An Implementation Strategy for the California Ocean Protection Council Resolution to Reduce and Prevent Ocean Litter



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for the
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in consultation with the
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Ocean Litter – Quantity, Impacts, Costs

Ocean litter – also commonly referred to as "marine debris" – is a persistent and growing problem worldwide.[1] The general composition of ocean litter is 60-80% plastics, although it has reached 90-95% in some areas.[2] Plastic debris in an area north of Hawaii known as the Northwest Pacific Gyre has increased 5-fold in the last 10 years[3]. Similarly, off Japan's coast, researchers found that floating particles of plastic debris increased 10-fold in 10 years from the 1970s through 1980s, and then 10-fold again every 2-3 years in the 1990s.[4] In the Southern Ocean, the amount of plastic debris increased 100 times during the early 1990s.[5] These are just a few examples of an expanding body of research that demonstrate that, despite the MARPOL international treaty prohibition on dumping plastics at sea,[6] debris in the oceans is increasing at an alarming rate. This is due to the fact that 80% of the debris comes from land-based sources, particularly trash and plastic litter in urban runoff,[7] and the generation of trash and waste is increasing.

During the last 10 years, the Southern California Coastal Water Research Project (SCCWRP) and the Algalita Marine Research Foundation (AMRF) have conducted studies to identify and quantify ocean litter in 4 marine habitats: the beach, the ocean bottom, the ocean water column, and the ocean surface. The ocean bottom is dominated by larger material, such as fishing gear and beverage containers. The water column contains mostly plastic fragments, small enough to be suspended by ocean currents. The ocean surface contains fragments and whole items of floating plastic trash. The beach environment contains a combination of different materials that differ in size and composition according to distance from the water's edge. The environmental impacts associated with ocean litter will vary by habitat with aesthetic issues being more important on beaches, and food web concerns being more significant for the small surface material.[8]

In the ocean, plastic debris injures and kills fish, seabirds and marine mammals. Ocean litter is known to have affected at least 267 species worldwide, including 86% of all sea turtle species, 44% of all seabird species and 43% of all marine mammal species. The impacts include fatalities as a result of ingestion, starvation, suffocation, infection, drowning, and entanglement.[9] Seabirds that feed on the ocean surface are especially prone to ingesting plastic debris that floats. The laysan albatross, black-footed albatross, and northern fulmar frequently ingest a wide array of plastics including bottle caps, cigarette lighters, toys, party balloons, and fragments of consumer goods. Adults feed these items to their chicks that often die of starvation because their stomachs become filled with debris.[10] Other species – such as phalaropes, shearwaters and auklets – ingest small fragments of plastic consumer products and pre-production industrial plastic pellets.[11]

Because persistent organic pollutants in the marine environment attach to plastic debris, plastic pellets and fragments have been found to be a transport mechanism for toxic substances in the marine environment.[12] Floating and migrating plastic debris has also been found to transport invasive marine species.[13]

Economic impacts associated with ocean litter are also significant. For example, in the 2005/06

fiscal year Caltrans alone spent $55 million to remove litter and debris from roadsides and highways, the vast majority of which ultimately drain to the ocean. The County of Los Angeles (L.A.) Department of Public Works and the Flood Control District annually spend $18 million per year on street sweeping, catch basin cleanouts, cleanup programs, and litter prevention and education efforts.[14] Coastal communities spend considerable funds on beach cleaning, and in some areas, cleaning trash out of catch basins and other structures designed to trap trash from storm water. For example, L.A. County collects over 4,000 tons of trash annually on its beaches. In 1994, L.A. County spent over $4 million to clean 31 miles of beaches.[15]

In addition, in 2001, the L.A. Regional Water Quality Control Board adopted a trash Total Maximum Daily Load (TMDL) for the Los Angeles River and Ballona Creek that requires municipalities and Caltrans to implement a 10-year plan to reduce the amount of trash discharged to these water-bodies to a level of zero. Caltrans' projected annual costs for complying with this TMDL for highways is $300 million while the City of L.A. projects that its TMDL compliance costs are $125 million per year.[16]

The National Ocean Economics Program calculated the value of California's "ocean-dependent economy" at $46 billion. The largest portion of this figure was attributable to recreation.[17] While California has never assessed the loss of tourism dollars associated with littered beaches and coastal areas, we can look across the country for some sense of what the impact might be. A major release of trash from New York landfills to the ocean caused major debris incidents on New Jersey beaches and resulted in an estimated loss of $1 billion, primarily due to decreased coastal visitation in 1987 and 1988.

Background on the OPC Resolution to Reduce and Prevent Ocean Litter

Recognizing the need for immediate and meaningful action, the Ocean Protection Council (OPC) adopted a resolution on "Reducing and Preventing Marine Debris" (hereafter, "the OPC Resolution") on February 8, 2007. This implementation strategy is designed to provide a pathway to implementing the recommendations in the OPC Resolution.

The OPC was created by the California Ocean Protection Act, signed into law by Governor Schwarzenegger in September 2004, and is made up of the following council members: Secretary for Resources Mike Chrisman, who serves as the OPC Chair; Secretary for Environmental Protection Linda Adams; the State Lands Commission Chair, a position occupied in alternate years by the Lieutenant Governor and the State Controller; Assemblymember Pedro Nava; Senator Darrel Steinberg; and two members of the public, former San Diego Mayor Susan Golding and Geraldine Knatz (currently the L.A. Port Executive Director).

The OPC Resolution recognizes that ocean litter poses serious threats to the health of California's coastal waters and the world oceans, significantly impacts marine wildlife, causes state and local agencies to spend millions of dollars each year to clean beaches, rivers and storm water, and poses threats to public health and welfare. The OPC Resolution identified 13 priority recommendations for reducing and preventing ocean litter.*

* The thirteen actions are as follows: (1) Reduce the sources of plastic ocean litter; (2) Increase enforcement of anti-litter laws generally and enforcement of laws to eliminate pollution by plastic resin pellets (nurdles); (3) Seek innovative methods to reduce plastic waste; (4) Continue and expand watershed–based cleanups; (5) Increase the availability of trash, recycling, and cigarette butt receptacles at public places, schools, and

The OPC Resolution called for the OPC to chair a Marine Debris Steering Committee (hereafter, "Steering Committee") to prepare a plan to implement the OPC Resolution.[18] The Committee, comprised of representatives from state agencies, including the California Coastal Commission (CCC), California Integrated Waste Management Board (CIWMB), Department of Conservation (DOC), Department of Toxic Substances Control (DTSC), State Water Resources Control Board (SWRCB or Water Board), California Department of Parks and Recreation, and Department of Transportation (Caltrans), was charged with reporting back to the OPC on its recommendations. This document is composed of those recommendations.

