California Ocean Litter Prevention Strategy: Addressing Marine Debris from Source to Sea

DRAFT

September 14, 2017

PLEASE NOTE*

Thank you for taking the time to review the draft *California Ocean Litter Prevention Strategy: Addressing Marine Debris from Source to Sea (Strategy).* The draft Strategy was developed based on a wide range of stakeholder input and identifies objectives, strategies, and a list of action items for stakeholders to collaboratively implement to prevent and reduce ocean litter.

Please note that the Strategy is still in draft form and a final version of this document will be made available after the second workshop that is taking place on November 15-16, 2017 in La Jolla, CA. You will notice that there is some text in red and sections of the tables that are blank. These were intentionally left red or blank and will be discussed and further fleshed out during the second workshop.

In particular, we are soliciting feedback on the following:

1. Please identify any action items that you (and your organization) may be interested in taking a lead or partnership role in implementing or feel strongly that you may want to be involved in. Identifying your name (and your organization) next to an action item means that you and your organization will give your best efforts to implement the action item, given organizational and funding availability. Your input will help us develop breakout groups during the second workshop and further fill out the tables.

2. Do you think five years is the appropriate time scale for this document? Do you think it would be better if the time frame was longer or shorter?

3. What are your thoughts on the three ocean litter priority strategies?
    a) Do they reflect your understanding of what the state's ocean litter priorities are/should be?
    b) If not, what do you think the top priorities should be?
    c) What ocean-based litter strategies do you think should be included as a priority strategy?

4. Are there any actions that were not included in the draft Strategy that you would like to see incorporated?

Please see Appendix B of the draft Strategy for a complete list of action items that came out of workshop #1. Action items that were identified during workshop #1 were compiled and condensed and those that were mentioned the most by workshop #1 participants, as well as those that the planning team identified as particularly important (and feasible), were included in this draft. Your comments on this draft, as well as discussion during the second workshop, will help identify and address any gaps in the draft Strategy's action items and/or priority strategies, and ultimately finalize the Strategy.

Please send general comments, edits, and questions regarding the draft Strategy to oceanlitterstrategy@resources.ca.gov by Monday, October 16, 2017. When sending your comments, please include your thoughts on the above four questions. We anticipate circulating an updated version of the draft Strategy before the second workshop.

A formal invite with additional information regarding workshop #2 is forthcoming.
Thanks again and we look forward to hearing from you.

Sincerely,

The Planning Team

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EXECUTIVE SUMMARY

Ocean litter is a pervasive problem at a local, regional, and global scale with a wide range of consequences to human health, the environment, and the economy. To ensure that California communities, environments, and economies remain productive and vibrant, immediate actions need to be taken to reduce and prevent ocean litter. The Ocean Protection Council (OPC) is updating its 2008 Implementation Strategy to Reduce and Prevent Ocean Litter, in partnership with the National Oceanic and Atmospheric Administration's Marine Debris Program to develop the *California Ocean Litter Prevention Strategy: Addressing Marine Debris from Source to Sea (Strategy),* which will provide guidance on implementing effective solutions to addressing this pressing issue.

Since the original Strategy was developed, many of the actions described in the document have either been accomplished or are in progress. In some cases, the State's regulatory or agency landscape has changed. In other cases, our understanding of the ocean litter problem has changed considerably since 2008, and some of the actions that were outlined in the 2008 Strategy may no longer be the best way to go about addressing ocean litter. In addition, new forms of ocean litter, such as microfibers, have been identified since 2008, and are not covered in the original Strategy.

The update process expands the previous Strategy to include projects of a variety of scales and scopes so that entities including tribes, government agencies, industry, academia, and nonprofits can make meaningful contributions towards reducing ocean litter in California. The Strategy prioritizes source reduction strategies and actions, as agencies and experts agree that source reduction is the most effective tactic to address ocean litter. Preventing waste in the first place - through initiatives such as transitioning to reusable products and redesigning packaging - is a more effective method of reducing waste as it reduces the amount of litter to control, capture, and dispose.

The Strategy was drafted based on a wide range of stakeholder input and identifies objectives, strategies, and a list of action items for stakeholders to collaboratively implement. The three priority strategies listed below were identified as the most effective actions to reduce and prevent ocean litter:

> **Priority #1:** Prohibit single use products, such as straws, stirrers, expanded polystyrene, and balloons, if a feasible, less damaging alternative is available.
>
> **Priority #2:** Require the phase out of single use products in public institutions and facilities (i.e. government functions, campuses), such as convenience food and beverage packaging.
>
> **Priority #3:** Advance research on microplastics and technological solutions to reduce microplastics in wastewater discharge.

Contributors to this document identified specific action items that are politically, socially, and economically feasible for California to accomplish within the next five years. Furthermore, with many dynamic and influential entities working on ocean litter throughout the state, it was important that organizations take ownership and implement action items that align with their respective goals and mandates.

In summary, this document provides a holistic, collaborative strategy for addressing ocean litter in California, with a focus on reducing land-based litter at its source. It focuses on high impact action items that entities can commit to working on over the next five years. The document provides both guidance with flexibility so that lead and partner organizations can work collaboratively to pursue funding (where needed) and implement these action items. Everyone has a vital role in working towards reducing and preventing ocean litter to ensure a healthy coast and ocean for current and future generations of Californians

LIST OF ACRONYMS

**Update after workshop #2 and lead and partners organizations are identified*

BMP	Best Management Practices
CalRecycle	California Department of Resources Recycling and Recovery
CCC	California Coastal Commission
CSU	California State University
DTSC	Department of Toxic Substances Control
EPR	Extended Producer Responsibility
OPC	California Ocean Protection Council
MDP	Marine Debris Program
NRDC	Natural Resources Defense Council
NOAA	National Oceanic and Atmospheric Administration
SWRCB	State Water Resources Control Board; State Water Board
UC	University of California

BACKGROUND

The Global Problem of Ocean Litter

Ocean litter, or marine debris, is a persistent, well-documented problem of global scale. Anthropogenic litter has been observed in submarine canyons in the northeastern Atlantic Ocean (Pham et al. 2014), in surface waters of the Southern Ocean (Isobe et al. 2017), the Mediterranean Sea (Suaria et al. 2016), and the Caribbean Sea (Law et al. 2010), and on beaches and shorelines worldwide (Ocean Conservancy 2017, Browne et al. 2011). While there are many ways to classify ocean litter, it is common to characterize it as either land-based or ocean-based, depending on the way in which it enters the marine environment (Galgani et al. 2015). Land-based litter can enter the ocean through poor or inefficient waste management systems, or intentional or unintentional littering by individuals and industries (UNEP and GRID-Arendal 2016, Galgani et al. 2015). Furthermore, land-based litter may be discharged directly onto coastlines (through coastal tourism or recreation, for instance), or it may make its way to the marine environment through water treatment systems (especially in the case of microplastics), storm drains, rivers, or by wind (UNEP and GRID-Arendal 2016, Galgani et al. 2015, Rech et al. 2014). Ocean-based litter, on the other hand, is generated by the intentional or unintentional discharge of debris directly into the ocean. Marine activities that generate ocean-based litter include commercial shipping, recreational and commercial fishing, aquaculture, research and military endeavors, and offshore drilling (UNEP and GRID-Arendal 2016, Galgani et al. 2015).

The majority of marine debris comes from land-based sources, though ocean-based debris can be significant in some areas. Debris sources are dependent on nearby human activity (recreational beach use, shipping, fishing), proximity to population centers, and the efficiency of waste management systems (Jambeck et al. 2015, UNEP and GRID-Arendal 2016, Galgani et al. 2015). Most of the litter found in the world's oceans is plastic (Derraik 2002). Between 1950 and 2015, 6300 million metric tons of primary and secondary (or recycled) plastic waste was produced worldwide. Approximately 12% of this plastic waste was incinerated, and 9% was recycled, while 79% was discarded and is currently sitting in landfills or the environment (see Fig. 1 for historical and projected levels of plastic waste production and disposal) (Geyer et al. 2017). Currently, most (42%) of the primary non-fiber plastic produced comes in the form of packaging, most of which is used and disposed of within the same year it is produced (Geyer et al. 2017). Globally, it is estimated that between 4.8 and 12.7 million metric tons of plastic enter the ocean from land every year (Jambeck et al. 2015).

