a few times a year for the indefinite future, for instance).

LITTER GITTER Based near Mobile, Alabama, **Osprey Initiative** is currently the only full-service program in the US. They install and maintain their Litter Gitter device, custom-designed for each site, in small streams that receive no boat traffic. For a yearly price, Osprey Initiative continuously maintains the device, cleaning it out, weighing the trash (and sending the data to clients on a quarterly basis), as well as separating litter from vegetative debris and recyclables from regular trash. Osprey Initiative also offers "tactical cleanup," targeting spots in the watershed where litter accumulates in the landscape, but is hard to access.

Cost:	Between $20,000 and $45,000 per year, depending on the location and number of traps in your area.
Contact:	Don Bates at Osprey Initiative, don.bates@osprey.world or (601) 842-7305 .

TRASH WHEEL

In some cases, the solution to escaped trash can't be dealt with higher up in the watershed. Storm sewers and other feeder streams carry runoff to rivers that eventually discharge into harbors, bays, and oceans. The larger the marine debris problem becomes, the more expensive and high-tech the solution needs to be.

Trash interceptor wheels are appropriate for small to large rivers. **Mr. Trash Wheel**, for instance, is situated at the mouth of a tidal river that feeds into Baltimore's Inner Harbor. The location is extremely challenging for any trash capture device because of high velocities and large storms. The Trash Wheel is durable under very high flow events, although it can't pick up all the trash in the river during an enormous storm event.

WATERWHEEL POWERED TRASH INTERCEPTOR **Clearwater Mills LLC** created the Waterwheel Powered Trash Interceptor ("Trash Wheel"), which uses the river current, as well as solar-powered pumps to turn the device's water wheel. The wheel runs during rain events and powers a conveyor that lifts trash and debris from the river and deposits it into a dumpster. The dumpster sits on a separate barge that can be pushed by boat to a place where it can be emptied or swapped out by a trash-hauling device. Trash wheel devices are also fitted with booms to guide trash and debris to the conveyor.

Cost:	$400,000 to $750,000 for device and installation, with permitting, installation, and maintenance provided by Clearwater Mills. Yearly maintenance costs can be up to $175,000 per year, based on drainage size, not including tipping fees for dumpsters.
Contact:	Clearwater Mills, gearhart@clearwatermills.com.

CONCLUSION

Addressing litter in your community requires the whole community, from fast food restaurant owners to homeowners to public servants. The most successful approach will undertake to examine the lifecycle of litter in your community, figuring out where it originates and how to most quickly and efficiently intercept escaped trash along its path to the ocean. Of course, this also involves working to change community behavior by promoting initiatives to use fewer single-use materials, recycling more, and ensuring people are disposing of trash properly. It also requires city-wide commitments, from businesses and parks providing appropriate trash receptacles, to local governments supporting garbage collection and recycling systems that minimize the amount of litter in our communities.

Aquatic litter removal devices are an effective tool in tackling the large-scale litter problems in your area. Not only are these devices effective at removing litter from the landscape by capturing it at "pinch points," they are visible in the community, thereby providing great opportunities for education and awareness. However, they are not a long-term solution on their own, and should be treated as one useful tool in your community's broader litter prevention and collection toolbox.

ADDITIONAL RESOURCES

- **SFEP Trash Capture Demonstration Project, a good example of a large-scale trash capture demonstration project of the San Francisco Estuary Partnership.**
- **CSRIO Research (Australia)**
- **Keep America Beautiful 2009 Visible Litter Survey**
- **Technical Assessment: Litter, Solid Waste and Storm Water Management Systems in Honolulu, Hawaii (ER Planning)**
- **Plastic litter in streams: The behavioral archaeology of a pervasive environmental problem, Evan Carpenter and Steve Wolverton**
- **Declaration from the American Chemistry Council**
- **NOAA's Marine Debris Clearinghouse**
- **Recycling Reconsidered: The Present Failure and Future Promise of Environmental Action in the United States** by Samantha MacBride, 2011