Overview of the Implementation Strategy

This Implementation Strategy organizes specific actions to reduce ocean litter into the following four objectives:

1. **Prevent and control litter and plastic debris** (*changing individual behavior)*
2. **Reduce single-use plastic packaging and promote sustainable packaging** *(changing producer behavior)*
3. **Cleanup and remove litter** *(engaging communities)*
4. **Coordinate efforts with other Jurisdictions in the Pacific region** *(engaging other regions)*

Each objective is accompanied by specific actions and implementation tasks, as well as the obstacles related to each action. A chart of the actions, implementation tasks and obstacles is provided for each objective. The chart also indicates which recommendation of the OPC Resolution would be implemented by the proposed action. Implementers of the actions contained in this strategy will be asked to report back to the OPC on progress annually through updates provided by the Steering Committee.

Essential Actions for Measurable Success

This implementation strategy recommends many actions that the Steering Committee views as necessary to accomplish the goals of the OPC Resolution. However, there are a few key actions that the Steering Committee proposes as essential to achieving measurable success.

Because the majority of the ocean litter problem (80%) comes from land-based sources, the greatest potential for success in reducing ocean litter involves eliminating the land-based sources. Litter is the primary component of land-based sources of ocean litter and the biggest component of litter is packaging waste. [19] Therefore, the highest priorities of this strategy are actions that focus on prevention of packaging waste. Past efforts to reduce litter impacts have been focused on litter cleanup, which is costly and includes cleanup of streets, parks, beaches, and in some jurisdictions, removal of trash and litter from rivers and storm drain catch basins.

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commercial establishments statewide; (6) Promote environmental education and outreach on the impacts of plastic debris and on litter prevention; (7) Coordinate a Marine Debris Steering Committee to implement the recommendations of the OPC Resolution; (8) Coordinate a regional ocean litter reduction effort; (9) Reduce single-use plastic packaging; (10) Remove derelict fishing gear; (11) Ban toxic plastic packaging; (12) Advance environmental education; (13) Prepare an Education Plan.

Prevention measures are more likely to achieve measurable reductions in litter and ocean litter and significantly reduce public expenditures for litter abatement.

Reducing or preventing packaging waste is a key element in reducing litter since packaging waste is the main component of litter.[20] If we generate less packaging, there is less waste available to become ocean litter. The Steering Committee has identified three priority methods for reducing packaging waste. The first is Environmental Producer Responsibility (EPR) for packaging waste – also known as "producer take-back." The second is outright prohibitions of specific types of packaging, such as single-use grocery bags. The third is fees on commonly littered items; these fees encourage both manufacturers and consumers to seek out less litter-prone product alternatives.

Each of these 3 priority implementation measures is discussed below. Implementing these 3 strategies would reduce the vast majority of ocean litter. The other strategies discussed in this document complement these three priority strategies.

It is worth noting at the outset that in 2007 Governor Schwarzenegger signed AB 258, a bill to stop the discharge of pre-production plastic pellets (known as "nurdles"). AB 258 was introduced as a result of the OPC Resolution, and requires the State Water Board to focus on stopping the discharge of nurdles from those facilities that use them in the production of plastic products. Though small individually (a nurdle is about the size of a grain of rice), collectively they make up 17% of all ocean litter found on our beaches. Removing them from the waste stream will make a significant dent in our overall ocean litter problem.

Priority #1 – EPR for Convenience Food Packaging Waste

EPR for packaging places the responsibility for collection and disposal of packaging waste on producers of packaging and manufacturers of products that use packaging. By placing physical or financial responsibility for collection and disposal of these wastes on the producer, EPR motivates producers to reduce waste since the producer bears the responsibility to pay to manage the waste that it generates. The first implementer of EPR for packaging was Germany. Using EPR methods, Germany achieved a 14% reduction in packaging waste in the first 4 years of the program. In addition, Germany has achieved a 75% recycling rate for plastics (the rate in the U.S. is 5.5%[21]). Germany is not the only EPR country to achieve goals of preventing packaging waste; other countries have achieved equally impressive results.

By comparison, the U.S. EPA reports that from 1960 to 2006 packaging waste generation in the U.S. increased from 27,000 to 79,000 tons (293%). [22] Garbage generated in the U.S. is increasingly comprised of packaging waste. According to the U.S. EPA, containers and packaging are the largest component of the municipal solid waste stream (80 million tons or 31.7 %). [23]

Producer take-back of packaging has been implemented in 33 countries around the world. While not all of them have reduced the generation of packaging waste below original levels, most have stopped or significantly slowed the increase in packaging waste generation.

One specific mandate for producer take-back has been implemented in the U.S. with great success. The car battery take-back program requires manufacturers to take back used batteries for recycling. Under this mandatory program, the recycling rate for auto batteries in 2006 was

99%.[24] Without a mandate for producer take-back, similar products have much lower recycling success.

Americans, who comprise 5 percent of world population, generate 50 percent of the world's solid waste.[25] In 1995, Americans consumed 30% of materials produced globally.[26] Since the largest percent of our garbage is comprised of food packaging waste, policies aimed at preventing convenience food packaging waste from being created in the first place will not only reduce ocean litter, but will also reduce greenhouse gas emissions, resource depletion and oil dependency.

Priority #2 – Product Prohibitions

- **Plastic Bag Prohibitions**

According to the Progressive Bag Alliance, 19 billion plastic grocery bags are distributed in California each year and fewer than 5% are recycled, according to the CIWMB.[27] A waste characterization study conducted by the City of Los Angeles in June 2004 found that plastic bags made up 25% by weight (and 19% by volume) of litter found in 30 storm drain catch basins.[28] Bags and other items, such as polystyrene food take-out containers, are increasingly being targeted by coastal communities in California for bans as studies show these items to be significant components of litter and beach debris.