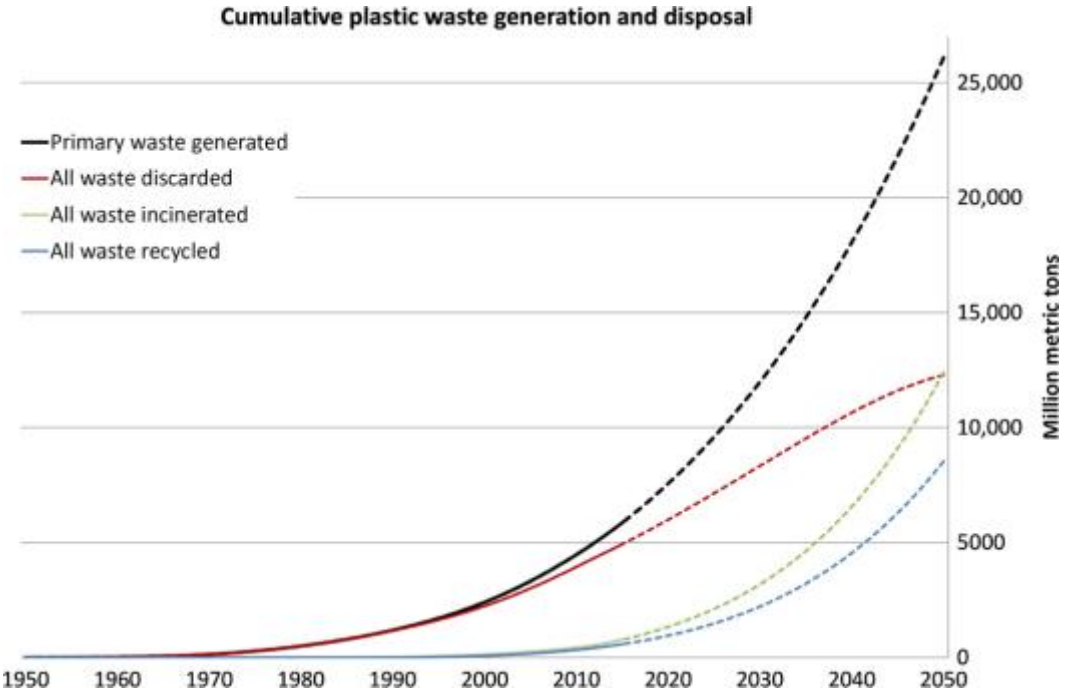


Fig.1. Historical and projected global cumulative plastic waste generation and disposal (here, disposal refers to how plastic waste is managed – either through incineration, recycling, or discard into landfills or the environment). Solid lines show historical data from 1950 to 2015, dotted lines show projections of historical trends to 2050. It is estimated that by 2050, 26,000 million metric tons of primary plastic waste will have been generated, 9,000 million metric tons of plastic waste will have been recycled, 12,000 million metric tons will have been incinerated, and another 12,000 million metric tons will have been discarded in landfills or the environment. Figure from Geyer et al. 2017.

Ocean litter has detrimental ecological, economic, and social impacts. Marine species, including seals, sea birds, sea turtles, whales, and dolphins, are entangled in debris, resulting in hindered movement, decreased feeding ability, injury, and death (NOAA MDP 2014, Kühn et al. 2015). Fish (Boerger et al. 2010), crustaceans (Murray and Cowie 2011), shellfish (Browne et al. 2008), and zooplankton (Cole et al. 2013) ingest microplastics, and some of these organisms consume less food and have decreased energy for growth as a result (Watts et al. 2015, Cole et al. 2013). Marine debris smothers and shades coral reefs and salt marshes, disrupting growth and surface cover (Richards and Beger 2011, Uhrin and Schellinger 2011). Plastics have recently been found in the digestive tracts of fish and shellfish and the soft tissues of shellfish sold at markets for human consumption (Rochman et al. 2015, Li et al. 2015, Van Cauwenberghe and Janssen 2014). A serving of six oysters grown off the coast of France could contain as many as 50 plastic particles (Van Cauwenberghe and Janssen 2014).

The economic impacts of ocean litter include costs associated with beach and harbor cleanup, loss of coastal tourism and recreation, rescue missions for vessels with entangled propellers, impacts to the fishing and aquaculture industries – including costs associated with repairing damaged vessels, repairing or replacing fishing gear lost or damaged as a result of encountering marine debris, loss of catch due to ghost fishing (the continued catch of marine species by lost or

discarded gear) or gear encounters with marine debris, and loss of earnings due to time spent dealing with litter – and other impacts to human welfare and ecosystem services (Newman et al. 2015). The UNEP estimates that the impacts of plastic pollution, specifically, on the world's oceans amount to about $13 billion a year, accounting for time spent on cleanup, as well as revenue lost by the fisheries and tourism sectors (UNEP 2014). Ghost fishing can be extremely costly – both ecologically and for the fishing industry. It is estimated that each year, the approximately 145,000 derelict blue crab pots in Chesapeake Bay catch more than 6 million blue crabs, killing over 3.3 million of them (which is the equivalent of 4.5% of the 73 million blue crabs harvested commercially in 2014) (Bilkovic et al. 2016). These derelict pots also catch approximately 3.5 million white perch and 3.6 million Atlantic croaker every year (Bilkovic et al. 2016). An effort that took place from 2008-2014 to remove almost 44,000 derelict pots from Chesapeake Bay is estimated to have increased blue crab harvests by 38.17 million pounds, valued at $33.5 million, due to improved efficiency of active crab pots (Bilkovic et al. 2016). On average, removing one derelict pot increases blue crab harvest by 868 pounds (Bilkovic et al. 2016).

Ocean Litter and Waste Generation in California

Ocean litter is prevalent in California watersheds and ocean waters. For example, 78% of Southern California river miles[1] and about one third of seafloors and seafloor sediments in the Southern California Bight contain trash (Moore et al. 2016). Plastic is the most prevalent type of debris found across all habitats in the Southern California Bight, with wrappers, bags, plastic pieces, and Styrofoam being the most commonly found plastic items (Moore et al. 2016). 73 water bodies throughout the State of California are listed as having impaired water quality due to the presence of large amounts of trash (State Water Board 2015). The California coast and ocean are also impacted by lost fishing gear. Between May 2006 and November 2012, the California Lost Fishing Gear Recovery Project retrieved more than 60 tons of gear from California's coastal ocean, and collected more than 1,400 pounds of recreational gear from public fishing piers from Santa Cruz to Imperial Beach (SeaDoc Society 2017). From 2001 to 2006, 31.1% of the reported cases of injured California brown pelicans at five California wildlife rehabilitation centers were fishing gear-related, while 11.1% of injured gull cases and 2.9% of injured California sea lion cases were fishing gear-related (Kaplan Dau et al. 2009).

In 2016, California generated approximately 76.5 million tons of waste (based on AB 341 definitions)[2], 35.2 million tons (~46%) of which were disposed in landfills, and another 7.5 million tons (~10%) of which went to disposal-related activities such as beneficial reuse at solid waste landfills and waste to energy conversion (CalRecycle 2017b). This means that California had a disposal rate of 6.0 pounds of trash per resident per day in 2016 (CalRecycle 2017b). Roughly 24.5 million tons (~32%) of the total trash produced in 2016 were diverted through source

[1] A river mile is a measure of distance in miles from the mouth of a creek or river.

