Source Reduction & Marine Debris in West Coast Communities

AN ANALYSIS OF CALIFORNIA, OREGON, AND WASHINGTON

JULY 2016

Source Reduction & Marine Debris in West Coast Communities

An Analysis of California, Oregon, and Washington

Emma Tonge[1,*, †]

[1] National Oceanic and Atmospheric Administration
Office of Response and Restoration
NOAA Marine Debris Program
Silver Spring, MD 20910, USA

* The content of this report does not reflect an official position of NOAA or the Department of Commerce.

† Prepared for the West Coast Marine Debris Alliance, a diverse coordinating body that adds value by breaking barriers between state agencies, federal government, NGOs, and industry to address marine debris on the West Coast. More information can be found at marinedebrisalliance.org.

Previous page: Photo of expanded polystyrene debris. Photo credit: NOAA.

This document should be cited as follows:
Tonge, E. (2016) Source Reduction & Marine Debris in West Coast Communities. West Coast Marine Debris Alliance.

Contents

Tables

Figures

Executive Summary

Marine debris has become a persistent problem in coastal communities around the world. Much of this debris can be attributed to an increased global demand for plastics, with the annual production of plastics growing from 1.5 million metric tons in 1950, to 245 million metric tons in 2011 (Andrady, 2011; Hopewell et al., 2009). Since plastics are lightweight, inexpensive, and versatile such growth is likely to continue in society, with increasing dependence on single-use plastic items such as plastic bags, food ware, and packaging.

Upon entering the ocean, marine debris can become vectors for pollutants that have a toxic effect on both the environment and marine life. The potential chemical impacts from plastic debris are concerning given that many animals have been found to ingest plastic marine debris. Ingestion could lead to disruption in biological processes and a false sense of satiation, possibly resulting in death. These effects could lead to economic consequences as industries on the West Coast, including tourism, rely on marine life. In order to prevent impacts to the economy, an estimated $520 million is spent on litter abatement and management on the West Coast every year. In order to reduce debris and achieve savings on litter abatement, a number of municipalities on the West Coast have passed source reduction laws. Generally taking the form of a prohibition, these laws attempt to reduce the distribution of common marine debris items, including plastic bags, polystyrene food ware and packaging, plastic microbeads, and rigid plastic packaging containers.

Plastic Bags

A majority of plastic bag prohibition laws are implemented at the local level within cities and counties. These laws prohibit the distribution of single-use plastic bags at the point of sale by retailers and require that only alternatives such as paper or reusable bags be available to customers. Regulated businesses generally include grocery stores, pharmacies, drug stores, supermarkets, convenience stores, and other businesses that carry food items. Most plastic bag prohibitions require businesses to charge customers a fee for paper bags. This fee is generally small and ranges from 5 to 25 cents. In California a state wide prohibition on plastic bags has been signed into law, but was pushed to a voter referendum on the 2016 ballot.

Polystyrene

Expanded polystyrene is a common type of plastic marine debris. It is lightweight and fragile nature and can be easily be moved by the wind and other forces, entering watersheds and the ocean. This material can break and crumble into small

pieces in the environment, making it more bioavailable for marine species (Wegner et al., 2012).

In California, there is a prohibition on the sale of expanded polystyrene loose fill packaging materials, unless they meet a certain standard for recycled materials used during production.

Prohibitions on polystyrene food ware and containers are more commonly implemented on the West Coast. As an alternative to disposable polystyrene food ware, many communities require businesses to use containers that are biodegradable or compostable. Polystyrene prohibitions are generally applied directly to restaurants and food vendors.

Microbeads

Microbeads are a kind of microplastic particle smaller than 5mm in diameter (*Waste management: plastic microbeads*, 2015). Microbeads are often marketed as exfoliants and can be found in a range of products, from toothpaste to face washes. Because of the small size of microbeads, wastewater treatment facilities are not designed to remove these plastics form wastewater.

The State of California has passed legislation that would require manufacturers to phase microbeads out of production. However, this bill may be surpassed by the Microbead-Free Waters Act of 2015, which will be implemented on a federal level and affect all the states in the US.

Rigid Plastic Packaging Containers

The State of California's Rigid Plastic Packaging Container Program and the Oregon Rigid Plastic Packaging Law require that inflexible plastic packaging be made with at least 25 percent postconsumer materials. In California manufacturers also have the option of source reducing containers by 10 percent, or guaranteeing a 45 percent recycling rate, while in Oregon manufacturers must reuse the container at least 5 times or guarantee a 25 percent recycling rate.

Discussion

Although gaps may exist within source reduction laws on the West Coast, with the use of prohibitions, fees, and regulations on common marine debris items, state and local governments can make significant changes to their communities by preventing the introduction of harmful consumer products into the environment. A significant portion of West Coast residents live in areas with source reduction laws and the regulated population will increase as the reach of this kind of legislation continues to expand. In order to further improve the success of source reduction laws on the West Coast, increased education, research, monitoring and coordination is needed to better inform stakeholders and communities.

Source Reduction & Marine Debris in West Coast Communities

An Analysis of California, Oregon, and Washington

I. Introduction

Marine debris has become a persistent problem that affects coastal communities around the world. Much of the debris can be attributed to an increased global demand for plastics, with annual production growing from 1.5 metric tons in 1950, to 245 metric tons in 2011 (Andrady, 2011; Hopewell et al., 2009). As this growth continues, society has become increasingly dependent on single-use plastic items such as bags, food ware, and packaging. Many of these items can be commonly found in the environment as litter, and in coastal communities as marine debris. Marine debris is any persistent solid material that is manufactured or processed and directly or indirectly, intentionally or unintentionally, disposed of or abandoned into the marine environment or Great Lakes (Whiting, 1998). The occurrence of this debris can severely impact coastal ecosystems and economies by affecting the resources, environments, and species that they depend on.

A number of sources exist for the introduction of these materials into the marine environment. In California, Oregon, and Washington, these are often land-based and diffuse, coming from coastal urban areas with growing populations and growing waste management needs. It is unknown exactly how much waste becomes marine debris, however, it has been estimated in published literature that in the year 2010, 4.8 to 12.7 million metric tons of plastic entered the marine environment from land worldwide. With increased production and demand for plastic items, this number is expected to continue to rise in coming years (Jambeck et al., 2015).

Upon entering the ocean marine debris can become vectors for pollutants as they absorb and carry persistent organic pollutants (POP), polychlorinated biphenyl (PCB), and dichlorodiphenyltrichloroethane (DDT) (Ogata et al., 2009; Satir, 2009; Van et al., 2012; Velzeboer et al., 2014). These pollutants, in addition to plastic additives such as bisphenol A (BPA), may have a toxic effect on the environment, as well as marine life. Marine animals are especially vulnerable to the chemical impacts of plastic debris as many species have been found to ingest plastic materials, including birds (Acampora et al., 2014; Auman et al., 1997; Pettit et al., 1981), invertebrates (Browne et al., 2008; Graham & Thompson, 2009; Van Cauwenberghe & Janssen, 2014), turtles (Balazs, 1985; González Carman et al., 2014; Schuyler et al., 2014), pelagic fish (Choy & Drazen, 2013; Jantz et al., 2013), and marine mammals (de Stephanis et al., 2013; Denuncio et al., 2011). When these species ingest plastic marine debris, toxic pollutants could be passed into their bodies, disrupting biological processes and possibly leading to death (Rochman, Hoh, et al., 2013; Rochman et al., 2014). Exposure levels can increase should animals ingest low trophic level species that have ingested plastic marine debris and pollutants (Koelmans et al., 2014). Ingestion can also harm marine life by blocking intestines and creating a false sense of satiation, potentially resulting in malnutrition or starvation (de Stephanis et al., 2013; Secchi & Zarzur, 1999).

In the United States, 39 percent of the nation's population lives in coastal shoreline counties (National Oceanic and Atmospheric Administration, 2013). With such large populations and coastal and ocean dependent industries, such as tourism, negative effects on marine life can result in costs to the coastal economy. In 2001 it was estimated that the tourism industry contributed $4.8 billion to the Washington economy and was one of the fastest growing industries within the state (Washington's Coastal Zone Management Program, 2001). The economy in California enjoyed similar growth, with coastal tourism contributing more than $12 billion to the state's gross domestic product in the year 2000 (Kildow & Colgan, 2005). Marine debris can make beaches unsightly and entangle and be ingested by important species, such as dolphins and whales, which drive many tourism activities on the West Coast.

In order to prevent impacts to the coastal economy from marine debris, an estimated $520 million is spent on litter abatement and management on the West Coast every year, with $480 million spent in California alone (Stickel et al., 2013; Stickel et al., 2012). These costs include but are not limited to waterway and beach cleanup, street sweeping, storm water capture and maintenance, and public education activities. Should the amount of commonly littered items be reduced, these costs to West Coast communities could be lowered. In a 2014 study of beach recreation in Orange County,

California, it was found that reducing debris by just 25 percent would save residents $32 million during summer months in costs associated with cleanup and litter abatement (Leggett et al., 2014).

Marine debris is wholly man-made, and to a large extent, a preventable problem. The most efficient way to lessen the impact of debris is to prevent it from entering the marine environment. One way to achieve this is by regulating the production and distribution of common marine debris items through source reduction laws and policies. The United States Environmental Protection Agency defines source reduction as “the design, manufacture, purchase or use of materials to reduce their quantity or toxicity before they reach the waste stream” (USEPA, 1995).

A number of municipalities on the West Coast have introduced laws that put source reduction into practice within their communities. Generally taking the form of a prohibition, these laws attempt to reduce the distribution and the amount of litter resulting from of common marine debris items such as plastic bags, polystyrene, microbeads, and plastic containers. This paper will investigate how these laws can be used to address marine debris in these West Coast states through an evaluation of the effectiveness of source reduction laws at the local and state levels of government.

II. Plastic Bags

Overview

Plastic bags are an item commonly found as marine debris that are repeatedly targeted through source reduction laws on the West Coast. They are often made of polyethylene, are less than a millimeter in thickness, and are typically nondegradable in the environment (Figure 1). Given that they are so lightweight and inexpensive to produce, plastic bags are commonly used in grocery stores, supermarkets, and retail establishments with an estimated 4-5 trillion plastic bags of all varieties being produced globally every year (The Worldwatch Institute, 2004).

Although they are simple and inexpensive to produce, single-use plastic bags come with hidden costs to the environment and economy. Within the United States some of these costs come from recycling of plastic bags. Many communities do not accept plastic bags and other plastic films in curbside recycling as they can jam machines and contaminate paper bales. Instead, plastic bags must be disposed of in store recycling programs that result in only a fraction of consumers traveling to properly dispose of their waste. In California this method of recycling has had little success as the recycling

rate for single-use plastic bags in 2009 was only 3 percent. Consumers may reuse or repurpose bags for other uses, but it is likely that the remainder of the 53,000 tons of plastic bags produced in California in 2009 ended up in a landfill or in the environment (CalRecycle, 2009).

Figure 1: Single-Use Plastic Bag

Photo Credit: NOAA

The hidden costs of plastic bags can also be seen as these single-use items are among the top ten marine debris items found worldwide during the 2015 International Coastal Cleanup (Ocean Conservancy). They present a danger to marine life that may inadvertently ingest plastic bags, mistaking them for food. Whales are commonly found to have plastic bags among the contents of their stomachs and turtles are thought to mistake them for jellyfish due to their “flexible and translucent” nature (de Stephanis et al., 2013; Schuyler et al., 2014; Seminoff et al., 2002). When plastic bags are ingested by these animals they not only have the potential to block intestines, but can falsely communicate a sense of satiation, possibly leading to illness or death.

In order to reduce the amount of plastic bags that enter the environment, many countries have placed restrictions, prohibitions, and taxes on plastic bags to varying degrees of success (Table 1). These include a number of developing countries that have faced severe impacts from the introduction of plastic bags into the environment, as well

as a number of European countries and individual cities. On the West Coast of the United States, many municipalities have passed source reduction laws in order to similarly reduce the amount of littered plastic bags in their communities and in the environment. Although these prohibitions differ in content, their overall goal remains to reduce the amount of single-use plastic bags distributed by businesses.

Table 1: International Restrictions on Plastic Bags

Country	Type of Ban	Scope
American Samoa	Prohibition	Statewide
Antigua	Prohibition	Statewide
Argentina	Prohibition	Buenos Aires Only
Australia	Fee/Prohibition	Several Cities/Provinces
Bangladesh	Prohibition	Statewide
Bhutan	Prohibition	Statewide
Botswana	Fee	Statewide
Brazil	Prohibition	Several Cities
Cameroon	Prohibition	Statewide
Canada	Fee/Prohibition	Several Cities/Provinces
Cayman Islands	Fee/Prohibition	Statewide
Chile	Prohibition	Pucón Only
China	Fee	Statewide
Denmark	Fee	Statewide
Egypt	Prohibition	Hurghada Only
England	Fee	Statewide
Eritrea	Prohibition	Statewide
Ethiopia	Prohibition	Statewide
France	Prohibition	Statewide
Germany	Fee	Statewide
Haiti	Prohibition	Statewide
India	Prohibition	Several Cities

Table 1 Continued...