California communities are joined by many jurisdictions across the globe in recognizing plastic bags as a significant threat to the marine environment. China, Australia, South Africa, Bangladesh, Tanzania, and several other countries recently banned plastic grocery bags. Several states, including Alaska, Massachusetts, New York, and Washington are considering plastic bag prohibitions. Whole Foods Market recently decided to stop offering plastic bags in its nearly 300 stores. In 2002, Ireland imposed a tax on the distribution of plastic grocery bags that resulted in a 95% drop in plastic bag use since it was implemented.

In 2007, Governor Schwarzenegger signed AB 2449 (Levine) to increase the recycling of plastic bags. California should join the growing list of jurisdictions that have decided to prohibit the sale of single-use plastic bags.

- **Polystyrene Food Container Prohibition**

In 1998, the State Water Board and SCCWRP published a study entitled "Composition and distribution of beach debris in Orange County, California." It found that foamed plastics were second only to pre-production plastic pellets as the most abundant debris item on Orange County beaches.[29] Foamed plastic pieces collected on Orange County beaches in a two-month period accounted for 1,526 pounds. Prohibitions of polystyrene food containers would not reduce all polystyrene debris on California beaches. However, thousands of pounds would be reduced.

Polystyrene food container prohibitions have been implemented in many jurisdictions, including: City of Santa Monica, City of Millbrae, City of Alameda, City of Laguna Beach, City of Santa Cruz, City of Calabasas, City of Capitola, City of San Francisco, City of Malibu, City of Huntington Beach, City of Aliso Viejo, City of San Juan Capistrano, City of Laguna Woods,

City of San Clemente, City of Berkeley, City of Oakland, City of Emeryville, County of Ventura, County of Sonoma, City of Portland, OR, and the City of Freeport, ME.[30]

Priority #3 – Litter prevention funded by a litter fee

Food containers and product wrappers that are widely distributed for "free" often end up in the marine environment. If a litter fee were assessed on, say, plastic fast-food drink cups, consumers would be more aware of the environmental costs associated with that product. More consumers would either use their own cups or choose "to stay" instead of "to go." Those consumers who chose to pay the fee would by doing so help pay for the costs of providing litter cleanup, education and enforcement to prevent litter. The physical and environmental costs will be borne by those who choose to consume the products that contribute most to the ocean litter problem. The fees would be used to fund the following types of activities:

- Increased enforcement of litter laws;
- Public education and outreach campaigns;
- Environmental education in K-12 classes;
- Funding for research on alternative products, safer product additives, and product design for the environment; and
- Grants to local governments to control litter discharges, especially in storm water, and to assist them (at least in the short term) with the burden of collection and disposing of existing ocean litter loads on beaches. These grants will help local governments address their immediate needs.

Measuring Success

The Steering Committee views these 3 priority actions as the major tools that will be needed to address the 80% of ocean litter that comes from land-based sources. Preventing packaging waste from being generated in the first place, and banning or placing a fee on items that are prevalent in ocean litter are more effective and more cost effective than cleaning up litter. These actions also reduce resource consumption, greenhouse gas production and other pollution associated with the production of these products.

These 3 priority actions alone can help California to reduce substantially the 80% of ocean litter that comes from land-based sources. However, even with reductions in packaging and specific items that become ocean litter, littering will continue to happen without changes in behavior by litterers. Therefore, it is important also to focus on litter reduction. The other tools described in this document that address litter – including education and outreach, and increased litter enforcement – also contribute to the goal of completely eliminating ocean litter. Funds from the litter fee can be directed to these activities.

Objective 1: PREVENT AND CONTROL LITTER AND PLASTIC DEBRIS
Changing Individual Behavior

The prevention and control of litter is one of the primary objectives of this plan because 80% of ocean litter comes from land-based sources[31] and the vast majority of the land-based contribution comes from trash in storm water runoff.[32]

When individuals fail to properly dispose of trash it can become litter. Sometimes it is intentional and sometimes it is the result of negligence. Behavior change can be motivated through education, law enforcement and economic incentives (e.g. the California Redemption Value (CRV), better known as the "bottle bill"). Very little of the debris found on our beaches consists of bottles and cans covered by the bottle bill because those items have value even as a "waste." The debris that is found on our beaches has no value. There are costs associated with cleaning up litter, and there is no financial incentive to the individual who caused it to do otherwise.

Plastic products in the marine and terrestrial environment degrade into smaller and smaller pieces of plastic. These small plastic fragments, as well as the pellets and powders used to manufacture plastic products, present several threats to the marine environment, including most conspicuously harm to the marine life that eats or gets entangled in them.[33]

Actions to implement the objective:

a) Increase enforcement of anti-litter laws
b) Coordinate education and outreach campaigns
c) Direct state funds for litter education to the Environmental Education Initiative (EEI)
d) Prohibit smoking on state beaches and provide ash receptacles at transition points
e) Assess fees on commonly littered items

1. PREVENT AND CONTROL LITTER AND DISCHARGE OF PLASTIC DEBRIS

Action	Implementation Tasks	Obstacles	Solutions	Res.#
(a) Increase enforcement of anti-litter laws Rationale: People who litter will continue to do so unless the consequences are severe and the likelihood of getting caught high.	I. Support increased penalties for littering. For example, the Vehicle Code imposes a $1,000 fine for littering. That fine should be doubled to $2,000 for the first violation, $5,000 for the second violation, etc.	No coordinated effort or funding available to motivate increased enforcement at local level.	The agency that receives monies generated by the litter fee could be directed to fund increased litter enforcement at the local level.	2
(b) Coordinate education and outreach campaign Rationale: Public education promotes behavior change (e.g. anti-smoking education).	I. Steering Committee to coordinate existing state outreach programs (Thank You Ocean, Don't Trash California, Erase the Waste) II. Support and expand outreach in local communities III. Engage local business community IV. Establish education and training program for enforcement officers	Need to coordinate outreach efforts. There is a lack of funding for a large-scale outreach effort on ocean litter.	Use litter fees to fund state-wide litter and ocean litter outreach effort. Pursue public/private partnerships for anti-litter education with the plastics and food and beverage industries.	6, 13
(c) Direct state funds for ocean litter and litter education to Education and the Environment Initiative (EEI) Rationale: The EEI will provide information on the problem of ocean litter as part of the basic education in California.	OPC staff will work with EEI staff to determine how best to integrate ocean litter content into the curriculum and what funding is needed.	Funding will be needed for personnel to support the EEI.	Direct funding from litter fee to support this action.	6, 12, 13
(d) Prohibit smoking on state beaches and provide ash receptacles at transition points Rationale: Cigarette butts litter our beaches. Coastal communities have implemented prohibitions due to concerns about higher cleanup costs, public health, and poisoning of wildlife.[34]	Support the implementation of a prohibition on smoking at beaches throughout California.	Smokers and others will view prohibitions on smoking at beaches as an infringement on a personal liberty.	California already prohibits smoking in buildings and in cars with children, so there is precedent for prohibiting smoking where public health concerns outweigh smokers' rights.	1, 2, 3, 5
(e) Assess fees on commonly littered items Assessing a fee on litter-prone items will help fund litter abatement and storm water capture, and have consumers pay higher costs for litter-prone items. NJ, WA, NE, OH, RI and TN all impose litter fees.	I. Establish a litter fee assessed on the sale of products commonly littered in California. II. The fee should be assessed at point of sale so that the consumer is aware of paying more for litter-prone items. The fee will fund local litter abatement efforts.	Some will oppose an increase in the up-front cost of consumer goods.	This is a fee, not a tax.[35] Revenues will be used only to fund litter and debris mitigation and prevention efforts.	1, 2, 5, 6, 9, 12, 13