[2] As required by AB 341, 1990-2010 waste generation levels (10.7 pounds per person per day) are used as baseline data. The amount of total waste generated in California in a year is estimated by multiplying the State's population in that year by the 1990-2010 per person baseline. Source reduction is also calculated using these baseline data.

reduction and recycling, and another 9.2 million tons (~12%) were diverted through composting and mulching (CalRecycle 2017b). Overall, about 56% of California's waste was disposed of and about 44% was diverted through source reduction, recycling, and composting in 2016 (CalRecycle 2017b). Though diversion has come a long way in 20 years (the state's diversion rate was 31% in 1996), over the last three years, California's source reduction, composting, and recycling rate has declined, from 50% in 2014, to 47% in 2015, and now to 44% in 2016 (CalRecycle 2017b) (see Fig. 2 for statewide disposal and recycling from 2010 to 2016). Through AB 341, California has declared a goal that by 2020, 75% of the solid waste generated in the state should be source reduced, recycled, or composted (as compared to 1990-2010 waste generation levels). This translates to a reduction in per capita disposal from the current 6.0 pounds per person per day to 2.7 pounds per person per day in 2020 (CalRecycle 2017b).

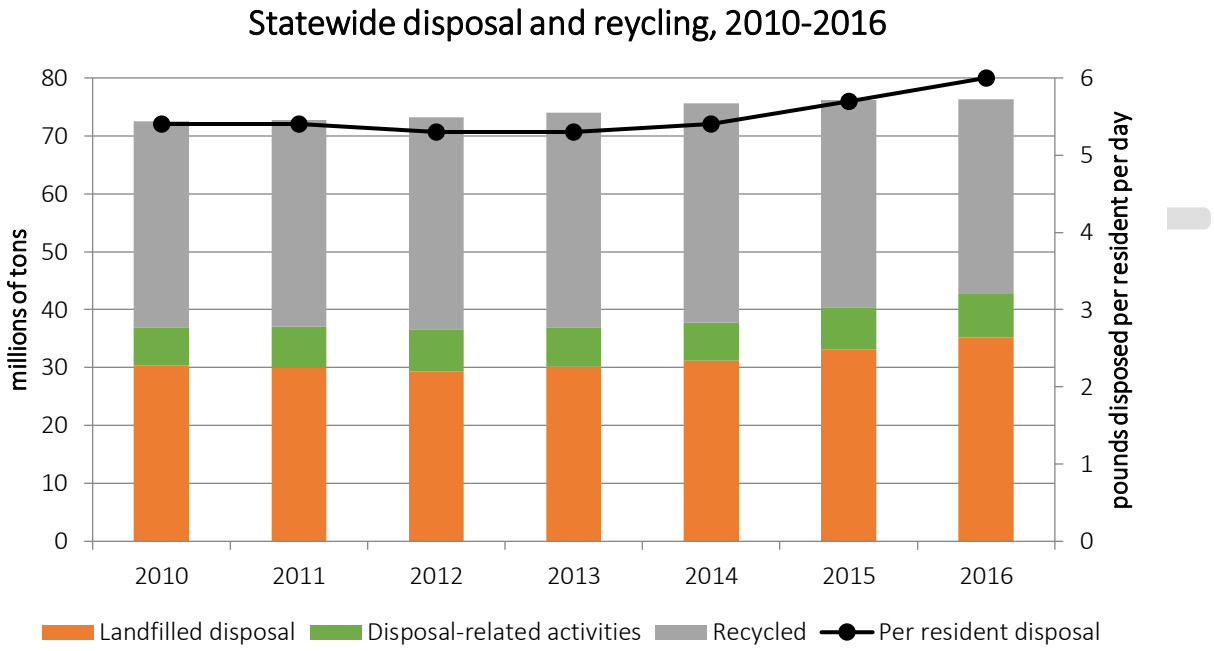


Fig.2. Amount of waste disposed and recycled in California, from 2010 to 2016. Included in this figure are estimates of the amount of waste disposed in landfills, the amount of waste managed through disposal-related activities, and the amount of waste recycled (which includes source reduction, recycling, and composting) every year in millions of tons (left axis). Also shown is the per resident disposal rate (pounds per resident per day) for each year (right axis). Figure adapted from CalRecycle's webpage "California's Statewide Recycling Rate" (CalRecycle 2017a).

California currently estimates the amount of waste that is source reduced and recycled by subtracting the quantities of waste disposed in landfills and through other disposal-related activities, and the quantities of waste that is managed through composting and mulching, from the estimated total amount of waste generated in the State (CalRecycle 2017b). This method of calculation assumes that all waste that is not disposed is source-reduced or recycled (CalRecycle 2017b). There is currently no way to know how much of California's waste ends up in the environment and becomes marine debris every year. However, Jambeck et al. (2015) estimated that in 2010, the United States had 0.25-1 million metric tons of mismanaged plastic waste

available to enter the oceans, based on waste generated by populations within 50 km of the coast.

Ocean litter costs Californians money. California communities spend more than $428 million annually to cleanup and control ocean litter through waterway and beach cleanup, street sweeping, installation of stormwater capture devices, storm drain cleaning and maintenance, manual litter cleanup, and public education (Stickel et al. 2013). From July 2012 to June 2016, Adopt-A-Highway participants removed over 77,000 cubic yards of litter that may have otherwise ended up in the ocean from California's roads, a service valued at $18 million annually (Caltrans 2017). Orange County, California residents go out of their way to avoid trash-littered beaches, spending extra time and money in order to visit a cleaner beach or engage in other recreational activities; it is estimated that removing 100% of the marine debris on Orange County beaches could can prevent financial loss and provide economic benefits by $148 million during the three-months in the summer (Leggett et al. 2014). There are no known estimates of the costs of ocean litter to California's tourism, fishing, or aquaculture industries.

2008 Strategy "An Implementation Strategy for the California Ocean Protection Council Resolution to Reduce and Prevent Ocean Litter" Update

Recognizing the serious threats of ocean litter to human health, the economy, communities, and the environment, and the immediate need for decisive action in California, the California Ocean Protection Council (OPC) adopted a resolution on "Reducing and Preventing Marine Debris" in 2007. In 2008, the OPC initiated a steering committee to publish an Implementation Strategy, outlining three main priorities for addressing marine debris in the State. This Strategy was designed to provide a pathway to implement the recommendations in the OPC Resolution. The three priority actions were as follows:

1. Implement a producer take-back (EPR) program for convenience food packaging.
2. Prohibit single-use products that pose significant ocean litter impacts where a feasible less damaging alternative is available. Products specifically called out included polystyrene food packing and plastic bags.
3. Assess fees on commonly littered items.

Since the original Strategy was developed, many of the actions described in the document have either been accomplished or are in progress. In some cases, the State's regulatory or agency landscape has changed. For example, some items that were listed out separately in the Strategy are now being addressed under a single program, but there may be elements of those items that still need to be addressed (for instance, separate actions focused on minimizing toxins in packaging and developing sustainable alternatives are now jointly addressed by the California Department of Toxic Substances Control's (DTSC's) Safer Consumer Products Program, which examines product-chemical combinations that may have negative impacts on human health and the environment, and requires that manufacturers of priority products perform an alternatives analysis to determine whether such products can be made without the chemical of concern (DTSC 2013)). In other cases, our understanding of the ocean litter problem has changed

considerably since 2008 (for example, the examination of microplastics' impacts on marine life and their interaction with persistent organic pollutants has increased dramatically over the last decade (Ryan 2015)) and some of the actions that were outlined in the 2008 Strategy may not cover issues of emerging concern (such as microplastics and microfibers) or may no longer be the best way to go about addressing ocean litter.