Country	Type of Ban	Scope
Indonesia	Fee	Several Cities
Ireland/Northern Ireland	Fee	Statewide
Israel	Fee	Statewide
Italy	Prohibition	Statewide
Ivory Coast	Prohibition	Statewide
Kenya	Fee	Statewide
Macedonia	Fee/Prohibition	Statewide
Malawi	Prohibition	Statewide
Malaysia	Fee	Several Cities
Mali	Prohibition	Statewide
Malta	Fee	Statewide
Mauritania	Prohibition	Statewide
Mauritius	Prohibition	Statewide
Mexico	Prohibition	Mexico City Only
Mozambique	Prohibition	Statewide
Myanmar	Prohibition	Several Cities
Netherlands	Prohibition	Statewide
Oman	Prohibition	Statewide
Philippines	Prohibition	Several Cities
Puerto Rico	Prohibition	Statewide
Romania	Fee	Statewide
Scotland	Fee	Statewide
South Africa	Fee/Prohibition	Statewide/Cape Town
Spain	Fee	Andalucía Only
Tanzania	Prohibition	Statewide
Uganda	Prohibition	Statewide
Wales	Fee	Statewide

Sources: Earth Policy Institute, 2014; Surfrider Foundation

Plastic bag laws in West Coast states commonly prohibit the distribution of single-use plastic bags. These are products with handles that are provided at the point of sale for transporting merchandise or food, and do not include bags used to contain and separate meats and produce. In their place, paper and reusable alternatives are permitted, in addition to the option of using no bag when purchasing goods. Items that are generally not considered to be a single-use plastic bag include packaging that is a part of a food or merchandise item, as well as bags without handles that are used for holding bulk food or prescription drugs. Plastic bags are also commonly allowed for the purposes of separating food or merchandise that can contaminate other items.

In California there are at least 108 cities and 13 counties that have passed a prohibition on plastic bags (Figure 2), as well as 4 cities in Oregon and 13 cities and 1 county in Washington (Figure 3). In 2014 a state-wide prohibition was also enacted in California. However, the law has not yet gone into force as opponents collected enough signatures the bill to be placed on the voter ballot in the fall of 2016. This referendum could potentially result in the removal of the first state level plastic bag prohibition in the United States. A list of municipalities that have passed plastic bag prohibitions on the West Coast can be found in the Appendix.

Figure 2: California Municipalities with Plastic Bag Prohibitions

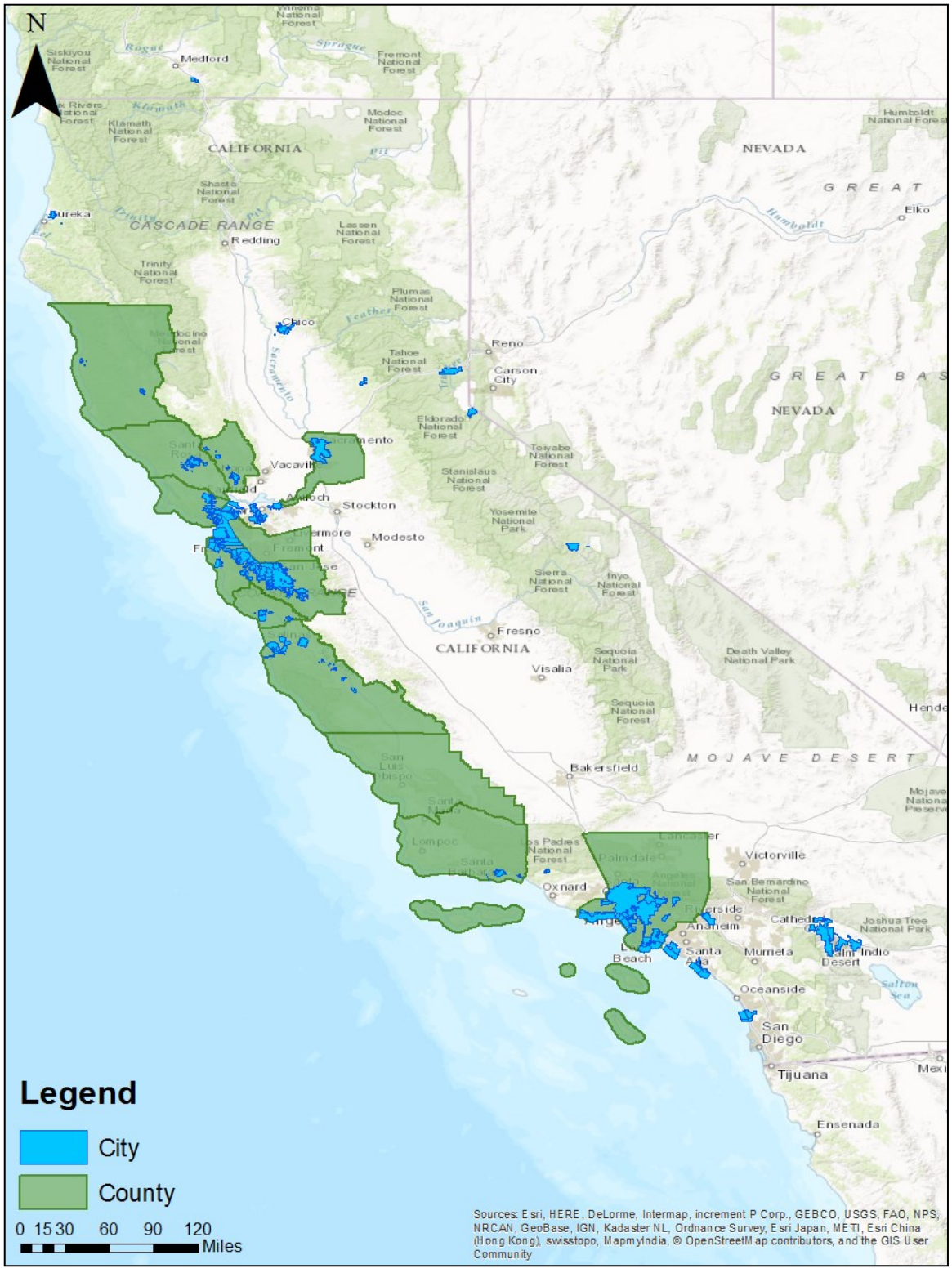
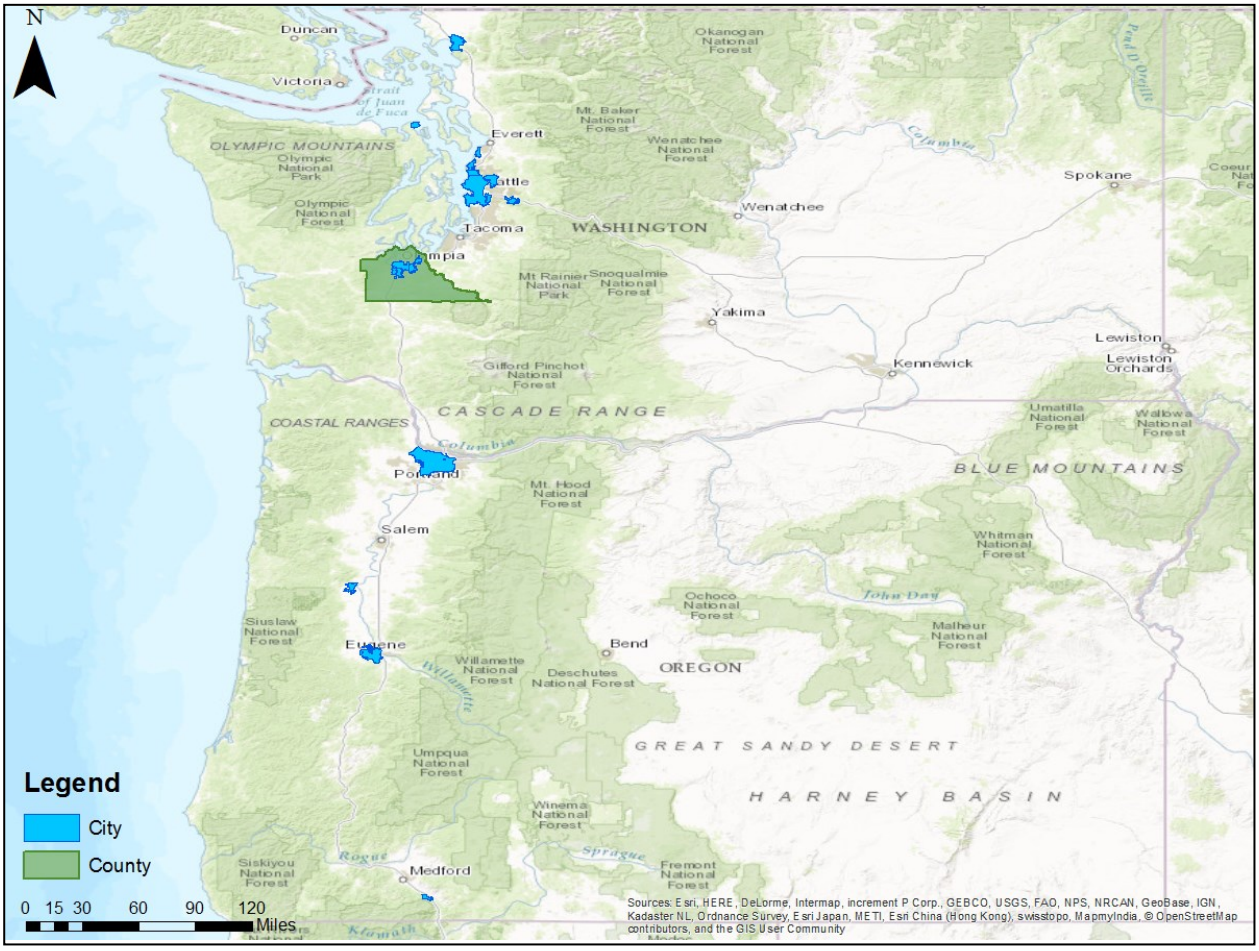


Figure 3: Washington & Oregon Municipalities with Plastic Bag Prohibitions



Plastic Bag Alternatives

A common alternative to single-use plastic bags across all municipalities are paper bags made of recycled material. These can be provided at the point of sale in lieu of prohibited plastic bags, often at a small charge to customers (Figure 4). Many municipalities have created specific requirements that regulate the paper content and qualifying features of paper bags. Requirements can differ between neighboring cities and common themes can be seen across states. In California, Oregon, and Washington many municipalities require that any paper bags distributed by businesses at the point of sale be recyclable and be made with a minimum of 40 percent postconsumer recycled material. This requirement ensures that the paper alternatives to plastic being distributed by regulated businesses are produced with the greatest amount of recycled material, further reducing the amount of new resources being utilized for consumption. These are also the requirements for *SB-270 Solid waste: single-use carryout bags*, the California state-wide prohibition on plastic bags.

Unlike those in California, many municipalities in Washington have also included within the law requirements concerning the volume of a recycled paper bag. Only those bags with the capacity of one-eighth barrel (882 cubic inches) or more qualify as recycled paper bags for the purposes of consumer use. Any bags that are smaller in size are not regulated, and are not subject to a fee.

Another alternative to single-use plastic bags are reusable bags of various material types. These may be sold by regulated businesses, or provided by the customer and are not meant to be disposed of after a single-use like their paper and plastic counterparts (Figure 4). In order to be sold as a reusable bag, this type of alternative must meet a certain standard of durability. In many municipalities the standard is the same with reusable bags being required to have a minimum lifetime of 125 uses and be able to carry at least 22 pounds over a distance of 175 feet. A number of municipalities also include a volume requirement, making only those products with a minimum volume of 15 liters qualify as reusable bags.

Figure 4: Recycled Paper Bag (Left), Reusable Bag (Right)

Photo Credit: City of Menlo Park; ULINE

Unlike paper alternatives, reusable bags are not required to be produced with a certain amount of recycled content or with specific materials. Instead, in response to sanitary concerns for reusable bags, many municipalities require that the durable materials used in a reusable bag be machine washable or have the ability to be disinfected. Consumers are often encouraged to use plastic bags that are allowed under this type of prohibition, like produce bags without handles, to separate meats, poultry, and fish when using a reusable alternative. In addition, reusable bags are required to contain

no heavy metals in toxic amounts, ensuring that consumers have access to a number of safe and long-lasting products that can be properly cleaned.

California's state-wide plastic bag prohibition would introduce addition regulations, requiring that reusable bags produced with fabric or other synthetic materials be sewn, as well as contain a minimum fabric weight of 80 grams per square meter in order to ensure their life of 125 uses. If they are not sewn, and are instead produced with plastic, the manufacturer must apply for a certification with the State of California. The law would also require that any reusable bags produced with plastic film contain 20 percent postconsumer materials by January 1, 2016, and 40 percent postconsumer materials by January 1, 2020.

Regulated Businesses

Those businesses regulated under plastic bag source reduction laws on the West Coast are prohibited from providing single-use plastic bags to customers. Many communities choose to target businesses that distribute plastic bags in large volumes, such as grocery stores and large retail stores. Greatly differing definitions of what constitutes a regulated business has resulted in the varying distribution of single-use plastic bags across the coast.

In some municipalities in California only large retail establishments are regulated by plastic bag prohibitions. These are businesses with gross annual sales of $2,000,000 or are at least 10,000 square feet in area, and generally include grocery stores, pharmacies, drug stores, supermarkets, convenience stores, or any other stores that sell food items (milk, bread, snack foods, etc.). These businesses would also be regulated under California's SB-270 (*Solid waste: single-use carryout bags*, 2014). Other municipalities in California have a broader reach, regulating the distribution of plastic bags in all manner of retail establishments that sell perishable or nonperishable items, including food and clothing.

