Environmental Law Centre
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Seven Reforms to Address Marine Plastic Pollution

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AGENDA FOR ACTION:
7 REFORMS TO ADDRESS MARINE PLASTIC POLLUTION

RECOMMENDATIONS IN A NUTSHELL

1. **REGULATE SINGLE-USE PLASTICS**
    - **A. PLASTIC BAGS**
    - **B. BOTTLES, STRAWS, TABLEWARE**
    - **C. POLYSTERENE/STYROFOAM**
    - **D. CIGARETTE FILTERS**
    - **E. BEVERAGE CONTAINERS**
2. **REGULATE STORMWATER OUTFALLS**
3. **REGULATE MICROPLASTIC POLLUTION**
4. **A NATIONAL STRATEGY TO CLEAN UP DERELICT FISHING GEAR**
5. **EXTEND PRODUCER RESPONSIBILITY**
6. **ADDRESS THE ROOT PROBLEM – REDESIGN THE PLASTIC ECONOMY**
7. **EDUCATION, OUTREACH & BEACH CLEANUPS**

Figure 1: #CleanSeas campaign infographic from UNEP Newscentre, "UN Declares War on Ocean Plastic" (23 February 2017) http://web.unep.org/newscentre/un-declares-war-ocean-plastic

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THE PROBLEM

Marine plastic pollution is an increasingly urgent global problem. Up to 20 million tons of debris enters the world's oceans every year.[1] Plastic bags, bottles, caps, lids, straws, stirrers, food containers, wrappers, plastic microfibers and pellets all find their way to the ocean, carried by urban runoff, wind, sewage and careless people.[2] Marine activities add plasticized fishing nets, fishing lines, traps, aquaculture components and plastic debris from shipping and other industries. [3]

On average, there is more than one piece of plastic litter for *every square metre* of shoreline around the world.[4] An average of 18,000 pieces of plastic litter float on every square kilometre of ocean globally.[5] In areas where currents concentrate plastics (gyres), the number of pieces can exceed 300,000 per square kilometer.[6] Closer to home, on the BC coast thousands of tiny *invisible* plastic particles *per cubic metre*

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[1] The 20 million ton figure comes from Natural Resource Defence Council expert Leila Monroe in <http://www.livescience.com/44098-recycling-boom-benefits.html>. The UN Environment Program has recently estimated the figure at 20 million tonnes. See: UN News Centre release, "Biodegradable plastics are not the answer to reducing marine litter," November 17, 2015 at: <http://www.un.org/apps/news/story.asp?NewsID=52583#.WRtwImjyuUk>. However, some sources estimate the volume of plastic debris at around eight million tons annually. See *The Plastics Ban List* found at Appendix C.

[2] Pathways to the ocean include run-off, stormwater systems, rivers, etc. Sewage effluent also delivers a vast amount of microplastic fibres to the environment from laundering of clothes and textiles. See: Mark Gold et al., "Stemming the Tide of Plastic Marine Litter: A Global Action Agenda," Emmett Institute on Climate Change & the Environment, online: (2013) 5: Pritzker Brief, <https://law.ucla.edu/~/media/Files/UCLA/Law/Pages/Publications/CEN_EMM_PUB%20Pritzker_5_Stemming_Tide.ashx/?filedownload=1> [UCLA Report] at p.3. Also see Jean-Pierre Desforges et al, "Ingestion of Microplastics by Zooplankton in the Northeast Pacific Ocean," *Archives of Environmental Contamination and Toxicology,* June 12, 2015, Abstract.

[3] In fact, 80% of marine debris originates from land-based sources including urban runoff, combined sewer overflows, beach visitors, inadequate waste disposal and management, industrial activities, construction, and illegal dumping. Of these, urban runoff is the primary contributor of marine debris, which is transported by storm drains, wind, or direct dumping. See the December 11, 2012 Center for Biological Diversity *Petition for Preliminary Assessment of Northwestern Hawaiian Islands and the Great Pacific Garbage Patch for Plastic Contamination under Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act,* at p.7. And see Mark Gold *et al*., "Stemming the Tide of Plastic Marine Litter: A Global Action Agenda," Emmett Institute on Climate Change & the Environment, online: (2013) 5: Pritzker Brief, <https://law.ucla.edu/~/media/Files/UCLA/Law/Pages/Publications/CEN_EMM_PUB%20Pritzker_5_Stemming_Tide.ashx/?filedownload=1> [UCLA Report] at p.3.

[4] Jean-Pierre Desforges et al, "Widespread Distribution of Microplastics in Subsurface Seawater in the NE Pacific Ocean: *Marine Pollution Bulletin,* 79 (2014) 94-99, at p.94.

[5] See Government of Western Australia, Department of Parks and Wildlife, "Marine Park protectors – Facts about marine litter" (25 November 2015), online: <https://www.dpaw.wa.gov.au/management/marine/marine-parks-wa/398-marine-park-protectors?showall=&start=3>.

[6] This was measured in the so-called Eastern Garbage Patch. See Moore, S L *et al*., 2001, 'Composition and Distribution of Beach Debris in Orange County, California" *Marine Pollution Bulletin*, 42(3), pp.1–5. Much media attention has focused on the North Pacific Gyre and its massive accumulation of plastics. Other major gyres include the South Pacific, North Atlantic, South Atlantic and Indian Ocean Gyres. See Jessica Midbust *et al*., "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds," online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.30-31.

of seawater are being found.[7] It is also estimated that if trends continue, that in 2050 the world's oceans could contain more plastic than fish.[8]

This plastic pollution devastates marine life. Every year plastic litter kills one million seabirds and 100,000 turtles and marine mammals such as dolphins, whales and seals.[9] Plastic bags, styrofoam cups, bottles, balloons, strapping bands, plastic sheeting, and fishing gear all pose risks. For example, six-pack holders strangle marine birds and other animals. Nets, ropes, fishing lines and traps entangle and drown both mammals and birds. A variety of animals can swim into bags and plastic wrapping and be entrapped or suffocated – or ingest the plastic and die. It has been estimated that more than 260 animal species worldwide have become entangled in or consumed fishing line, nets, ropes and other discarded equipment – and that over 600 marine species are harmed by marine plastic pollution. Plastics can also smother ocean floor habitat – and serve as a transport mechanism for invasive species.[10]

The slow breakdown of plastics presents further, long-term threats. Most plastic debris in the marine environment will not biodegrade but will instead break down into much smaller microplastics.[11] Studies

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[7] Jean-Pierre Desforges *et al.*, "Widespread Distribution of Microplastics in Subsurface Seawater in the NE Pacific Ocean: *Marine Pollution Bulletin,* 79 (2014) 94-99, at pp.94-98.

[8] Compared by weight. See: World Economic Forum, *The New Plastics Economy: Rethinking the future of plastics* (January 2016), online: <http://newplasticseconomy.org/report-2016> at p.14 and <https://www.theguardian.com/business/2016/jan/19/more-plastic-than-fish-in-the-sea-by-2050-warns-ellen-macarthur>.

[9] Government of Western Australia, Department of Parks and Wildlife, "Marine Park protectors – Facts about marine litter" (25 November 2015), online: < https://www.dpaw.wa.gov.au/management/marine/marine-parks-wa/398-marine-park-protectors?showall=&start=3>.

[10] See: Government of Western Australia, Department of Parks and Wildlife, "Marine Park protectors – Facts about marine litter" (25 November 2015), online: < https://www.dpaw.wa.gov.au/management/marine/marine-parks-wa/398-marine-park-protectors?showall=&start=3> and UN Newscentre, "UN Declares War on Ocean Plastic" (23 February 2017), online: <http://web.unep.org/newscentre/un-declares-war-ocean-plastic>. Also see Mark Gold *et al.*, "Stemming the Tide of Plastic Marine Litter: A Global Action Agenda", Emmett Institute on Climate Change & the Environment, online: (2013) 5: Pritzker Brief, <https://law.ucla.edu/~/media/Files/UCLA/Law/Pages/Publications/CEN_EMM_PUB%20Pritzker_5_Stemming_Tide.ashx/?filedownload=1> [UCLA Report] at p.3 And see Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.32-33. A description of plastic ingestion killing marine animals is found in *IFL Science,* "For Ocean Animals, 'Death by Plastic' Could be Occurring More Frequently" at <http://www.iflscience.com/environment/ocean-animals-%E2%80%98death-plastic%E2%80%99-could-be-occurring-more-frequently/> and a description of plastics-related whale deaths is at <http://www.sciencedirect.com/science/article/pii/S0025326X13000489>.

[11] There are two types of microplastics: primary microplastics and secondary microplastics. Primary microplastics are small plastic particles that are manufactured to be smaller than 1mm and are generally found in cosmetic products and industrial cleaners. Secondary microplastics are plastic particles smaller than 1mm that result from the breakdown of larger plastic debris. See Mark Gold *et al.*, "Stemming the Tide of Plastic Marine Litter: A Global Action Agenda", Emmett Institute on Climate Change & the Environment, online: (2013) 5: Pritzker Brief, <https://law.ucla.edu/~/media/Files/UCLA/Law/Pages/Publications/CEN_EMM_PUB%20Pritzker_5_Stemming_Tide.ashx/?filedownload=1> [UCLA Report] pp.3-5.

have found that 90% of plastics found in the open ocean are not large visible pieces of plastic – but are tiny (<5 mm) microplastics.[12]

And these microplastic particles are omnipresent. Out of 16 samples of commercial sea salt recently analyzed from eight different countries, all but one contained plastic particles.[13] In the Strait of Georgia between Vancouver Island and mainland BC, over 3,000 particles of plastic were found *per cubic meter* of seawater analyzed. Surprisingly, the water in the remote Queen Charlotte Sound had more than double that number of plastic particles.[14]

Fish, shellfish and mammals are ingesting these microplastics. Zooplankton mistake plastic for food and eat the particles, which then work their way up the food chain. A recent study estimated that returning BC adult salmon may be ingesting up to 90 particles of plastic per day.[15] Because of the omnipresent and growing spread of microplastics, it is estimated that by 2050, 99% of sea birds will have ingested plastic.[16] These tiny plastic particles can disrupt digestive and reproductive processes and harm animal health.[17] A recent review of 101 peer-reviewed papers on marine microplastic pollution concluded:

> *All of the marine organism groups are at an eminent risk of interacting with microplastics according to the available literature… This type of [microplastic] pollution is ubiquitous and persistent in the world's oceans and openly threatens marine biota.*[18]

Furthermore, as plastics degrade they can release carcinogens and endocrine inhibitors – and can absorb and concentrate contaminants from the water such as PCBs, PAHs, DDT, PBDES, and BPA. In these ways, plastics can expose marine wildlife to toxins.[19] Thus, in addition to causing immediate harm

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[12] United States Environmental Protection Agency, "State of the Science White Paper: A Summary of Literature on the Chemical Toxicity of Plastics Pollution to Aquatic Life and Aquatic-Dependant Wildlife" (December 2016), online: <https://www.epa.gov/sites/production/files/2016-12/documents/plastics-aquatic-life-report.pdf> at p.10.

[13] The countries where the salt was gathered included Australia, France, Iran, Japan, Malaysia, New Zealand, Portugal and South Africa. Only one sample from France was plastic-free. See: Michael Allan, "There's Probably Plastic in Your Sea Salt," Hakai Magazine, May 8, 2017 at: <https://www.hakaimagazine.com/article-short/theres-probably-plastic-your-sea-salt>. Also see the study described at <https://qz.com/979101/sea-salt-is-likely-to-contain-microparticles-of-plastic-according-to-a-new-study/>.

[14] Jean-Pierre Desforges *et al.*, "Widespread Distribution of Microplastics in Subsurface Seawater in the NE Pacific Ocean: *Marine Pollution Bulletin,* 79 (2014) 94-99, at pp.94-98.

[15] Jean-Pierre Desforges *et al.*, "Ingestion of Microplastics by Zooplankton in the Northeast Pacific Ocean," *Archives of Environmental Contamination and Toxicology,* June 12, 2015, Abstract.

[16] UNEP Newscentre, "UN Declares War on Ocean Plastic" (23 February 2017), online: <http://web.unep.org/newscentre/un-declares-war-ocean-plastic>. Already, of the 1.5 million Laysan albatrosses that inhabit Midway, nearly all likely currently have plastic in their digestive systems – and one-third of their chicks die, many from eating plastic.[30] [31][32]

[17] Source: "Microplastics: A Threat to BC Marine Ecosystems," Garth Covernton UVic Master's Thesis Discussion, Air and Waste Management Association Technical Luncheon, May 16, 2017, Victoria, BC.

[18] do Sul, J. A. I., & Costa, M. F. (2014). "The present and future of microplastic pollution in the marine environment". *Environmental Pollution*, *185*, 352-364, Introduction.

[19] Mark Gold et al., "Stemming the Tide of Plastic Marine Litter: A Global Action Agenda", Emmett Institute on Climate Change & the Environment, online: (2013) 5: Pritzker Brief, <https://law.ucla.edu/~/media/Files/UCLA/Law/Pages/Publications/CEN_EMM_PUB%20Pritzker_5_Stemming_Tide.ashx/?filedownload=1> [UCLA Report] at p.5 Contaminants adsorbed by microplastics include PCBs, PAHs, DDT,

to marine wildlife, plastic debris can have long-term harmful impacts to the entire food chain.[20] As EPA chemist Richard Engler warned in a 2012 review:

> *While current research cannot quantify the amount, plastic in the ocean does appear to contribute to [persistent, bioaccumulative, and toxic substances] in the human diet.*[21]

What is worse, the current plastics economy is a colossal waste of resources – and a major contributor to climate change. An estimated 95% of plastic value is lost to the economy after only a single use.[22] And this ongoing loss of plastics into the environment necessitates never-ending production of *new* plastics. Currently, plastics-related industry consumes 7-8% of the world's oil and gas production.[23] By 2050 it has been estimated that the plastics industry overall could be consuming 20% of total world oil production – and 15% of the global annual carbon budget.[24]

Unfortunately, the plastics problem is becoming ever more urgent. The demand for plastics doubled in the last 20 years – and is expected to *double again* in the next 20 years.[25] If the issue of plastic pollution in the marine environment is not addressed, the accelerating use and production of plastics could spell disaster for the oceans and ocean life.