This updated Strategy aims to expand collaboration to include projects of a variety of scales and scopes so that entities including tribes, government agencies, industry, and nonprofits can make a meaningful contribution towards reducing ocean litter in California.
See Appendix D for more detailed information on the progress made on the priorities and action items included in the 2008 OPC Strategy.

2017 Strategy Process

The Ocean Litter Strategy includes the following:

- **5 Objectives**: The first four objectives are dedicated to land-based ocean litter, while the last objective is dedicated to ocean-based litter. These objectives focus on source reduction, behavior change, research, control, and cleanup.
- **3 Priority Strategies:** These key strategies were identified as being essential to making the biggest impact in reducing and preventing ocean litter, and achieving the objectives. *(These priorities will be discussed during workshop #2)*
- **19 Strategies:** Nested under each objective, these strategies are approaches that may be taken to achieve an objective. Three of them were identified as priorities.
- **61 Action Items**: Listed under each strategy, action items are concrete and measurable actions that partners can commit to working on during the duration of the plan to implement a strategy.

In 2016, the Ocean Protection Council and NOAA Marine Debris Program initiated a partnership with California Sea Grant to update the 2008 Strategy. The 2017 Strategy planning team was rounded out with the participation of the California Coastal Commission and Surfrider Foundation. Representatives from organizations active in conservation, research, waste reduction, and education, as well as industry, tribes, and State and Federal agencies were invited to participate in two workshops in 2017 aimed at generating solutions to the problem of ocean litter in California. All of the ideas included in this Strategy document were identified by workshop participants. *See Appendix B for the complete list of ideas for action items generated by workshop participants.*

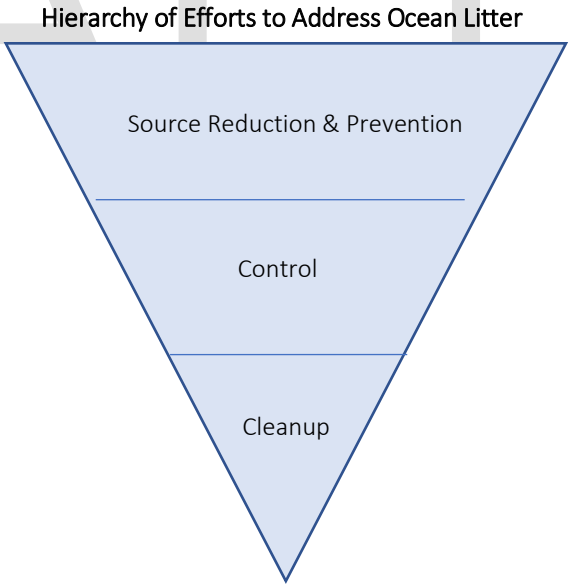
The first of the two workshops, held in May 2017, allowed participants to brainstorm and discuss potential solutions to the presence of (and problems associated with) ocean litter in California. 148 solution ideas to reduce and prevent ocean litter were identified during this workshop. These ideas were streamlined (duplicative and similar ideas were condensed) and organized into a draft Strategy by the planning team, which was then circulated among the workshop

participants and posted on the OPC's website for review and comment. The second of the two workshops, held in November 2017, allowed for further refinement of the Strategy's action items and the selection of priority actions, and gave organizations the opportunity to commit to taking a leadership role in implementing proposed actions. Each workshop was attended by approximately 50 participants. *See Appendices A, B, and C for the complete list of ideas for action items generated during the first workshop, the agenda from the first workshop, and the participant list from the first workshop, respectively. Additional Appendices with the agenda and participant list from the second workshop will be added prior to finalizing the Strategy.*

Scope of Document

Emphasis on Source Reduction and Prevention

This document prioritizes source reduction strategies and actions, as agencies and experts agree that that is the most effective tactic to address ocean litter. Source reduction, or waste prevention, refers to practices that reduce the amount of materials entering the waste stream, including changes in the design, manufacture, purchase or use of materials (EPA 2016). Preventing waste in the first place through initiatives such as packaging redesign and reusing materials is a better method for reducing waste as it reduces the amount of litter to control, capture, and dispose. This method is considered by the US EPA to be the most preferred method for dealing with waste (EPA 2017).



Furthermore, source reduction creates significant opportunities for industry to take initiative and responsibility over the product and packaging they produce and procure. By altering their production, operation, and raw material use, industries can prevent litter at the source. In addition, these changes can lead to economic benefits to industries by reducing costs associated with transportation, disposal, or recycling of waste (Maryland Department of the Environment 2017).

Waste management and ocean litter are inextricably linked. This Strategy is intended to be a complementary document to other waste prevention and management strategies, with a focus on the issue of ocean litter. *See Appendix E for state agencies working on issues that affect ocean litter, and their accompanying mandates.*

The source of ocean-based litter can be traced to vessels, as well as ports, terminals, and marinas that serve them, offshore platforms, fishing, and other marine activities. However, for this document, the focus is on lost fishing and aquaculture gear. Workshop participants who deal with ocean-based litter were mainly from the fishing and aquaculture industries and it was

agreed that due to the large scope of ocean-based debris and complexities with international regulations, a bigger impact could be made by narrowing the scope to lost fishing and aquaculture gear. For example, the International Convention for the Prevention of Pollution from Ships, MARPOL, (adopted in 1973) is the main international convention covering pollution of the marine environment from operational or accidental discharge from ships. MARPOL regulations prohibit many types of pollution from ships on a global scale.

Control and Cleanup

Controlling and cleaning up litter in the environment is important, but less efficient and effective in the longer term compared to source reduction and prevention. Examples of control and cleanup methods include: beach and waterway cleanups, street sweeping, stormwater capture devices, storm drain cleaning and maintenance, manual litter cleanup, and outreach and education to prevent littering. The public cost burden of these efforts makes a compelling argument for accelerating the search for effective strategies to reduce and prevent trash streams that enter our waterways and contribute to ocean litter.

In 2015, the State Water Resources Control Board (State Water Board) adopted a statewide water quality objective aimed at reducing the amount of trash that finds its way into rivers, lakes, and the ocean by prohibiting the discharge of trash into state surface waters; the water quality objective is commonly referred to as the "Trash Amendments." These Trash Amendments provide statewide consistency in efforts to reduce trash in state waters, and use a land use-based compliance approach that targets high trash generating areas such as high density residential, industrial, commercial, mixed urban and public transportation land uses. This program allows flexibility for local governments to come up with compliance approaches that work best for them to effectively eliminate trash discharge from their stormwater systems. Local governments may choose to increase trash capture in stormwater runoff, or a use combination of source reduction approaches that are equivalent to full trash capture. This Strategy provides a suite of source reduction approaches that may be cost-effective and useful to local governments as they develop their compliance approach for the Trash Amendments.

California also has a robust and successful network for implementing cleanups. From local nonprofits to municipalities, beach cleanups are held on a regular basis throughout the state. California Coastal Cleanup Day is a notable program held once a year, where approximately 60,000 volunteers pick up hundreds of thousands of pounds of trash and recyclables from beaches, lakes, and waterways. In 2016, 59,154 volunteers participated in California Coastal Cleanup Day and collected 710,781 pounds of litter (California Coastal Commission 2016). California Coastal Cleanup Day is a part of International Coastal Cleanup Day, the world's biggest effort to clean up ocean litter. Annually, nearly 12 million people volunteer to pick up litter in their communities (Ocean Conservancy 2017).

There are numerous organizations that also organize lost fishing gear cleanups on and off the water. For example, the California Lost Fishing Gear Project, administered by the University of California, Davis' School of Veterinary Medicine and the Wildlife Health Center, encourages

ocean users to report the presence of lost gear, and hires experienced commercial SCUBA divers to remove gear from nearshore waters in a safe and environmentally sensitive manner. Between 2006 and 2012, this program has retrieved more than 60 tons of gear from California's coastal ocean, primarily in Southern California, including around the California Channel Islands (Santa Rosa, Santa Cruz, Anacapa and Santa Catalina) (SeaDoc Society 2017).