Within the state of Washington, language applying to all retail establishments is broader and includes any person, corporation, vendor, government agency, etc. Unlike most legislation in both California and Oregon, this definition of retail establishment includes restaurants and farmers' markets. Of the 14 municipalities with legislation regarding plastic bags in Washington, only the Cities of Edmonds and Mukilteo exempt restaurants from complying with the law.

Exemptions

There are a number of exemptions to plastic bag legislation that reflect the different needs of West Coast communities. A number of cities and counties offer businesses that are regulated by the legislation the option of applying for an exemption to compliance. These businesses must demonstrate any undue hardship that has been brought on as a result of a prohibition on plastic bags. However, this action is often limited and generally expires within a year.

Those businesses that are not expressly regulated within plastic bag legislation are exempt from the prohibition. This most often includes restaurants and food vendors. Under the exemption businesses are able to continue to provide takeout food or leftovers in a plastic bag. Also regularly exempt from plastic bag legislation are nonprofit charitable reusers. These are organizations with 501(c)(3) tax-exempt status that reuse or recycle donated goods or materials. In Washington this also applies to food banks and food assistance programs that may be distributing food items in single-use plastic bags. Other, less common exemptions include farmers' markets, wholesale agricultural activities, food trucks, dry cleaners, and even retail establishments that do not carry any food items. This could include clothing stores or other retail where there are no food items offered for sale within the store.

The Pass-Through Charge

Most plastic bag prohibitions on the West Coast require businesses to incur a "pass-through" charge on plastic bag alternatives when they are distributed at the point of sale. This is a small amount that customers pay for alternatives with the goal of both reducing the number being distributed and encouraging consumers to bring their own reusable bag or use no bag in the future. Similar source reduction laws have been passed in Washington DC and Ireland, where a tax or levy acts as the pass-through charge on single-use plastic bags. Of the 5 cents that businesses must charge for plastic or paper bags in Washington DC, only 1 cent of this fee goes to the retailer, while the remainder is put into the Anacostia River Clean Up and Protection Fund ("Anacostia River Clean Up and Protection Act of 2009," 2012). This money is then used to implement education programs and fund trash collection projects.

On the West Coast the pass-through charge does not act as a tax, instead allowing all money collected from the charge to be kept by the retailer. The fee instead acts to both deter consumers from using a bag and as a way to help retailers pay for the more expensive alternatives to single-use plastic bags. In Los Angeles, it was estimated that

this fee would equate to an annual economic impact to consumers of $5.72 per capita (Sapphos Environmental, 2010).

In most municipalities, no mandate exists on how retailers must spend the money gained from the fee. However, some communities, as well as SB-270 in California, require that this money be used for specific purposes, including the costs of compliance, paper bags, and any educational materials that encourage the use of reusable bags. Some municipalities also allow this money to be used to fund reusable bag giveaways by retailers for a limited time.

In Washington and Oregon, the pass-through charge for paper bags is generally set at $0.05. This relatively low amount encourages shoppers to think about their impact when making a purchase. In California this amount is commonly higher, often beginning at $0.10, and increasing to $0.25 after a set period of time. SB-270 would establish a $0.10 minimum on paper bags at the point of sale. Few municipalities do not require a pass-through charge, instead allowing businesses to set a fee if they choose.

Discussion

Despite limited information about the success of prohibitions on plastic bags, many communities on the West Coast continue to implement this type of legislation in local governments. These communities recognize the hidden costs of plastic waste and the value of reducing the amount of potentially harmful plastic materials being distributed to consumers. In the city of San Jose, CA, the presence of plastic bags was documented through litter surveys before and after the implementation of a prohibition and showed an 89 percent reduction in storm drains, 60 percent reduction in rivers and creeks, and a 59 percent reduction in city streets. In addition, observance of consumers using reusable bag alternatives increased from 2 percent before the prohibition, to 62 percent after (Romanow, 2012). Although this success may not extend to other communities in the same way, it is clear through plastic bag prohibitions worldwide and on the West Coast that source reduction laws could be a powerful tool to reduce debris.

Notwithstanding demonstrated success in the City of San Jose and the growing number of municipalities adopting prohibitions on single-use plastic bags, there are a number of gaps that allow for their continued use across the West Coast. In many municipalities the definition of a reusable bag contains a hole that allows the continued distribution of nondegradable plastic bags to occur. Aside from the town of Fairfax, CA where reusable bags provided to customers must be produced with cloth or machine

washable fabric, municipalities with plastic bag prohibitions in California, Oregon, and Washington allow reusable bags to be made of plastic (Town of Fairfax, 2007). In 95 cities and 10 counties in California, the city of Corvallis, OR, and all the municipalities in Washington excluding the City of Kirkland, require that plastic reusable bags be at least 2.25 mils (a measurement equal to 1/1000 of an inch) in thickness. In Monterey and Santa Cruz Counties of California, and the cities of Ashland, Eugene, and Portland, Oregon, this standard has been raised to 4.0 mils, while in Manhattan Beach, bags must simply made with cloth or an unspecified "durable material suitable for reuse" (City of Manhattan Beach, 2012).

Some retailers have taken advantage of this gap in order to continue to distribute plastic bags that are thicker, and are produced with more plastic per bag than the original prohibited disposables. It is currently not clear if consumers are treating these bags as reusable, or if they are utilized in the same manner as prohibited single-use plastic bags. Should plastic reusable bags be littered at the same rates, more plastic by weight could potentially enter the marine environment. However, there is also a gap in information related to the rates that thicker plastic bags enter the marine environment, compared to their thinner and prohibited counterparts.

California's state-wide bill, SB-270, attempts to better close the gap created within the definition of a reusable bag by municipalities. This would be achieved through the implementation of a program that requires manufacturers that wish to switch from the production of single-use plastic bags to reusable plastic bags, to be certified by a third party before they can sell their product within the State of California. The certification would include a fee and must be resubmitted every two years. A list of manufacturers with a certification would be publicly posted on county websites where residents and business owners could ensure compliance (*Solid waste: single-use carryout bags*, 2014). Although the program does not completely close the gap on reusable bags, it makes the production of thicker plastic bags by manufacturers more difficult, inconvenient, and transparent.

Other problems with plastic bag prohibition arise due to the immense variation in legislation. Without any state or federal level prohibitions in force, cities and counties are able to make these laws as stringent or ineffectual as they wish. Variation can most clearly be seen in the differing standards of what constitutes a store or retail establishment. These definitions not only deviate between states, but between neighboring local governments. Many larger cities, such as Los Angeles, have opted to only prohibit the distribution of plastic bags by large retail stores. Most affected by this definition are

grocery stores and supermarkets, including convenience stores that sell food items. SB -270 would also follow these standards, only applying to convenience stores a year after the original, but postponed, implementation date in 2015. Although businesses regulated by prohibitions generally distribute large volumes of single-use plastic bags on a daily basis, the definition of a store within municipal law often leaves out clothing stores and other retail that do not carry food items, or have a pharmacy on the premises. With such variation, compliance between the cities and counties that enact this type of legislation is scattered and diffuse, confusing to retailers and consumers alike. Furthermore, those municipalities that have yet to enact any such legislation can leave neighboring municipalities open to continued harm as single-use plastic bags travel across borders on land and in the marine environment.

Other gaps exist in the exemptions offered by municipalities, especially those placed on public eating establishments. More stringent prohibitions on plastic bags include restaurants in their definition of a store or retail establishment, such as those in San Francisco, CA and the majority of local governments in Washington. In California it is particularly common to see eating establishments exempt from this type of source reduction law. Although restaurants and food vendors do not distribute bags in the same quantities as many of the regulated businesses, this gap allows distribution to continue through a great number of businesses. Furthermore, based on this exemption restaurants are not required to incur a pass-through charge to customers, allowing them to continue to provide customers with single-use plastic or paper bags, without the deterrent created by this small fee.

III. Polystyrene

Overview

Expanded polystyrene (EPS) is a common type of plastic marine debris produced by expanding plastic beads, resulting in a product that is 90-95 percent air and is particularly lightweight compared to cardboard, glass, or other plastics used in packaging and food ware (State of California Integrated Waste Management Board, 2004). Using light weight EPS as a packaging material reduces costs of shipping, as well as the amount of raw materials used in production. Despite these benefits, EPS can bring great harm to the environment as its lightweight nature allows this product to be easily moved by the wind and other forces, entering watersheds and the ocean. When met with these forces, this material can break and crumble into small pieces, making it more bioavailable for marine species that mistake it for food (Wegner et al., 2012).

EPS also acts as a source and a sink for pollutants within the marine environment. Polycyclic aromatic hydrocarbons (PAHs) are used in the production of many polystyrene materials and upon entering the marine environment, these materials can act as a contaminant to the water and to marine life, in addition to continually absorbing PAHs that are found there (Rochman, Manzano, et al., 2013). Furthermore, the liquid chemical styrene used to produce polystyrene is a possible carcinogen according to the National Toxicology Program, and is linked to increased risks of cancer (2014).

On the West Coast of the United States, EPS is one of the most common types of marine debris. In the Salish Sea between Washington and Canada, it is pervasive in the marine environment. Within this highly populated and transboundary sea, EPS is found in excess on both beaches and floating within surface waters (Davis & Murphy, 2015). Similar discoveries have been documented within Orange County and Monterey Bay, California, revealing that EPS fragments and fast food containers are some of the most abundant beach debris found within the marine environment of California (Moore et al., 2001; Roosevelt et al., 2013).

Similar to plastic bags, EPS can be recycled but is not accepted in curbside recycling in most communities. There is little incentive for recycling companies to accept EPS as it is often bulky, expensive to transport, and the recycled material can be used to manufacture very few products. Consumers that wish to dispose of EPS materials responsibly must bring them to a facility with the proper capacity or to a local drop off location. In 2004 there were only 12 facilities in the State of California that recycle EPS (State of

California Integrated Waste Management Board, 2004). This number has since increased to at least 20 facilities, alongside 4 facilities in Washington (Dart Container Corporation). These obstacles make proper disposal of EPS materials seemingly impossible and expensive. Many municipalities on the West Coast have passed prohibitions on certain items in order to break down these barriers and reduce the amount of EPS packaging material and disposable food ware found in the environment.

Polystyrene Packaging

Overview

The State of California has passed source reduction legislation related to polystyrene through AB-3025, which prohibits the sale of some EPS loose fill packaging materials (*Solid waste: polystyrene loosefill packaging*, 2008). These are commonly referred to as packing peanuts, and are especially lightweight (Figure 5). Used in large quantities to protect items during shipping, these EPS materials could act as an abundant pollutant should they enter the marine environment.

Figure 5: EPS Loose Fill Packaging

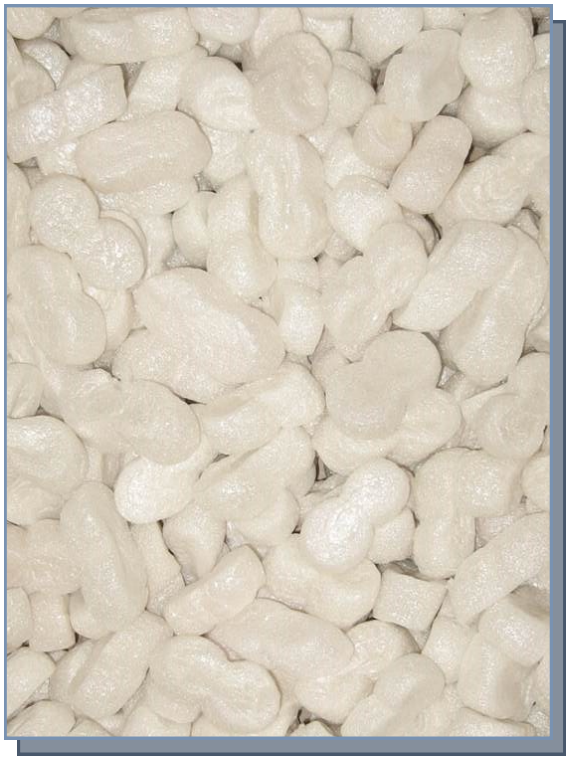


Photo Credit: Wikipedia

Regulated Businesses

Those businesses regulated by AB-3025 include wholesalers and manufacturers of polystyrene loose fill packaging. After January 1, 2012 these businesses were prohibited from selling or offering for sale polystyrene loose fill packaging materials in the State of California. In addition to the providers of EPS materials, the bill stipulates that no reimbursement to local agencies or school districts for costs associated with this mandate will be necessary, as is normally obligatory under the California Constitution.

Exemptions

The State of California exempts the sale of loose fill packaging materials by wholesalers and manufacturers if it meets the standard for the amount of recycled content used in its production. The requirement of 60 percent recycled content as of January 1, 2012 increased to 80 percent on January 1, 2014, with an ultimate goal of 100 percent recycled content by January 1, 2017 (Table 2).