PBDES, and BPA. Jean-Pierre Desforges et al, "Widespread Distribution of Microplastics in Subsurface Seawater in the NE Pacific Ocean: *Marine Pollution Bulletin,* 79 (2014) 94-99, at p. 95. Jessica Midbust et al., "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.34.

[20] Mark Gold et al., "Stemming the Tide of Plastic Marine Litter: A Global Action Agenda", Emmett Institute on Climate Change & the Environment, online: (2013) 5: Pritzker Brief, <https://law.ucla.edu/~/media/Files/UCLA/Law/Pages/Publications/CEN_EMM_PUB%20Pritzker_5_Stemming_Tide.ashx/?filedownload=1> [UCLA Report] at p.6. Also see Wright, S. L., Thompson, R. C., & Galloway, T. S. (2013). "The physical impacts of microplastics on marine organisms: a review". *Environmental Pollution*, *178*, 483-492.

[21] Seltenrich, N. (2015). New link in the food chain? Marine plastic pollution and seafood safety. *Environmental health perspectives*, *123*(2), A34-A41.

[22] World Economic Forum, "The New Plastics Economy: Rethinking the future of plastics" (January 2016), online: <http://newplasticseconomy.org/report-2016>, at p.7.

[23] Plastics consume 4% of the world's oil and gas production, and an additional 3-4% of world oil and gas is used for plastics manufacture. Jefferson Hopewell, Robert Dvorak and Edward Kosior, "Plastics recycling: challenges and opportunities", online: (2009) 364:1526 Philosophical Transactions of the Royal Society B, <http://rstb.royalsocietypublishing.org/content/364/1526/2115>. For a discussion of economic impacts of marine plastics, see United Nations Environment Programme, Marine Litter Legislation: A Toolkit for Policymakers, 2016 online: http://apps.unep.org/publications/index.php?option=com_pub&task=download&file=012253_en at p.3.

[24] World Economic Forum, "The New Plastics Economy: Rethinking the future of plastics" (January 2016), online: <http://newplasticseconomy.org/report-2016>, at p.22,

[25] World Economic Forum, "The New Plastics Economy: Rethinking the future of plastics" (January 2016), online: <http://newplasticseconomy.org/report-2016>, at p.7. See also: PlasticsEurope, *Plastics – the Facts 2016,* online: < http://www.plasticseurope.org/cust/documentrequest.aspx?DocID=67651> at p.33 and Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds," online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.10.

Fortunately, the world is beginning to recognize the need for action on marine plastics. The issue has been addressed by several international agreements, campaigns and organizations in recent years:

- The Leaders' Declaration from the 2015 G7 Summit agreed to an *Action Plan to Combat Marine Litter* with an emphasis on plastic debris.[26]
- The Rio+20 United Nations Conference on Sustainable Development identified the conservation of oceans as one of the sustainable development goals defined in their 2030 Agenda for Sustainable Development.[27] Specifically, the *Rio+20 Agenda* aims to effect the prevention and reduction of marine pollution by 2025.[28]
- In 2016, the Global Ocean Commission, an international initiative, released a report identifying numerous proposals to improve the health of oceans globally. The Commission identified the need to keep plastic pollution out of the ocean as their fifth proposal. The Commission called for intensified efforts "to address the variety of sources of marine pollution".[29]
- In February 2017 UN Environment launched the *#CleanSeas* campaign which aspires to eliminate major sources of marine litter by 2022.[30]

However, effective regulation of marine plastic pollution is uniquely difficult. Plastics come from virtually everywhere – and then spread themselves diffusely over vast areas, often crossing borderlines. Yet each country regulates such debris differently, and international controls have been ineffective.

In Canada to date, our approach has been somewhat *ad hoc* and patchwork – due in part to the widely variable nature of plastic use and distribution, and to the number of jurisdictions with different powers. However, notable recent Canadian measures include a variety of municipal plastic bag bans and the recent federal ban on microbeads.[31]

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[26] *Leaders' Declaration G7 Summit 7-8 June 2015* <https://sustainabledevelopment.un.org/content/documents/7320LEADERS%20STATEMENT_FINAL_CLEAN.pdf>.

[27] Division for Sustainable Development, UN-DESA, *Sustainable Development Goals,* online: <https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals#> at target 14.

[28] Division for Sustainable Development, UN-DESA, *Sustainable Development Goals,* online: <https://sustainabledevelopment.un.org/topics/sustainabledevelopmentgoals#> at target 14. The Emmett Center on Climate Change and the Environment contend, in their 2013 report entitled *Stemming the Tide of Plastic Marine Litter: A Global Action Agenda*, that the Rio+20 target can be achieved through a rigorous regime incorporating "enforceable marine pollution standards … (and) strong tracking, monitoring, reporting and enforcement mechanisms". -- Mark Gold et al., "Stemming the Tide of Plastic Marine Litter: A Global Action Agenda", Emmett Institute on Climate Change & the Environment, online: (2013) 5: Pritzker Brief, <https://law.ucla.edu/~/media/Files/UCLA/Law/Pages/Publications/CEN_EMM_PUB%20Pritzker_5_Stemming_Tide.ashx/?filedownload=1 at p.2.

[29] Global Ocean Commission, "The Future of our Ocean: Next Steps and Priorities", online: <http://www.some.ox.ac.uk/wp-content/uploads/2016/03/GOC_2016_Report_FINAL_7_3.low_1.pdf>

[30] UNEP Newscentre, "UN Declares War on Ocean Plastic" (23 February 2017), online: <http://web.unep.org/newscentre/un-declares-war-ocean-plastic>.

[31] Plastic microbeads will be regulated through the *Canadian Environmental Protection Act* starting in 2018. See the discussion below.

If we are to meet the challenge of marine plastic pollution, international organizations, international agreements, countries, states/provinces, local governments, and civil society will all have to mobilize. The issue of marine plastic pollution demands attention at virtually every level of government.[32]

Below we recommend a broad Canadian action agenda to prevent and remediate marine plastic pollution -- through regulation, policy and mobilization of civil society. As the G7 *Action Plan to Combat Marine Litter* points out, the ultimate solution must include both:

- prevention of the pollution; and
- actions to address and remove the current pollution.[33]

Therefore, we attempt to address both.

Following is a discussion of our top seven recommendations for addressing marine plastic pollution. These recommendations are:

1. Increased regulation of single use plastics, such as:
    a. Plastic bags;
    b. Bottles, straws and tableware;
    c. Polystyrene/Styrofoam;
    d. Cigarette filters;
    e. Beverage containers;
2. Regulate stormwater outfalls;
3. Regulate microplastic pollution;
4. A national strategy to clean up derelict fishing gear;
5. Extend producer responsibility;
6. Address the root problem – redesign the plastic economy; and
7. Education, outreach and beach cleanups.

[32] As a recent report from the Emmett Center on Climate Change and the Environment noted: "International law is not likely to solve the problem independent of domestic actions". Mark Gold *et al.*, "Stemming the Tide of Plastic Marine Litter: A Global Action Agenda", Emmett Institute on Climate Change & the Environment, online: (2013) 5: Pritzker Brief, <https://law.ucla.edu/~/media/Files/UCLA/Law/Pages/Publications/CEN_EMM_PUB%20Pritzker_5_Stemming_Tide.ashx/?filedownload=1> [UCLA Report] at p.11

[33] http://www.international.gc.ca/g7/g7_germany_declaration-g7_allemagne_declaration_annex.aspx?lang=eng

RECOMMENDATIONS

1. REGULATE SINGLE-USE PLASTICS

A common and effective method to address plastic pollution is increased regulation of single-use consumer plastics. Single-use consumer plastics – which include things like plastic beverage containers and plastic bags -- make up the bulk of Canada's "Dirty Dozen" of debris collected on Canadian beaches.[35] Similarly, US studies have concluded that single-use packaging is the most commonly identified source of marine plastic debris.[36] As a result, many jurisdictions have implemented complete bans on various single-use consumer plastics. However, there are other regulatory options for such plastics. For example, several US states have implemented measures that span from plastic bag bans, to fees or taxes on plastic bags, to programs requiring labelling and recycling programs.[37]

Key measures that have been taken by various countries, states, and municipalities to regulate single use plastics are:

- plastic bag levies and bans;
- bans on water bottles, straws and tableware;
- polystyrene/styrofoam bans;
- beverage container deposit/refund schemes; and
- extended producer responsibility programs.

CANADA'S DIRTY DOZEN

1. Cigarette Butts
2. Food Wrappers
3. Plastic Bottle Caps
4. Plastic Beverage Bottles
5. Beverage Cans
6. Other Plastic & Foam
7. Straws & Stirrers
8. Other Plastic Bags
9. Metal Bottle Caps
10. Plastic Grocery Bags
11. Plastic Lids
12. Paper Cups & Plates

[35] Great Canadian Shoreline Cleanup, "Facts & Figures", online: <http://www.shorelinecleanup.ca/en/content/facts-figures>.
[36] Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.6.
[37] National Conference of State Legislatures, "State Plastic and Paper Bag Legislation", online: <http://www.ncsl.org/research/environment-and-natural-resources/plastic-bag-legislation.aspx>.

PLASTIC BAG TAXES, LEVIES AND BANS

Single use plastic bags have a very short useful life -- only one in five bags is reused; very few are recycled; and the large majority landfilled after just a few moments of use.[38] Far too many are discarded and washed by storm sewers, streams and the wind into the ocean. In fact, single-use plastic grocery bags rank 6th in the top ten debris items collected in Ocean Conservancy clean up efforts.[39] These plastic bags can be particularly harmful to the marine ecosystem. Marine mammals, birds, turtles and other animals often suffer serious harm when they ingest -- or are entangled in -- plastic bags.[40] Plastic bags and balloons come a close second to fishing gear as a threat to marine wildlife. Ingestion of whole or parts of bags is a problem. For example, sea turtles mistake plastic bags for jellyfish or other prey.[41] Plastic bags break down into microplastics that are ingested. And plastic bags entangle animals. As a recent study of marine debris threats to wildlife stated:

> *Plastic bags and balloons, however, were also found to pose considerable entanglement risk to marine taxa…Plastic bags generally have handles which pose an entanglement risk as well as a 3-dimensional structure that creates a space in which an animal or parts of an animal can become entwined; indeed, plastic bags have been shown to entangle pinnipeds [seals]. The expert elicitation findings reported here confirm that compared to most other consumer plastic items, plastic bags pose one of the greatest impacts to ocean wildlife and thus, from an environmental impact perspective, plastic bags warrant the specific attention they have received from governments and advocates to address their use.*[42]

[38] Submission from Environmental Defenders Offices (EDOs) of Australia to the Committee Secretary regarding Inquiry into the threat of marine plastic pollution in Australia and Australian waters (9 October 2015), online: <http://www.edonsw.org.au/marine_plastic_pollution> at p.4. The EDOs estimated 5% were recycled, but the World Watch Institute estimates recycling of such bags in the US is far less – only 0.6%. See Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.92.

[39] Jessica Midbust et al., "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.91.

[40] See the submission from the Environmental Defenders Offices (EDOs) of Australia to the Committee Secretary regarding Inquiry into the threat of marine plastic pollution in Australia and Australian waters (9 October 2015), online: <http://www.edonsw.org.au/marine_plastic_pollution> at p.4.

[41] One study examined the digestive tracts of endangered green sea turtle carcasses and found ingested debris in 24 of 43 animals examined. Bjorndal, K., Bolten, A., & Lagueux, C., 1994. *Ingestion of marine debris by juvenile sea turtles in coastal Florida habitats.pdf.* pp.154–158.

[42] Chris Wilcox *et al.*, "Using expert elicitation to estimate the impacts of plastic pollution on marine wildlife," *Marine Policy* 65 (2016) 107–114, at pp. 109-111. See <https://oceanconservancy.org/wp-content/uploads/2017/05/2016-threat-rank-report.pdf>.