ACKNOWLEDGEMENTS

We would like to acknowledge the following contributors to this toolkit who all lent their time, experience, and wisdom to this project and have undertaken impactful local work in their communities:

Don Bates, **Osprey Initiative**

Duane Bennish, **Elastec**

Eric Bradford, **Asheville Greenworks**

Dennis Chestnut, **Groundwork Anacostia River (retired)**

Brian Deurloo, **Frog Creek Partners**

Gary Hopkins, **Storm Water Systems**

John Kellett, **Clearwater Mills**

Sally LaRue, **Freshwater Land Trust**

Adam Lindquist, **Waterfront Partnership of Baltimore**

Mark Maksimowicz, **WaterGoat**

Michele White, **National Recreation and Park Association**

Special thanks to Rommell Nandi, Emma Maschal, and Layne Marshall in the US EPA Office of Wetlands, Oceans, and Watersheds' Trash-Free Waters Program for their generosity in sharing their knowledge about all things trash, and to Tom Sprehe at KCI Technologies for his wisdom and for reviewing the toolkit.

This toolkit was researched and written by **Jesslyn Shields**, with editing support from River Network staff including Amy Boal, Karla Noboa, Nicole Silk, and Diana Toledo. Layout and design provided by Sarah Riddle, **Riddle Design Co**. April 2020.

THE COCA-COLA FOUNDATION

THIS TOOLKIT WAS PRODUCED WITH SUPPORT FROM THE COCA-COLA FOUNDATION

This report can be found at **www.rivernetwork.org**

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connecting people · saving rivers

River Network empowers and unites people and communities to protect and restore rivers and other waters that sustain all life. We envision a future with clean and ample water for people and nature, where local caretakers are well-equipped, effective and courageous champions for our rivers. We believe that everyone should have access to affordable, clean water and healthy rivers.

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APPENDIX A

TABLE 3: TECHNICAL CONSIDERATIONS & ADDITIONAL DETAIL

Name	Type of Device	Sizes	Installer	Initial Cost of Device – DETAIL	Potential for Additional Costs to Consider – DETAIL	Permit Requirements & Considerations
Bandalong (Storm Water Systems products)						
Bandalong 320	Trash boom with trap attached	5′ wide X 16–18′ long	Installed by Storm Water Systems	$50–60K (extensions available: $325/linear foot)	Additional costs depend on particular site. Extensions available: $325/linear foot	Easements and permits are the responsibility of owner
Bandalong 920	Trash boom with trap attached	13′ wide X 30′ long	Installed by Storm Water Systems	$145,000	Additional costs depend on particular site. Options include walkways, boarding ramps, solar powered lights	Easements and permits are the responsibility of owner
Bandalong 922	Trash boom with trap attached	143′ X 50′ long	Installed by Storm Water Systems	$225,000	Additional costs depend on particular site. Options include walkways, boarding ramps, solar powered lights	Easements and permits are the responsibility of owner
Bandit (a Storm Water Systems product)	Trash boom	3′ wide X 6′ long	Can be installed by grantee under supervision or by Storm Water Systems	$14k	$120/additional linear ft	Easements and permits are the responsibility of owner
Elastec Brute Bin/Booms	Trash bin (large and small)	Large: 12′ x 20′ footprint Small: 8′ x 12′ footprint	Self installed, or Elastec can send a team to install for additional cost	$20k for large bin and $13k for the small bin. Additional cost (around $10k) for booms.	For installation: consulting during installation with labor, boat, heavy equipment: $1400/day+travel for 3 days	Generally does not require permitting, but confirm with local authorities
Elastec Super Swamp Boom	Trash containment boom (i.e. standard oil containment boom)	Sold by 10′, 25′, 50′, 100′ lengths	Self installed, or Elastec can send a team to install for additional cost	100 ft is $740 ($7/foot)	No additional costs if self-installed. May hire Elastec technicials to install.	Not across the board, but navigable waterways might
Frog Creek Partners Gutter Bin	Drop inlet filter for under a storm drain	Adjustable to fit square or rectangular basins	Frog Creek Partners can travel to you to install them for $100–$150 per unit. Owner can install or hire a construction company or environmental service group.	Between $1000 and $6000, bags $60–$150	Single use and reusable bags	Approval from city (storm drains are property of city) and possible lane closure on a street for installation

