2016 ANNUAL TOWN MEETING
APRIL 2, 2016

ARTICLE 35:

To see if the Town will vote to reduce thin carry out bags used from stores or take any action relative thereto.

BY PETITION Alexander L. Burns et al.

Article 35: Reduce Use of Thin Carry Out Bags from Stores

The purposes of the Carryout Plastic Bag Bylaw are :

1. To encourage the use of reusable carryout shopping bags and decrease plastic waste.
2. To decrease litter on our roads, beaches, parks, athletic fields and open spaces. To cut current cost of cleanups
3. To reduce exposure to potentially harmful chemicals used to manufacture disposable bags.
4. To protect land and marine animals from ingestion or entanglement with carryout plastic bags
5. To reduce energy used to produce, distribute and recycle carryout plastic bags.
6. To reduce the burden on to our solid waste and recycling facilities.

SECTION 2: DEFINITIONS

CARRYOUT BAG:
A carryout bag is a thin plastic bag with handles provided to a customer by an establishment and is used to transport merchandise from the establishment. Carryout bags do not include small bags to contain fish, meats, produce or other products selected by the consumer to deliver items to the point of sale.

REUSABLE CARRYOUT BAG:
A Reusable Carryout meets all of the following requirements:
[1] Has the word "Reusable" or "Reuse" printed on the outside of the bag in a visible manner; is made solely of or in a combination of natural cloths, synthetic fibers, other washable material; or of a non-toxic plastic as defined by applicable state and federal regulations and that is no less than 3 mils thick.
[2] is specifically designed for multiple reuse and has handles.
[3] has printed on the bag, or an attached tag, the manufacturer's name with country of origin; the percentage of post-consumer recycled content and level of heavy metals, if any.

RECYCLABLE PAPER BAG
A paper bag that [1] is 100% recyclable and [2] contains at least 40% post-consumer recycled paper content.

ESTABLISHMENT:
An Establishment means any business selling goods, articles, or personal services to the public, including restaurants.

SECTION 3: USE REGULATIONS

Any retail Establishment that provides to customers Carryout Bags shall only provide Reusable Carryout Bags that comply with the definition in Section 2. Nothing in this section shall be read to preclude any Establishment from utilizing Recyclable Paper Bags, with or without handles, at the point of sale.

All of the requirements set forth in this by-law shall take effect within six months of the approval of the bylaw by the Office of the Massachusetts State's Attorney General and satisfaction of the posting/publication requirements of G.L. c. 40, § 32. However, if a retail establishment cannot comply with the effective date of this by-law due to economic hardship, the establishment may petition the Board of Health for an extension of six months.

SECTION 4: ADMINISTRATION AND ENFORCEMENT

This Bylaw may be enforced by any agent of the Board of Health.

This Bylaw may be enforced through any lawful means in law or in equity, including, but limited to, non-criminal disposition pursuant to M.G.L c.40, Section 21D and the appropriate chapter of the Town's General By-laws. If a non-criminal disposition is elected, then any Establishment that violates any provision of this Bylaw shall be subject to the following penalties:

First Offense:	Written Warning
Second Offense:	$50 fine
Third Offense:	$100 fine
Fourth Offense:	$200 fine

SECTION 5: SEVERABILITY

If any provision of this ordinance shall be held to be invalid by a court of competent jurisdiction, then such provision shall be considered separately and apart from the remaining provisions of this ordinance, which shall remain in full force and effect.

Article 35: Supporting Documents

1. The Problem with Plastic Bags by Sierra Club.

2. First pages of peer-reviewed scientific journal articles. The Title and Abstract of contains the very readable essence of each article (Entire articles are available).

3. Letters of Endorsement

SIERRA CLUB
FOUNDED 1892

The Problem with Plastic Bags

The ubiquitous plastic shopping bag, often used once & thrown away, uses up natural resources, consumes energy to manufacture, creates litter, endangers wildlife, adds to landfill waste, impacts human health and takes forever to disappear.