Regulating the use of consumer plastic bags is an important step towards solving the marine plastics problem.[43]

At least 35 countries have taken action to either tax or ban single-use carrier bags.[44] Countries, states and cities that have instigated bans on single-use plastic shopping bags include:

- In 2016 California voters approved a statewide ban on supermarkets distributing single-use plastic bags at checkout.[45]
- This initiative was preceded by many similar California *local government* bans. For example, the City of Napa, California had previously banned such plastic shopping bags and imposed a fee on paper bags – and claimed that the law reduced marine litter by 60% in its first year.[46] After San Jose banned such bags, the city documented an 89% reduction in plastic film in storm drains -- and a 59% reduction in local streams.[47]
- Seattle has banned single use plastic carrier bags, as have a handful of municipalities in Quebec and Manitoba.[48]
- In Australia, four out of the eight jurisdictions have banned single-use plastic bags and the remainder are considering similar bans.[49]
- In 2016 France banned both single-use plastic bags from use at super markets and non-biodegradable disposable plastic cups and plastic tableware.[50] Further, France intends to extend this ban to plastic bags used for fruit and vegetables unless they are bio-sourced and

[43] Submission from Environmental Defenders Offices (EDOs) of Australia to the Committee Secretary regarding Inquiry into the threat of marine plastic pollution in Australia and Australian waters (9 October 2015), online: <http://www.edonsw.org.au/marine_plastic_pollution> at p.4.
[44] Earth Policy Institute, *The Downfall of the Plastic Bag: A Global Picture* (2014).
[45] In November, 2016 voters approved Proposition 67, which ratified a 2014 state law banning retailers from handing out single-use plastic bags at the checkout. <http://www.latimes.com/opinion/editorials/la-ed-beyond-bag-ban-20161121-story.html>.
[46] See p.5 of the City of Victoria staff report at: <https://victoria.civicweb.net/FileStorage/C41EA3BD4C6C473C996EB99BFDD8504E-Attachment_COTW%20Report%20May%2026,%202016%20.PDF>.
[47] Jessica Midbust et al., "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: < http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.96.
[48] See p. 5 of the City of Victoria staff report at: <https://victoria.civicweb.net/FileStorage/C41EA3BD4C6C473C996EB99BFDD8504E-Attachment_COTW%20Report%20May%2026,%202016%20.PDF>.
[49] Submission from EDOs of Australia to the Committee Secretary regarding Inquiry into the threat of marine plastic pollution in Australia and Australian waters (9 October 2015), online: <http://www.edonsw.org.au/marine_plastic_pollution> at p.4.
[50] CNN World, "France becomes first country to ban plastic cups and plates" (20 September 2016), online: <http://www.cnn.com/2016/09/19/europe/france-bans-plastic-cups-plates/>.

domestically compostable. The only exemption is for bags that are bio-sourced and domestically compostable.[51]

- In 2015, the European Union issued a directive to its member states to take measures to reduce consumption of single-use plastic bags.[52]
- In 2008, Rwanda instigated a complete ban on non-biodegradable polyethylene bags.[53] The ban prohibits the manufacture, use, import, and sale of all polyethylene bags.[54] This ban is strict -- all passengers coming into Rwanda must surrender any plastic bags that are in their luggage.[55]
- In 2016, national regulations on single use plastic bags were enacted in Indonesia, Columbia and Morocco.[56]

An alternative to a ban is imposing a levy on bag use. In some cases, levies have not been successful, but there are examples of jurisdictions where levies have been effective at reducing single-use plastic bags -- especially when combined with strong public education efforts.[57] The Northwest Territories has imposed a territory-wide fee of 25 cents per single-use retail bag.[58] Boulder, Colorado imposed a 10-cent fee that reduced use of bags by 68%.[59] In Ireland, the levy of 15 cents per bag – along with a public education campaign – resulted in a prompt reduction of such bag usage from 328 to 21 per capita.[60] In England, the introduction of a 5p charge on plastic bags in 2015 was highly effective in stopping shoppers from using single-use bags. Sweden has conducted a successful pilot project requiring a

[51] Ministère de l'Environnement, de l'Énergie et de law Met, "Les actions en faveur de la protection des mers et de l'Océan" (22 February 2017), online: <http://www.developpement-durable.gouv.fr/actions-en-faveur-protection-des-mers-et-locean>. Bio-sourced bags are those made of a blend of plastic and either cornstarch or potato starch that can be composted by consumers.

[52] Directive (EU) 2015/720 of the European Parliament and of the Council of 29 April 2015 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags, online: <http://data.europa.eu/eli/dir/2015/720/oj>.

[53] The Guardian, "Think you can't live without plastic bags? Consider this: Rwanda did it" (15 February 2014), online: <https://www.theguardian.com/commentisfree/2014/feb/15/rwanda-banned-plastic-bags-so-can-we>.

[54] The delicious day, "First Country to Ban Plastic Bag: Rwanda!" (2 April 2012), online: <http://www.thedeliciousday.com/environment/rwanda-plastic-bag-ban/>.

[55] ReuseThisBag.com, "Plastic Bag Bans in the World", online: <https://www.reusethisbag.com/reusable-bag-infographics/plastic-bag-bans-world.php>.

[5656] World Economic Forum, "The New Plastics Economy: Rethinking the future of plastics" (January 2016), online: <http://newplasticseconomy.org/report-2016 > at p.22.

[57] Samuel Bowles, "Moral sentiments and material interests: When economic incentives crowd in social preferences" (26 May 2016), online: <http://voxeu.org/article/when-economic-incentives-crowd-social-preferences>.

[58] See *Plastic Bag Regulations Worldwide* by the Earth Policy Institute at <WWW.EARTH-POLICY.ORG/DATACENTER/XLS/UPDATE123_ALL.XLSX>.

[59] See p.6 of the City of Victoria staff report at <https://victoria.civicweb.net/FileStorage/C41EA3BD4C6C473C996EB99BFDD8504E-Attachment_COTW%20Report%20May%2026,%202016%20.PDF>.

[60] The 15-cent levy was later raised to 22 cents. Department of Housing, Planning, Community and Local Government, "Plastic Bag Levy", online: <http://www.housing.gov.ie/environment/waste/plastic-bags/plastic-bag-levy>; Samuel Bowles, "Moral sentiments and material interests: When economic incentives crowd in social preferences" (26 May 2016), online: < http://voxeu.org/article/when-economic-incentives-crowd-social-preferences>.

deposit for people taking plastic bags – which is refundable if the bag is returned. [61] Advocates of such levy and deposit/refund systems argue that such systems may reduce *overall* use of *disposable bags* -- whereas bans on plastic bags may increase the use of paper bags as alternatives.

Both plastic bag bans and taxes are now widespread, and have been effective at reducing unnecessary plastic usage. The compelling rationale for taking this action was summed up by the Government of France, which recently noted:

> *Non-biodegradable plastic bags are used for a few minutes but take several hundreds of years to degrade.*[62]

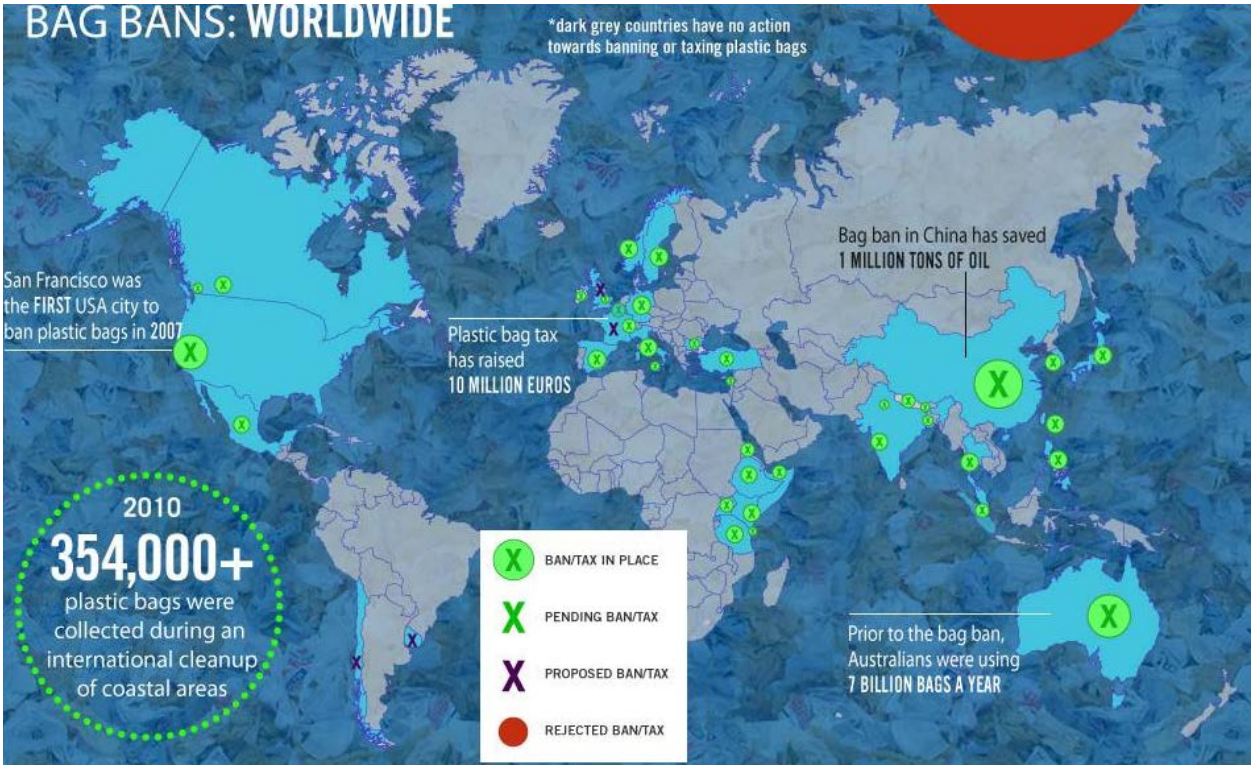

Figure 2: Plastic ban bans around the world. Source: ReuseThisBag.com "Plastic Bag Bans in the World" online: https://www.reusethisbag.com/reusable-bag-infographics/plastic-bag-bans-world.php

[61] "Deposit System Cuts Plastic Bag Use, Study Shows," *Environment Journal*, January 27, 2017, at: <http://environmentjournal.online/articles/deposit-system-cuts-plastic-bag-use-study-shows/>.

[62] "Les sacs plastique en matière non biodégradable sont utilisés quelques minutes mais mettent plusieurs centaines d'années à se dégrader." Ministère de l'Environnement, de l'Énergie et de law Met, "Les actions en faveur de la protection des mers et de l'Océan" (22 February 2017), online: <http://www.developpement-durable.gouv.fr/actions-en-faveur-protection-des-mers-et-locean>.

OTHER RELEVANT LINKS AND RESOURCES:

- *Plasticbaglaws.org* – A resource for legislative bodies considering laws limiting the use of plastic bags. http://plasticbaglaws.org/
- *Resources for Reducing Plastic Bags in Your Community*, MassGreen.org - This site contains a toolkit, sample legislation, facts, discussion of alternatives, and discussion of reduction options. http://www.massgreen.org/plastic-bag-resources.html
- BagLaws.com – a resource for retailers seeking information about laws detailing use of paper and plastic bags. Provides the latest in bag legislation news in the United States. www.baglaws.com
- Surfrider Foundation, Plastic Bag Bans and Fees – A partial list of bag legislation in the United States. http://www.surfrider.org/pages/plastic-bag-bans-fees
- City of Victoria Committee of the Whole Reports for the meetings of May 19, 2016, and March 23, 2017 discussing the reduction of single-use plastic retain bags. Attached as Appendices F and G. The City of Victoria is working towards developing a plastic bag ban, and has researched numerous jurisdictions that have already banned or otherwise regulated plastic bags. See the City's staff study that canvases such initiatives in many different jurisdictions, and reviews various policy considerations: https://victoria.civicweb.net/FileStorage/C41EA3BD4C6C473C996EB99BFDD8504E-Attachment_COTW%20Report%20May%2026,%202016%20.PDF
- Surfrider Foundation, *Rise Above Plastics* – a program run by the Surfrider Foundation to raise awareness about the dangers of plastic pollution and advocating for reduction and recycling of plastics. http://www.surfrider.org/programs/rise-above-plastics
- Surfrider Foundation, *Rise Above Plastics Activist Toolkit* – An informative toolkit regarding how to reduce plastics in your community. http://public.surfrider.org/RAP/RAP_Toolkit.pdf
- Initiate A Plastic Bag Ban, *a* guidebook written by the creator of the *Plastic Bag Ban Report* newsletter.
- *Marine Debris & Plastic Source Reduction Toolkit for Colleges & Universities* – This Product Stewardship Institute toolkit contains model language for plastic bag bans. https://www.epa.gov/sites/production/files/2016-03/documents/marine-debris-toolkit-epar9-2015.pdf
- *Bag the Ban* – To see the industry arguments raised when bans are proposed, see this resource for those opposed to bag bans, created by a bag manufacturer. http://www.bagtheban.com/

BANS ON WATER BOTTLES, STRAWS AND PLASTIC TABLEWARE

In addition to plastic bag bans, there is now a growing movement to ban individual-sized water bottles, plastic straws and non-biodegradable plastic tableware.

For example, in 2016 San Francisco banned the sale of individual (<21 oz.) water bottles in public spaces in a regulation to be phased in over the next four years. Waivers from the rule may be given if no alternative water source is available. This follows complete bans on water bottle sales in Concord Massachusetts, at numerous universities, and in 14 US National Parks.[63]

Straw Wars is a UK initiative that aims to eliminate pollution from plastic straws. Straw Wars estimates that every day MacDonalds in the UK alone distributes 35,000,000 plastic straws that are immediately discarded. Straw Wars is working to encourage and incentivise the elimination of plastic straws. See Straw Wars at http://strawwars.org/. Manhattan Beach, California has banned plastic straws.[64] And Seattle recently banned conventional plastic straws and utensils at all businesses that sell drinks.[65] Restaurants will have to offer compostable or recyclable options, or ask customers to not use straws. Plastic straw bans seem reasonable, since straws are often unnecessary – and paper straws are an alternative for those that require straws.