OBJECTIVES

Broadly broken into land and ocean-based litter categories, the objectives are a framework to organize each strategy and action items of this Strategy focus on source reduction, cleanup, and control.

Land-Based Ocean Litter

Objective 1: Reduce land-based ocean litter at its source by implementing producer-oriented action items

Objective 2: Reduce the consumption of commonly found ocean litter items by implementing institution- and business-oriented action items

Objective 3: Promote behavior change by educating and engaging communities and individuals to reduce ocean litter

Objective 4: Conduct research on emerging issues impacting human health and the environment

Ocean-Based Litter

Objective 5: Reduce ocean-based litter at its source, and maximize the efficiency of control and cleanup of ocean-based litter

(with the option to split objective 5 into two) - *Discuss further during workshop #2*

OCEAN LITTER PRIORITY STRATEGIES AND JUSTIFICATIONS

NOTE: *In this draft, the priority strategies below are suggested for stakeholder and public feedback. At the workshop in November, participants will have an opportunity to vote on the ocean litter priority strategies, and the top priority strategies coming out of that process will be identified here in the final Strategy.*

The following top three ocean litter priority strategies were identified as being essential to making the biggest impact in reducing and preventing ocean litter:

Priority #1: Prohibit single use products, such as straws, stirrers, expanded polystyrene, and balloons, if a feasible, less damaging alternative is available

Banning single use products, such as straws and stirrers, polystyrene packaging, and balloons, will help reduce land-based ocean litter at its source, by preventing these items from becoming waste in the first place and leaking into the environment. As mentioned above, the EPA

considers source reduction to be the most efficient method for managing waste and reducing pollution (EPA 2017, EPA 2016).

From 1989 to 2014, food wrappers and containers were the second most prevalent items removed from California's coastlines and inland waterways on Coastal Cleanup Day, while straws and stirrers were the sixth most prevalent items (see Table 1 for the list of the top 10 litter items found on Coastal Cleanup Day from 1989-2014) (California Coastal Commission 2017). While balloons don't make this list, they are important to address, as they are identified by experts as one of the top items of concern for impacts to marine life, particularly in terms of entanglement (Wilcox et al. 2016).

Table 1. Top ten litter items removed on California Coastal Cleanup Day, 1989-2014.

Litter Item	Count	Percentage
Cigarettes/Cigarette filters	6,992,106	37.76%
Food wrappers/Containers	1,940,013	10.48%
Caps/Lids	1,619,071	8.74%
Bags (paper and plastic)	1,462,726	7.90%
Cups/Plates/Utensils	1,014,229	5.48%
Straws/Stirrers	736,595	3.98%
Glass beverage bottles	600,871	3.24%
Plastic beverage bottles	475,799	2.57%
Beverage cans	455,433	2.46%
Construction material	330,711	1.79%

Many of these common litter items may already be manufactured using alternative, less damaging materials (e.g., takeaway containers made from compostable materials). Ultimately, reusing products (and reducing potential ocean litter) is the better option, but manufacturing compostable or readily recyclable materials can also help to reduce ocean litter. It is important to note that implementing bans and utilizing alternative materials should be undertaken in such a way that ensures, through adequate research and analysis, that the ban and/or alternative item considered are in fact more beneficial to the environment than the original material or product.

A number of municipalities have already undertaken bans to prohibit these and other single use items in their jurisdictions. For example, San Francisco recently expanded its ban on polystyrene foam food containers (originally implemented in 2007) to prohibit the sale and distribution of polystyrene foam food ware and other products in the city (San Francisco Department of the Environment 2016). This regulation, called the Food Service and Packaging Waste Reduction Ordinance, went into effect January 1, 2017, and covers items such as foam cups, plates, clamshells, egg cartons, meat and fish trays, and packing peanuts (San Francisco Department of the Environment 2016).

Priority #2: Require the phase out of single use products in public institutions and facilities (i.e. government functions, campuses), such as convenience food and beverage packaging.

The State is the single largest purchasing entity in California, purchasing billions of dollars of products each year (Suh et al. 2017). As a result, the State can have a significant impact on, and set a good example for, preventing and reducing waste at the source through procurement policies that prioritize reusable items. Implementing sustainable purchasing programs can have environmental, health, social, and economic benefits for the state. For example, purchasing sustainable products can significantly reduce waste disposal costs. Through state legislation such as Assembly Bill 2490 and various Public Contracts Code Sections, the State has been actively purchasing more sustainable goods and services for over two decades, but additional actions can be taken to further the prevention and reduction of ocean litter (Responsible Purchasing Network 2017).

Priority #3: Advance research on microplastics and technological solutions to reduce microplastics in wastewater discharge.

Microplastics are small plastic pieces less than five millimeters in size which are either manufactured to be small in size (and often used in personal products such as face wash) or are created when larger pieces of plastic degrade over time (NOAA NOS 2017). Microfibers from synthetic clothing are another significant source of microplastics. Research on microplastics and their impacts is an emerging field of study, and microplastics are becoming recognized as one of the greatest threats posed to the aquatic environment (Crawford and Quinn 2017). Microplastics have been found in almost every marine habitat in the world (Lusher 2015) and there is still much to learn about the basic characteristics of microplastics, and the consequences these plastics have for environmental and human health.

Microplastics that are found in the aquatic environment have varying shapes, colors, and sizes which make it difficult to characterize their composition. Recent research has revealed that microplastics can adsorb organic contaminants (e.g., polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs)) (Rochman et al. 2013a) and trace metals (Holmes et al. 2012) from their surrounding environments, and, depending on concentration gradients, may transfer contaminants to marine organisms, inducing harmful health effects (Browne et al. 2013, Rochman et al. 2013b). Furthermore, once in the environment, microplastics are extremely difficult to remove. Many wastewater treatment plants and washing machines are not equipped to catch and filter microplastics before releasing effluent water from their systems, and (eventually) into rivers and the ocean. Therefore, research and technological advances need to be made to further address this pressing issue.

ACTION ITEMS

NOTE: *In this draft, the strategies and action items below are suggested for stakeholder and public feedback. At the workshop in November, participants will have an opportunity to discuss these action items further.*

In particular, please identify any action items that you (and your organization) may be interested in taking a lead or partnership role in implementing or feel strongly that you may want to be

involved in. Identifying your name (and your organization) next to an action item means that you and your organization will give your best efforts to implement the action item, given organizational and funding availability. Your input will help us develop breakout groups during the second workshop and further fill out the tables.

In the tables below, various action items to reduce and prevent ocean litter are grouped under broader objectives and strategies. Definitions of the information in each column are as follows:

- Action Items: Outlines the action item proposed;
- Needs & Barriers: Identifies the information or resources needed to successfully implement the action item and the barriers anticipated to implementing the action item;
- Status of Action & Resources Available: Indicates whether the action item is a new or ongoing effort, and lists resources available to assist with implementation; resources may include organizations that have expertise in a relevant issue or topic or that collect data that could assist with implementation of the action item.
- Lead & Partner Organizations: Identifies the organization that will take the lead on implementing the action item, as well as other organizations (partners) that would contribute to implementing the action item. The organization/s will give their best efforts to implement the action item, given organizational and funding constraints.

LAND-BASED OCEAN LITTER

OBJECTIVE 1. Reduce land-based ocean litter at its source by implementing producer-oriented action items.