Plastic is accumulating at an alarming rate in our oceans - wreaking havoc on wildlife, polluting our beaches and entering our food chain. Our addiction to use-and-toss items such as plastic bags and plastic bottles are a significant contributor to this growing problem. Of the 43 items tracked during Ocean Conservancy's 2008 International Coastal Cleanup, the top three items of trash found were cigarette butts, plastic bags, and food wrappers/containers.

The cost of manufacturing, transporting, dispensing & disposing of plastic bags is not apparent to the public who think they are getting something for free, and when something is free we tend to take it whether we need it or not.

The Problem:

- According to The Wall Street Journal, the U.S. goes through 100 billion plastic shopping bags annually at an estimated cost to retailers of $4 billion.
- The production of plastic bags requires petroleum and often natural gas, both non-renewable resources that increase our dependency on foreign suppliers. Prospecting and drilling for these resources contributes to the destruction of fragile habitats and ecosystems around the world. The energy needed to manufacture and transport disposable bags eats up more resources and creates global warming emissions.
- An estimated 8 billion pounds of plastic bags, wraps and sacks enter the waste stream every year in the US, putting an unnecessary burden on our diminishing landfill space and causing air pollution if incinerated.
- Plastic bags take up to 1,000 years to decompose in a landfill. In fact, nothing completely degrades in modern landfills because of the lack of water, light, oxygen and other important elements that are necessary for the degradation process to be completed.
- An estimated 500 billion to 1 trillion plastic bags are consumed worldwide each year. Billions end up as litter.
- As litter, plastic bags do not biodegrade, they photodegrade-breaking down into smaller and smaller toxic bits contaminating soil and waterways and entering the food chain when animals accidentally ingest. Since water keeps plastic cool and algae blocks ultraviolet rays, "every little piece of plastic manufactured in the past 50 years that made it into the ocean is still out there somewhere."
- Approximately 500 nautical miles off the California coast sits a growing "plastic island", a gargantuan patch of floating plastic trash held together by currents stretching across the northern Pacific almost as far as Japan. This "plastic island" is made up of about 7 billion pounds of plastic garbage and measures about twice the size of Texas.
- Phthalates, the chemicals used to make plastic bags soft and flexible, are banned in many European countries due to health risks.
- Plastic bags wrap around living corals "suffocating" and killing them.
- Sea turtles often mistake plastic bags for jellyfish and ingest them. Hundreds of thousands of marine mammals die every year from eating discarded plastic bags mistaken for food.

- In the marine environment, plastic debris acts like a sponge for toxic chemicals, soaking up a million fold greater concentration of such deadly compounds as PCBs and DDE (a breakdown product of DDT), than the surrounding seawater.

Recycling Plastic Bags Does Not Work:

- Only 1 to 3% of plastic bags are recycled.
- Many bags collected for recycling never get recycled. A growing trend is to ship them to Third world countries like India and China which are rapidly becoming the dumping grounds for the Western world's glut of recyclables. Rather than being recycled they are cheaply incinerated under more lax environmental laws.
- It costs $4,000 to process and recycle 1 ton of plastic bags, which can then be sold on the commodities market for $32.

Paper Is Not The Answer:

- It takes more than four times as much energy to manufacture a paper bag as it does to manufacture a plastic bag.
- In 1999, 14 million trees were cut to produce the 10 billion paper grocery bags used by Americans that year alone.

There Are Solutions:

- A plastic bag tax introduced in Ireland in 2002 reduced consumption by 90% (individuals pay a tax of $.15 per plastic bag consumed at check out). Approximately 18,000,000 liters of oil have been saved due to this reduced production.
- Whole Foods eliminated disposable plastic bags in all of its 270 stores in the U.S., Canada and the U.K. in 2008. They sell several reusable bags, some very economically priced and made of recycled material, and encourage their customers to bring their own bags by giving a .10 grocery bill credit for each reusable bag a customer brings. They also offer an environmentally sensitive option when needed–paper bags made with 100 percent recycled fiber content, which are completely recyclable.
- IKEA became one of the first major US retailers to charge customers for plastic bags in March 2007, projecting at least a 50% reduction from 70 million to 35 million plastic bags in the first year.