In 2016, France took the cutting-edge step of banning non-biodegradable disposable plastic cups and plastic tableware.[66] Earlier this year, the National Green Tribunal in Delhi, India banned disposable single use cutlery, bags, cups and other forms of single-use plastic.[67]

POLYSTYRENE/STYROFOAM BANS

In addition to the above bans, many cities have begun to regulate polystyrene. Polystyrene is used in many single-use food and beverage containers. Styrofoam is the most obvious of polystyrene products.[68] Coffee cup lids are another common product made from polystyrene.[69] Polystyrene is problematic on numerous levels. It is both harmful to the environment and to human health. In the environment Styrofoam tends to fragment into countless floatable small pieces that are extremely

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[63] <http://globalflare.com/san-francisco-becomes-the-first-city-to-ban-sale-of-plastic-bottles/> and <http://www.plasticpollutioncoalition.org/pft/2016/2/19/the-first-american-city-to-ban-plastic-water-bottles>. MassGreen.org has information on bottle bans as well.

[64] <http://www.ocregister.com/2017/03/16/restricting-use-of-plastic-straws-the-latest-trend-to-clean-up-beaches-ocean/>.

[65] "The last straw? Seattle will say goodbye to plastic straws, utensils with upcoming ban" (2017 September 8) *Seattle Times*, online: <https://www.seattletimes.com/seattle-news/the-last-straw-seattle-will-say-goodbye-to-plastic-straws-utensils-with-upcoming-ban/>.

[66] CNN World, "France becomes first country to ban plastic cups and plates" (20 September 2016), online: <http://www.cnn.com/2016/09/19/europe/france-bans-plastic-cups-plates/>.

[67] "India just banned all forms of disposable plastic in its capital" *The Independent*, January 25, 2017 at: <http://www.independent.co.uk/news/world/asia/india-delhi-bans-disposable-plastic-single-use-a7545541.html>

[68] Styrofoam is a type of polystyrene called expanded polystyrene foam. The 5 Gyres Institute, #FOAMFREE, online: < https://www.5gyres.org/styrofoam/?rq=foam>.

[69] The 5 Gyres Institute, #FOAMFREE, online: <https://www.5gyres.org/styrofoam/?rq=foam>.

difficult to clean up.[70] Further, polystyrene foam is durable and tends to accumulate high levels of pollutants.[71] Polystyrene is rarely recycled as it is most often contaminated with food.[72] Indeed, in 2013 less than 2% of polystyrene products were recycled.[73] In addition to being harmful to the environment, polystyrene may be harmful to human health – it has been designated as a likely human carcinogen.[74]

Many polystyrene bans focus on Styrofoam food packaging containers.[75] However, this year San Francisco banned the sale and distribution of a broader spectrum of polystyrene foam products. The San Francisco ban on polystyrene foam prohibits the following items made of polystyrene foam: food ware, meat and fish trays, egg cartons, *packing materials, coolers, beach toys, and dock floats*. For some of these items, there is an exception if they are completely encased within a more durable material.[76] A similar Canadian ban would address much of the Styrofoam debris commonly found on BC beaches. (See *Canada's Dirty Dozen* above.)

OTHER RELEVANT LINKS AND RESOURCES:

- Polystyrene ordinances in the United States and Internationally. Surfrider Foundation, "Polystyrene Ordinances." http://www.surfrider.org/pages/polystyrene-ordinances
- Several helpful resources and links regarding reducing polystyrene. MassGreen.Org, "Resources for Reducing Polystyrene in Your Community." http://www.massgreen.org/polystyrene-resources.html

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[70] Marcus Eriksen, Matt Prindiville, Beverly Thorpe and Contributors, "The Plastics BAN List: Better Alternatives Now", online: The 5 Gyres Institute <https://static1.squarespace.com/static/5522e85be4b0b65a7c78ac96/t/581cd663d2b857d18a7db3fd/1478284911437/PlasticsBANList2016-11-4.pdf> at p.6.

[71] Marcus Eriksen, Matt Prindiville, Beverly Thorpe and Contributors, "The Plastics BAN List: Better Alternatives Now", online: The 5 Gyres Institute <https://static1.squarespace.com/static/5522e85be4b0b65a7c78ac96/t/581cd663d2b857d18a7db3fd/1478284911437/PlasticsBANList2016-11-4.pdf> at p.6.

[72] Marcus Eriksen, Matt Prindiville, Beverly Thorpe and Contributors, "The Plastics BAN List: Better Alternatives Now", online: The 5 Gyres Institute <https://static1.squarespace.com/static/5522e85be4b0b65a7c78ac96/t/581cd663d2b857d18a7db3fd/1478284911437/PlasticsBANList2016-11-4.pdf> at p.6.

[73] The 5 Gyres Institute, #FOAMFREE, online: <https://www.5gyres.org/styrofoam/?rq=foam>.

[74] It has been designated as such by both the National Toxicology Program and California's Proposition 65. See: The 5 Gyres Institute, #FOAMFREE, online: <https://www.5gyres.org/styrofoam/?rq=foam>.

[75] Surfrider, "Polystyrene Ordinances", online: <http://www.surfrider.org/pages/polystyrene-ordinances>. For an enumeration of municipalities with local polystyrene bans, See Jessica Midbust et al., "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.97.

[76] See Food Service and Packaging Waste Reduction Ordinance, *San Francisco Environment Code,* Chapter 16, online: <http://library.amlegal.com/nxt/gateway.dll/California/environment/environmentcode?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$anc=JD_Environment>. SF Environment Factsheet, "San Francisco Food Service and Packaging Waste Reduction Law", online: <http://sfenvironment.org/sites/default/files/fliers/files/sfe_zw_polystyrene_faq.pdf>.

- Polystyrene ordinances in Californian cities and counties. Californians Against Waste, "Polystyrene: Local Ordinances." http://www.cawrecycles.org/polystyrene-local-ordinances/
- "The Plastics BAN List: Better Alternatives Now", attached here as Appendix C. This document discusses the best alternatives for some of the most environmentally offensive plastic products
- *Marine Debris & Plastic Source Reduction Toolkit for Colleges & Universities* – This Product Stewardship Institute toolkit contains model language for bans on water bottles, polystyrene, take-out food packaging and plastic tableware. https://www.epa.gov/sites/production/files/2016-03/documents/marine-debris-toolkit-epar9-2015.pdf

BEACH SMOKING BANS

As you will note from the results of the Great Canadian Shoreline Cleanup, cigarette butts head the list of items found during Canadian beach cleanups. Cigarette filters are made out of a wood-based plastic that takes generations to fully decompose. Animals can choke on the butts, or be poisoned by the toxins they contain.[77]

Note that the Vancouver Park Board Smoking Regulation Bylaw addresses this problem by prohibiting smoking on city beaches. Other cities address the problem with littering laws. [78] One of the main recommendations of a University of California study on marine plastics was to increase litter law enforcement. The California Ocean Protection Council advocates increasing fines for littering – and using fine revenue to pay for litter cleanup programs.[79] Others have advocated cigarette butt recycling programs, such as the one run by the City of Vancouver and Terracycle.[80]

BEVERAGE CONTAINER DEPOSIT-REFUND SCHEMES

Beverage bottles are a major plastic packaging application – constituting approximately 16% of the market (by weight).[81] In fact, in 2016 plastic beverage bottles were the fifth most common item

[77] Brian Clark Howard, "Cigarette Butts, World's #1 Litter, Recycled as Park Benches: A Growing Movement Targets Cigarette Waste as a Solvable Problem", *National Geographic*, May 5, 2015. <http://news.nationalgeographic.com/2015/05/150504-cigarette-butt-litter-recycling-environment/>.
[78] Vancouver Park Board Smoking Regulation Bylaw <http://vancouver.ca/your-government/park-board-smoking-regulation-bylaw.aspx>.
[79] Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.13 and 90.
[80] For information on current cigarette butt recycling programs, see the Terracycle recycling website at: <https://www.terracycle.ca/en-CA/brigades/cigarette-waste-brigade>. Terracycle recycles the butts into fertilizer, composting material and even industrial plastic, and others recycle them as park benches, as noted in the National Geographic article noted above. The City of Vancouver recently initiated a pilot cigarette butt recycling program with Terracycle. See: <https://www.greencoastrubbish.com/cigarette-recycling-in-vancouver/>.
[81] SmithersPira, *Demand for PET Packaging Material to reach USD 60 billion by 2019* (2014, http://www.smitherspira.com/ news/2014/april/demand-for-pet-packagingmaterial-in-2019); Transparency Market

collected on beach clean ups in Canada – and the separate category of plastic bottle caps were the third most common.[82] One effective method of preventing the prevalence of these plastic items in ocean debris is through container deposit-refund schemes, which are now commonplace in North America.[83]

British Columbia current deposit refund scheme is relatively effective at keeping many containers out of the environment -- but it should be improved and expanded to cover more containers. BC consumers now pay deposits on containers for:

- soft drinks;
- juices;
- water;
- wine;
- coolers;
- spirits; and
- non-refillable beer bottles.

These deposits provide consumers with a tangible incentive to return those containers to recover the monetary deposit. And it provides an incentive for others – including the poor – to seek out and retrieve stray containers, in order to recover the container deposit. This results in an overall return rate of over 79% of such containers.[84] However, the system needs to be improved and extended to other containers, such as individualized milk containers, yogurt containers, etc.

The deposit/refund system is an extremely effective tool that should be used vigorously. An Australian parliamentary committee has recognized that container deposit schemes are a "simple and cost effective way to change consumer behavior, and to reduce the number of beverage containers found in the marine environment".[85] Most Canadian provinces and territories, with the exception of Nunavut,

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Research, *Plastic Packaging Market: Global Industry Analysis, Size, Share, Growth, Trends and Forecast*, 2014-2020 (2015).

[82] Great Canadian Shoreline Cleanup, "Facts & Figures", online: <http://shorelinecleanup.ca/impact/facts>.

[83] See the Container Recycling Institute at <http://www.container-recycling.org/?tmpl=unsupported> for information on US deposit laws.

[84] This system is established under the BC Recycling Regulation, which requires industries to set up infrastructure to achieve set recycling targets. The Regulated target for beverage containers is a 75% return rate, and industry's Encorp's Plan target is 80.1%. See Schedule 1, Beverage Container Product Category (BC Reg. 449/2004). See: : Encorp Pacific (Canada), "2014 Annual Report: Executive Summary" (accessed 21 October 2015), online: <http://www.return-it.ca/ar2014/index.html#/executive-summary>.

[85] The Australian Parliamentary Committee examining marine plastics recognized that the financial incentive offered by these schemes encourages consumer participation in recycling. -- Parliament of Australia, The Threat of Marine Plastic Pollution in Australia (20 April 2016), Chapter 8 Conclusion and Recommendations, online: <http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Marine_plastics/Report>, at s.8.71. Container deposit schemes are effective at regulating plastic beverage litter and operate through "internalising the costs of littering and creating community incentives to recycle more" -- Submission from Environmental Defenders Offices (EDOs) of Australia to the Committee Secretary regarding Inquiry

already have some sort of container deposit scheme in place.[86] These should be expanded and enhanced.

In addition, the Swedish pilot project of establishing a deposit-refund system for plastic shopping bags should be followed closely.[87]

REFILLABLE CONTAINERS

The World Economic Forum's *New Plastic Economy* initiative points out that refillable beverage containers should also be encouraged.[88] Laws and policies should be considered to encourage refillable beverage containers.

into the threat of marine plastic pollution in Australia and Australian waters (9 October 2015), online: <http://www.edonsw.org.au/marine_plastic_pollution> at p.4.

[86] Bottle Bill Resource Guide, "Recycling Legislation in Canada: All Canada Bottle Bills", online: <http://www.bottlebill.org/legislation/canada/allprovs.htm>.

[87] "Deposit System Cuts Plastic Bag Use, Study Shows," *Environment Journal*, January 27, 2017, at: <http://environmentjournal.online/articles/deposit-system-cuts-plastic-bag-use-study-shows/>.

[88] World Economic Forum, "The New Plastics Economy: Rethinking the future of plastics" (January 2016), online: <http://newplasticseconomy.org/report-2016 >, at p.33.

2. REGULATE STORMWATER OUTFALLS

Litter that is not picked up by such things as street sweeping and cleanups tends to eventually make its way to the ocean. Rainwater flushes plastic litter into storm drain systems -- and on into waterways and the ocean. This is a major source of marine plastic pollution. Eighty percent of marine debris originates on land – and the majority of that comes from urban runoff, including storm drain systems.[89]

We need laws to stop this constant tide of plastic into the ocean. Regulations should be implemented to set a standard of zero plastic debris discharge from stormwater outfalls -- as has been done in various US jurisdictions.[90]

A University of California study has recommended that all storm drain systems have mesh screens and catchments to capture any object that is larger than 5mm.[91] In fact, the City of Los Angeles already requires such screens and catchment inserts. The screens and inserts capture plastic debris, and substantially reduce marine pollution. [92]

Such strict results-based stormwater requirements could force industry and governments to better control plastics through:

- local and provincial laws (*e.g.*, litter controls, deposit-refund systems, product bans);
- industrial best practices (*e.g.*, re-design of products to foster re-use, replacement of plastic inputs with benign materials, adoption of best technology to prevent plastic escape);
- enhanced recycling and other programs; and
- other measures.

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[89] As previously mentioned, It has been estimated that 80% of marine debris originates from land-based sources including urban runoff, combined sewer overflows, beach visitors, inadequate waste disposal and management, industrial activities, construction, and illegal dumping. Of these, urban runoff is the primary contributor of marine debris, which is transported by storm drains and un-channeled runoff. See the December 11, 2012 Center for Biological Diversity *Petition for Preliminary Assessment of Northwestern Hawaiian Islands and the Great Pacific Garbage Patch for Plastic Contamination under Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act,* at p. 7. Note that 43% of the litter caught in Southern California storm drains is plastic debris Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds," online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.37.