Strategy 1.1. Prohibit single use products, such as straws, stirrers, expanded polystyrene, and balloons, if a feasible, less damaging alternative is available			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
1.1.1. Implement a city pilot project banning expanded polystyrene and measure the efficacy of the ban (reduction in polystyrene, environmental impacts, economic impacts).	- Industry opposition (i.e. food service/retail customer service)	- Ongoing effort - Plastic bag ban, local foam bans, local water bottle in government venues bans - NGOs, Clean Seas Coalition, Plastic Pollution Coalition - Local governments that have passed bans previously	
1.1.2. Develop a toolkit for local advocates (fact sheets, talking points, sample letters to the editor, sample media engagement strategies) to aid in the		- Ongoing effort	

process of banning single use items.			
1.1.3. Engage with industry allies that are already using alternative products to help advocate for transition away from single use items		- Ongoing effort	
1.1.4. Implement statewide ban/s of single-use items as opposed to starting on local ordinances	- Determine economic impacts to businesses - Industry opposition (i.e. manufacturers, trade associations) - Specific parameters of the law (i.e. hospitals, disabilities) - Who will enforce the ban?	- New effort - Statewide plastic bag ban, local foam bans, local water bottle in government venues bans - NGOs; Clean Seas Coalition - Local governments that have passed bans	
1.1.5. Expand the statewide bag ban to apply to retail stores.		- New effort - Oahu just expanded their bag ban and outlawed the thicker bags after 2020	
Strategy 1.2. Support and promote extended producer responsibility (EPR).			
Action Items	Needs & Barriers	Status of Action & Resources Available	Lead & Partner Organizations
1.2.1. The Ocean Protection Council will promote EPR as a policy to consider as part of CalRecycle's Packaging Reform Effort.		- Ongoing effort	OPC
1.2.2. Include performance measures in mandatory/extended producer responsibility programs for both prevention and recycling; with prevention being a higher priority.		- New effort	
1.2.3. Producers share responsibility to help municipalities achieve and pay for requirements under the trash amendments.		- New effort	

Strategy 1.3. Support voluntary packaging redesign with the aim of creating packaging with no/less plastic, and/or to be more recyclable, marine degradable (when appropriate), and less likely to emit toxins.			
Action Items	Needs & Barriers	Status of Action & Resources Available	Lead & Partner Organizations
1.3.1. Encourage redesign of products that are commonly littered to have less plastic and/or make them recyclable.		- Ongoing effort	
1.3.2. Implement packaging design challenges.		- Ongoing effort - CalRecycle	
1.3.3. Create a venue for sharing innovative designs, support the innovators (e.g., take-out paper cups with no plastic resin liner).		- New effort	
1.3.4. Engage corporations to enhance packaging design.		- New effort	
1.3.5. Attach lids to bottles.		- New effort	

OBJECTIVE 2. Reduce the consumption of commonly found ocean litter items by implementing institution- and business-oriented action items.

Strategy 2.1. Require the phase out of single use products in public institutions and facilities (i.e. government functions, campuses), such as convenience food and beverage packaging.			
Action Items	Needs & Barriers	Status of Action & Resources Available	Lead & Partner Organizations
2.1.1. Require the phase out of single use products in the UC and CSU systems (e.g., ban single use water bottles, ban expanded polystyrene containers on campuses, require	- Additional water stations to refill reusable water bottle, dishwashing capacity, reusable alternatives to disposable products. - Pre-existing franchises on	- Ongoing/New (?) effort - UC has committed to sending zero waste to the landfill by 2020 (http://policy.ucop.edu/doc/3100155/Sustainable%20Practice)	

dishwashing in dining halls, etc.), through Executive Order or mandate from the UC Regents/UC Office of the President and CSU Board of Trustees, or internal sustainability policy. Encourage the procurement of safer alternatives where available.	campus that are required to use franchise packaging and products - Timetable for contract negotiations between campuses and vendors.	- Individual UC campus sustainability offices and programs - Individual CSU campus sustainability offices and programs (e.g., CSUSF is working with the City of San Francisco to achieve the City's 2050 zero waste goal [https://www.calstate.edu/impact/sustainability/on-campus.html])	
2.1.2. Require the phase out of single use products in government (local, state, federal) buildings and events, through Executive Order or internal policy. Encourage the procurement of safer alternatives where available.	- Additional water stations to refill reusable water bottle, dishwashing capacity, reusable alternatives to disposable products. - Pre-existing contracts between company and campus/institutions	- New effort	
2.1.3. Require the phase out of single use products in other public institutions (i.e. hospitals).	- Additional water stations to refill reusable water bottle, dishwashing capacity, reusable alternatives to disposable products. - Pre-existing contracts between company and campus/institutions - Potentially (for hospitals) health concerns surrounding bacteria transmission.	- New effort	
2.1.4. Perform plastic audits for institutions (governments, campuses) that are required to transition to reusables.		- Ongoing effort	
2.1.5. Local governments charge businesses a fee if they produce a high volume of single use packaging (i.e., take out containers), which could be used to fund cleanups and other programs addressing trash pollution.		- New effort	

2.1.6. Require restaurants to have dishwashing capacity.		- Ongoing effort	
2.1.7. Charge consumers for disposables/single use food service packaging, where funding could be used for cleanups and other programs focused on reducing trash pollution.		- New effort	

Strategy 2.2. Encourage institutions, businesses, public venues, and events to voluntarily transition to using reusable products.

Action Items	Needs & Barriers	Status of Action & Resources Available	Lead & Partner Organizations
2.2.1. Encourage businesses and corporations to transition to reusables (e.g., corporate dining systems purchasing, water refill stations).		- Ongoing effort	
2.2.2. Encourage events such as music festivals, concerts, sports competitions, etc. to implement zero waste principles and develop a certification for participating events.		- New effort - Green Sports Alliance - NRDC	
2.2.3. Engage with the film industry to implement zero waste principles and develop a certification for participating films.		- New effort	

OBJECTIVE 3. Generate behavior change by educating and engaging communities and individuals to reduce ocean litter.

Strategy 3.1. Formal and Informal education on the watershed, regarding how litter on land becomes ocean litter.

Action Items	Needs & Barriers	Status of Action & Resources Available	Lead & Partner Organizations
3.1.1. Integrate ocean litter curriculum into school programs.		- Ongoing effort - CA Department of Education's Education and the Environment Initiative	
3.1.2. Provide toolkits for local high school/college students to educate people on their campuses and in their communities.		- Ongoing effort	
Strategy 3.2. Engage consumers in campaigns targeting producers of commonly found ocean litter items.			
Action Items	Needs & Barriers	Status of Action & Resources Available	Lead & Partner Organizations
3.2.1. Educate consumers using compelling communication strategies that reach coastal and inland communities.	- Language and cultural relevancy - Cost of outreach (time, face-to-face) - Measurement/sustained results - Identifying best way to communicate to the population of CA (i.e., millennials) - Developing targeted messaging	- Ongoing effort	
3.2.2. Conduct public education about microfibers and encourage consumers to not buy plastic-based clothing.		- New effort	
3.2.3. Implement significant public education and engagement campaign targeting the ban of expanded polystyrene (i.e., NGO campaign).		- New effort	
3.2.4. Implement a "truth" campaign about cigarette filters.		- New effort - Truth Initiative	

3.2.5. Conduct consumer behavior research to look at behavior and convenience, choices, and incentives to better understand consumer choices.		- New effort	
3.2.6. Implement a behavior modification campaign (i.e. single-use plastic, littering), targeting young adults for behavior change and education.	- Engaging target audience	- New effort	
Strategy 3.3. Support the State Water Resources Control Board's Trash Amendments.			
Action Items	Needs & Barriers	Status of Action & Resources Available	Lead & Partner Organizations
3.3.1. Create alternative funding mechanism for local government to fund stormwater trash programs (prop 218 for trash collection?		- New effort	
3.3.2. Implement a statewide Adopt a Storm Drain program.	- Develop and share BMPs based on knowledge from local municipalities	- Ongoing effort - City of Oakland	
3.3.3. Establish trash receptacles in high use areas and improve management (e.g. more containers for cigarette disposal, closed receptacles and proper maintenance schedules at access points, user-friendly trashcan lids, oversight for transportation ways/trails).	- Analyze effectiveness of program (e.g. Ocean Beach in San Francisco removed trash cans to prevent ocean litter. The theory being that people are more likely to leave trash next to an overflowing trash can than on the beach, and would otherwise pack their trash out.)	- Ongoing effort - Surfrider Hold on to Your Butt Campaign and collaboration with San Francisco's Union Square Business Improvement District	
Strategy 3.4. Engagement with homeless communities - *Discuss further during workshop #2*			
Action Items	Needs & Barriers	Status of Action & Resources Available	Lead & Partner Organizations

3.4.1. Look at effectiveness of social programs to engage homeless communities and address issues related to trash hotspots from homeless camps (e.g. municipalities get credit for implementing programs that tackle homelessness)	- Map hotspots of homeless camps - Outreach to homeless communities	- New effort	

OBJECTIVE 4. Conduct research on emerging issues related to land-based ocean litter.