Table 2: Implementation Schedule for AB-3025, *Solid waste: polystyrene loose fill packaging*

Percent Recycled Content	Date
60	Dec 31, 2013
80	Jan 1, 2014
100	Jan 1, 2017

Source: *Solid waste: polystyrene loosefill packaging*, 2008

Discussion

Although this legislation aims to close the loop on EPS loose fill packaging materials, it does not represent a true prohibition of this product. The bill bars the sale of EPS loose fill products in the State of California, but does not prohibit their manufacture altogether. Using recycled materials in loose fill packaging materials may increase the price of production, but it does not rid the state of these potentially toxic and difficult to recycle items.

By allowing the continued production of these materials, the State of California diverts them to another state. In 2004 there was an estimated 125 manufacturers of polystyrene located within the State of California (State of California Integrated Waste Management Board, 2004). Manufacturers are not able to sell any loose fill packaging materials they produce within the state unless it meets the standards laid out by this legislation. However, manufacturers have the ability to continue producing the prohibited polystyrene and transport it to be sold outside of California. Similarly, if manufacturers produce any polystyrene items outside of the realm of EPS loose fill packaging, their sale can continue indefinitely within the state.

The bill also creates no requirement for manufacturers of EPS products to include any postconsumer materials as part of the increasing recycled content. Instead manufac-

turers can use other sources of recycled material, including abnormal pieces that were not fit for sale and scrap. Although using scrap material reduces waste, including a requirement for the percentage of postconsumer materials within loose fill packaging could bring benefits to the few recycling facilities with the capacity to process these materials. A better established market for postconsumer EPS could make recycling the material more lucrative and widespread throughout the State of California and the West Coast in general.

Polystyrene Food Ware

Overview

Prohibitions on polystyrene food ware and containers are more commonly implemented in West Coast communities than prohibitions on polystyrene packaging materials (Appendix). Polystyrene food ware is single-use plastic produced with EPS that is commonly used for eating or to contain food (Figure 6). Nearly 100 cities and 10 counties in California have passed polystyrene food ware prohibitions (Figure 7), as well as 3 cities in Oregon, 2 cities and 1 county in Washington (Figure 8).

The Oregon State Legislature has also passed legislation concerning the use of EPS food ware in schools and has declared its prohibition as a state of emergency. No school will be permitted to provide EPS plates, trays, food containers or food packaging during any meal after July 1, 2021 (*Use of polystyrene foam in meal service; rules*, 2015). Schools that currently rely on any of these items are required to create a plan, outlining how they plan to make the switch to other materials before this date.

Figure 6: Compostable Food Ware (Left), Prohibited EPS Food Ware (Right)

Photo Credit: City of Menlo Park, 2013

Figure 7: California Municipalities with EPS Food Ware Prohibitions

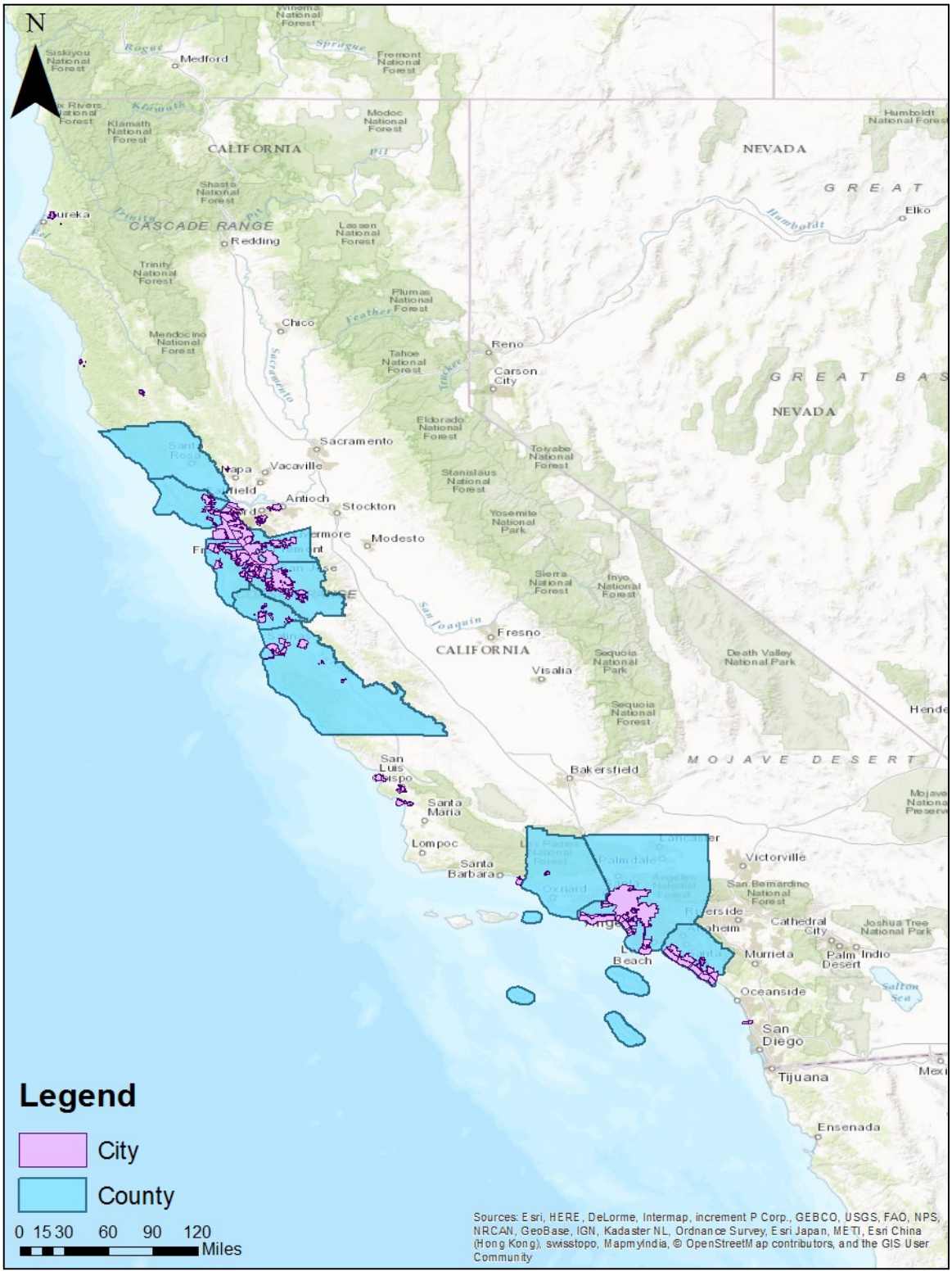
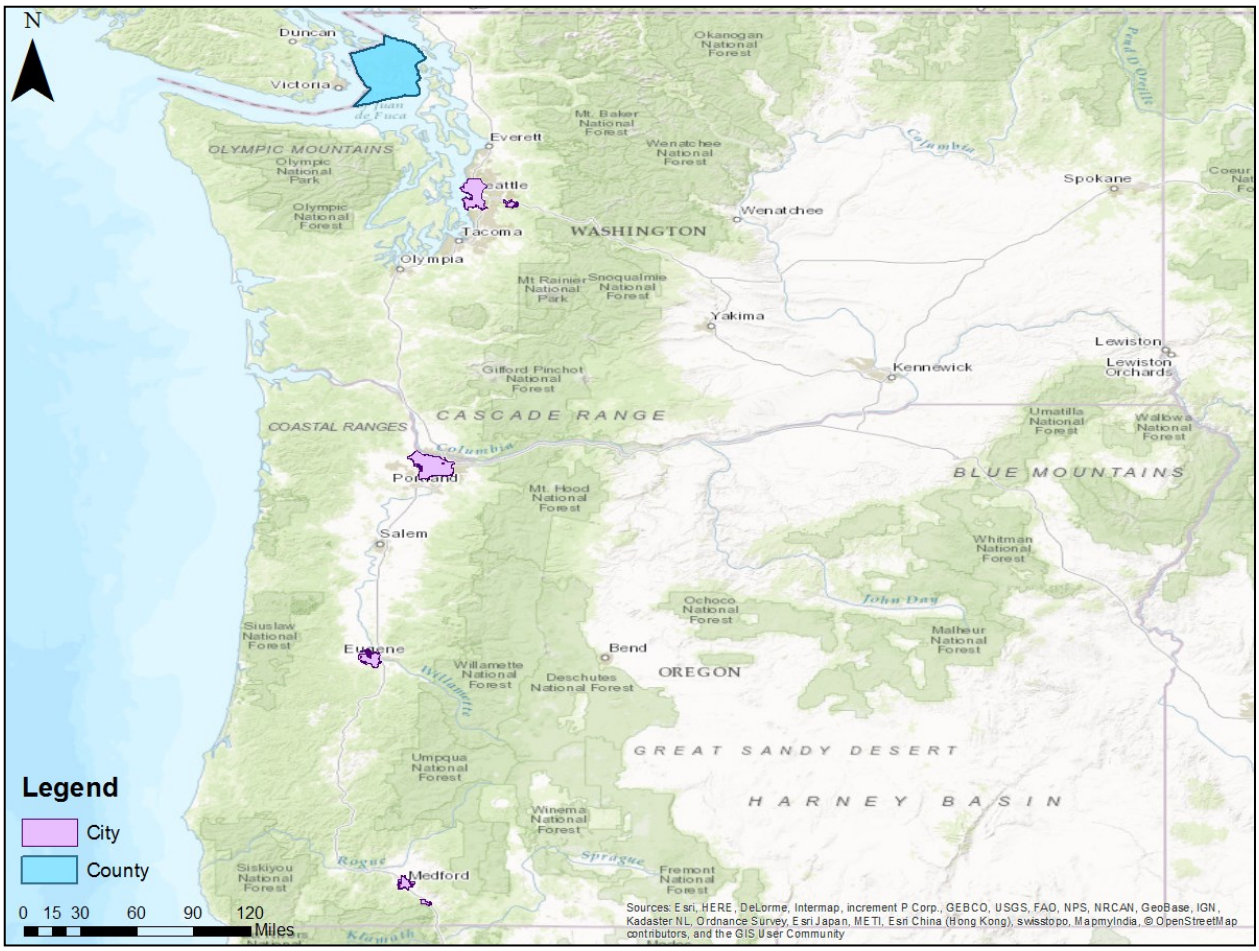


Figure 8: Washington & Oregon Munis. with EPS Food Ware Prohibitions



Alternatives

As an alternative to disposable polystyrene food ware, many communities implement specific requirements for business detailing the types of food ware that are allowed under the prohibition. More than 30 municipalities in California have included this requirement within the law, as well as the cities of Issaquah and Seattle in Washington. The most common required alternatives to polystyrene food ware are biodegradable or compostable items, such as paper products (Figure 8). Other communities also allow recyclable, reusable, or even returnable materials to be used for food.

Regulated Businesses

Unlike most prohibitions on plastic bags on the West Coast, polystyrene prohibitions are generally applied directly to restaurants and food vendors. A majority of these laws also apply to city or county facilities, with some only covering these locations and not restaurants within the community.

Exemptions

Exemptions to polystyrene food ware prohibitions apply to items, rather than businesses. One of the most common exemptions includes foods that are prepared and packaged outside of the city or county. Others include expanded polystyrene coolers and ice chests, and trays for raw meats and fish provided at a meat counter. A less common exemption in some municipalities specifies that polystyrene materials encased in a more durable material are not regulated by the prohibition.

Similar to plastic bag source reduction laws, several communities allow businesses to apply for an exemption based on any undue hardship brought on by the polystyrene prohibition. In addition, food vendors at San Francisco International Airport are allowed to continue to distribute polystyrene food containers under the polystyrene prohibition in place in San Mateo County, California.

Discussion

Despite varying exemptions found within polystyrene prohibitions, this type of legislation is fairly similar throughout California, Oregon, and Washington. The biggest gap exists within those communities where polystyrene food containers are only prohibited on city or county property. Although municipalities set a positive example for their community with this limited prohibition, the distribution of polystyrene food ware is able to continue outside of city or county property.

Other gaps include the exemptions placed on some items. Especially concerning is the exemption allowing the continued use of EPS for foods that are prepared and packaged outside of city or county limits, meaning only food prepared on site is regulated. Under this exemption, businesses such as grocery and convenience stores that package and ship food in EPS containers can continue to do so without restriction.

Also permitted under many polystyrene prohibitions on the West Coast are polystyrene coolers and ice chests. These items are commonly seen at outdoor events, in parks, or on beaches. Although they are intended for reuse, the durability of polystyrene ice

chests is questionable. They may break when exposed to the elements or handled roughly, creating the potential for large volumes of polystyrene to enter the environment without restraint.

IV. Microbeads

Overview

Microbeads are a kind of microplastic smaller than 5mm in diameter (*Waste management: plastic microbeads,* 2015). Microbeads are often marketed as exfoliants and can be found in a range of products, from toothpaste to face washes. Because of their small size (Figure 9), most waste water treatment facilities do not have the technology to filter microbeads out of water they discharge or reuse. Upon entering the marine environment these plastics transport POPs and can become a ready food source for marine life (Andrady, 2011; Ivar do Sul & Costa, 2014; Karapanagioti et al., 2011).

Figure 9: Microbeads

Photo Credit: Alliance for the Great Lakes; Pardes & Newton

Of the West Coast states, only California has enacted a prohibition on microbeads through AB-888. For the purposes of this legislation, microbeads are defined as any "intentionally added solid plastic particle measuring five millimeters or less in every dimension" (*Waste management: plastic microbeads*, 2015). Although this prohibition is not yet in force, microbeads will be required to be removed from a number of common commercial items, most notably to any personal care and rinse off products. The implementation of this bill will likely be surpassed by the Microbead-Free Waters Act of 2015, federal legislation that will prohibit the manufacture and sale of microbeads in personal care products across the United States. The final stages of this legislation go into effect in 2019, a year before AB-888 is fully implemented.