Be Part of the Solution:

- BYOB – Bring your own bag!
- Encourage your local stores to sell reusable shopping bags, to only hand out plastic bags on request, and to offer alternatives that are compostable or made of recycled materials.
- Be aware of the packaging on products you purchase; opt for products with less packaging. Write letters to companies that use excessive packaging, asking them to change their approach.
- Post comments on the DEP web site http://www.dep.state.fl.us/waste/retailbags/default.htm. Make it known that you want plastic bags drastically reduced.

Sources: www.reusablebags.com and Sierra Magazine May/June 2009

Sierra Club Florida
Waste Minimization Campaign
Linda.Demler@sierraclub.org
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Threat of plastic pollution to seabirds is global, pervasive, and increasing

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Edited by James A. Estes, University of California, Santa Cruz, CA, and approved July 2, 2015 (received for review January 31, 2015)

Plastic pollution in the ocean is a global concern; concentrations reach 580,000 pieces per km^2 and production is increasing exponentially. Although a large number of empirical studies provide emerging evidence of impacts to wildlife, there has been little systematic assessment of risk. We performed a spatial risk analysis using predicted debris distributions and ranges for 186 seabird species to model debris exposure. We adjusted the model using published data on plastic ingestion by seabirds. Eighty of 135 (59%) species with studies reported in the literature between 1962 and 2012 had ingested plastic, and, within those studies, on average 29% of individuals had plastic in their gut. Standardizing the data for time and species, we estimate the ingestion rate would reach 90% of individuals if these studies were conducted today. Using these results from the literature, we tuned our risk model and were able to capture 71% of the variation in plastic ingestion based on a model including exposure, time, study method, and body size. We used this tuned model to predict risk across seabird species at the global scale. The highest area of expected impact occurs at the Southern Ocean boundary in the Tasman Sea between Australia and New Zealand, which contrasts with previous work identifying this area as having low anthropogenic pressures and concentrations of marine debris. We predict that plastics ingestion is increasing in seabirds, that it will reach 99% of all species by 2050, and that effective waste management can reduce this threat.

extinction | ingestion | marine debris | risk analysis | seabird

Introduction of plastic waste into the marine environment is a global concern. Plastic production is rapidly rising, with a doubling of production every 11 y since commercial production began in the 1950s (1). This growth in production has been accompanied by a corresponding increase in the concentration of plastics in the marine environment although it has been suggested that marine organisms may be a major sink reducing this increase (2–4). The durability of plastic implies that it is retained for years to centuries, in some cases failing to degrade at all if it is not exposed to bacterial activity or UV radiation (5).

Plastic fragments can be found throughout the world's oceans, with observed concentrations up to 580,000 plastic pieces per square kilometer (2, 3, 6). Modeling studies, validated by global sampling efforts, demonstrate that plastics are ubiquitous, with high concentrations in all five subtropical convergence zones and along the coastal margins near human population centers (3, 6, 7).

In addition to the evidence of its prevalence, there is emerging evidence of the threats plastics pose to wildlife, and indirectly to human health. Plastic waste affects wildlife via two means: entanglement and ingestion (8). A recent review for the United Nations Convention on Biological Diversity documented over 600 species, ranging from microorganisms to whales, affected by marine plastic waste, largely through ingestion (9). Ingestion is known to have many effects, ranging from physical gut blockage (10) to organ damage from leaching toxins (11). Recent experimental studies have also demonstrated transmission and toxicological effects of plastics, or adsorbed chemicals, at environmentally relevant concentrations in higher vertebrates (11–13).