Objective 2: REDUCE SINGLE-USE PACKAGING AND PROMOTE SUSTAINABLE PACKAGING - *Changing Producer Behavior*

Removal of litter is important. However, litter *prevention* should be a higher priority since, as discussed above, collection and disposal of litter is costly and litter is detrimental to human health and the environment. Accordingly, in addition to encouraging individuals to modify their behavior, the OPC Resolution also seeks to reduce ocean litter by implementing methods to prevent certain wastes (primarily packaging waste) from being generated in the first place, an approach to waste described in California's Integrated Waste Management Act (IWMA, AB 939). The OPC Resolution directs the Steering Committee to consider the following approaches to changing producer behavior in order to accomplish this objective:

1. Reduce the generation of single-use plastic packaging and containers (Resolution item #9)
2. Reduce plastic waste through packaging redesign (Resolution item #3)
3. Prepare a phased ban on toxic additives in packaging (Resolution item #11)
4. Prevent pollution from plastic resin pellets and powders used in manufacturing plastics (Resolution item #2)

The strategy for implementing each of these four elements of this objective is described briefly below and outlined in the chart that follows.

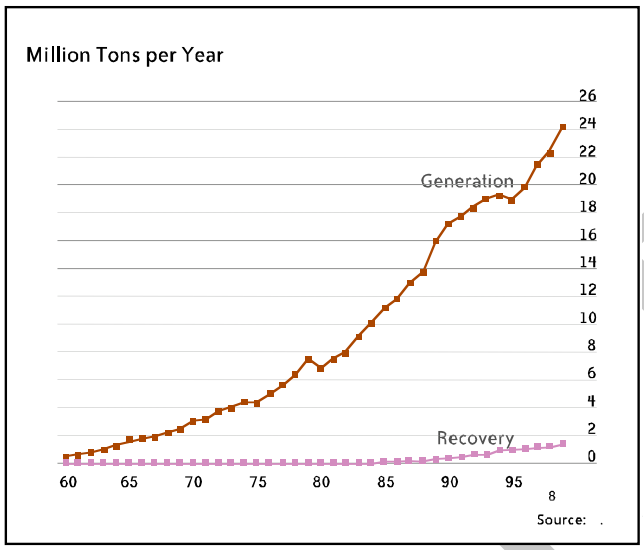
Reducing Packaging Waste Generation

OPC Resolution item #9 directs the Steering Committee to develop a plan for reducing single-use plastic packaging and containers. The focus of this Resolution item is on single-use fast-food and convenience market packaging and containers. These items constitute a large percentage of ocean litter from land-based sources.[36] Surveys of roadside litter show that take-out food packaging and food-ware items are the most significant category of roadside litter.[37] This objective can be achieved by finding ways to encourage or require the fast food and convenience store industries to use less packaging and containers or use products that minimize harm to the environment.

The Steering Committee recommends two strategies for reducing packaging waste: (1) extended producer responsibility for convenience food packaging, and (2) prohibiting certain products that have extensive ocean litter impacts.

- **Extended Producer Responsibility (EPR) for Convenience Food Packaging**

The CIWMB states that "(p)lastics production continues to far outpace plastics recycling, and plastics are displacing some other more recyclable materials. Waste management systems have not been able to keep pace with the rapid increase in plastics use…"[38] Generation versus recycling rates for plastics in California are not available. Accordingly, the report provides the following chart from the U.S. Environmental Protection Agency (U.S. EPA) that shows that nationwide plastic generation far outpaces recycling.[39]



Plastics recovery in the U.S. (CIWMB Plastics White Paper)

An Extended Producer Responsibility (EPR) or "take-back" program assigns the costs or physical management of waste to the producer. By assuming the costs of a product at the end of that product's useful life (when it's a waste), a producer has an incentive to reduce the amount of product waste it generates. The producer will be encouraged to make design and manufacturing changes that will lead to waste reduction, lower toxics content, increased recycled content, and improved recyclability. Reducing the amount of product waste generated reduces the amount of product waste that has the potential to become ocean litter. Preventing product waste from being generated in the first place has many additional benefits. It saves energy and other resources, reduces damage associated with resource extraction, reduces pollution including greenhouse gas production, and reduces waste management costs.

EPR for packaging has been implemented effectively in at least 33 countries to date. Recycling rates have risen dramatically in EU countries as a result of packaging take-back programs. For example, Germany has achieved a 75% recycling rate for plastics (the rate in the U.S. is 5.5%), and generation of all "green dot" (a logo for producer-financed take-back) packaging wastes was reduced by 14% in the first 4 years of the program (1991-1995).[40] By 1998, total packaging in Germany was reduced by a volume of 1 million tons. Significant design changes were made to reduce the amount of material used in packaging. Quantities of packaging layers were reduced. Container shapes and sizes were altered to reduce volume, and thin-walled films and containers were introduced. [41] Other countries have achieved similar results.