[90] Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.42-48.

[91] Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.12 and 37.

[92] Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.37-41. The recommendation is in accordance with California's Trash Total Daily Maximum Loads standards.

It is only reasonable that producers of plastic debris pay for storm sewer upgrades, to ensure that their products don't contaminate the ocean. As former NRDC marine plastics expert Leila Monroe has argued, requiring producers to pay for cleaner storm sewer operation would be a logical implementation of the "Polluter Pays Principle" and "Extended Producer Responsibility".[93] (See below for a discussion of Extended Producer Responsibility.)

Trash booms, such as those used in Long Beach, California, should be considered as a further measure to divert plastic from entering the ocean.[94]

[93] See: <http://www.livescience.com/44098-recycling-boom-benefits.html>.

[94] See Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.129-131.

3. REGULATE MICROPLASTIC POLLUTION

In recent years, there has been rising concern about the impacts of microplastics such as microbeads and microfibers.[95] Microplastics are a pressing issue because they are now so ubiquitous in the marine environment.[96] The fact that over 3000 particles of plastic are found *per cubic meter* of seawater in the Straits of Georgia[97] and that returning BC adult salmon may be ingesting 90 particles of plastic per day has raised alarms.[98]

The Lake Ontario Waterkeeper distinguishes between the five main types of microplastics found in waters:

1. Microbeads – Microbeads are plastic particles that are manufactured to be smaller than one millimeter in diameter. They are used in cosmetics, facial scrubs and other personal care products, as well as in industrial applications.
2. Nurdles (plastic pellets) – Nurdles are a primary plastic product. They are small pellets that are melted down to make other plastic items.
3. Fibrous microplastics – Fibrous microplastics come from laundering of synthetic fabrics, cigarette butts, and from other synthetic fibre products. In the Great Lakes, fibrous microplastics make up 71% of the total microplastic pollution.
4. Fragments – Fragments are tiny pieces of plastic that have broken down from larger pieces during the process of weathering.
5. Foam – Foam microplastics have broken down from polystyrene (styrofoam) products. [99]

In general, primary manufactured microplastics such as microbeads and nurdles may be easier to target through legislation (such as the microbead manufacturing ban and the nurdle regulations discussed below). [100] However, secondary microplastics created by the breakdown of plastics can be extraordinarily difficult to deal with once they are in the environment. For example, microfibers from

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[95] Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.76-78.
[96] Microfiber Pollution & the Apparel Industry, Project Findings, online: <http://brenmicroplastics.weebly.com/project-findings.html>.
[97] Jean-Pierre Desforges *et al.*, "Widespread Distribution of Microplastics in Subsurface Seawater in the NE Pacific Ocean: *Marine Pollution Bulletin,* 79 (2014) 94-99, at p.94-98.
[98] Jean-Pierre Desforges *et al.*, "Ingestion of Microplastics by Zooplankton in the Northeast Pacific Ocean," *Archives of Environmental Contamination and Toxicology,* June 12, 2015, Abstract.
[99] Matt Flowers, "Zooming in on the Five Types of Microplastics" (November 16 2016), online: Lake Ontario Waterkeeper <http://www.waterkeeper.ca/blog/2016/11/15/zooming-in-on-the-five-types-of-microplastics?utm_source=Lake+Ontario+Waterkeeper&utm_campaign=15fe0beabb-EMAIL_CAMPAIGN_2017_03_30&utm_medium=email&utm_term=0_0114e8b68b-15fe0beabb-354567673>.
[100] Carl Bruch *et al.*, "Marine Litter Legislation: A Toolkit for Policymakers" (2016), United Nations Environment Programme, online: <http://apps.unep.org/publications/index.php?option=com_pub&task=download&file=012253_en>.

the laundering of clothing are not filtered out in wastewater treatments,[101] and are impossible to recover once they are in the ocean.[102] Similarly, Styrofoam tends to break down into innumerable tiny, irretrievable pieces.

MICROBEADS:

As noted above, microbeads are a type of microplastic that are manufactured to be tiny and are used in a variety of applications such as cosmetics, personal care products and industrial cleaners. In 2016, Canada listed microbeads under the *Canadian Environmental Protection Act's* List of Toxic Substances.[103] This specifically targets microbeads used in personal care products. Canada will ban the sale of shower gels, toothpaste and facial scrubs containing plastic microbeads, effective July 1, 2018. Microbeads found in natural health products and non-prescription drugs will be prohibited on July 1, 2019.[104]

This is a progressive move; however, more can be done. For some ideas, see Appendix E, the Canadian Environmental Law Association's response to the original proposed microbead regulations.

NURDLES (PLASTIC PELLETS):

Plastic pellets, resins and powders are used to produce final plastic products. These materials are ubiquitous around plastic manufacturing sites, and are often lost during transport and handling. For example, pellets (nurdles) are shipped in bags and boxes on ocean tankers, spills are not uncommon,

[101] Matt Flowers, "Zooming in on the Five Types of Microplastics" (November 16 2016), online: Lake Ontario Waterkeeper <http://www.waterkeeper.ca/blog/2016/11/15/zooming-in-on-the-five-types-of-microplastics?utm_source=Lake+Ontario+Waterkeeper&utm_campaign=15fe0beabb-EMAIL_CAMPAIGN_2017_03_30&utm_medium=email&utm_term=0_0114e8b68b-15fe0beabb-354567673>.
[102] Carl Bruch *et al.*, "Marine Litter Legislation: A Toolkit for Policymakers" (2016), United Nations Environment Programme, online: <http://apps.unep.org/publications/index.php?option=com_pub&task=download&file=012253_en>.
[103] *Canada Gazette*, Order Adding a Toxic Substance to Schedule 1 to the *Canada Environmental Protection Act*, 1999 (June 17 2016), online: <http://www.gazette.gc.ca/rp-pr/p2/2016/2016-06-29/html/sor-dors150-eng.php>.
[104] On June 14, 2017, the Government of Canada published the *Microbeads in Toiletries Regulations* pursuant to the *Canadian Environmental Protection Act, 1999* (CEPA). The regulations will prohibit the manufacture, import, and sale of toiletries used to exfoliate or cleanse that contain plastic microbeads, including non-prescription drugs and natural health products. As of January 1, 2018, the manufacture and import of toiletries that contain plastic microbeads will be prohibited unless the toiletries are also natural health products or non-prescription drugs, in which case the prohibition will begin July 1, 2018. As of July 1, 2018, the sale of toiletries that contain plastic microbeads will be prohibited, unless the toiletries are also natural health products or non-prescription drugs, in which case the prohibition will begin July 1, 2019. For more information, see: <www.chemicalsubstanceschimiques.gc.ca/plan/approach-approche/microb-eng.php>.

and the pellets are hard to recover. Pellets (nurdles) have often been found on Vancouver Island and other BC beaches.[105]

Nurdles can have a detrimental impact on the environment and, due to their small size, they are nearly impossible to clean up once released. Marine animals can easily mistake nurdles for food items, such as roe.[106] Some members of industry are addressing this problem through the Canadian Plastics Industry Association (CPIA) Operation Clean Sweep initiative.[107] Operation Clean Sweep is a voluntary, *international* initiative that aspires to achieve zero plastic pellet and other primary product loss.[108] Such a voluntary initiative may help address this issue – because producers don't want to lose or spill nurdles, which are a source of income and a headache for environmental managers. As Operation Clean Sweep puts it:

> *Pellet, flake and powder containment is good for the environment. It's good for business…*[109]

Operation Clean Sweep aims to eliminate the accidental loss of nurdles – and acknowledges that every segment of the plastics industry has a role to play in eliminating plastic nurdle spills.[110] Operation Clean Sweep is well regarded by some government officials and, as an industry driven initiative, it can effectively mobilize industry players to participate. However, in some places the Clean Sweep Initiative has been criticized for low participation rates by plastic industry companies.[111]

The Canadian Plastics Industry Association is also a signatory to the *Joint Declaration for Solutions on Marine Litter*, which is a commitment to work cooperatively with government and stakeholders to prevent marine pollution.[112] Standards found in Industry Best Management Practices and Guidelines

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[105] Jessica Midbust et al., "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.81.

[106] Operation Clean Sweep, "Overview", online: <https://opcleansweep.org/overview>; *Saanich News*, "Ideafest presenters perplexed by plastic nurdles" (2 March 2017), online: <http://www.saanichnews.com/news/ideafest-presenters-perplexed-by-plastic-nurdles/>.

[107] Canadian Plastics Industry Association, "Stop Pellet Loss: Take the Pledge to Prevent Resin Pellet Loss into the Environment", online: <https://www.plastics.ca/PlasticTopics/EnvironmentalSustainability/LitterPreventionManagement/MarineLitter/ocs>.

[108] Operation Clean Sweep is an international program led by the plastics industry. The Canadian Plastic Industry Association is the Canadian licensee of Operation Clean Sweep and promotes the program to the Canadian plastics industry. Members of the Canadian plastics industry work with CPIA on the Clean Sweep program. See: "Overview", online: <https://opcleansweep.org/overview>.

[109] Operation Clean Sweep, "Plastics in the Environment," online: <https://opcleansweep.org/overview/environment.asp>.

[110] Operation Clean Sweep, "Plastics in the Environment," online: <https://opcleansweep.org/overview/environment.asp>.

[111] Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.118.

[112] Canadian Plastics Industry Association, "Stop Pellet Loss: Take the Pledge to Prevent Resin Pellet Loss into the Environment," online:

such as the *Declaration of the Global Plastic Associations for Solutions on Marine Litter* and the Operation Clean Sweep "Marine Plastics Pledge" could be used as a starting point for legislation to regulate industry bad actors.[113] Government should work with industry to evaluate current voluntary measures, and find cooperative solutions to prevent future spills. But legislation must be developed to deal with any remaining gaps in environmental protection.

California's regulation of nurdles should be carefully considered. In 2008 the state enacted the "nurdle law," which specifically names pre-production plastic pellets as a pollutant under the federal *Clean Water Act*.[114] This law requires industrial facilities to take measures to eliminate the escape of nurdles and other pre-production plastics. As George Torgun, lawyer for the Baykeeper group explains, the law is quite simple:

> *With plastic facilities, controlling pollution should be pretty simple. It's just about containing nurdles and other bits of plastic and making sure that if they do escape they don't get into waterways or storm drains.* [115]

The Santa Monica Bay, California requirement for Plastic Pellet Monitoring and Reporting Plans for all municipalities with plastics plants should also be studied.[116]

In Australia, the Parliamentary Committee on Marine Plastic Pollution recommended that Australian laws relating to the prevention of nurdles entering the waste management system be more effectively enforced.[117]

<https://www.plastics.ca/PlasticTopics/EnvironmentalSustainability/LitterPreventionManagement/MarineLitter/ocs>

[113] See the *Pledge* at: <https://opcleansweep.org/Pledge/companypledge>. See Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.80 for a description of the *Declaration*.

[114] *The Guardian*, "It's taken seven years, but California is finally cleaning up microbead pollution" (27 March 2015), online: < https://www.theguardian.com/vital-signs/2015/mar/27/microbead-california-pollution-nurdle-law-plastic>.

[115] *The Guardian*, "It's taken seven years, but California is finally cleaning up microbead pollution" (27 March 2015), online: <https://www.theguardian.com/vital-signs/2015/mar/27/microbead-california-pollution-nurdle-law-plastic>.

[116] Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.52 and 100.

[117] Parliament of Australia, The Threat of Marine Plastic Pollution in Australia (20 April 2016), Chapter 8 Conclusion and Recommendations, online: <http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Marine_plastics/Report>, at s. 8.97.

MICROFIBRES

When nylon, polyester and synthetic fleece clothing is laundered, microfibers are washed off that can enter the environment. One experiment found that a single fleece jacket released 1,900 fibres. A Lake Michigan study found 19,000 strands of microfibers per square kilometre of surface water – which was 16% of total plastic recovered in the area.

Apparel companies, washing machine companies, and wastewater treatment plants could all potentially contribute to a solution. For example, some advocate development of "microfiber filters" on washing machines.[118] Others point to the need to change the materials being used in clothing manufacture. But thoughtful regulation of the production and handling of such clothing needs to be urgently considered.[119]

Ultimately, the microfiber problem – like problems linked to other microplastic pollution -- may be best addressed by the fundamental redesign of the plastic economy. It may require systemic analysis of the human needs being met, the materials used, technologies employed, potential for resource efficiencies and closed looping of systems. See the discussion of redesigning the Plastic Economy below.

[118] Jessica Midbust et al., "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds", online: < http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.120.

[119] Jefferson Lai, "Banned, but What About Microfibers", *Georgetown Environmental Law Review,* April 21, 2016 https://gelr.org/2016/04/21/microbeads-banned-but-what-about-microfibers-georgetown-environmental-law-review/

3. A NATIONAL STRATEGY TO CLEAN UP DERELICT FISHING GEAR

Figure 3: http://cetussociety.org/marine-stewardship-programs/derelict-fishing-gear/

Derelict fishing gear -- sometimes termed ghost fishing gear -- is lost or abandoned fishing gear such as nets, lines, crab and shrimp traps/pots.[120] Fishers don't typically lose expensive fishing gear on purpose, but gear can get hooked up on passing vessels, dragged into deeper water, or a vessel propeller can cut the buoy line making gear impossible to find. When made of synthetic materials and plastics, such gear can take hundreds of years to decompose.[121] Yet the lost gear –which is specifically designed to entrap animals – can needlessly continue to trap and kill fish, birds, seals porpoises and whales.[122] In addition, such gear can entangle divers and swimmers, damage propellers and rudders, capsize boats, and damage sensitive habitats.[123]

Of all the plastic debris in the ocean, derelict fishing gear is the most deadly entanglement threat to wildlife. One recent study shows that fishing-related items like buoys, nets, rope, monofilament, traps and pots were the items that caused the most damage to animals.[124]

Canada does have some laws that could apply to the problem of derelict fishing gear. For example, *Fisheries Act* licencing requirements can demand rot strips on traps (strips that rot out quickly so lost gear will stop fishing); identification tags on nets, buoys and traps; and maximum allowable soak times for leaving things like crab traps in the water.[125] There are general laws against deliberate disposal of materials at sea, in the unusual case where a fisher might do so.[126]

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[120] Washington Department of Fish & Wildlife, "Fishing & Shellfishing: Derelict Fishing Gear Removal Project," online: <http://wdfw.wa.gov/fishing/derelict/>.