The effect of plastic ingestion on seabirds in particular has been of concern. This concern is due to the frequency with which seabirds ingest plastic (12) and because of emerging evidence of both impacts on body condition and transmission of toxic chemicals, which could result in changes in mortality or reproduction (13–16). Understanding the contribution of this threat is particularly pressing because half of all seabird species are in decline, a higher fraction than other comparable taxa (17). Despite a recent extensive review of the threats to seabirds by a globally recognized authority (17), however, pollution has been identified only in a coastal context, and there is little mention of the impact of plastic ingestion, particularly on the high seas where the most threatened seabirds forage (17).

We predict the extent of plastics exposure for 186 pelagic seabird species worldwide, excluding coastal taxa such as shorebirds, sea ducks, and gulls and species for which distribution data were not available (*SI Appendix*, Table S1). We compare our predictions with diet studies published over the last 40 y and incorporate additional factors such as foraging strategy, body size, and sampling method that may affect the relationship between exposure and ingestion. Based on this adjusted model of risk, we map the global distribution of plastic ingestion risk for seabirds and highlight global areas of concern.

Results

We predicted plastic exposure for 186 species, from 42 genera within 10 families (*SI Appendix*, Table S1). Our plastic exposure

Significance

Plastic pollution in the ocean is a rapidly emerging global environmental concern, with high concentrations (up to 580,000 pieces per km^2) and a global distribution, driven by exponentially increasing production. Seabirds are particularly vulnerable to this type of pollution and are widely observed to ingest floating plastic. We used a mixture of literature surveys, oceanographic modeling, and ecological models to predict the risk of plastic ingestion to 186 seabird species globally. Impacts are greatest at the southern boundary of the Indian, Pacific, and Atlantic Oceans, a region thought to be relatively pristine. Although evidence of population level impacts from plastic pollution is still emerging, our results suggest that this threat is geographically widespread, pervasive, and rapidly increasing.

Author contributions: C.W. and B.D.H. designed research; C.W., E.V.S., and B.D.H. performed research; C.W. and E.V.S. analyzed data; and C.W., E.V.S., and B.D.H. wrote the paper.

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Marine Litter Distribution and Density in European Seas, from the Shelves to Deep Basins

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Abstract

Anthropogenic litter is present in all marine habitats, from beaches to the most remote points in the oceans. On the seafloor, marine litter, particularly plastic, can accumulate in high densities with deleterious consequences for its inhabitants. Yet, because of the high cost involved with sampling the seafloor, no large-scale assessment of distribution patterns was available to date. Here, we present data on litter distribution and density collected during 588 video and trawl surveys across 32 sites in European waters. We found litter to be present in the deepest areas and at locations as remote from land as the Charlie-Gibbs Fracture Zone across the Mid-Atlantic Ridge. The highest litter density occurs in submarine canyons, whilst the lowest density can be found on continental shelves and on ocean ridges. Plastic was the most prevalent litter item found on the seafloor. Litter from fishing activities (derelict fishing lines and nets) was particularly common on seamounts, banks, mounds and ocean ridges. Our results highlight the extent of the problem and the need for action to prevent increasing accumulation of litter in marine environments.

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Introduction

Litter disposal and accumulation in the marine environment is one of the fastest growing threats for the world's oceans health. Marine litter is defined as "any persistent, manufactured or processed solid material discarded, disposed of or abandoned in the marine and coastal environment"[1]. The issue has been

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Using expert elicitation to estimate the impacts of plastic pollution on marine wildlife

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ABSTRACT

Marine litter is a growing environmental concern. With the rapid increase in global plastics production and the resulting large volume of litter that enters the marine environment, determining the consequences of this debris on marine fauna and ocean health has now become a critical environmental priority, particularly for threatened and endangered species. However, there are limited data about the impacts of debris on marine species from which to draw conclusions about the population consequences of anthropogenic debris. To address this knowledge gap, information was elicited from experts on the ecological threat (both severity and specificity) of entanglement, ingestion and chemical contamination for three major marine taxa: seabirds, sea turtles and marine mammals. The threat assessment focused on the most common types of litter that are found along the world's coastlines, based on data gathered during three decades of international coastal clean-up efforts. Fishing related gear, balloons and plastic bags were estimated to pose the greatest entanglement risk to marine fauna. In contrast, experts identified a broader suite of items of concern for ingestion, with plastic bags and plastic utensils ranked as the greatest threats. Entanglement and ingestion affected a similar range of taxa, although entanglement was rated as slightly worse because it is more likely to be lethal. Contamination was scored the lowest in terms of impact, affecting a smaller portion of the taxa and being rated as having solely non-lethal impacts. This work points towards a number of opportunities both for policy-based and consumer-driven changes in plastics use that could have demonstrable affects for a range of ecologically important taxa that serve as indicators of marine ecosystem health.