CONTINUED >

TABLE 3: TECHNICAL CONSIDERATIONS & ADDITIONAL DETAIL (CONTINUED)						
Name	Type of Device	Sizes	Installer	Initial Cost of Device – DETAIL	Potential for Additional Costs to Consider – DETAIL	Permit Requirements & Considerations
Litter Gitter (an Osprey Initiative product)	Full-service litter trap and technical cleanups	Prefer to stay on non-navigable streams	Installed and maintained by Osprey initiative	$20k to $45k/year. Depending on location and number of traps	Permiting, time-dependent services, litter assessment/ planning	Generally does not require permitting, but Osprey confirms with local authorities
StormX (a Storm Water Systems product)	End of pipe capture net	Full capture or half-pipe units. 14 in-62 in diameter, plus custom sizes	Installed by owner with manual	Pricing is dependent on pipe diameter: $3,665 to $8960	Possible consulting costs	No
Trash Cage (a Clearwater Mills product)	Trash cage	Made to order	Installed by Clearwater Mills	$76,000–110,000 for device and installation	$5,000–20,000 (plus hauling & disposal fees)	Permits handled by Clearwater Mills
Trash Trout Jr.	Litter trap	4′ x 2′ x 8′	You build and install yourself, Trash Trout (GreenWorks Asheville) can give you the plans to build yourself.	$3,500	Asheville Greenworks can sell you the plans, and consult on site selection, permitting, community engagement and sponsorship	Requires permit from Stormwater Administrator for Flood Permitting, recommends checking with USGS , Army Corps Engineers, US Fish and Wildlife
WaterGoat	Trash barrier/ boom	40′ to 200′—also available in 35′ connectable sections	Installed by WaterGoat or owner does it themselves.	Between $3k and $5k	Labor only	unknown
Water Wheel (a Clearwater Mills product)	Trash interceptor wheel	Scalable	Installed by Clearwater Mills	$400k–$750k for device and installation	No, all included	Yes. Army Corps

APPENDIX B

NATIONAL SURVEY OF LITTER INITIATIVES ACROSS 12 COMMUNITIES

Introduction

In 2019, River Network surveyed leaders of 12 communities across the United States. We reached out to representatives of river and watershed organizations, various departments across municipal government (i.e. stormwater, public works, parks and recreation, and sustainability), elected officials, water utilities, community foundations, and other local organizations to understand how issues of litter are perceived and addressed locally.

We received 83 total responses across all of the communities and found that many were facing expansive issues with litter.

The communities surveyed included:

Birmingham, AL
Decatur, AL
Long Beach, CA
Denver, CO
Jacksonville, FL
South Atlanta, GA
New Orleans, LA
Boston, MA
Minneapolis & St Paul, MN
Charlotte, NC
Portland, OR
San Antonio, TX