[121] Washington Department of Fish & Wildlife, "Fishing & Shellfishing: Derelict Fishing Gear Removal Project," online: <http://wdfw.wa.gov/fishing/derelict/>.

[122] Northwest Straits Foundation, "Derelict Gear", online: <http://nwstraitsfoundation.org/derelict-gear/>; Whale entanglement is discussed in Briana Goodwin for Pacific States Marine Fisheries Commission, "Derelict Fishing Gear on the West Coast," online: <http://marinedebrisalliance.org/wp-content/uploads/2016/04/DFG_Report_Final.pdf>.

[123] Washington Department of Fish & Wildlife, "Fishing & Shellfishing: Derelict Fishing Gear Removal Project," online: <http://wdfw.wa.gov/fishing/derelict/>.

[124] Chris Wilcox *et al.*, "Using expert elicitation to estimate the impacts of plastic pollution on marine wildlife," *Marine Policy* 65 (2016) 107–114, at pp.109-111. See <https://oceanconservancy.org/wp-content/uploads/2017/05/2016-threat-rank-report.pdf> and: <http://www.oceanconservancy.org/our-work/marine-debris/threat-rank-report/2016-threat-rank-report.pdf>.

[125] See Environmental Law Centre, *Environmental Laws: A Field Guide for BC's North and Central Coast and Haida Gwaii* pp. 32-44 at <http://www.elc.uvic.ca/wordpress/wp-content/uploads/2014/12/EnviroLawFieldGuide_2011May.pdf> for examples.

[126] The *Regulations Respecting the Prevention of the Pollution from Ships and for Dangerous Chemicals* prohibit disposal of all plastics into the ocean (These regulations were created pursuant to the *Canada Shipping Act 2001*. See Transport Canada, "2. Marine acts and regulations", online: <https://www.tc.gc.ca/eng/marinesafety/tp-tp14609-2-marine-acts-regulations-617.htm> at 2.2.1 and 2.2.1.g..) Plastics includes synthetic ropes, fishing nets and plastic bags. Transport Canada, "2. Marine acts and regulations," online:

However, Canadian policies, regulations and incentive programs need to be developed to:

- encourage technological measures to minimize loss of gear and minimize impacts (*e.g.* development of proper biodegradable traps, green fishing nets, etc.);
- encourage fishers to promptly report lost gear;
- encourage the prompt recovery of lost gear by fishers and others;
- reward those who adopt practices that reduce gear loss; and
- create powerful financial incentives – including bounties – to motivate people to seek out and recover abandoned fishing gear.

Canada currently has a Canadian *Code of Conduct for Responsible Fishing Operations*. This Code:

- outlines ways that fishermen can reduce loss of gear;
- outlines mechanisms for reporting loss gear;
- advises biodegradable materials; and
- includes efforts to tag fishing gear.

The Canadian Code is in accordance with the Food and Agriculture Organization of the United Nations' *Code of Conduct for Responsible Fisheries*.[127] Although much of this Code is currently in use, as an initial step towards reform, this Code could be incorporated into all mandatory integrated fisheries management plans.

Needed: A National Strategy to Remove Ghost Fishing Gear

In 2016, the Australian Parliamentary Committee on the Environment's report on the *Threat of Marine Plastic Pollution in Australia* noted that ghost fishing gear was not being dealt with adequately, and recommended that the Australian Government fund research and identification of ghost fishing gear. The committee also recommended that Government develop a strategy to ensure the timely collection of ghost gear and for the development of technologies for tagging of fishing gear.[128]

Like Australia, we need a comprehensive strategy to remove such gear. A variety of approaches have been taken internationally – but there are good examples nearby in the US Northwest. Appendix A, a

<https://www.tc.gc.ca/eng/marinesafety/tp-tp14609-2-marine-acts-regulations-617.htm> at 2.2.1. Note that Canada allows the disposal of floatable fabrics and packing materials provided it is released further from 25 nautical miles of the nearest land. In addition, the *Canadian Environmental Protection Act* prohibits the disposal of wastes and other matter at sea without Ministerial authorization. (For more information, see: <http://www.ec.gc.ca/lcpe-cepa/default.asp?lang=En&n=26A03BFA-1>.)

[127] FAO Corporate Document Repository, "Code of Conduct for Responsible Fisheries," online: <http://www.fao.org/docrep/005/v9878e/v9878e00.htm>.

[128] Parliament of Australia, The Threat of Marine Plastic Pollution in Australia (20 April 2016), Chapter 8 Conclusion and Recommendations, online: <http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Marine_plastics/Report>, at s.8.56 and 8.61

report by the West Coast Marine Debris Alliance, provides a comprehensive discussion of approaches being taken to address derelict fishing gear in Washington, Oregon and California.

Washington has enacted legislation entitled *An act relating to recovering gear used in the coastal Dungeness crab fisheries*.[129] This enactment allows the Washington Department of Fish and Wildlife to issue crab pot removal permits as a part of their Coastal Commercial Dungeness Crab Pot Removal Program.[130] Through this enactment, Washington encourages retrieval of derelict fishing gear. In addition, crab gear must be marked with identifying information.[131]

Further, the US Government has funded the Northwest Straits Initiative to retrieve derelict fishing gear in Puget Sound, Washington. Between 2002-2012, the Initiative removed 4,358 derelict fishing nets and 2,889 crab pots from Puget Sound – and restored 616 acres of critical marine habitat. It was estimated that the removed gear had killed almost 300,000 entangled animals, including porpoises, sea lions, scoters, grebes, cormorants, canary rockfish, Chinook salmon, and crabs.[132] (It is estimated that derelict crab traps in Puget Sound kill more than $700,000 worth of crabs every year.)[133]

Notably, indigenous organizations have played a large role in the removal of derelict fishing gear in Washington. The Nisqually Indian Tribe works with the Northwest Straits Marine Initiative to remove derelict fishing gear in central and northern Puget Sound.[134] Further, the Quinault Indian Nation has partnered with the Nature Conservancy and the Washington Coastal Restoration Initiative to retrieve derelict fishing gear in Grays Harbor County, Washington. The partnership has removed over 58.4 metric tons of marine debris.[135] There are numerous other notable examples of indigenous organizations and partnerships addressing the issue of derelict fishing gear in Washington.

There are few efforts in Canada and British Columbia to address derelict fishing gear. In Canada, efforts are generally on a much smaller scale than those in Washington. The Volunteer Diver Derelict Fishing Gear Removal Program run by Rendezvous Dive Adventures removes derelict fishing gear in BC. In 2016 they wrote a letter to the Prime Minister Justin Trudeau pleading for a national program to address derelict fishing gear.[136] It pointed out that Government "support is especially important in addressing

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[129] Washington House Bill Report, ESHB 1516, <http://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bill%20Reports/House/1516-S.E%20HBR%20PL%2009.pdf>.
[130] Washington House Bill Report, ESHB 1516, <http://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bill%20Reports/House/1516-S.E%20HBR%20PL%2009.pdf>.
[131] <http://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bill%20Reports/House/1516-S.E%20HBR%20PL%2009.pdf>.
[132] Dr. Steve Katona, "Busting Ocean Ghosts", *Ocean Health Index*, October 29, 2014 <http://www.oceanhealthindex.org/news/Busting_Ocean_Ghosts>.
[133] Briana Goodwin for Pacific States Marine Fisheries Commission, "Derelict Fishing Gear on the West Coast," online: <http://marinedebrisalliance.org/wp-content/uploads/2016/04/DFG_Report_Final.pdf> at p.1.
[134] Briana Goodwin for Pacific States Marine Fisheries Commission, "Derelict Fishing Gear on the West Coast," online: <http://marinedebrisalliance.org/wp-content/uploads/2016/04/DFG_Report_Final.pdf>.
[135] Briana Goodwin for Pacific States Marine Fisheries Commission, "Derelict Fishing Gear on the West Coast," online: <http://marinedebrisalliance.org/wp-content/uploads/2016/04/DFG_Report_Final.pdf>.
[136] Rendezvous Dive Adventures, "Ghost net removal," online: <http://rendezvousdiving.com/stewardship/ghost-net-removal/>; Marine Science Today, "Catching Ghosts on the Reef with Rendezvous Dive Adventures," online: <http://marinesciencetoday.com/2014/03/10/catching-ghosts-on-the-reef-with-rendezvous-dive-adventures/>.

abandoned, lost or discarded fishing gear.[137] Government needs to address that important request. Canada needs a National Strategy to remove derelict fishing gear.

OTHER RELEVANT LINKS AND RESOURCES:

- *Canadian Code of Conduct for Responsible Fishing Operations.* http://www.dfo-mpo.gc.ca/fm-gp/policies-politiques/cccrfo-cccppr-eng.htm
- FAO Corporate Document Repository, *Code of Conduct for Responsible Fisheries*. http://www.fao.org/docrep/005/v9878e/v9878e00.htm
- Washington Department of Fish & Wildlife's Derelict Fishing Gear Removal Project. http://wdfw.wa.gov/fishing/derelict/
- Northwest Straits Foundation, *Derelict Gear.* http://nwstraitsfoundation.org/derelict-gear/
- *An act relating to recovering gear used in the coastal Dungeness crab fisheries,* Washington. http://apps.leg.wa.gov/documents/billdocs/2009-10/Pdf/Bill%20Reports/House/1516-S.E%20HBR%20PL%2009.pdf
- Cetus Research & Conservation Society – Derelict Fishing Gear. This Society has done some work on BC coastlines in cleaning up derelict fishing gear. cetussociety.org/marine-stewardship-programs/derelict-fishing-gear/
- *British Columbia Derelict Fishing Gear Survey and Removal Project* by the Northwest Straights Marine Conservation Initiative. http://www.nwstraitsfoundation.org/download/british-columbia-derelict-fishing-gear-survey-and-removal-project/?wpdmdl=610&ind=a76uBh1mULzEk463ui2tXuynHtoKnGBXK6Y2aPurFKhAu_TF5kcueoqO8qQgsg1f

[137] Carl Bruch *et al.*, "Marine Litter Legislation: A Toolkit for Policymakers" (2016), United Nations Environment Programme, online: <http://apps.unep.org/publications/index.php?option=com_pub&task=download&file=012253_en> at p.69.

4. EXTENDING PRODUCER RESPONSIBILITY

Extended Producer Responsibility (EPR) programs require producers to be proper stewards of their own products. EPR programs require producers and distributors to take responsibility for proper disposal and recycling of their products – after consumer use. [138] EPR is based on the idea that producers have the most control over product design – and thus have the most control over end-of-life options for the item. Progressive governments can establish effective EPR programs that:

- shift financial and management responsibility for proper disposal and recycling to the producer; and
- by extending responsibility, provide incentives to producers to incorporate environmental considerations when they first design their products and packaging.[139]

Such EPR (sometimes called "product stewardship") programs are important, to ensure that plastic products are properly disposed of. Such programs can also shift manufacturers away from wasteful plastic packaging in the long term. As Leila Munroe has written:

> *First, we need to incentivize companies to reduce the use of wasteful, difficult-to-recycle plastic packaging in favor of reusable, easily recyclable and compostable options. One way to incentivize this innovation is to require the companies to internalize the costs that their products create for society and the environment. This means asking them to help cover the costs of recycling infrastructure, street and beach cleanup, and storm-drain maintenance, often as part of "extended producer responsibility" or "product stewardship" programs.*[140]

Canadian governments now recognize that producers must take long-term responsibility for their products. In 2009 Canada adopted the *Canada-Wide Action Plan for Extended Producer Responsibility* -- and all provincial governments have now established Extended Producer Responsibility programs. There are now 160 legislated and voluntary EPR programs in place across the country, covering 20 product categories, including packaging.[141]

If we are going to solve the marine plastics problem, there must be comprehensive implementation of the requirement that producers take *full* responsibility to stop their products from causing environmental havoc.

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[138] Canadian Council of Ministers of the Environment, "Canada-Wide Action Plan for Extended Producer Responsibility" (October 2009), online: <http://www.ccme.ca.vsd46.korax.net/files/current_priorities/waste/pn_1499_epr_cap_e.pdf>.

[139] Product Stewardship Institute, "What is product stewardship, anyway?" online: <http://www.productstewardship.us/?page=Definitions>.

[140] <http://www.livescience.com/44098-recycling-boom-benefits.html>.

[141] For more information about Canada's implementation of EPR programs, see the documents found at Canadian Council of Ministers of the Environment, *Current Priorities: Extended Producer Responsibility* at: <http://www.ccme.ca/en/current_priorities/waste/epr.html>.