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1. Introduction

Marine litter, and in particular plastic waste, is a growing environmental concern due to its aesthetic, economic, and ecological impacts. Volunteer clean-up efforts and coastal litter surveys have raised the public's awareness of marine debris as well as provided valuable data on the categories of litter items that are most abundant and/or frequently found on beaches and waterways [1,2]. In addition, microplastics have been shown to be ubiquitous in the open ocean [3,4]. In general, debris items fall into two broad categories: fishing-related gear such as lines, nets, and buoys; and end-use consumer items such as plastic bags, plastics bottles, metal and plastic bottle caps, cigarette butts, expanded polystyrene (EPS) containers and a variety of other food packaging items (ICC website [5]). The top 10 items collected during Ocean Conservancy's annual International Coastal Cleanup have remained remarkably consistent, with cigarette butts topping the list and plastic items making up 83% of the remaining items (ICC website [5]).

While identifying the types and amount of debris that are frequently found on beaches is an important first step, understanding the impacts of those consumer items is critical if effective voluntary or regulatory measures are to be implemented to limit their impacts. The number of scientific publications on marine debris has increased dramatically in the last ten years and nearly 700 marine species are now known interact with marine debris [6]. Entanglement and ingestion are the two main mechanisms by which marine taxa are exposed to marine debris ([7]; others) with contamination from toxic chemicals a secondary consequence of ingestion. At present, there is far less known about the toxicological impacts of marine litter but this is an active area of scientific enquiry and a growing conservation concern

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ICES International Council for the Exploration of the Sea
CIEM Conseil International pour l'Exploration de la Mer

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Plastic and marine turtles: a review and call for research

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Plastic debris is now ubiquitous in the marine environment affecting a wide range of taxa, from microscopic zooplankton to large vertebrates. Its persistence and dispersal throughout marine ecosystems has meant that sensitivity toward the scale of threat is growing, particularly for species of conservation concern, such as marine turtles. Their use of a variety of habitats, migratory behaviour, and complex life histories leave them subject to a host of anthropogenic stressors, including exposure to marine plastic pollution. Here, we review the evidence for the effects of plastic debris on turtles and their habitats, highlight knowledge gaps, and make recommendations for future research. We found that, of the seven species, all are known to ingest or become entangled in marine debris. Ingestion can cause intestinal blockage and internal injury, dietary dilution, malnutrition, and increased buoyancy which in turn can result in poor health, reduced growth rates and reproductive output, or death. Entanglement in plastic debris (including ghost fishing gear) is known to cause lacerations, increased drag—which reduces the ability to forage effectively or escape threats—and may lead to drowning or death by starvation. In addition, plastic pollution may impact key turtle habitats. In particular, its presence on nesting beaches may alter nest properties by affecting temperature and sediment permeability. This could influence hatchling sex ratios and reproductive success, resulting in population level implications. Additionally, beach litter may entangle nesting females or emerging hatchlings. Lastly, as an omnipresent and widespread pollutant, plastic debris may cause wider ecosystem effects which result in loss of productivity and implications for trophic interactions. By compiling and presenting this evidence, we demonstrate that urgent action is required to better understand this issue and its effects on marine turtles, so that appropriate and effective mitigation policies can be developed.

Keywords: ecosystem effects, entanglement, ghost fishing, ingestion, marine debris, marine turtle, nesting beaches, plastic pollution.