The U.S. EPA notes that per capita waste generation has nearly doubled since 1960, from 2.7 to 4.41 pounds per day and states that "the most effective way to stop this trend is by preventing waste from being generated in the first place."[42] In the U.S., producer take-back programs are becoming increasingly popular. Some are voluntary, such as the consortium of producers involved in the Rechargeable Battery Recycling (RBRC) program that takes back batteries and cell phones, and the thermostat mercury recycling program. California has take-back programs for electronic waste and automotive batteries, a program that has achieved a 99% recovery

rate.[43] Similar programs are being considered for universal waste (wastes with a hazardous component). In the state of Washington, a company must be part of a producer-funded take-back program to sell electronics. Similar legislation is proposed in 15 U.S. states.

Recently, the CIWMB approved a Strategic Directive on Producer Responsibility that states that "It is a core value of the CIWMB that producers assume the responsibility for the safe stewardship of their materials in order to promote environmental sustainability."[44] The CIWMB recently adopted an EPR framework as an overall policy priority.

Many local governments nationwide have passed EPR resolutions that resolve to: have all city or county purchasing encourage producer take-back in contracts; favor leasing over purchasing (one form of take-back); and urge state legislators to pursue statewide EPR policies. In California, these include: the City of Elk Grove, the City of Fresno, Contra Costa County SWA, Solano County, California Council of Directors of Environmental Health, San Bernardino County, Santa Clara County, the Regional Council of Rural Counties, the City of Oakland, Sonoma County, Santa Cruz County, Marin County, Morgan Hill, and the City and County of San Francisco.[45]

- **Prohibit Single-Use Packaging Products that Have Major Ocean Litter Impacts**

Prohibition on Polystyrene Food Packaging
Increasingly, coastal communities in the U.S. and other countries are prohibiting the free distribution of certain single-use disposable packaging items that are associated with the largest ocean litter impacts. Polystyrene (PS), or foamed plastic, was the second most numerous item found in the Orange County Beach Debris Study of 1998. The following communities in California have banned PS food packaging: Santa Monica, Millbrae, Alameda, Laguna Beach, and Santa Cruz. Expanded Polystyrene (EPS) prohibitions have been implemented in the cities of: Calabasas, Capitola, San Francisco, Malibu, Huntington Beach, Aliso Viejo, San Juan Capistrano, Berkeley, Oakland, Emeryville, Ventura, Sonoma, and Freeport. Communities that have banned products often argue that the convenience value of the product is outweighed by its negative environmental impacts.

Plastic Grocery Bag Prohibition
California retailers distribute more than 19 billion plastic retail carryout bags annually. Fewer than 5 percent are currently recycled in California.[46] A waste characterization study conducted by the City of Los Angeles in June 2004 found that plastic bags made up 25% by weight (and 19% by volume) of litter found in 30 storm drain catch basins.[47]

Single-use carry-out bags are banned in many countries in response to litter and ocean litter concerns. Taiwan, Kenya, Rwanda, Bangladesh, Germany, Sweden, and China have implemented complete prohibitions. Thirty towns in Alaska have also banned plastic carryout bags. Ireland, Denmark, and Switzerland have instituted a fee on plastic carryout bags. Ireland's 20 cent (Euro) fee has resulted in a 95% reduction in the use of plastic bags since the fee was imposed in March 2002.

The City of Oakland's bag prohibition went into effect January 18, 2008. Within Southern California, the L.A. County Board of Supervisors voted on January 22, 2008 to prohibit the free distribution of single-use plastic carry-out bags in unincorporated areas of the County if voluntary programs by retailers in those areas do not result in significant decreases.[48]

Meanwhile, voluntary initiatives have proven less successful. San Francisco recently implemented a prohibition on plastic grocery bags after the plastic bag industry failed to achieve a desired voluntary recycling rate.

Minimize Toxics in Packaging

OPC Resolution item #11 directs the Steering Committee to prepare a plan for the phased ban of the most toxic types of all plastic packaging. In coordination with DTSC, the OPC has begun an inventory of all of the chemicals in plastics that are commonly found in the marketplace. When this research is completed later in 2008, the Steering Committee and the OPC will be able to rank specific additives in plastic packaging by volume and then follow-up with a review of health risks to humans and to the marine environment. The DOC is supporting investigations into the potential human health impacts of chemicals used as plastic additives. The OPC and DOC also engaged the Office of Environmental Health Hazard Assessment (OEHHA) to develop toxicological profile reports on the health effects on human, experimental animals and marine organisms of bisphenol-A, nonylphenol and di-2-ethyl hexyl phthalate (DEHP), chemicals commonly used as additives in plastics. OEHHA will report its findings later in 2008 and will provide the OPC with its judgment as to the impact on human health and the marine environment of these chemicals.

Develop Alternative Products and Promote Sustainable Packaging

Resolution item #3 directs the Steering Committee to seek innovative ways to reduce plastic waste, including investigating packaging alternatives that reduce the amount of plastic debris that ends up in the marine environment and reduce the use of toxic additives. DOC has taken a lead role in supporting investigations being conducted by DTSC to improve recycling methods for plastics, identify safer formulations of plastic products, and assess the impacts of bioplastics options. The results of these investigations will help inform the OPC and other agencies on the Marine Debris Steering Committee about product alternatives and formulations that may have less of an impact on the marine environment.

Actions to Implement the Objective:

(a) Implement a producer take-back (EPR) program for packaging and single-use disposable goods
(b) Prohibit products that pose significant ocean litter impacts where a less damaging alternative product is available
(c) Determine which plastic additives threaten the marine environment, educate the public, and prepare a plan for a phased ban
(d) Develop alternative products and additives
(e) Increase enforcement of laws to eliminate pre-production plastic pellets and powders