EXTEND PRODUCER RESPONSIBILITY FOR PACKAGING

Plastic packaging is a good example. Packaging alone makes up 26% of all plastics use.[142] Thus, it is vital that plastics used in packaging gets properly disposed of. The Canadian Council of Ministers of the Environment approved the Canada-wide Action Plan for Extended Producer Responsibility and the Canada-wide Strategy for Sustainable Packaging in 2009, attached as Appendix B.[143] The Action Plan aims to require producers to:

- ensure proper disposal of packaging; and
- bear the "full life-cycle cost" for their products.[144]

When producers must incorporate end-of-life costs into the product's price, this creates a strong market incentive for the producer to reduce wasteful packaging.[145] The Strategy is guiding provinces and territories in their development of EPR programs.[146]

For example, in British Columbia, the *Recycling Regulation* sets out the requirements of the province's EPR program. The regulation now requires producers to develop and operate a product stewardship scheme that ensures the recycling of at least 75% of packaging and printed paper.[147]

This Polluter Pays program will create an incentive to reduce packaging in the long run. Such EPR programs have the potential to have large effects on the root causes of marine plastic pollution. As the Australian Parliamentary Committee on Marine Plastic Pollution emphasized:

> *Producers and manufacturers play a crucial role in reducing marine plastic pollution, particularly through packaging design choices*[148]

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[142] World Economic Forum, "The New Plastics Economy: Rethinking the future of plastics" (January 2016), online: <http://newplasticseconomy.org/report-2016 >, at p.14.
[143] Canadian Council of Ministers of the Environment, "Current Priorities: Extended Producer Responsibility," online: <http://www.ccme.ca/en/current_priorities/waste/epr.html>.
[144] Canadian Council of Ministers of the Environment, "Canada-Wide Action Plan for Extended Producer Responsibility" (October 2009), online: <http://www.ccme.ca.vsd46.korax.net/files/current_priorities/waste/pn_1499_epr_cap_e.pdf>.
[145] Canadian Council of Ministers of the Environment, "Canada-Wide Action Plan for Extended Producer Responsibility" (October 2009), online: <http://www.ccme.ca.vsd46.korax.net/files/current_priorities/waste/pn_1499_epr_cap_e.pdf> at Appendix G.
[146] Canadian Council of Ministers of the Environment, "Canada-Wide Action Plan for Extended Producer Responsibility" (October 2009), online: <http://www.ccme.ca.vsd46.korax.net/files/current_priorities/waste/pn_1499_epr_cap_e.pdf> at Appendix G.
[147] *Recycling Regulation,* BC Reg 88/2014, s 5. Note that the 75% recovery rate must be achieved "within a reasonable time", and the minister may allow for a different recovery rate.
[148] Parliament of Australia, The Threat of Marine Plastic Pollution in Australia (20 April 2016), Chapter 8 Conclusion and Recommendations, online: <http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Marine_plastics/Report>, at s.8.81.

The Parliamentary Committee concluded that improved product stewardship is essential to reduce the amount of plastic pollution that enters the oceans.[149]

Leila Monroe, Natural Resource Defence Council expert, has written extensively on how to utilize product stewardship[150] and extended producer responsibility (EPR) policies to reduce marine plastic pollution. Monroe recommends that law makers, advocates, and producers craft Product Stewardship/Extended Producer Responsibility programs for marine pollution which consider:

- explicit aquatic waste reduction program goals;
- incentives to motivate product design improvements that reduce negative environmental impacts;
- incorporation of the costs of the entire set of activities necessary to manage products, beyond just recycling or product take-back;
- monitoring and assessment of the extent to which programs and activities achieve a quantifiable reduction in marine plastic pollution; and
- requiring reporting data by producers of plastic about the quantity of plastic packaging produced, the quantity delivered to market, and the quantity recovered for recycling.

OTHER RELEVANT LINKS AND RESOURCES:

- Environment and Climate Change Canada website on Extended Producer Responsibility. https://www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=FB8E9973-1
- Council of Canadian Minsters of Environment website on Extended Producer Responsibility. http://www.ccme.ca/en/current_priorities/waste/epr.html

See the following articles and reports by Leila Monroe on using Extended Producer Responsibility Programs to reduce marine plastic pollution:

- Tulane Environmental Law Journal
- http://www.calrecycle.ca.gov/Actions/Documents%5C77%5C20142013%5C987%5CPanel%204_Monroe.pdf
- https://www.nrdc.org/sites/default/files/consumer-goods-packaging-report.pdf

[149] Parliament of Australia, The Threat of Marine Plastic Pollution in Australia (20 April 2016), Chapter 8 Conclusion and Recommendations, online: <http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Marine_plastics/Report>, at s.8.83.

[150] "Product Stewardship is the act of minimizing health, safety, environmental and social impacts, and maximizing the economic benefits of a product and its packaging throughout all lifecycle stages. The producer of the product has the greatest ability to minimize adverse impacts, but other stakeholders, such as suppliers, retailers, and consumers, also play a role." Product Stewardship Institute, "What is product stewardship, anyway?" online: CCME < http://www.productstewardship.us/?page=Definitions>.

- http://connection.ebscohost.com/c/articles/95969045/tailoring-product-stewardship-extended-producer-responsibility-prevent-marine-plastic-pollution
- http://www.livescience.com/44098-recycling-boom-benefits.html

Note that the Australian Packaging Covenant is another example of bringing industry and other players together to address reduction, recycling and recovery of plastics. The Australian Packaging Covenant is a voluntary measure that establishes a framework for the effective life cycle management of consumer packaging and paper products.[151] The covenant relies on a collaborative approach between all sectors of the packaging supply chain including consumers, collectors, reprocessors and all spheres of government.[152]

We may also be able to learn from the European Green Dot system of extending responsibility to producers – and incentivizing them to reduce wasteful use of plastics and other materials.[153]

[151] Australian Government, Department of the Environment and Energy, "Australian Packaging Covenant," online: <http://www.environment.gov.au/protection/national-waste-policy/packaging-covenant>.

[152] Australian Government, Department of the Environment and Energy, "Australian Packaging Covenant," online: <http://www.environment.gov.au/protection/national-waste-policy/packaging-covenant>.

[153] The German government encouraged the establishment of the "Green Dot" recycling program that encourages recycling – and provides industry with a financial incentive to reduce wasteful use of plastics and other materials. As described by Wikipedia: *"The Green Dot was a system thought up by Klaus Töpfer, Germany's environment minister in the early 1990s.[1] The basic idea of the Green Dot is that consumers who see the logo know that the manufacturer of the product contributes to the cost of recovery and recycling. This can be with household waste collected by the authorities (e.g. in special bags - in Germany these are yellow), or in containers in public places such as car parks and outside supermarkets. The system is financed by the green dot licence fee paid by the producers of the products. Fees vary by country and are based on the material used in packaging (e.g. paper, plastic, metal, wood, cardboard). Each country also has different fees for joining the scheme and ongoing fixed and variable fees. Fees also take into account the cost of collection, sorting and recycling methods. In simple terms, the system encourages manufacturers to cut down on packaging as this saves them the cost of licence fees."* See Wikipedia, "Green Dot" at: <https://en.wikipedia.org/wiki/Green_Dot_(symbol)>. The Packaging Recovery Organization Europe (PRO Europe) now serves as the umbrella organization for European "packaging and packaging waste recovery and recycling schemes" that use the Green Dot as the financing symbol. PRO Europe recognizes that the Green Dot systems are internationally acknowledged for their successful implementation of producer responsibility. See: PRO Europe, "Overview", online: <http://www.pro-e.org/About.html>.

5. ADDRESS THE ROOT PROBLEM – REDESIGN THE PLASTICS ECONOMY

> *Healthy oceans can support healthy people and healthy profits; if we let them. That means governments, business and individual citizens backing an inclusive, circular economy. It means using legislation, innovation and consumer choices to replace plastic related demand and pollution with better alternatives that create jobs and still look after our planet. And it means supporting this [New Plastics Economy] initiative by ensuring that each us knows how we can help rethink, reuse and recycle plastic.*
>
> *Erik Solheim, Executive Director, UN Environment*[154]

The fundamental problem with the current plastic economy is that it is, by and large, a *linear* system of constantly:

- extracting petroleum resources;
- producing new plastics;
- using them briefly; and
- disposing of them – too often into the environment and landfills.

Under this system a vast portion of plastics are lost to the economy after a single brief use – simply thrown away, at massive environmental cost. As we throw away yesterday's plastics, we go on to extract massive amounts of new petroleum resources to create ever more plastics. The world's oceans and climate suffer grievously from this wastrel approach.

It is essential to replace the conventional linear supply chain of plastics with a non-wasteful, *circular* system. [155] We have much experience in stopping industrial pollution by redesigning factories from linear systems into "closed loop" systems where pollution is not released -- but is captured and used as a raw resource for further production. This redesign of industrial plants arose when production was re-thought in a fundamental way -- using Buckminster Fuller's insight that pollution was a resource we had simply not yet figured out how to use. Such circular systems also systematically replace toxic inputs with more benign inputs. Redesign of many factories to such circular "closed loop" systems has been enormously successful at preventing pollution. [156]

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[154] World Economic Forum and Ellen MacArthur Foundation, The New Plastics Economy – Catalysing action (2017, http://www.ellenmacarthurfoundation.org/publications), p.7. Also see the must-read companion document, *The New Plastics Economy: Rethinking the future of plastics* <http://www3.weforum.org/docs/WEF_The_New_Plastics_Economy.pdf>.

[155] The Ellen Macarthur Foundation has published extensively on the concept of circular systems and the circular economy. See: Ellen Macarthur Foundation, "What is a circular economy?" online: <https://www.ellenmacarthurfoundation.org/circular-economy>. See the Foundation's other publications on the circular economy at: <https://www.ellenmacarthurfoundation.org/circular-economy>.

[156] See Calvin Sandborn, *et al*., *Preventing Toxic Pollution: Toward a British Columbia Strategy*, West Coast Environmental Law Association, Vancouver, BC, 1991, Chapter 3, Pollution Prevention Pays.

Similarly, the whole system of producing, using and disposing of plastics needs to be fundamentally re-designed. We need a radical re-design of the world's plastics system to dramatically slash the amount of plastic that leaks out of the plastic economy to destroy our oceans. We need to redesign the materials being used -- and fundamentally rethink business models.

This rethink is now happening. The Ellen MacArthur Foundation has convened a group including the World Economic Forum, plastics-related businesses, conservation groups, civic leaders from major cities, philanthropists and academics to come up with such a radical rethink – the New Plastics Economy Initiative. Similarly, the European Commission is developing a Circular Economy Action Plan strategy for plastics.[157]

These initiatives are important. As the head of the London Waste and Recycling Board has stated:

> *The New Plastics Economy Initiative represents a truly momentous and unique opportunity to completely rewrite the rules of global resource management, in line with circular economy principles.*[158]

The New Plastics Economy: Catalysing Action report calls for the following Priority actions[159]:

Priority Actions

To address the 30% of plastic packaging that because of their current design will never be re-used or recycled and will often leak into the environment after a single use:[160]

- Fundamentally redesign packaging to avoid small formats that currently don't get recycled (wherever possible);
- Boost material innovation to recyclable or compostable alternatives (decouple plastics from fossil feedstocks; adopt renewably-sourced feedstocks);
- Move to replace plastic materials that are so uncommon that they are currently hard to recycle efficiently;
- Scale up truly compostable packaging for things like fast food packaging and garbage bags for organic waste;

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[157] World Economic Forum, *The New Plastics Economy: Rethinking the future of plastics* (January 2016), online: <http://newplasticseconomy.org/report-2016>, at p.10.

[158] World Economic Forum and Ellen MacArthur Foundation, *The New Plastics Economy – Catalysing action* (2017, http://www.ellenmacarthurfoundation.org/publications), p.10.

[159] See: World Economic Forum and Ellen MacArthur Foundation, *The New Plastics Economy – Catalysing action* (2017), http://www.ellenmacarthurfoundation.org/publications) and World Economic Forum, *The New Plastics Economy: Rethinking the future of plastics* (January 2016), online: <http://newplasticseconomy.org/report-2016>.

[160] Such as small-format packaging, such as sachets, tear-offs, lids and sweet wrappers; multi-material packaging made of several materials stuck together to enhance packaging functionality; uncommon plastic packaging materials of which only relatively low volumes are put on the packaging market, such as polyvinyl chloride (PVC), polystyrene (PS) and expanded polystyrene (EPS, sometimes referred to under its brand names Styrofoam or Thermocol); and highly nutrient-contaminated packaging, such as fast-food packaging. (Note that the 30% is 30% by weight.)

- Explore the potential for technologies to reprocess currently unrecyclable plastic packaging.

To address the 20% of plastic packaging where reuse is economically attractive:

- Move towards creative, new delivery models based on reusable packaging (e.g., use reusable dispensers for soaps, shampoos, and active ingredients of a wide variety of products; refillable beverage containers). For example, note that Container *exchange* programs at fast food restaurants could reduce waste massively;[161]
- Replace single-use plastic carrier bags by reusable alternatives;
- Scale-up reusable packaging in a business-to-business setting for both large rigid packaging and pallet wrap.

To address the remaining 50% of plastic packaging with recycling:

- Apply concerted efforts to Implement design changes in plastic packaging to facilitate recycling (ensure that product materials, additives and formats facilitate economic recycling);[162]
- Apply concerted efforts to create effective after-use collection and management systems;
- Harmonise and adopt best practices for collection and sorting systems, also as part of a Global Plastics Protocol;
- Scale up high-quality recycling processes;
- Explore the potential of material markers to increase sorting yields and quality;
- Develop and deploy innovative sorting mechanisms for post-consumer flexible films;
- Boost demand for recycled plastics through voluntary commitments or policy instruments (*e.g.*, California requires producers of rigid containers to use at least 25% recycled content);[163]
- Explore other policy measures to support recycling (*e.g.*, recycling targets, levies and/or bans on landfilling; carbon or resource taxes; EPR schemes supporting after-use systems; deposit-for-recycling systems, etc.);
- Improve the economics and uptake of recycling and reuse -- and of controlled biodegradation for target applications;
- Deploy adequate collection and sorting infrastructure where it is not yet in place.[164]

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[161] Jessica Midbust *et al.*, "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds," online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at pp.101-102.