Introduction

Between 1950 and 2015, the total annual global production of plastics grew from 1.5 million t to 299 million t (PlasticsEurope, 2015). As a result, the abundance and spatial distribution of plastic pollution, both on land and at sea, is increasing (Barnes *et al.*, 2009; Jambeck *et al.*, 2015). Indeed, plastic items have become the principal constituent of marine debris, the majority originating from land-based sources, such as landfill sites, with the remaining deriving from human activities, such as fishing (Barnes *et al.*, 2009; Ivar do Sul *et al.*, 2011).

Of particular concern is the longevity of plastic debris and its wide dispersal ability (Barnes *et al.*, 2009; Wabnitz and Nichols,

‡Joint lead authors.

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SIX PONDS

Long Pond, Little Long Pond, Bloody Pond, Gallows Pond, Halfway Pond, Round Pond

The Six Ponds Improvement Association

Box 1580 Plymouth, MA 02362 www.sixponds.org

Date: January 18, 2016

To: Board of Selectmen, Finance Committee Members – Town of Plymouth

From: Love Albrecht Howard – President, Six Ponds

Re: **Carry Out Bag Bylaw**

The Six Ponds Improvement Association is dedicated to the protection of the ponds, natural areas and quality of life in our neighborhoods and town. In the spirit of improvement, please join with us and other communities across the Commonwealth and the country and eliminate thin plastic shopping bags. Please support the Carry Out Bag Bylaw.

One estimate is that every American throws away over 300 of these bags every year. **In Plymouth alone** that translates to **over 17 million thin plastic bags** that annually go in to the town waste stream, escalating costs for transportation and disposal.

This past week there were public service announcements from the New England Aquarium demanding an end to the use of thin plastic shopping bags. The obvious litter issues aside, these bags wreak havoc with wildlife in our ponds and in the ocean.

At our twice-yearly Plymouth town cleanups we pick up thousands of these bags. But the ones we pick up is where we're lucky . . . unlucky are the thousands upon thousands of bags that end up in our ponds and oceans where they strangle turtles, seabirds, fish and marine mammals who mistake them for food, clog boat engines and machinery, and ultimately break down in to microscopic particles that can never be removed, particles that bioaccumulate and poison the wildlife that ingests them. Including humans.

The Town of Plymouth can do something to decrease the astounding number of thin plastic bags. *America's Hometown* can serve as an example to the rest of the South Shore, the Commonwealth and the Nation by working to eliminate the use of these ubiquitous bags.

We can do this! Please support the Carry Out Bag Bylaw. Thank you!

cc: Jonathan Beder – Director, Department of Public Works
Lee Burns, PhD – CoCoordinator Carry Out Bag Bylaw
David Gould – Director, Department of Marine and Environmental Affairs
Ken Stone, Ed.D – CoCoordinator Carry Out Bag Bylaw
Richard Vacca – Conservation Agent

southeastern massachusetts
pine barrens alliance
collaborative conservation initiatives

January 19, 2016

To Whom It May Concern:

The board of the Southeastern Pine Barrens Alliance (SEMPBA) recently voted to support the passage of Article 35 which seeks to establish a "Carryout Plastic Bylaw."

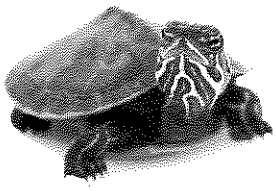
SEMPBA is a non–profit, all–volunteer group dedicated to preserving the globally rare Pine Barrens of Southeastern Massachusetts.

Our volunteers participate in the town wide litter clean up and spend a great deal of time in Plymouth forests where they have witnessed the proliferation of single-use plastic bags along the trails and in the trees and bushes of otherwise pristine environments.

We believe that reducing the use of these types of bags would be a constructive way to promote a healthier habitat.

We urge Plymouth residents to support passage of this bylaw.

Very truly yours,
Sharl Heller
Sharl Heller, President



Northern Red–bellied Cooter found only in ponds in Plymouth County

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