Discussion

Although the California microbead legislation is considered to be stringent, manufacturers are not required to use specific alternatives to microbeads in their products. This is the result of the removal of a provision requiring alternatives to microbeads to be made with natural products, such as fruit peels. Without this language in both California's AB-888 and the Microbead-Free Waters Act of 2015, the definition of microbeads as a solid plastic particle could be left open to interpretation.

Despite this gap, AB-888 improves on similar microbead legislation introduced in states such as Wisconsin and Illinois that allow the use of biodegradable plastics, called "bioplastics", to continue. Bioplastics are made from plant based materials and are meant to biodegrade when exposed to sunlight. However, when they enter the marine environment the degradability of bioplastics can become considerably slowed as debris or algal growth block sunlight, or the bacteria required to break the plastics down is not available within the environment (Accinelli et al., 2012; UNEP, 2015). However, AB-888 and the Microbead-Free Waters Act of 2015 close the gap by prohibiting the use of all types of plastic microbeads.

V. Rigid Plastic Packaging

Overview

The production of plastic packaging is regulated in both California and Oregon through California's Rigid Plastic Packaging Container Program and the Oregon Rigid Plastic Container Law. Unlike many other source reduction laws implemented on the West Coast, the regulations on this plastic packaging do not prohibit rigid plastic products, but instead require that they be produced with postconsumer materials.

Figure 10: Different Types of Rigid Plastic Packaging Containers

Photo Credit: CalRecycle, 2013

A rigid plastic packaging container (or a rigid plastic container as it is referred to in Oregon) is defined in California and Oregon regulations as a container having an inflexible shape with a minimum capacity of 8 fluid ounces and a maximum capacity of 5 gallons (Oregon Recycling Act, 1991; State of California, 1991). This packaging must be able to maintain its shape when it is holding any item, but may be collapsible when empty. Products such as bubble wrap, plastic bags, or plastic wrap therefore do not qualify as a rigid plastic packaging container (RPPC), as they are made of plastic films that are flexible and change shape. Examples of products that qualify as a RPPC can be seen in Figure 10. Unlike EPS or plastic bags, the infrastructure for these kinds of items to be recycled is much more substantial. However, they are generally produced with larger amounts of plastic in order to give the packaging appropriate structure.

Regulated Businesses

In both states RPPCs can be produced with at least 25 percent postconsumer recycled materials as a method of compliance. This decreases the amount of virgin plastic products used in the production of containers, as well as the amount of petroleum needed to create the plastic. No business or product manufacturer can sell or offer for sale an RPPC in California unless they meet this specification.

If a manufacturer can prove that it is infeasible for an RPPC to follow these specifications in California, the product must have a 45 percent recycling rate, be reusable, or be source reduced by 10 percent. Manufacturers must obtain a certification from the State of California that details each product line of RPPCs that they produce, signing a statement that they are complying with the law. Specific regulations apply to the floral industry, where RPPCs must be intended to be used for at least 2 years (*Recycling: plastic packaging containers*, 2006).

In Oregon, manufacturers are offered three compliance options, including source reduction through the use of 25 percent postconsumer materials in production. Other methods of compliance include guaranteeing a 25 percent recycling rate for the container, as well as reusing or refilling containers at least 5 times (*Oregon Recycling Act*, 1991).

Exemptions

In California, RPPCs that are intended to stay with the product they contain during shipment do not need to comply with this program if their intended destination is outside of the state. For both states any RPPCs that contain drugs or medical items, cosmetics, food, or infant formula are also exempt from the program, in addition to toxic or

hazardous materials. In Oregon those containers that are reduced in weight by 10 percent compared to the five years prior are also exempt, in addition to any bottles used for beverages.

Discussion

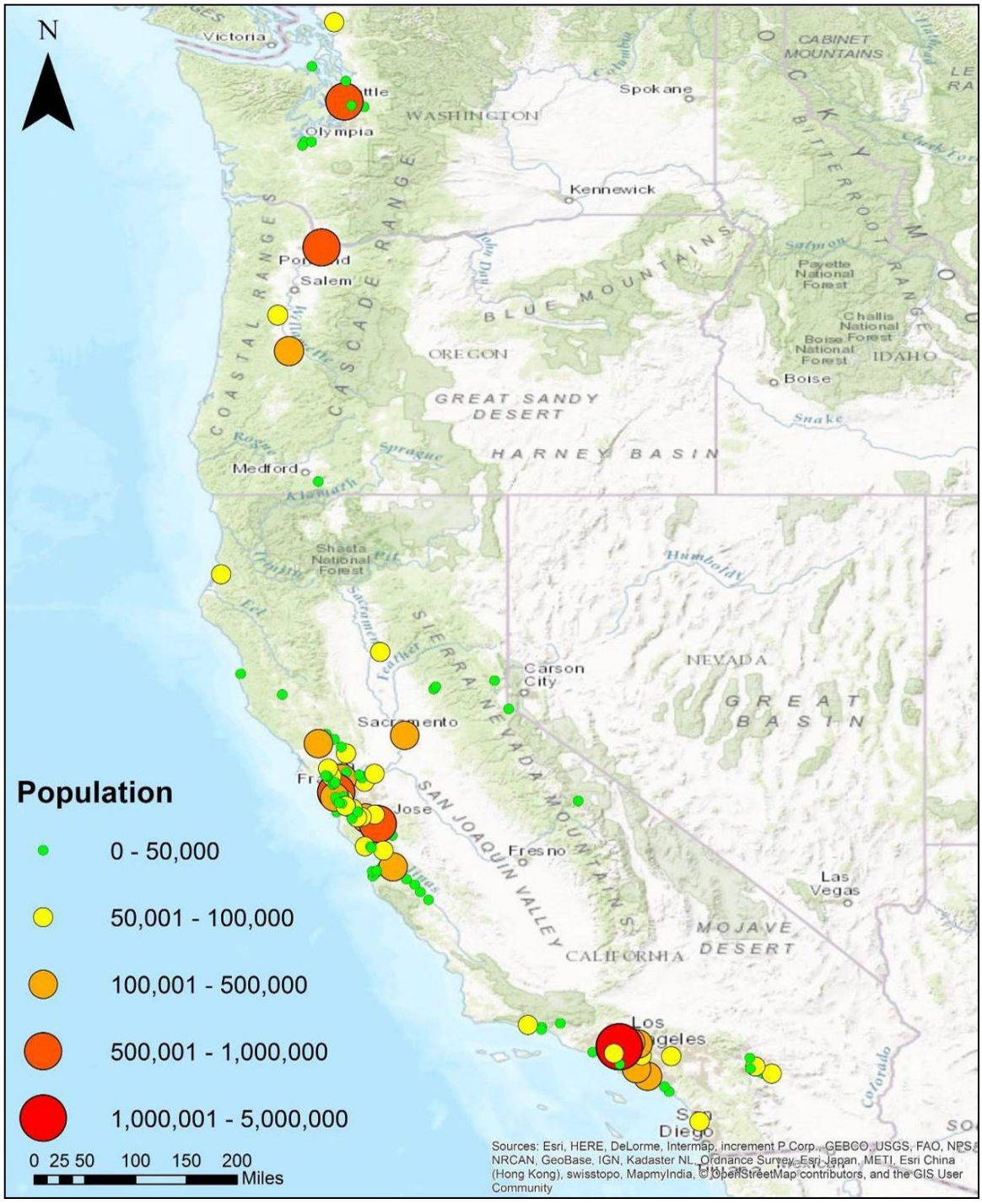
This type of legislation, although not a prohibition on RPPCs, does implement considerable requirements to reduce the amount of raw materials used in packaging in both Oregon and California, and thus the amount of plastic in the system that may become marine debris. The regulations on RPPCs in both states have the ability to considerably bolster the market for postconsumer plastics, thereby reducing the amount of new plastic being created. However, not all parts of RPPC regulations in Oregon and California act as a form of source reduction. In both states a method of compliance that requires manufacturers to ensure a certain rate of recycling does not prevent the amount of materials being used, but instead ensures that the RPPC items being produced will be recycled at the end of their life cycle.

VI. Discussion

Although gaps may exist within source reduction laws on the West Coast, this type of legislation has brought a reduction in impacts to the coastal economy and marine ecosystems within the region. With the use of prohibitions, fees, and regulations on common marine debris items, state and local governments can make significant changes to their communities by preventing the introduction of harmful consumer products into the environment. A significant portion of West Coast residents live in areas with source reduction laws pertaining to single-use plastic bags, EPS, microbeads, and plastic containers and the regulated population will increase as the reach of this kind of legislation continues to expand. Laws and regulations concerning microbeads and plastic containers have been passed at the state level in California, affecting manufacturers and a state population of over 37 million people. By 2019, federal legislation concerning microbeads will go into force that will not only affect West Coast States, but the entire country.

Though plastic bag prohibitions have not yet been implemented at the state level, many of the areas where these laws are currently in effect are large urban centers within the West Coast states, including Los Angeles, San Francisco, Portland, and Seattle (Figure 11). As a result, large populations are affected by these prohibitions, as can be seen in Table 3. In 2010 the population of the County of Los Angeles was near-

Figure 11: Population of West Coast Cities with Plastic Bag Prohibitions



The municipalities that have passed prohibitions on plastic bags in California contain 53 percent of the state's population. Assuming the residents of municipalities that have passed prohibitions continue to shop at stores within these cities and counties, the consumption of these disposables is reduced considerably. Large populations have also been affected in Oregon and Washington where 21 and 17 percent of the states' respective populations live in areas with plastic bag prohibitions in place and 45.4 percent of the total population in all three states.

Table 3: Population of Municipalities with Prohibitions on Plastic Bags

State	Population, Census, April 1, 2010	Percentage of Total State Population
California	19,729,524	53.0
Oregon	814,501	21.3
Washington	1,140,050	17.0
All	**21,684,075**	**45.4**

Population Data: United States Census Bureau, 2010

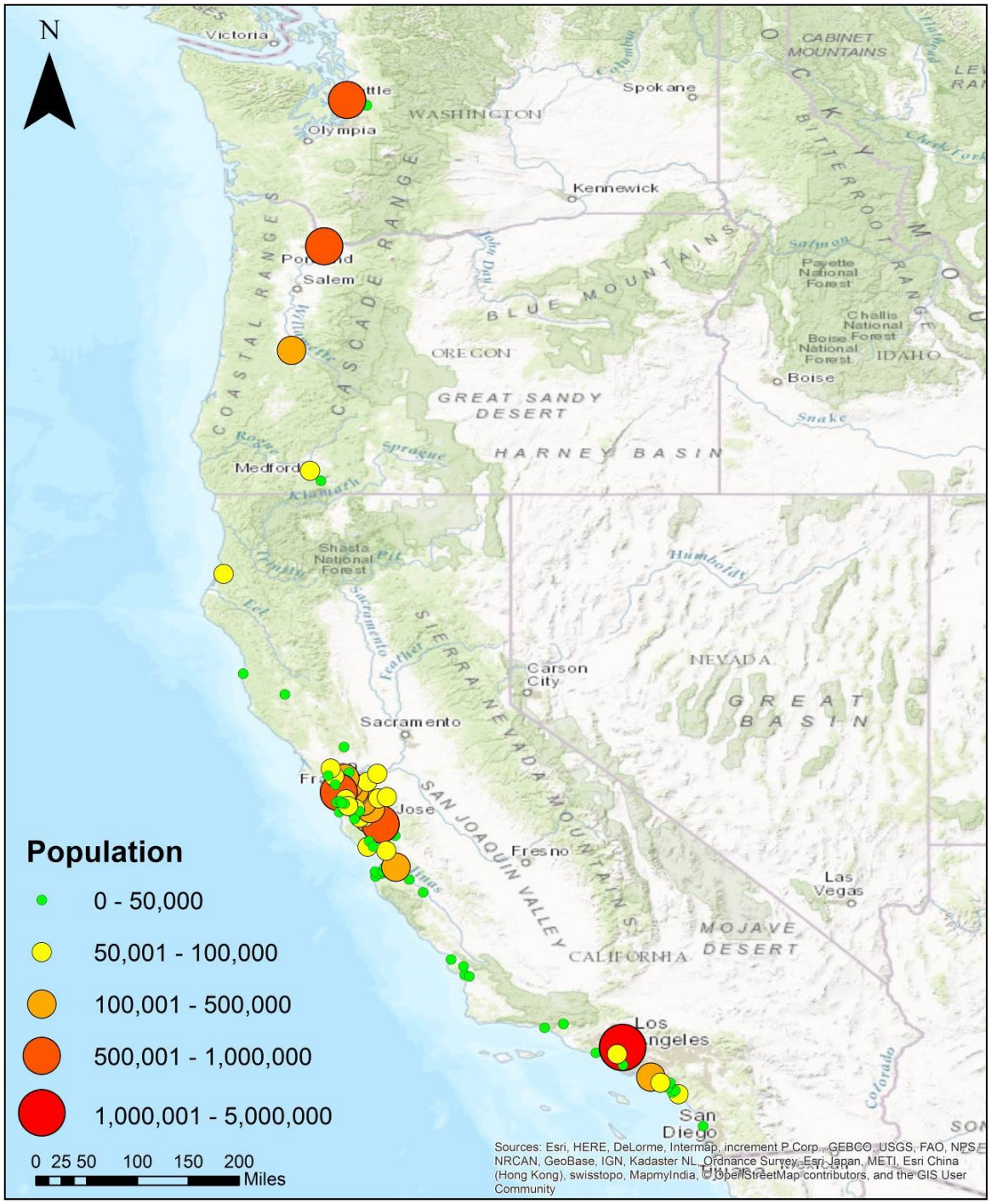
Although laws regarding the prohibition of EPS food ware have been passed in fewer municipalities on the West Coast than those concerning plastic bags, slightly larger populations have been influenced, with 45.7 percent of people on the West Coast living in areas with prohibitions on EPS food ware. Similar to plastic bags, EPS food ware prohibitions have gone into force within several urban centers on the West Coast where it has proven to be a common type of marine debris (Figure 12). Within California, 54.6 percent of the state's population lives within an area where a prohibition on EPS is in place. In Oregon 21.8 percent of the population is affected, as well as 9.7 percent in Washington (Table 4).