Strategy 4.1. Conduct a comprehensive characterization study of trash inputs to identify the most common litter products.			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
4.1.1. Analyze and quantify discharges from a variety of endpoints, including street litter, stormwater, wastewater, and direct discharges form coastal tourism and homeless encampments, etc. throughout the state of California. Develop targets for reduction and implementation plans for each product (connect data to action plan, product source).		- New effort	
Strategy 4.2. Increase the characterization of microplastics and macro-debris.			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
4.2.1. Invest in source identification for plastics by funding studies using Fourier Transform Infrared	- There is currently not a clear understanding of the source of plastics entering the marine environment	- Ongoing effort - California State University Channel Islands has previously borrowed a FTIR	

(FTIR) microscope.	- Equipment is costly (e.g. the cost of a microscope is roughly $70,000)	microscope and learned that they had previously underestimated the amount of plastic in their samples. - This type of microscope would allow researchers to determine the composition of the plastic and possibly its source, as well as forensic tracking of substances.	
4.2.2. Develop standardized monitoring/data collection and compliance methods for trash and microplastics, including methodologies for measuring reductions of litter.		- Ongoing effort	
4.2.3. Develop a program to model and monitor microplastics transport and degradation.		- Ongoing effort	
Strategy 4.3. Advance research on microplastics and technological solutions to reduce microplastics in wastewater discharge.			
Action Items	Needs & Barriers	Status of Action & Resources Available	Lead & Partner Organizations
4.3.1. Research wastewater effluent to identify and quantify microfibers and microplastics.		- Ongoing effort - San Francisco Estuary Institute	
4.3.2. Research technological solutions at wastewater treatment plants or in washing machines (filtration/collection system).		- Ongoing effort - Rozalia ball	
4.3.3. Research technical solutions for microfibers in apparel (i.e., washing machines/add-ons and innovative solutions).		- Ongoing effort	

Strategy 4.4. Research toxicological impacts of commonly found ocean litter (including plastics, microplastics, and microfibers) on marine resources and human health.			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
4.4.1. Work with DTSC and others to identify ongoing research and other work that may help fill knowledge gaps on the chemical components of common ocean litter items; the potential for chemicals to migrate from litter items into the environment; and the potential for chemicals from various forms of ocean litter to expose and harm people, aquatic organisms and the marine environment.	- Scope of DTSC priorities	- Ongoing effort - Unknown, may depend on scope of DTSC 2018-2020 Priority Products Work Plan; potentially the Safer Consumer Products Program	Lead: OPC, Partner: DTSC
4.4.2. Research on relationship between plastic toxicity and human health via consumption of seafood exposed to plastic debris.		- Ongoing effort - EPA compilation paper	
4.4.3. Research alternative materials and composition of plastics so they break down easier, and are less likely to emit toxins.		- Ongoing effort	
Strategy 4.5. Assess the effectiveness of existing bans and policies.			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
4.5.1 Conduct cost-benefit analyses for implementation of different litter reduction policies/strategies and provide them to cities (i.e. local ordinances to ban expanded polystyrene).		- New effort - Reporting on effectiveness of bag ban (a few NGOs and local governments are collecting data)	

4.5.2. Analyze impact of the statewide plastic bag ban (i.e. how many bags are kept out of circulation, corresponding environmental protection gains, cost savings to government, if any).		- New effort	

OCEAN-BASED LITTER

OBJECTIVE 5. Reduce ocean-based litter at its source, and maximize the efficiency of control and cleanup of ocean-based litter.

Strategy 5.1. Improve tracking for lost fishing and aquaculture gear.			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
5.1.1. Improve reporting system for lost fishing gear.		- Ongoing effort	
5.1.2. Develop centralized database for lost fishing gear/Develop centralized website to report GPS location of traps without penalty to fishermen.		- New effort	
5.1.3. Implement a pilot project testing the best tagging and marking methods for aquaculture gear.		- New effort	
Strategy 5.2. Implement Best Management Practices (BMPs) for the aquaculture industry.			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
5.2.1. Compile BMPs for the aquaculture industry through collaboration with, and between, growers. Educate growers about BMPs.		- Ongoing effort	

5.2.2. Update Fish and Game Commission policies to include BMPs in permits.		- New effort	
Strategy 5.3. Improve fishing gear to increase durability, decrease loss, and mitigate environmental impact.			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
5.3.1. Design fishing line to be biodegradable.		- Ongoing effort	
5.3.2. Improve fixed gear technology to minimize repetitive gear losses (i.e. traps and pots).		- Ongoing effort	
Strategy 5.4. Leverage industry knowledge to prevent lost fishing gear.			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
5.4.1. Leverage fishermen's knowledge about strategies to prevent gear loss to educate within the industry and to educate new fishermen (education could be incentivized, required, or voluntary; fishermen could work with other partners to create educational materials).		- Ongoing effort	
5.4.2. Share lessons learned with other stakeholders and managing bodies to focus policy and funding on prevention and recovery of lost gear.		- New effort	
Strategy 5.5. Increase the removal of lost fishing and aquaculture gear.			
Action Items	**Needs & Barriers**	**Status of Action & Resources Available**	**Lead & Partner Organizations**
5.5.1. Implement a buyback program for old and/or unused gear.		- Ongoing effort - Humboldt County Crab Pot Gear Recovery Project - State Bill 1287	

5.5.2. Remove legacy aquaculture debris from historic aquaculture lease operations in Tomales Bay and in other areas of historic aquaculture activities in the State.		- Ongoing effort	
5.5.3. Engage boaters, fishermen, divers, and community to participate in cleanup programs organized by Bay/Harbor industries (i.e. growers, kayak companies, etc.).		- Ongoing effort	
5.5.4. Research policy barriers to lost gear removal and ocean-based marine debris cleanup.		- Ongoing effort	
5.5.5. Identify funding and start program to remove derelict commercial fishing vessels.		- New effort	

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APPENDICES

A. Workshop #1 Agenda
B. Compiled List of Solution Ideas from Workshop #1
C. Workshop #1 Participants
D. Status Update on the 2008 Strategy

APPENDIX A

California Ocean Litter Strategy Update Workshop #1 May 2-3, 2017

Ronald V. Dellums Federal Building
North Tower, 5th Floor Conference Room H
1301 Clay Street, Oakland, CA 94612

Workshop Objectives:

- Identify content and framework to draft CA Ocean Litter Strategy
- Identify priorities, strategies, and actions to prevent and reduce ocean litter in CA
- Increase coordination and collaboration among entities working on ocean litter