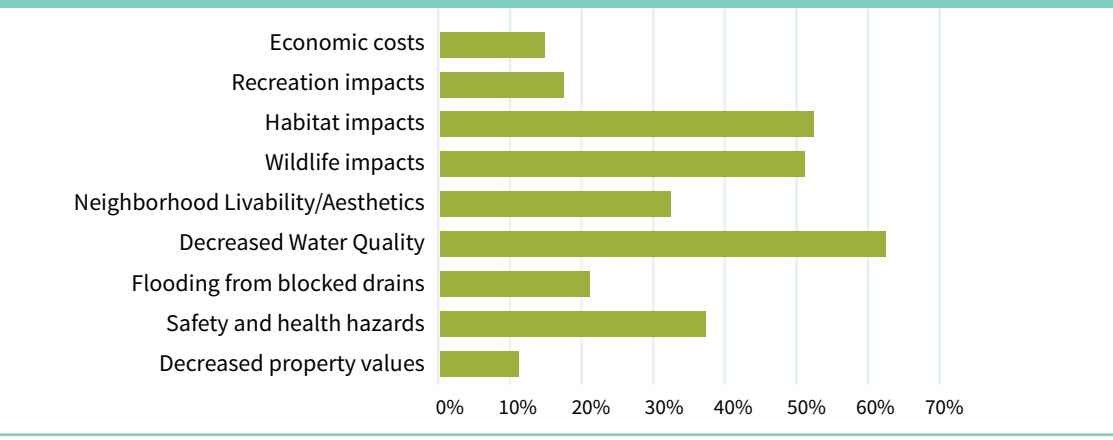
Local Perceptions of Litter Issues

River Network assessed the extent to which respondents consider litter a major issue in their landscape. We overwhelmingly found that litter was a problem that communities were ready to tackle, though only 19% of respondents thought their local decision makers were taking adequate measures to address the litter problem. (Graph A)

GRAPH A: RESPONDENT PERCEPTIONS OF THE IMPORTANCE OF LITTER (n=83)

When participants were asked to identify the most problematic impacts of litter in their communities, they most frequently cited decreased water quality, habitat impacts, and wildlife impacts. (Graph B)

GRAPH B: PERCENTAGE OF RESPONDENTS LISTING SELECT IMPACTS OF LITTER AS MOST PROBLEMATIC (n=80)