Table 4: Population of Municipalities with Prohibitions on EPS Food Ware

State	Population, Census, April 1, 2010	Percentage of Total State Population
California	19,729,524	53.0
Oregon	814,501	21.3
Washington	1,140,050	17.0
All	**21,684,075**	**45.4**

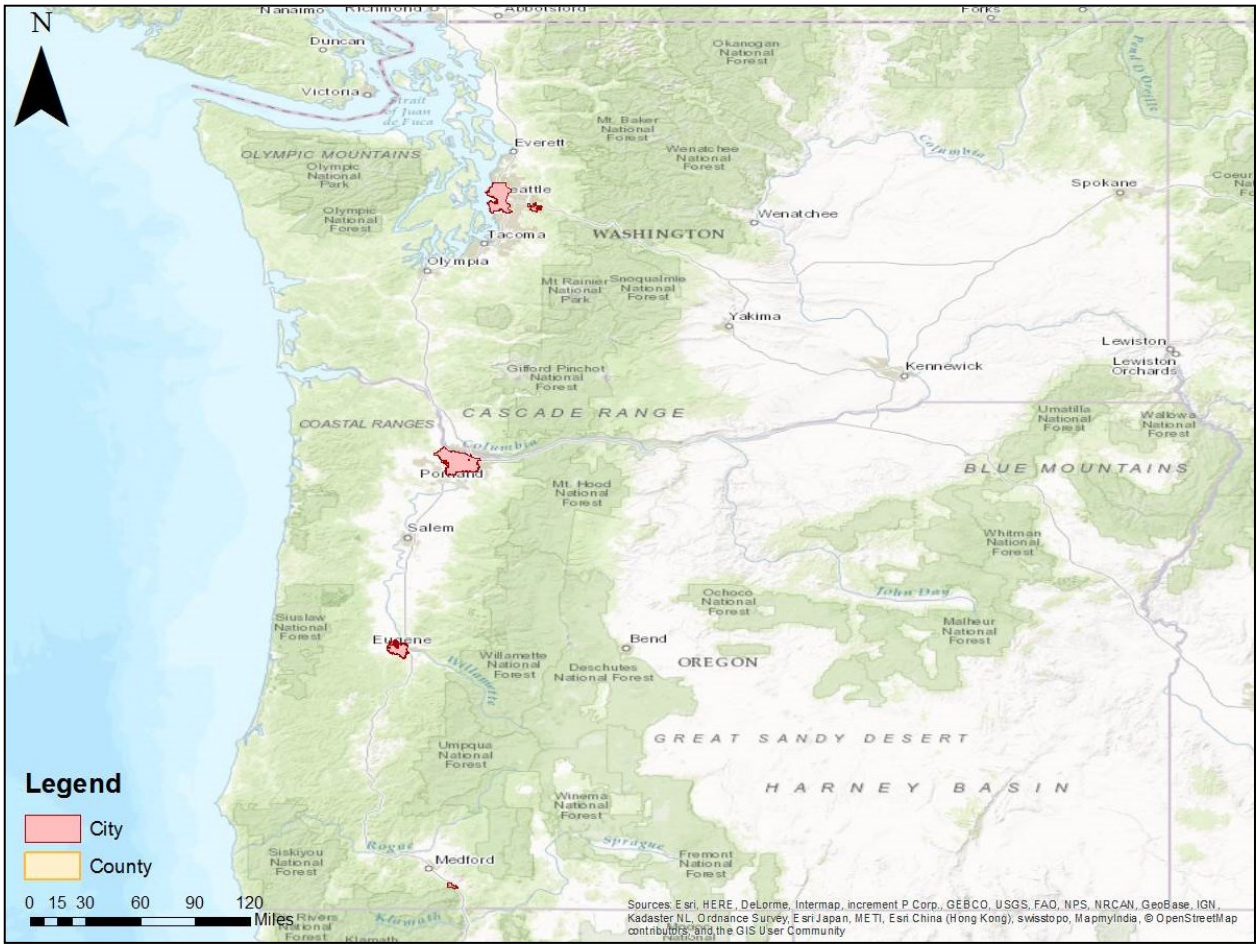
Population Data: United States Census Bureau, 2010

Figure 12: Population of West Coast Cities with EPS Food Ware Prohibitions



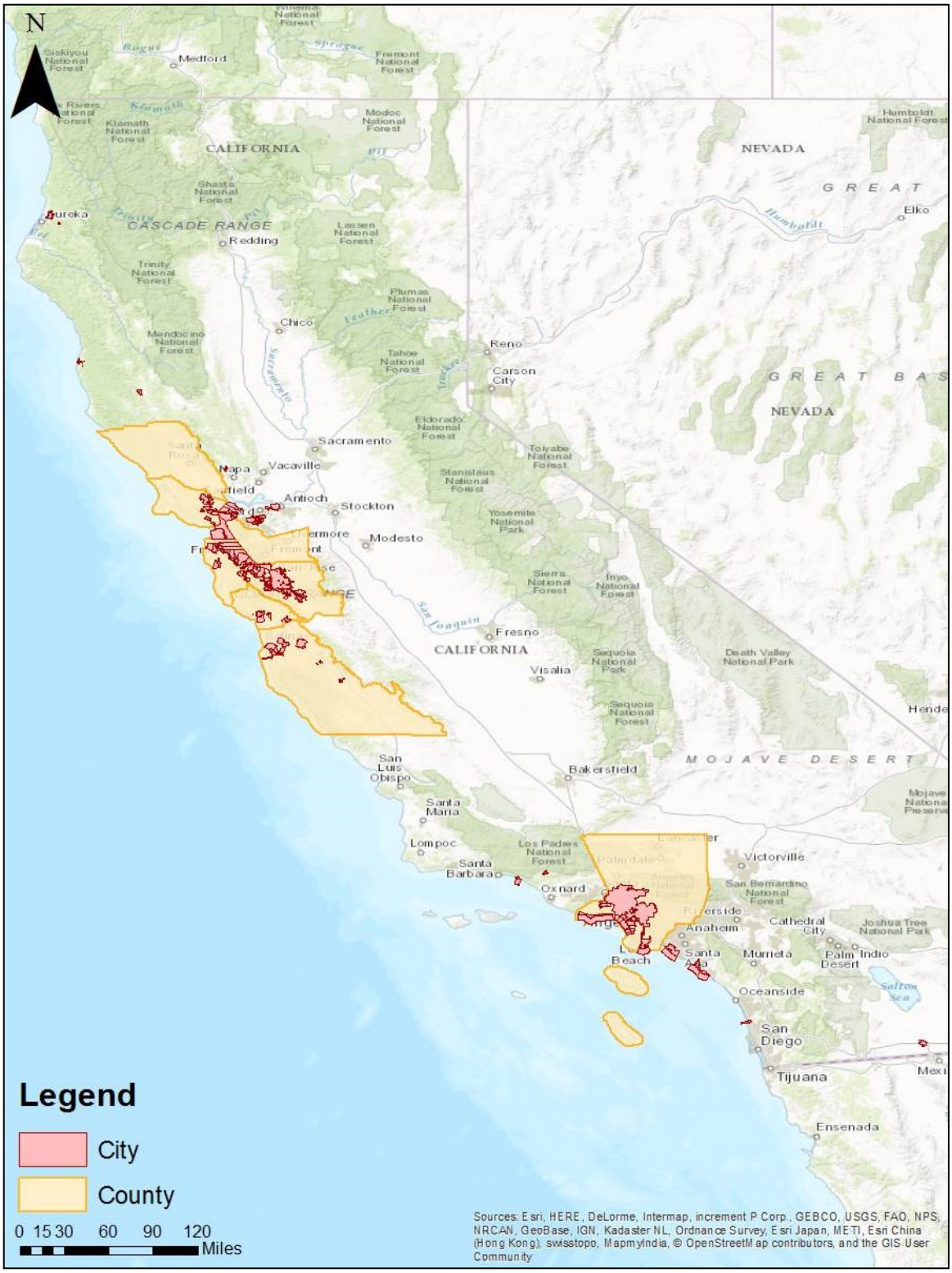
Overlap between areas with plastic bag and EPS prohibitions are the result of many local governments adopting both kinds of source reduction laws. 3 cities in Oregon and 2 cities in Washington have passed a version of both prohibitions (Figure 13), as well as 61 cities and 8 counties in California (Figure 14). A list of these municipalities can be found in the Appendix.

Figure 13: Washington & Oregon Municipalities with Both Plastic Bag & EPS Food Ware Prohibitions



.

Figure 14: California Municipalities with Both Plastic Bag & EPS Food Ware Prohibitions



Because of their wide reach on the West Coast, source reduction laws have compelled millions of consumers to come face to face with the problems of plastic waste and consider alternatives to single-use items. Consumers can no longer expect single-use items as a reality of life, but instead learn to consider the lifecycle of the products they use. When combined with education many consumers may even choose to actively change their behavior, rejecting other common marine debris and single-use items in other parts of their lives.

Source reduction laws have also had an effect on manufacturers as they must find a way to comply with changing rules. For example, instead of using microbeads in products, manufacturers will be forced to find alternatives, or simply remove these too often decorative additions to their products. Other manufacturers will need to increase the amount of postconsumer materials used in packaging in order to comply with the RPPC program. New requirements and prohibitions on certain items may also drive industry innovation in finding new, more environmentally friendly materials.

In order to further improve the success of source reduction laws on the West Coast, increased education, research, monitoring and coordination is needed to inform stakeholders and communities. Most importantly, consumers should be educated about the products and procedures that are prohibited through source reduction, as well as the gaps that exist within legislation. Empowered by this knowledge, consumers can consciously make the decision to close gaps themselves by refusing the uses of items such as thicker plastic bags or food items prepackaged in EPS.

However, the success of education efforts relies on accurate and improved information related to the composition and quantity of debris being introduced into the marine and terrestrial environment. Here exists a large disparity between municipalities with active litter abatement and survey activities, and those without the resources to quantify, share, and consistently monitor debris in the terrestrial environment, in waterways, or on the coast. For those municipalities with limited capacity, information may only exist through community volunteer cleanup activities. Despite serving as effective educational, community outreach, and debris removal efforts, cleanups are often performed in a nonscientific or inconsistent manner. As a result, current monitoring data does not always paint a true picture of the composition of debris that enters the environment from land based sources. With increased consistent and rigorous monitoring activities taking place on the West Coast, information on the products that are most common in the environment can be made available to consumers, promoting changes in behavior. Local and state governments can also use monitoring data in order to assess the effectiveness of source reduction laws by comparing the composition of litter before and after implementation.

As source reduction laws go into effect across the West Coast, research on the remaining impacts from gaps in legislation and other common single-use items that have not been regulated will become similarly important. In combination with monitoring data on the effectiveness of existing policies, impact assessments could encourage further source reduction, as policymakers identify and understand how gaps in legislation contribute to pollution within their communities. Armed with this wealth of knowledge, municipalities and state governments can create legislation that is stronger and more successful in the face of unsustainable alternatives to single-use products.

Governments should also be encouraged to work together in order to share best practices and barriers to compliance experienced in different communities. With such coordination, local governments can be encouraged to implement uniform rules and close gaps, not just between nearby municipalities, but across states as well. Uniform rules would also improve the implementation of legislation, improving compliance in the absence of wildly differing standards.

VII. Prospective Source Reduction

As West Coast municipalities work to prevent pollution in their communities, future targets for source reduction continue to be identified by local governments, educational institutions, non-governmental organizations (NGOs), and concerned communities.

Bottled Water

One of the most recent targets for source reduction in San Francisco are plastic water bottles. Plastic bottles and caps are common marine debris items that, similar to plastic bags, are among the top 10 items found annually during the International Coastal Cleanup (Ocean Conservancy, 2015). The City and County of San Francisco has passed legislation that prevents the sale of plastic water bottles of 21 fluid oz. or less on city property and at city events with more than 100 people in attendance (2014). In order to ensure that water continues to be available to people on city and county property and at public events, the bottled water legislation was accompanied by requirements to install bottle filling stations on drinking fountains (City and County of San Francisco, 2013).