2. REDUCE SINGLE-USE PACKAGING AND PROMOTE SUSTAINABLE PACKAGING

Action	Implementation Tasks	Obstacles	Solutions	Res.#
(a) Implement a producer take-back (EPR) program for convenience food packaging Rationale: Producer take-back provides incentives to industry to minimize waste generated, reducing ocean litter at the source.	I. Require take-back for certain products that are commonly found in ocean litter. II. Allow the retail and packaging industries to determine whether they will physically take back products for recycling or disposal or simply finance the take-back.	Impacted industry will oppose take-back programs for their products.	Provide clear examples of success in preventing packaging waste and ocean litter through EPR.	1, 3, 9
(b) Prohibit single-use products that pose significant ocean litter impacts where a feasible less damaging alternative is available Rationale: Some packaging, due to its propensity for entering the marine environment, should be prohibited.	Prohibit the sale of products that make up the bulk of ocean litter and whose utility is outweighed by ocean litter impacts. Bags and polystyrene food containers are suggested.	Industry will oppose prohibitions on products they produce.	A narrowly tailored prohibition should target only the worst ocean litter offenders.	1, 3, 9
(c) Determine which plastic additives threaten the marine environment, educate the public, and prepare a plan for a possible prohibition Rationale: Protect public health and the environment.	I. Consider recommending prohibitions pending results of the work being conducted OEHHA and DTSC. II. Require manufacturers to disclose additives in plastic products and packaging.	Funding for education and outreach on plastic additives not readily available.	Seek grant monies to conduct outreach.	3, 11
(d) Develop alternative products and additives Rationale: Safer substitutes for plastics and plastic additives are potentially a better choice.	I. DTSC, with funding from DOC, is researching safer plastic additives. II. Develop new designs for packaging that are less harmful to the marine environment.	Funding for research into sustainable packaging design.	Various grants and a litter fee can help to fund research.	1, 3, 9
(e) Increase enforcement of laws to eliminate pollution by pre-production plastic pellets and powders Rationale: Plastic pellets make up nearly a fifth by weight and 99% by abundance of all ocean litter found on Orange County beaches.[49] AB 258 mandates that the Water Boards implement resin pellet discharge prohibitions.	I. Water boards to enforce plastic pellet ("nurdle") and powder discharge prohibitions per AB 258. II. Water Boards to implement the Resin Initiative for Control and Enforcement (RICE).	Need sufficient resources to implement these measures.	Litter fee revenues could be used to defer these costs.	2

Objective 3: CLEANUP AND REMOVE OCEAN LITTER – *Engaging Communities*

California has over 1,100 miles of coastal shoreline, and thousands more miles of inland waterway shorelines. Each year, California Coastal Cleanup Day brings 40,000 to 50,000 volunteers to beaches and shorelines throughout California to collect trash. Volunteer cleanups not only help reduce trash on shorelines, they also provide a lasting educational opportunity. They instill in participants a strong sense of stewardship toward coastal and ocean resources. This objective includes actions to expand on California Coastal Cleanup Day by motivating and supporting year-round and on-going cleanups through the California Coastal Commission's Adopt-A-Beach (AAB) program.

A less well known tool, a regulatory process known as a TMDL (Total Maximum Daily Load), has been implemented for trash in Los Angeles. It requires that the municipalities in the L.A area reduce the amount of trash entering the storm drain system by 10% each year. The original target of zero trash will be evaluated once 50% of the trash in the two waterbodies (Los Angeles River and Ballona Creek) is reached. TMDLs should be adopted in other coastal communities in order to assure that trash is reduced.

Ocean-based discharges of ocean litter represent approximately 20% of the ocean litter problem.[50] Resolution Item #10 of the Resolution directs the Steering Committee to propose a plan for reducing derelict fishing gear. Though the overall amount of derelict fishing gear may be a fraction of the quantity of trash and debris in the ocean, because it is designed to trap and ensnare marine life, derelict fishing gear has a disproportionately large impact on the marine environment. Derelict fishing gear includes nets, lines, crab and shrimp traps/pots, and other recreational and commercial harvest equipment that has been lost or abandoned in the marine environment. Lost or abandoned gear can continue to trap or ensnare marine life with the unintended consequence referred to as "ghost fishing." Most fishing nets are made from synthetic fibers (plastic) that take a long time to degrade, and even as degraded material (plastic fragments) continue to pollute and degrade the marine environment. In addition to marine environment impacts, derelict fishing gear can entangle divers and swimmers and foul boat propellers, rudders, anchors, and drive shafts. The proposed actions should substantially reduce the amount of fishing gear that ends up as derelict gear.

Actions to Implement the Objective:

a) Ensure municipalities prevent litter from entering the storm drain system
b) Increase penalties and enforcement for abandoning fishing gear and allow fishermen to retrieve others' lost and abandoned gear at the end of a season
c) Conduct outreach to the fishing community; publicize Sea Doc Society's hotline
d) Develop an ocean litter data card to be used by AAB volunteers throughout the year, and an on-line database to house data
e) Develop an AAB Advisory Committee and work with local beach managers to provide necessary support for AAB efforts

Objective 3. Cleanup and Remove Ocean litter

Action	Implementation Tasks	Obstacles	Solutions	Res.#
(a) Ensure municipalities prevent litter from entering the storm drain system Rationale: Existing trash Total Maximum Daily Loads (TMDLs) require municipalities to install trash collection devices in storm drains.	I. Urge the development of TMDLs in other coastal communities. II. Urge regional boards to include litter as a pollutant to be addressed in MS4 permits in conformity with planned changes in the revised California Ocean Plan. III. Provide funding to municipalities for increased collection of litter. IV. Encourage public/private partnerships for ash, trash, and recycling receptacles.	No mandate that the state achieve a zero discharge of trash in waterways.	Litter fee revenues could be used to help defer these costs.	1, 2, 5
(b) Increase penalties and enforcement for abandoning fishing gear and allow fishermen to retrieve others' lost and abandoned gear at the end of a season Rationale: Increased penalties should reduce abandonment.	Step up existing enforcement efforts. Increase penalties.	Some fishermen will oppose.	Conduct outreach to fishing groups.	10
(c) Conduct outreach to fishing community and publicize Sea Doc Society's reporting hotline Rationale: Engaging participation of the fishing community is essential.	The OPC will coordinate an outreach effort.	None known.		10
(d) Develop an ocean litter data card to be used by AAB volunteers throughout the year, and an on-line database to house data Rationale: monitoring results of collected data will allow for measure of ocean litter efforts.	CCC will coordinate this effort.	Funding is needed for the database.	CCC will seek funding from grant sources and litter fee funds.	4
(e) Develop an AAB Advisory Committee and work with local beach managers to provide necessary support for AAB efforts Rationale: Coordination will help maximize limited resources	I. CCC to coordinate and advise state-wide AAB manager on ways to improve. II. CCC to develop new materials to help increase participation, and to support volunteers.	Funding for new outreach materials and database needed.	Litter fees can provide support for the AAB program.	4

Objective 4: COORDINATE WITH OTHER JURISDICTIONS IN THE PACIFIC REGION- *Engaging other Regions*

Ocean litter is a problem that migrates with ocean currents beyond political boundaries. Spending valuable state resources addressing ocean litter without similar measures being implemented in political regions that share the Pacific coast will not be enough to solve the problem. Too many other urban areas and fishing fleets contribute to the deposition of ocean litter in the Pacific Ocean. The state must coordinate efforts with regional partners.