[162] As a first step towards a Global Plastics Protocol.

[163] This California requirement is said to have boosted recycling efforts across the US. See World Economic Forum and Ellen MacArthur Foundation, The New Plastics Economy – Catalysing action (2017, <http://www.ellenmacarthurfoundation.org/publications>), p.j10.

[164] See: World Economic Forum and Ellen MacArthur Foundation, *The New Plastics Economy – Catalysing action* (2017), <http://www.ellenmacarthurfoundation.org/publications>, pp.16-20, 22-23, and 40.

Everyone from packaging designers at the beginning to recyclers at the end need to be involved in the reshaping of the plastic economy – and thoughtful product design is crucial. The problem is that original packaging design has a "direct and significant impact on the economics of collection, sorting and recycling." (For example, if the plastic product has uncommon types of plastics, layered/ mixed plastics or dark-coloured plastics, it makes recycling more problematic.)

Initial design of products must aim to make the post-use recycling or reuse both economic and probable. By making thoughtful choices about the polymer being used, the pigment being used, the additives being used and the design of format, the producer can make recycling much more likely.[165]

Caveat: In shifting from the old Plastics Economy, care must be taken to ensure that industrial interests do not skew results to their commercial benefit, at a cost to the environment. Public interest groups and scientific information must play a lead role in the process

For example, a number of environmental organizations have already produced "The Plastics BAN List: Better Alternatives Now," which is attached as Appendix C. This document discusses the best alternatives for some of the most environmentally offensive plastic products. For example, reusable items are often the "best" environmental alternative to disposables – with plant-based biodegradable items being "better" alternatives.

The issues surrounding alternatives can be complex, and the alternatives must be carefully analysed scientifically – and without undue corporate influence. For example, some promote biodegradable plastics as a substitute product – but in some cases, they may not be an ideal replacement. The Government of Ireland does not distinguish between biodegradable and non-biodegradable plastic bags, on environmental grounds -- noting that although biodegradable bags are generally preferable, they still "take a considerable time to degrade".[166] Indeed, the UN Environment Programme has published a report *that concludes:*

> *…the adoption of plastic products labelled as 'biodegradable' will not bring about a significant decrease either in the quantity of plastic entering the ocean or the risk of physical and chemical impacts on the marine environment, on the balance of current scientific evidence.*[167]

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[165] World Economic Forum, "The New Plastics Economy: Rethinking the future of plastics" (January 2016), online: <http://newplasticseconomy.org/report-2016> at p.35-37.

[166] Department of Housing, Planning, Community and Local Government, "Plastic Bag Levy," online: <http://www.housing.gov.ie/environment/waste/plastic-bags/plastic-bag-levy>.The European Union aspires to adopt an enactment by May 27, 2017 that will "ensure Union-wide recognition of biodegradable and compostable plastic carrier bags and to provide consumers with the correct information about the composting properties of such bags". Directive (EU) 2015/720 of the European Parliament and of the Council of 29 April 2015 amending Directive 94/62/EC as regards reducing the consumption of lightweight plastic carrier bags, online: <http://data.europa.eu/eli/dir/2015/720/oj>.

[167] See *Biodegradable Plastics and Marine Litter: Misconceptions, Concerns and Impacts on Marine Environments* at *https://wedocs.unep.org/bitstream/handle/20.500.11822/7468/-Biodegradable_Plastics_and_Marine_Litter_Misconceptions,_concerns_and_impacts_on_marine_environments-2015BiodegradablePlasticsAndMarineLitter.pdf.pdf?sequence=3&isAllowed=y*

In the end, elimination of waste should be the overriding priority. Reduction and Reuse options should generally be preferred over Recycling.

In sum, though, the New Plastics Economy proposal to develop a Global Practices Protocol to move the world towards a circular plastics economy holds great promise. The Governments of Canada and British Columbia should support this New Plastics Economy initiative, and should carefully consider the parallel European Commission's Circular Economy Action Plan Strategy for Plastics. Canada needs to become a leader in establishing a new Global Plastics Protocol that can reform the global plastics economy. Canada should convene stakeholders to move forward quickly to revamp the plastics economy that is killing our oceans.

OTHER RELEVANT LINKS AND RESOURCES:

- World Plastics Council, *Solutions to Marine Litter.* https://www.worldplasticscouncil.org/sustainability/solutions-on-marine-litter/
- At request of the G7 in 2015 the UN Environment International Resource Panel (IRP) developed a report outlining policy recommendations to increase resource efficiency, which is at the heart of a circular economy. The IRP report *Resource Efficiency: Potential and Economic Implications* is found at: http://www.resourcepanel.org/reports/resource-efficiency.
- The Organisation for Economic Co-operation and Development (OECD) followed up on the UN work by developing *Policy Guidance on Resource Efficiency*, which can be accessed at: http://www.oecd.org/env/policy-guidance-on-resource-efficiency-9789264257344-en.htm.
- The G7 adopted the Toyama Framework on Material Cycles in 2016 and the Bologna Roadmap in 2017, which marked increased commitment to moving the world towards a less wasteful circular economy – for both environmental and economic reasons.

6. INCREASED EDUCATION AND OUTREACH

Much of the public does not yet fully understand the crisis stage that we have reached with marine plastic pollution. And this limited public awareness contributes to the plastics problem. After all, citizens often directly add to plastic pollution -- and laws to solve the problem will only be enacted if the public demands reform.[168] As the UN Environment Program puts it:

> *Only through a real and active engagement of all of us, with the help of dynamic partnerships, we will be able to effectively combat marine litter.*[169]

Much of marine pollution starts when an individual chooses to discard plastic into the environment. Many individual citizens will have to change their behaviour, and public education programs can drive such change. Fortunately, education campaigns directed at specific groups of plastic users has proven effective in driving significant changes in consumer behavior.[170] Educational campaigns can encourage the public to:

- Recycle and properly dispose of plastics;
- Not pollute with plastics;
- Remove plastic garbage from beaches and water; and
- Support policies and laws to solve the plastics problem.

It is essential that government sponsor educational campaigns to raise public awareness about the negative impacts of plastic pollution on the marine environment.[171] Educational campaigns like beach clean ups and media advertisement promote behavioral change.[172] The Surfrider Foundation has pointed out that one essential feature of a successful federal litter policy must be general public awareness, which can be spread through education campaigns.[173]

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[168] Victoria Gonzalez Carman, Natalia Machain, Claudio Campagna, "Legal and institutional tools to mitigate plastic pollution affecting marine species: Argentina as a case study," Marine Pollution Bulletin 92 (2015) p.125-133 (at p.125).

[169] UNEP Newscentre, "UN Declares War on Ocean Plastic" (23 February 2017), online: <http://web.unep.org/newscentre/un-declares-war-ocean-plastic>.

[170] Parliament of Australia, The Threat of Marine Plastic Pollution in Australia (20 April 2016), Chapter 8 Conclusion and Recommendations, online: <http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Marine_plastics/Report>, at s.8.63

[171] Victoria Gonzalez Carman, Natalia Machain, Claudio Campagna, "Legal and institutional tools to mitigate plastic pollution affecting marine species: Argentina as a case study," Marine Pollution Bulletin 92 (2015) p.125-133 (at p.132).

[172] Victoria Gonzalez Carman, Natalia Machain, Claudio Campagna, "Legal and institutional tools to mitigate plastic pollution affecting marine species: Argentina as a case study," Marine Pollution Bulletin 92 (2015) p.125-133 (at pp.125 and 132).

[173] Megan Herzog, Angela Howe, Thomas Oh, Jaimini Parkh, "Federal Actions to Address Plastic Marine Pollution – 2013 Briefing Book," online: Emmett Institute on Climate Change & the Environment

The International Joint Commission, a collaboration of Canada and the United States created by the Boundary Waters Treaty in 1909, has specifically recognized that public education is an essential part of the marine plastics solution:

> *The goal of public education and outreach is to enhance environmental literacy to make informed decision, leading to positive actions and changes in behaviour to reduce the amount of plastics (and therefore microplastics) entering … waters".*[174]

The Commission recommends that both Canada and the United States provide funding to support local programs and organizations that provide education and help to reduce and prevent plastic pollution in the Great Lakes.[175] The Commission has noted that incorporating education on plastic pollution into the environmental curriculum of schools can be an effective means of promoting positive change to the environment.[176] All research and scientific findings should be shared in a manner that is easily understandable to the public.[177]

In Australia the leading environmental law advocacy group has strongly recommended that Government provide increased funding for education measures about plastic pollution.[178] The Australian Parliamentary Committee recognized that the different types of plastics (biodegradable, degradable plastic, compostable and traditional plastics) can create confusion in regards to the appropriate measures for disposing of these plastics.[179] Therefore, the committee recommended that the Australian Government support education campaigns to both change consumer behavior and to inform consumers about the traditional plastic alternatives.[180]

<https://law.ucla.edu/~/media/Files/UCLA/Law/Pages/Publications/CEN_EMM_PUB%20Surfrider%20UCLA%20-%20Plastics%20Solutions.ashx/?filedownload=1>.

[174] International Joint Commission, "International Joint Commission's Recommendations on Microplastics in the Great Lakes" (February 2017), online: <http://ijc.org/files/tinymce/uploaded/Publications/IJC_Microplastics_GL.pdf> at p.5.

[175] International Joint Commission, "International Joint Commission's Recommendations on Microplastics in the Great Lakes" (February 2017), online: <http://ijc.org/files/tinymce/uploaded/Publications/IJC_Microplastics_GL.pdf> at p.4.

[176] International Joint Commission, "International Joint Commission's Recommendations on Microplastics in the Great Lakes" (February 2017), online: <http://ijc.org/files/tinymce/uploaded/Publications/IJC_Microplastics_GL.pdf> at p.5.

[177] International Joint Commission, "International Joint Commission's Recommendations on Microplastics in the Great Lakes" (February 2017), online: <http://ijc.org/files/tinymce/uploaded/Publications/IJC_Microplastics_GL.pdf> at p.5.

[178] Submission from EDOs of Australia to the Committee Secretary regarding Inquiry into the threat of marine plastic pollution in Australia and Australian waters (9 October 2015), online: <http://www.edonsw.org.au/marine_plastic_pollution> at p.4.

[179] Parliament of Australia, The Threat of Marine Plastic Pollution in Australia (20 April 2016), Chapter 8 Conclusion and Recommendations, online: <http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Marine_plastics/Report>, at s.8.64.

[180] Parliament of Australia, The Threat of Marine Plastic Pollution in Australia (20 April 2016), Chapter 8 Conclusion and Recommendations, online:

INCREASED FUNDING AND SUPPORT FOR BEACH CLEAN-UPS:

We must address the pollution that already exists. Beach clean ups are an important part of addressing marine plastic pollution that is currently on our beaches. These clean ups serve as a form of downstream management of marine litter.[181] Fortunately, beach clean ups engage citizen involvement and serve as a highly effective education measure that can result in behavior change.[182] Currently the Great Canadian Shoreline Cleanup occurs across Canada on World Environment Day, with support from Parks Canada and Environment and Climate Change Canada. This is a great initiative, but governments at all levels should provide more support for marine litter cleanups.

Through both policy and legislation, governments can "provide incentives for cleanup." For example, the City of Los Angeles spends roughly 4 million dollars each year on beach clean ups – and municipalities throughout California spend roughly $428 million on marine and waterway litter clean up efforts.[183] Such funding can deliver more bang for the clean-up buck -- by catalyzing volunteers and non-profit organizations to add to the clean-up effort.

<http://www.aph.gov.au/Parliamentary_Business/Committees/Senate/Environment_and_Communications/Marine_plastics/Report> at s.8.65.

[181] Leila Monroe, "PLASTIC POLLUTION: Tailoring Product Stewardship and Extended Producer Responsibility To Prevent Marine Plastic Pollution," 27 Tul. Envtl. L. J. 219 (JSTOR) at p.221.

[182] Carl Bruch et al., "Marine Litter Legislation: A Toolkit for Policymakers" (2016), United Nations Environment Programme, online: <http://apps.unep.org/publications/index.php?option=com_pub&task=download&file=012253_en> at p.64.

[183] Jessica Midbust et al., "Reducing Plastic Debris in the Los Angeles and San Gabriel River Watersheds," online: <http://www.bren.ucsb.edu/research/2014Group_Projects/documents/Bren-Group-Project-Thesis-Reducing-Plastic-Debris-in-the-Los-Angeles-and-San-Gabriel-Riv_000.pdf> at p.73 and A-28.

CONCLUSION

Marine plastic pollution is a global issue that requires urgent action by governments at all levels, by industry, by conservation groups, stakeholders and by the general public. This report makes a number of recommendations to address the issue of marine plastic pollution from a Canadian perspective. As discussed above, these recommendations include:

1. Increase regulation of single use plastics;
2. Regulate stormwater outfalls;
3. Better regulate microplastic pollution;
4. A national strategy to clean up derelict fishing gear;
5. Extend producer responsibility;
6. Address the root problem: Redesign the plastic economy;
7. Increase education and outreach, including clean-up efforts.

APPENDICES