Similar regulations regarding bottled water have been implemented on university campuses to a varying degree of success. At the University of Vermont it was determined that a prohibition on bottled water pushed students to consumer drinks with more calories and sugars as an alternative and more plastic bottles were disposed of on campus

(NPR, 2015). At the University of California San Diego a similar program has been approved that would prevent bottled water from being sold on campus, instead introducing boxed water and bottle filling stations as alternatives (Chong, 2016). Should these changes combat unintended consequences and the restrictions reduce litter, the City of San Francisco and the University of California San Diego could act as models for a movement away from bottle related debris, and towards reusable alternatives.

Cigarettes

Other items targeted for source reduction are cigarettes butts. These are consistently the top item found littered in urban areas and on beaches (Ocean Conservancy, 2015). They present a danger to water quality and marine life as their plastic filters absorb the concentrated toxins found within cigarettes (Healton et al., 2011). Should marine life ingest cigarette debris they could become sick or die from exposure.

Communities on the West Coast have begun combatting cigarette debris by working with Terracycle to recycle cigarettes, tobacco, filters, ash, and associated packaging into industrial plastic items (2016). As a method of prevention organizations like the Surfrider Foundation have partnered with San Francisco State University and the Cities of Huntington Beach and San Diego to install hundreds of cigarette ashcans in high traffic areas and near beaches. In San Diego a 65 percent reduction in cigarette litter was seen in the areas where cans were installed (Surfrider Foundation San Francisco Chapter, 2016). The success of this program has led to the installation of ashcans in major cities across the West Coast, including Seattle, Portland, and Los Angeles.

The City and County of San Francisco have taken prevention efforts one step further by placing a fee on cigarettes. The fee increased from $0.20 to $0.40 in 2016 and is used to fund litter abatement activities within the city, which cost more than $24,000,000 in 2009 (City and County of San Francisco). Widespread implementation of such a fee could amount to reductions in the usage of tobacco, and therefore tobacco related litter, on the West Coast as fees deter smokers from purchasing cigarettes. As has been seen in San Francisco, the fee could be applied to continued litter abatement activities that prevent these toxic substances from entering the marine environment, as well as ease the costs of implementing and enforcing such a law.

Conclusion

West Coast states and their communities are leading the charge to enact laws and policies designed to stop waste at its source. Success largely can be attributed to local governments, NGOs, and citizens that recognize the impacts of debris in the environment and have worked to reduce the amount of plastic waste present in their communities. However, outside of Washington, Oregon, and California, local governments are slowly losing their ability to make decisions related to waste as a number of states are working to preemptively prevent source reduction laws related to plastic on a local level. In Florida, Idaho, Missouri, Indiana, and Wisconsin, legislation has already been passed that would take this power away from local governments, making it exceedingly difficult to pass source reduction legislation within a state. Lawmakers in the States of Arizona, Georgia, Michigan, New York, and Texas have already attempted or are currently attempting as of June 2016 to pass similar legislation restricting local governments. With this type of legislation in place, local governments and their communities would not have the option of implementing a prohibition on plastic bags, or in some places regulation of any kind of plastic container. In the face of such legislation, it is important that governments, universities, and consumers within West Coast states continue to serve as an example of the power that source reduction laws can have in preventing the ever increasing impacts to the environment.

VIII. References

Acampora, H., Schuyler, Q. A., Townsend, K. A., & Hardesty, B. D. (2014). Comparing plastic ingestion in juvenile and adult stranded short-tailed shearwaters (Puffinus tenuirostris) in eastern Australia. *Marine Pollution Bulletin, 78*(1-2), 63-68. doi:http://dx.doi.org/10.1016/j.marpolbul.2013.11.009

Accinelli, C., Saccà, M. L., Mencarelli, M., & Vicari, A. (2012). Deterioration of bioplastic carrier bags in the environment and assessment of a new recycling alternative. *Chemosphere, 89*(2), 136-143. doi:10.1016/j.chemosphere.2012.05.028

Alliance for the Great Lakes. Microbeads Menace? Retrieved from http://www.greatlakes.org/microbeads

Anacostia River Clean Up and Protection Act of 2009, (2012).

Andrady, A. L. (2011). Microplastics in the marine environment. *Marine Pollution Bulletin, 62*(8), 1596-1605. doi:10.1016/j.marpolbul.2011.05.030

Auman, H. J., Ludwid, J. P., Giesy, J. P., & Colborn, T. (1997). Plastic ingestion by Laysan Albatross chicks on Sand Island, Midway Atoll, in 1994 and 1995. In G. R. a. d. Gales (Ed.), *Albatross Biology and Conservation*: Surrey Beatty & Sons, Chipping Norton.

Balazs, G. H. (1985, November 27-29, 1984). *Impact of ocean debris on marine turtles: entanglement and ingestion.* Paper presented at the Proceedings of the workshop on the fate and impact of marine debris, Honolulu, HI.

Browne, M. A., Dissanayake, A., Galloway, T. S., Lowe, D. M., & Thompson, R. C. (2008). Ingested Microscopic Plastic Translocates to the Circulatory System of the Mussel, *Mytilus edulis* (L). *Environmental Science and Technology, 42*, 5026-5031.

CalRecycle. (2009). *2009 Statewide Recycling Rate for Plastic Carryout Bags*. Retrieved from http://www.calrecycle.ca.gov/plastics/atstore/annualrate/2009rate.htm

CalRecycle (Producer). (2013). Rigid Plastic Packaging Container (RPPC) Program Webinar Presentation. Retrieved from http://www.calrecycle.ca.gov/video/2013/scripts/20130723RPPCProgramSlides.pdf

Chong, R. (2016). A.S. Council Votes to Ban Plastic Water Bottles on Campus. *The Guardian UCSD*. Retrieved from http://ucsdguardian.org/2016/06/03/a-s-council-votes-to-ban-plastic-water-bottles-on-campus/

Choy, C., & Drazen, J. (2013). Plastic for dinner? Observations of frequent debris ingestion by pelagic predatory fishes from the central North Pacific. *Marine Ecology Progress Series, 485*, 155-163. doi:10.3354/meps10342

City and County of San Francisco. (2009). *Cigarette Litter Abatement Fee*. San Francisco Administrative Code: American Legal Publishing Company Retrieved from http://library.amlegal.com/nxt/gateway.dll/California/administrative/administrativecode?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$anc=JD_Administrative.

City and County of San Francisco. (2013). *Drink Tap Ordinance*. San Francisco Environment Code: American legal Publishing Corporation Retrieved from http://library.amlegal.com/nxt/gateway.dll/California/environment/environmentcode?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$sync=1.

City and County of San Francisco. (2014). *San Francisco Bottled Water Ordinance*. San Francisco Environment Code: American Legal Publishing Corporation Retrieved from http://library.amlegal.com/nxt/gateway.dll/California/environment/environmentcode?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$sync=1.

City of Manhattan Beach. (2012). *Prohibition of plastic carry-out bags*. Manhattan Beach, California - Municipal Code: Municipal Code Corporation.

City of Menlo Park. (2013). *Public Works Environmental programs*. Retrieved from http://www.vwww.menloparklibrary.org/departments/env/Dep_env_bag_policy.html.

Dart Container Corporation. PS Foam Recycling. Retrieved from https://www.dartcontainer.com/environment/ps-foam-recycling/

Davis, W., III, & Murphy, A. G. (2015). Plastic in surface waters of the Inside Passage and beaches of the Salish

Sea in Washington State. *Marine Pollution Bulletin, 97*(1-2), 169-177. doi:10.1016/j.marpolbul.2015.06.019

de Stephanis, R., Giménez, J., Carpinelli, E., Gutierrez-Exposito, C., & Cañadas, A. (2013). As main meal for sperm whales: Plastics debris. *Marine Pollution Bulletin, 69*(1–2), 206-214. doi:http://dx.doi.org/10.1016/j.marpolbul.2013.01.033

Denuncio, P., Bastida, R., Dassis, M., Giardino, G., Gerpe, M., & Rodríguez, D. (2011). Plastic ingestion in Franciscana dolphins, Pontoporia blainvillei (Gervais and d'Orbigny, 1844), from Argentina. *Marine Pollution Bulletin, 62*(8), 1836-1841. doi:10.1016/j.marpolbul.2011.05.003

Earth Policy Institute. (2014). The Downfall of the Plastic Bag: A Global Picture. Retrieved from http://www.earth-policy.org/plan_b_updates/2014/update123

González Carman, V., Acha, E. M., Maxwell, S. M., Albareda, D., Campagna, C., & Mianzan, H. (2014). Young green turtles, Chelonia mydas, exposed to plastic in a frontal area of the SW Atlantic. *Marine Pollution Bulletin, 78*(1-2), 56-62. doi:http://dx.doi.org/10.1016/j.marpolbul.2013.11.012

Graham, E. R., & Thompson, J. T. (2009). Deposit- and suspension-feeding sea cucumbers (Echinodermata) ingest plastic fragments. *Journal of Experimental Marine Biology and Ecology, 368*(1), 22-29. Retrieved from http://www.sciencedirect.com/science/article/B6T8F-4TP7HDD-1/2/56d6d9f083405d6a729f6f99f3226ebd

Healton, C. G., Cummings, K. M., O'Connor, R. J., & Novotny, T. E. (2011). Butt really? The environmental impact of cigarettes. *Tobacco Control, 20*(Suppl 1), i1. doi:10.1136/tc.2011.043729

Hopewell, J., Dvorak, R., & Kosior, E. (2009). Plastics recycling: challenges and opportunities. *Philosophical Transactions of The Royal Society B, 364*, 2115-2126.

Ivar do Sul, J. A., & Costa, M. F. (2014). The present and future of microplastic pollution in the marine environment. *Environmental Pollution, 185*(0), 352-364. doi:http://dx.doi.org/10.1016/j.envpol.2013.10.036

Jambeck, J. R., Geyer, R., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., . . . Law, K. L. (2015). Plastic waste inputs from land into the ocean. *Science, 347*(6223), 768-771. doi:10.1126/science.1260352

Jantz, L. A., Morishige, C. L., Bruland, G. L., & Lepczyk, C. A. (2013). Ingestion of plastic marine debris by longnose lancetfish (Alepisaurus ferox) in the North Pacific Ocean. *Marine Pollution Bulletin, 69*(1–2), 97-104. doi:http://dx.doi.org/10.1016/j.marpolbul.2013.01.019

Karapanagioti, H. K., Endo, S., Ogata, Y., & Takada, H. (2011). Diffuse pollution by persistent organic pollutants as measured in plastic pellets sampled from various beaches in Greece. *Marine Pollution Bulletin, 62*(2), 312-317. doi:10.1016/j.marpolbul.2010.10.009

Kildow, J., & Colgan, C. S. (2005). *California's Ocean Economy*. Retrieved from http://www.oceaneconomics.org/download/

Koelmans, A. A., Besseling, E., & Foekema, E. M. (2014). Leaching of plastic additives to marine organisms. *Environmental Pollution, 187*(0), 49-54. doi:http://dx.doi.org/10.1016/j.envpol.2013.12.013

Leggett, C., Scherer, N., Curry, M., Bailey, R., & Haab, T. (2014). *Assessing the Economic Benefits of Reductions in Marine Debris: A Pilot Study of Beach Recreation in Orange County, California.*

Microbead-Free Waters Act of 2015, Pub. L. 114-114, 3129 Stat. 129, codified as amended at 21 U.S.C. § 331.

Moore, S. L., Gregorio, D., Carreon, M., Weisberg, S. B., & Leecaster, M. K. (2001). Composition and Distibution of Beach Debris in Orange County, California. *Marine Pollution Bulletin, 42*(3), 241-245.

National Oceanic and Atmospheric Administration. (2013). *National Coastal Population Report*. Retrieved from http://oceanservice.noaa.gov/facts/coastal-population-report.pdf

National Toxicology Program. (2014). *Report on Carcinogens*. Retrieved from http://ntp.niehs.nih.gov/pubhealth/roc/roc13/index.html

(2015, October 14, 2015). *University Of Vermont's Ban On Bottled Water Backfires* [Radio]. Retrieved from http://www.npr.org/2015/10/14/448697099/university-of-vermonts-ban-on-bottled-water-backfires

Ocean Conservancy. (2015). *Trash Free Seas Every Piece, Every Person 2015 Report*. Retrieved from http://www.oceanconservancy.org/our-work/international-coastal-cleanup/2015-ocean-trash-index.html

Ogata, Y., Takada, H., Mizukawa, K., Hirai, H., Iwasa, S., Endo, S., . . . Thompson, R. C. (2009). International Pellet Watch: Global monitoring of persistent organic pollutants (POPs) in coastal waters. 1. Initial phase data on PCBs, DDTs, and HCHs. *Marine Pollution Bulletin, 58*(10), 1437-1446. Retrieved from http://www.sciencedirect.com/science/article/B6V6N-4WVK2NM-1/2/cc6e647e277aadbb41708ed5baaf397b

Oregon Recycling Act, Or. Rev. Stat. § 459A.650 (1991).

Pardes, A., & Newton, T. A Farewell to Microbeads. Retrieved from https://intothegloss.com/2015/12/microbeads-in-beauty-products/

Pettit, T. N., Grant, G. S., & Whittow, G. C. (1981). Ingestion of Plastics by Laysan Albatross. *The Auk, 98*(4), 839-841. Retrieved from http://links.jstor.org/sici?sici=0004-8038%28198110%2998%3A4%3C839%3AIOPBLA%3E2.0.CO%3B2-5

Recycling: plastic packaging containers Cal. Pub. Res. Code § 42310.3 et. seq. (2006).