Actions to Implement the Objective:

(a) Work with the West Coast Governors'Agreement (WCGA) and invite the participation of British Columbia, Hawaii and Baja, California

Objective 4. Coordinate with Other Jurisdictions in the Pacific Region

Action	Implementation Tasks	Obstacles & Solutions	Res.#
(a) Work with the WCGA participants Rationale: The WGCA participants are working on an Agreement on Ocean Health. This presents an opportunity to form a coalition of coastal governments to jointly achieve ocean litter reduction.	I. Establish coast-wide goals for ocean litter reduction that: • Set joint litter target reductions of plastic single-use fast-food and convenience market packaging and containers • Set joint derelict fishing gear litter target reductions and site cleanup targets • Consider relevant European Union chemical approaches • Address enforcement regulations for pre-production plastic pellets. II. Invite the participation of British Columbia, Hawaii, and Baja, California.		8

[1] J.G.B. Derraik, The pollution of the marine environment by plastic debris: a review, Marine Pollution Bulletin 44 (2002).
[2] Derraik.
[3] Charles Moore, Algalita Marine Research Foundation, presentation at California District Attorneys Association, Sept. 2006, *Trashed: Plastic Plastic Everywhere*
[4] Haruo Ogi and Yuri Fukimoto, A Sorting Method for Small Plastic Debris Floating on the Sea Surface and Stranded on Sandy Beaches, Bulletin of the Faculty of Fisheries, Hokkaido University 5 (2), 2000, 71-93.
[5] Sophia Copello and Favio Quintara, Marine debris ingestion by Southern Giant Petrels and its potential relationships with fisheries in the Southern Ocean, Marine Pollution Bulletin 46 (2003): 1513-1515.
[6] MARPOL 73/78 (the International Convention for the Prevention of Pollution by Ships) is the international treaty regulating disposal of wastes generated by vessels. MARPOL 73/78 is implemented in the U.S. by the Act to Prevent Pollution from Ships, under the lead of the U.S> Coast Guard. 161 countries have signed the treaty as of 2001. Annex V of the Treaty addresses the disposal of garbage from ships and prohibits the disposal of plastic at sea.
[7] Re: 80% from land based sources: U.S. Department of Commerce, NOAA, Office of Public and Constituent Affairs, (1999) "Turning to the Sea: America's Ocean Future," p.5. Re: most of land-based ocean litter comes from trash in urban runoff: *Trash TMDLs for the Los Angeles River Watershed,* (September 19, 2001):17. See also: California Coastal Commission and Algalita Marine Research Foundation, (2006) "Eliminating Land-Based Discharges of Marine Debris in California: A Plan of Action from the Plastic Debris Project," www.plasticdebris.org.
[8] Abstract for presentation provided Stephen B. Weisberg, Southern California Coastal Water Research Project, at the *Plastic Debris, Rivers to Sea Conference,* September 7-9, 2005.
[9] D.W. Laist, "Impacts of marine debris: entanglement of marine life in marine debris including a comprehensive list of species with entanglement and ingestion records," in Coe, J.M. Rogers, D.B. (eds), *Marine Debris: Sources, Impacts, and Solutions:* Springer-Verlag, New York, (1997) 99-139.
[10] Hannah Nevins et al, "Seabirds as indicators of plastic pollution in the North Pacific," presented at the Plastic Debris, Rivers to Sea Conference, Sept. 8, 2005, Redondo Beach, California. Available at: www.plasticdebris.org.
[11] Id.
[12] Y. Mato et al, "Toxic Chemicals Contained in plastic resin pellets in the marine environment-spatial difference in pollutant concentrations and the effects of resin type," *Kanyo Kagakukaishi* 15 (2002): 425-423; Charles Moore, Gwen Lattin, Ann Zellers, "A Brief Analysis of Organic Pollutants Sorbed to Pre- and post- Production Plastic Particles from the Los Angeles and San Gabriel River Watersheds," presented at the Plastic Debris, Rivers to Sea Conference, September 2005, Redondo Beach, CA (www.plasticdebris.org)
[13] David Barnes, "Biodiversity: Invasions by Marine Life on Plastic Debris," *Nature*, 6883 (April 25, 2002): 808-809.
[14] Los Angeles County Board of Supervisors Staff Report, "An Overview of Carryout Bags in Los Angeles County," August 2007.
[15] Los Angeles Regional Water Quality Control Board, *Trash TMDLs for the Los Angeles River Watershed,* (September 19, 2001)
[16] Currently, the trash TMDL applies to cities and counties within the Los Angeles River and Biona Creek watersheds and is enforced by Region 4 of the RWQCB. Other regions of the

Water Board are considering the implementation of various types of measures to minimize the amount of trash in California waterways.

[17] National Ocean Economics Program, California's Ocean Economy, July 2005, pp. 24-26. In 2000, the total market value of California's Gross State Product (GSP) was $42.9 billion. Tourism and recreation on the coast accounted for 58% of GSP. GSP is a measure of the contribution of the sector to the value of goods and services in the economy. The value-added, or net sales of a sector, minus the cost of inputs, e.g. the net output of a sector. Using this measure eliminates "double counting,"
among sectors.

[18] In January 2006, in response to the recommendations of the Action Plan to reduce marine debris, published by the CCC and AMRF Plastic Debris Project (www.plasticdebris.org), the CIWMB convened a Statewide Anti-Litter Task Force. The Task Force was focused on developing strategies and concrete plans for ridding California of litter. The Task Force designated a subcommittee in May, 2006 to pursue the writing of a draft strategic plan that would help to direct the work of the Task Force. The Subcommittee began meeting in July 2006 under the leadership of CalTrans. Soon after these initial meetings, the Subcommittee was approached by OPC staff for assistance. The Subcommittee's work on s strategic plan helped to shape a resolution on marine debris for consideration by the OPC. On February 8, 2007, the OPC passed a version of the resolution after considerable input from the public. The OPC Resolution calls for the creation of Marine Debris Steering Committee, including members from agencies already represented on the Anti-Litter Task Force. Rather than create an entirely new committee to conduct very similar work, a decision was made to re-focus the work of the Subcommittee of the Anti-Litter Task Force on developing a plan to implement the OPC Resolution.