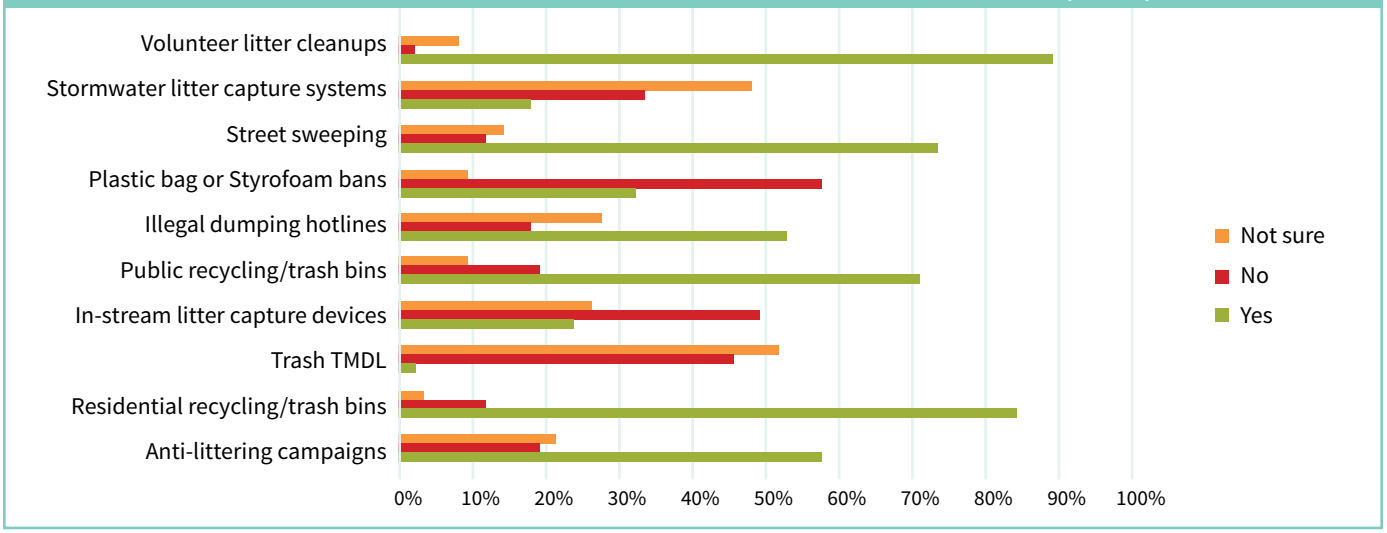


Local Actions to Address Litter

We also assessed what actions were already being taken to address litter and which litter control methods enjoyed the greatest levels of local support. Respondents reported the following four strategies most commonly used to control litter in their community (Graph C), with local civic engagement coming out on top as the most widely utilized method for managing litter removal, at 89%:

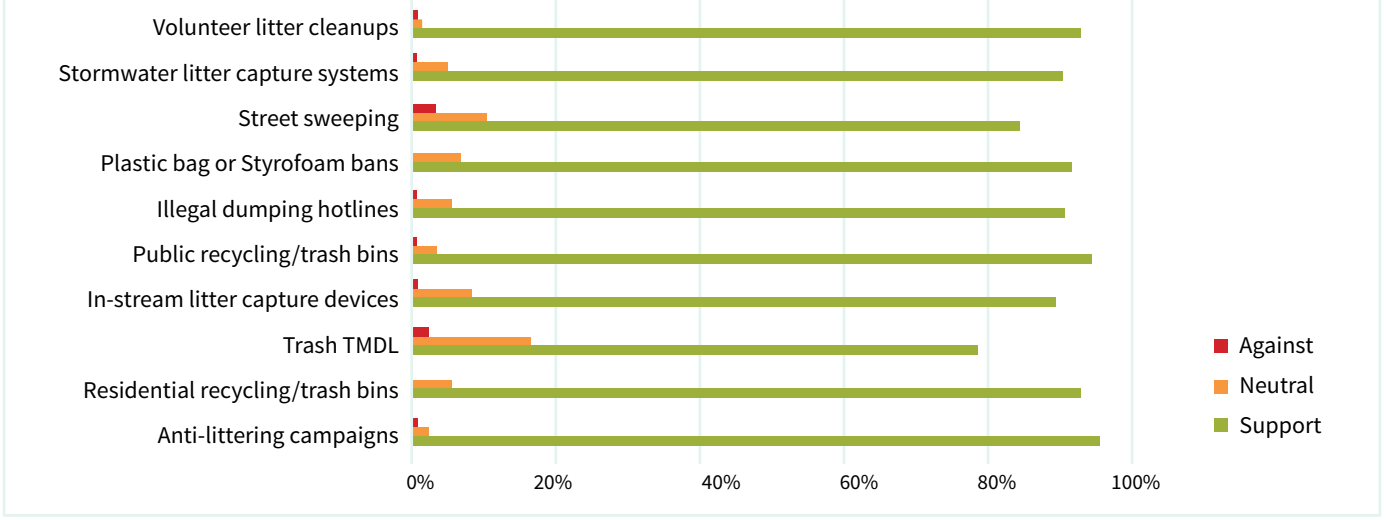
1. Volunteer Litter Cleanups
2. Residential trash and recycling bins
3. Street sweeping
4. Public recycling and/or trash bins

GRAPH C: PERCENTAGE OF RESPONDENTS WHOSE COMMUNITIES ARE IMPLEMENTING SELECT LITTER MANAGEMENT STRATEGIES (n=83)



The majority of respondents support any and all methods of litter removal in their communities (Graph D). This trend illustrates the extent to which litter control is of utmost importance across the nation and requires attention across local NGOs, governments, citizens, and more.

GRAPH D: RESPONDENT SUPPORT FOR SELECT LITTER MANAGEMENT STRATEGIES (n=82)



Understanding stakeholders' perceptions of litter in your community and their willingness to consider various strategies to manage litter locally is an important first step to identifying potential partners and begin to lay the groundwork for developing an action plan to address local litter issues.