Rochman, C. M., Hoh, E., Kurobe, T., & Teh, S. J. (2013). Ingested plastic transfers hazardous chemicals to fish and induces hepatic stress. *Sci. Rep., 3*. doi:10.1038/srep03263 http://www.nature.com/srep/2013/131121/srep03263/abs/srep03263.html#supplementary-information

Rochman, C. M., Kurobe, T., Flores, I., & Teh, S. J. (2014). Early warning signs of endocrine disruption in adult fish from the ingestion of polyethylene with and without sorbed chemical pollutants from the marine environment. *Science of The Total Environment, 493*(0), 656-661. doi:http://dx.doi.org/10.1016/j.scitotenv.2014.06.051

Rochman, C. M., Manzano, C., Hentschel, B. T., Simonich, S. L. M., & Hoh, E. (2013). Polystyrene Plastic: A Source and Sink for Polycyclic Aromatic Hydrocarbons in the Marine Environment. *Environmental Science & Technology, 47*(24), 13976-13984. doi:10.1021/es403605f

Romanow, K. (2012). *Bring Your Own Bag Ordinance Implementation Results and Actions to Reudce EPS Foam Food Ware*. Retrieved from http://www3.sanjoseca.gov/clerk/CommitteeAgenda/TE/20121203/TE20121203_d5.pdf

Rosevelt, C., Los Huertos, M., Garza, C., & Nevins, H. M. (2013). Marine debris in central California: Quantifying type and abundance of beach litter in Monterey Bay, CA. *Marine Pollution Bulletin, 71*(1–2), 299-306. doi:http://dx.doi.org/10.1016/j.marpolbul.2013.01.015

Sapphos Environmental, Inc.,. (2010). *Economic Impact Analysis Proposed Ban on Plastic Carryout Bags in Los Angeles County* Retrieved from http://ladpw.org/epd/aboutthebag/PDF/SocioEconomicImpactStudy_final.pdf

Satir, F. (2009). Microplastics, Macroproblem. *Terrain*. http://www.tacoma.washington.edu/terrain/microplastics.html Retrieved from http://www.tacoma.washington.edu/terrain/microplastics.html

Schuyler, Q. A., Wilcox, C., Townsend, K., Hardesty, B. D., & Marshall, N. J. (2014). Mistaken identity? Visual similarities of marine debris to natural prey items of sea turtles. *BMC Ecology, 14*(14). doi:10.1186/1472-6785-14-14

Secchi, E. R., & Zarzur, S. (1999). Plastic debris ingested by a Blainville's beaked whale, Mesoplodon densirostris, washed ashore in Brazil. *Aquatic Mammals, 25*(1), 21-24.

Seminoff, J. A., Resendiz, A., & Nichols, W. J. (2002). Diet of East Pacific Green Turtles (*Chelonia mydas*) in the Central Gulf of California, Mexico. *Journal of Herpetology, 36*(3), 447-453.

Solid waste: polystyrene loosefill packaging, Cal. Pub. Res. Code § 42390 et. seq. (2008).

Solid waste: single-use carryout bags, Cal. Pub. Res. Code § 42280 et. seq. (2014)

State of California Integrated Waste Management Board. (2004). *Use and Disposal of Polystyrene in California* Retrieved from http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1011

Stickel, B. H., Jahn, A., & Kier, B. (2013). *Waste in Our Water: The Annual Cost to California Communities of Reducing Litter that Pollutes our Waterways*. Retrieved from https://www.nrdc.org/sites/default/files/oce_13082701a.pdf

Stickel, B. H., Jahn, A., & Kier, W. (2012). *The Cost to West Coast Communities of Dealing with Trash, Reducing Marine Debris*.

Surfrider Foundation. Plastic Bag Bans and Fees. Retrieved from http://www.surfrider.org/pages/plastic-bag-bans-fees

Surfrider Foundation San Francisco Chapter. (2016). Hold on to Your Butt. Retrieved from https://sf.surfrider.org/what-we-do/holdontoyourbutt/

Terracycle. (2016). Cigarette Waste Recycling Program. Retrieved from https://www.terracycle.com/en-US/brigades/cigarette-waste-brigade#how-it-works

Town of Fairfax. (2007). *Plastic Bag Reduction*. Retrieved from Fairfax Municipal Code of Ordinances.

The Worldwatch Institute. (2004). *The State of the World 2004*. New York: WW Norton & Company.

ULINE. Paper Grocery Bags. Retrieved from http://www.uline.com/Product/Detail/S-18692/Retail-Bags-Paper/Paper-Grocery-Bags-12-x-7-x-17-1-6-Barrel-Flat-Handle-Kraft

UNEP. (2015). *Biodegradable Plastics & Marine Litter Misconceptions, Concerns, and Impacts on Marine Environments*. Retrieved from: http://www.unep.org/gpa/documents/publications/BiodegradablePlastics.pdf

United States Census Bureau. (2010). *QuickFacts*. Retrieved from: http://www.census.gov/quickfacts/

Use of polystyrene foam in meal service; rules, Or. Rev. Stat. § 336.445 (2015).

USEPA. (1995). Decision Maker's Guide to Solid Waste Management. *II*. Retrieved from http://nepis.epa.gov/Exe/ZyNET.exe/10000VWJ.txt?ZyActionD=ZyDocument&Client=EPA&Index=1995%20Thru%201999&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C95THRU99%5CTXT%5C00000000%5C10000VWJ.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=p%7Cf&DefSeekPage=x&SearchBack

Van, A., Rochman, C. M., Flores, E. M., Hill, K. L., Vargas, E., Vargas, S. A., & Hoh, E. (2012). Persistent organic pollutants in plastic marine debris found on beaches in San Diego, California. *Chemosphere, 86*(3), 258-263. doi:10.1016/j.chemosphere.2011.09.039

Van Cauwenberghe, L., & Janssen, C. R. (2014). Microplastics in bivalves cultured for human consumption. *Environmental Pollution, 193*(0), 65-70. doi:http://dx.doi.org/10.1016/j.envpol.2014.06.010

Velzeboer, I., Kwadijk, C. J. A. F., & Koelmans, A. A. (2014). Strong Sorption of PCBs to Nanoplastics, Microplastics, Carbon Nanotubes, and Fullerenes. *Environmental Science & Technology*. doi:10.1021/es405721v

Washington's Coastal Zone Management Program. (2001). *Managing Washington's Coast*. Retrieved from https://fortress.wa.gov/ecy/publications/documents/0006029.pdf

Waste management: plastic microbeads, Cal. Pub. Res. Code § 42360 et. seq. (2015).

Wegner, A. B., E., Foekema, E. M., Kamermans, P., & Koelmans, A. A. (2012). Effects of nanopolystyrene on the feeding behavior of the blue mussel (Mytilus edulis L.). *Environmental Toxicology & Chemistry, 31*(11), 2490-2497. Retrieved from http://onlinelibrary.wiley.com/doi/10.1002/etc.1984/pdf

Whiting, S. D. (1998). Types and sources of marine debris in Fog Bay, Northern Australia. *Marine Pollution Bulletin, 36*(11), 904-910. Retrieved from http://www.sciencedirect.com/science/article/B6V6N-3VRV0GG-7/2/501eae76bd372540df08456d4b604dba

Wikipedia. Foam Peanut. Retrieved from https://en.wikipedia.org/wiki/Foam_peanut

Appendix:

The following are tables of municipalities that have passed plastic bag, EPS food ware, and both plastic bag and EPS food ware prohibitions.

California Cities

City	Plastic Bag	EPS	Both
Alameda		✓	
Albany		✓	
Aliso Viejo		✓	
American Canyon	✓		
Arcata	✓	✓	✓
Arroyo Grande		✓	
Belmont	✓	✓	✓
Belvedere	✓		
Berkeley		✓	
Beverly Hills	✓		
Brisbane	✓		
Burlingame	✓	✓	✓
Calabasas	✓	✓	✓
Calistoga	✓		
Campbell	✓	✓	✓
Capitola	✓	✓	✓
Carmel-by-the-sea	✓	✓	✓
Carpinteria	✓	✓	✓
Cathedral City	✓		
Chico	✓		
Colma	✓		
Corte Madera	✓		
Culver City	✓		
Cupertino	✓		
Daly City	✓		
Dana Point	✓	✓	✓
Davis	✓		

City	Plastic Bag	EPS	Both
Del Mar	✓		
Del Rey Oaks		✓	
Desert Hot Springs	✓		
East Palo Alto	✓		
El Cerrito	✓	✓	✓
Emeryville		✓	
Encinitas	✓		
Fairfax	✓	✓	✓
Fort Bragg	✓	✓	✓
Foster City	✓	✓	✓
Fremont		✓	
Glendale	✓		
Gonzales	✓	✓	✓
Grass Valley	✓		
Greenfield	✓	✓	✓
Half Moon Bay	✓	✓	✓
Hayward		✓	
Hercules	✓	✓	✓
Hermosa Beach	✓	✓	✓
Huntington Beach	✓	✓	✓
Indio	✓		
King City	✓		
Lafayette	✓	✓	✓
Laguna Beach	✓	✓	✓
Laguna Woods		✓	
Larkspur	✓		
Livermore		✓	
Long Beach	✓		
Los Altos	✓	✓	✓
Los Altos Hills		✓	
Los Angeles	✓	✓	✓

City	Plastic Bag	EPS	Both
Los Gatos	✓	✓	✓
Malibu	✓	✓	✓
Mammoth Lakes	✓		
Manhattan Beach	✓	✓	✓
Marina	✓	✓	✓
Martinez	✓		
Menlo Park	✓	✓	✓
Mill Valley	✓	✓	✓
Millbrae	✓	✓	✓
Milpitas	✓		
Monrovia	✓		
Monterey	✓	✓	✓
Morgan Hill	✓	✓	✓
Morro Bay		✓	
Mountain View	✓	✓	✓
Napa	✓		
Nevada City	✓		
Newport Beach		✓	
Novato	✓	✓	✓
Oakland		✓	
Ojai	✓	✓	✓
Pacific Grove	✓	✓	✓
Pacifica	✓	✓	✓
Palm Desert	✓		
Palm Springs	✓		
Palo Alto	✓	✓	✓
Pasadena	✓		
Pico Rivera	✓		
Pismo Beach		✓	
Pittsburg	✓	✓	✓
Pleasant Hill	✓		

City	Plastic Bag	EPS	Both
Pleasanton		✓	
Portola Valley	✓	✓	✓
Redwood City	✓	✓	✓
Richmond	✓	✓	✓
Ross	✓		
Sacramento	✓		
Salinas	✓	✓	✓
San Anselmo	✓		
San Bruno	✓	✓	✓
San Carlos	✓	✓	✓
San Clemente		✓	
San Francisco	✓	✓	✓
San Jose	✓	✓	✓
San Juan Capistrano		✓	
San Leandro		✓	
San Luis Obispo		✓	
San Mateo	✓	✓	✓
San Pablo	✓		
San Rafael	✓	✓	✓
Santa Barbara	✓		
Santa Clara	✓		
Santa Cruz	✓	✓	✓
Santa Monica	✓	✓	✓
Santa Rosa	✓		
Sausalito	✓	✓	✓
Scotts Valley		✓	
Seaside	✓	✓	✓
Solana Beach	✓	✓	✓
Soledad	✓		
South Lake Tahoe	✓		
South Pasadena	✓		

City	Plastic Bag	EPS	Both
South San Francisco	✓	✓	✓
St. Helena	✓		
Sunnyvale	✓	✓	✓
Tiburon	✓		
Truckee	✓		
Ukiah	✓	✓	✓
Walnut Creek	✓	✓	✓
Watsonville	✓	✓	✓
West Hollywood	✓	✓	✓
Yountville	✓	✓	✓
Total:	**108**	**83**	**61**

California Counties

County	Plastic Bag	EPS	Both
Alameda	✓	✓	✓
Los Angeles	✓	✓	✓
Marin	✓	✓	✓
Mendocino	✓		
Monterey	✓	✓	✓
Orange		✓	
Napa	✓		
Sacramento	✓		
San Luis Obispo	✓		
San Mateo	✓	✓	✓
Santa Barbara	✓		
Santa Clara	✓	✓	✓
Santa Cruz	✓	✓	✓
Sonoma	✓	✓	✓
Ventura		✓	
Total:	**13**	**10**	**8**

Oregon Cities

City	Plastic Bag	EPS	Both
Ashland	✓	✓	✓
Corvallis	✓		
Eugene	✓	✓	✓
Medford		✓	
Portland	✓	✓	✓
Total:	**4**	**4**	**3**

Washington Cities

City	Plastic Bag	EPS	Both
Bainbridge Island	✓		
Bellingham	✓		
Edmonds	✓		
Issaquah	✓	✓	✓
Kirkland	✓		
Lacey	✓		
Mercer Island	✓		
Mukilteo	✓		
Olympia	✓		
Port Townsend	✓		
Seattle	✓	✓	✓
Shoreline	✓		
Tumwater	✓		
Total:	**13**	**2**	**2**

Washington Counties

County	Plastic Bag	EPS	Both
San Juan		✓	
Thurston	✓		
Total:	**1**	**1**	**0**