[19] California Coastal Commission and Algalita Marine Research Foundation, *Eliminating Land-based Discharges of Marine Debris in California: A Plan of Action from the Plastic Debris Project,* June 2006, pp. 16-19. Volunteer-based cleanups at California's Coastal Cleanup Day generally yield data showing that the most numerous type of debris collected is food and beverage packaging when the various categories of these items are added together. For example in 2004 the data showed that 40.4% of debris items were related to food and beverage packaging (food wrappers and containers = 14.1%, caps and lids = 7.4%, cups /plates/forks/knives spoons = 4.9%, beverage bottles/glass= 4.1%, straws and stirrers = 3.8%, plastic beverage bottles = 3.2%, metal beverage cans= 2.9%). Few studies characterize debris in terms of product types. The composition of trash found in a Los Angeles River catch basin cleanout in 2004 found plastic film and bags were the most numerous item (43%). See also, note 31.

[20] Daniel Styrek, Frank Bernheisel, *Mississippi Litter 2000, A Baseline Survey of Litter at 113 Street and Highway Locations,* 2000. Note that there is no comprehensive baseline survey of litter for California that focuses on identifying litter in terms of product wastes. Caltrans has conducted litter studies of roadside litter, such *as the California Department of Transportation (June 2000) District 7 Litter Management Pilot Study* , and these studies typically characterize litter in terms of composition, such as, paper, plastic, glass, wood.

[21] United States Environmental Protection Agency, *Municipal Solid Waste Generation in the United States: 2001 Facts and Figures Executive Summary*, Office of Solid Waste and Emergency Response, EPA 530-S-03-011, p.7- available at: http://www.epa.gov/epaoswer/non-hw/muncpl/pubs/msw-sum01.pdf

[22] Data from US EPA Municipal Waste Characterization Study 2006 at http://www.epa.gov/epaoswer/non-hw/muncpl/pubs/06data.pdf

[23] U.S. EPA, Municipal Solid Waste Generation, Recycling and Disposal in the United States: Facts and Figures for 2006 p. 6, available at: http://www.epa.gov/epaoswer/non-hw/muncpl/pubs/msw06.pdf
[24] Id. at p. 3.
[25] Thorpe, et al, (citing Paul Hawkens) at 3.
[26] Betty Fishbein (2000), Extended Producer Responsibility; A Materials Policy for the 21st Century, INFORM, Inc, New York City, p. 7.
[27] http://www.ciwmb.ca.gov/LGCentral/Basics/PlasticBag.htm
[28] Friends of the L.A. River and the City of L.A., "L.A. River and Long Beach Waste Characterization Study," 2004.
[29] S. Moore, D. Gregorio, S. Weisberg, "Composition and Distribution of beach debris in Orange County, California," *Marine Pollution Bulletin,* 42:3(2001).
[30] Information provided by Heal the Bay
[31] U.S. Department of Commerce, NOAA, Office of Public and Constituent Affairs (1990), "Turning to the Sea: America's Ocean Future," p. 56.
[32] Los Angeles Regional Water Quality Control Board, *Trash TMDLs for the Los Angeles River Watershed,* (September 19, 2001): 17.
[33] U.S. Environmental Protection Agency (1992), *Plastic Pellets in the Aquatic Environment: Sources and Recommendations.*
[34] January 16, 2008, email communication from Eben Schwartz: recently compiled data by the California Coastal Commission indicates a 43% decrease in smoking litter on L.A. County beaches from 2004-2006. Smoking bans were in effect on a vast majority of L.A. County beaches by 2005. In those same years (2004-06), in areas where smoking was not banned, the presence of smoking litter increased. Similar decreases were found in San Diego and Santa Cruz counties, where smoking is banned on many beaches.
[35] In Sinclair Paint Co. v. State Bd. of Equalization, 937 P.2d 1350 (Cal. 1997), the court explained that the determination of whether a levy is a fee or a tax is based upon its operation and intent, not upon its label. Taxes raise revenue for the state's general use, whereas fees are paid into specialized funds associated with a particular state service. Furthermore, fees serve to reimburse the state for specific costs associated with providing some benefit, service, or regulation, and cannot require the collection of more than the amount reasonably necessary to cover the cost of the state's regulatory activities.
[36] See note 19.
[37] Styrek.
[38] CIWMB, *Plastics White Paper: Optimizing Plastics Use, Recycling and Disposal in California,"* May 2003, p.8.
[3939] CIWMB at p.8. This chart is copied from the US EPA, *Municipal Solid Waste in the United States 1999,* prepared by Franklin and Associates, Ltd., Washington, D.C., 2000. A similar chart was provided in the later 2005 waste characterization study of the US EPA.
[40] Beverly Thorpe, et al, *Extended Producer Responsibility: A waste management strategy the cuts waste, creates a cleaner environment and saves taxpayers money,* Clean Production Action, 9.
[41] OECD, "Extended Producer Responsibility: Case Study on the German Packaging Ordinance" May 1998, p. 25
[42] US EPA (2003), *Municipal Solid Waste in the United States: 2001 Facts and Figures,* p. 114.
[43] See note 27.
[44] http://www.ciwmb.ca.gov/BoardInfo/StrategicPlan/2007/SD05.htm
[45] http://caproductstewardship.org/local/local_Resolutions.htm

[46] http://www.ciwmb.ca.gov/LGCentral/Basics/PlasticBag.htm
[47] Friends of the L.A. River and the City of L.A., "L.A. River and Long Beach Waste Characterization Study," 2004.
[48] Bag ban information provided by City Council of Santa Monica report for February 12, 2008.
[49] S. Moore, D. Gregorio, S. Weisberg, "Composition and Distribution of beach debris in Orange County, California," *Marine Pollution Bulletin,* 42(2001); U.S. Environmental Protection Agency (1992) *Plastic Pellets in the Aquatic Environment: Sources and Recommendations.*
[50] See note 3.