May 2, 2017

8:30am	Check-in Participant sign-in, light breakfast
9:00am	Welcome and Introductions Jenn Eckerle *(CA Ocean Protection Council)*
9:45am	2008 Implementation Strategy to Reduce and Prevent Ocean Litter: Overview and Update
10:15am	**BREAK**
10:30am	Overview of Extended Producer Responsibility (EPR) *Speakers:* Jim Hill *(CalRecycle)* Heidi Sanborn *(California Product Stewardship Council)*
11:15am	Break Out Group Objectives & Instructions
11:45am	**LUNCH (Provided)**
12:45pm	Breakout Group #1: Source – Producers - Extended Producer Responsibility, product design, source reduction discussion
1:45pm	Breakout Group #1: Report Out & Discussion
2:30 pm	**BREAK**
2:45pm	Breakout Group #2: Consumers - Consumer behavior, behavioral/purchasing/institutional change, assessing effectiveness discussion
3:30pm	Breakout Group #2: Report Out & Discussion
4:00pm	Group Discussion & Check-In
4:30pm	**Adjourn**
4:45pm	***Optional*** Happy Hour at the Tribune Tavern (401 13th St, Oakland, CA 94607)

May 3, 2017

8:30am	Light Breakfast
9:00am	Re-Cap from Day 1, Day 2 agenda overview
9:15am	Trash Amendments Overview *<u>Speaker</u>:* Gayleen Perreira *(State Water Resources Control Board)*
10:00am	**BREAK**
10:15am	Breakout Group Instructions
10:30am	Break Out Group #3: Ocean Litter in Transit - Data collection and characterization, waste and stormwater management systems, monitoring, technology, removal, impacts discussion
11:15am	Breakout Group #3 – Report Out & Discussion
11:45am	**LUNCH**
12:45pm	Break Out Group #4: Final Destination (Ocean and Beaches) - Removal, monitoring, pollution impacts discussion
1:30pm	Break Out Group #4 – Report Out & Discussion
2:00pm	**BREAK**
2:15pm	Break Out Group #5 - Further discussion and review of topics raised during earlier breakout sessions
3:00pm	Break Out Group #5 – Report Out & Discussion
3:30pm	Group Discussion - Strategy Framework, future work that needs to be done, address "parking lot" topics
4:15pm	**Wrap Up & Adjourn** - Workshop #2, evaluation and final check-in, closing remarks

ADDITIONAL INFORMATION

- We will be meeting in the North Tower, 5th Floor Conference Room H in the Ronald V. Dellums Federal Building (https://www.gsa.gov/portal/content/175951). After going through the North Tower security, take either bank of elevators up to the 5th floor. From the 5th floor elevator bank turn left down the hall toward a set of double doors that lead to a balcony. At the end of the hall turn right - Conference Room H is at the end of that hallway.
- Allow some extra time to pass through airport-like security to enter the building. Make sure to bring a valid government-issued ID (e.g. driver's license) or passport (from any country). Liquids are allowed through but leave pocket knives, etc. at home.
- We recommend utilizing public transportation as the building is very close to the 12th St Oakland BART station. If you are driving, Oakland parking lots are mapped here: https://www.parkme.com/oakland-parking. The City Center West garage at 1239 Jefferson St is the closest.
- We encourage you to bring your own mug and/or water bottle for beverages.

APPENDIX B. All ideas for action items (here called "solution ideas") generated by participants at the first Ocean Litter Strategy Workshop. Ideas are organized alphabetically, by "detailed solution type," as assigned by the planning team. Ideas that fall under the same, general "detailed solution type" are highlighted in the same color, for visual aid. The first table (pages 1-9) includes all land-based litter ideas, while the second table (pages 10-12) includes all ocean-based litter ideas.

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Straw ban	Policy/Legislation, Outreach/Education	Ban	Recommend policy statewide (as opposed to starting on local patchwork); City pilot and measure; Legislative champion; NGO campaign; Leaning on prior policy decisions (zero waste)	Perceptions; Habits; Industry - food service/retail customer service; Specific parameters of the law; Hospitals/disabilities; Gov't involvement in personal habits; Boba	Effects of alternatives; Cost-effective alternatives; More focused studies on straw pollution; Baseline data (getting baseline data for cups might be easier since the data is built into their POS); Designing a baseline study	Alternatives industry	Breakout Group A (Green)	Source/Producers
Ban straws, both plastic and paper (with exceptions, available on need basis)	Policy/Legislation	Ban					Breakout Group B (Blue)	Consumers/Institutions, would fit better in Source/Producers
Ban plastic straws and stirrers	Policy/Legislation, Outreach/Education	Ban	Paper/wooden			Heal the Bay "Rethink the Drink" campaign regarding single use drink items – ban straws on Santa Monica Pier, straws upon request, paper straws if requested – microeconomic study that could happen there Clean Water Action – broken down the cost savings, GHG savings, et	Breakout Group C (Red)	Source/Producers
Ban single use items (straws, utensils, lids, stirrers); Ban flexible packaging (potato chip bag, baby food container, etc.)	Policy/Legislation	Ban					Breakout Group A (Green)	Source/Producers
Ban polystyrene foam containers and transport packaging	Policy/Legislation	Ban	1) Fund advocacy organizations - collect data on extent of the problem; 2) Author for the bill; 3) Develop grassroots community support; 4) Engage the media; 5) Develop advocacy toolkit for local advocates (fact sheets, talking points, sample letters to editor, sample media engagement strategies); 6) Work with industry allies that already have alternative products in place; 7) Identify key legislative districts who will be key opponents and supporters; 8) Engage local officials and agencies in providing support; 9) Significant public education and engagement campaign	Economic impacts to businesses; Public opposition/habits - inconvenience; Industry opposition (manufacturers, trade associations); False story of recyclability of polystyrene - e.g., Dart container setting up recycling systems with local government; Funding for advocacy organizations; Enforcement of ban?	Alternatives that don't meet the intent of the legislation - will this lead to alternatives that create more litter?	Model projects: Plastic bag ban, local foam bans, local water bottle in government venues bans; NGOs; Clean Seas Coalition; Plastic Pollution Coalition; Local governments that have passed bans; Reporting on effectiveness of bag ban (a few NGOs and local governments are collecting data)	Breakout Group B (Blue)	Consumers/Institutions, would fit better in Source/Producers
Mylar balloon ban	Policy/Legislation, Research/Monitoring, Outreach/Education	Ban	record (in an app, hand-written) data (needs standardization), need to share data at best forum	Already have a mylar balloon release ban (bill in 2016)		Seen by many water people (e.g. fishers, boaters during races)	Breakout Group C (Red)	Ocean Litter in Final Destination, would fit better in Source/Producers
Bottle ban on campus	Policy/Legislation, Outreach/Education	Ban - mandate to use reusables in specific setting	Student advocacy, self-regulation; Convince institution to make that change; No bottled water sold on campus; Given reusable bottles (and other supplies) at orientation; Mandatory exchange program at cafeterias; Advertising where you can refill your bottle; Bring existing campaigns together/breaking down silos; Roll-out on a UC level	Access to water/places to refill your reusable water bottle; Existing contracts (phase-in approach); Industries that are reliant on plastic bottles for their product	Life-cycle awareness of reusable bottle	Find existing campaigns on campuses; Bulk dispensers already available in larger cafeterias (roll-out to smaller corner stores)	Breakout Group A (Green)	Consumers/Institutions
Ban single use plastic bottled water in all public venues	Policy/Legislation	Ban - mandate to use reusables in specific setting					Breakout Group B (Blue)	Consumers/Institutions
Mandating reusables for events/facilities/buildings	Policy/Legislation	Ban - mandate to use reusables in specific setting	Set initial metric/goal to achieve by a certain time; Educate elected officials and staff; legislative champion	Health codes; Water use; Cost to vendors (don't want to make it harder for vendors to do business); Different populations/industries (i.e., tourist economy, college town economy); Consistency in health codes; Access to water; Culture/habit	Research on health codes for specific localities	Cost-benefit analyses to make case for institutions; Businesses that can specifically fulfill mandate exist and become an option for facilitiy; Music concerts/festivals already developing consistency	Breakout Group A (Green)	Consumers/Institutions
Ban PFAS's for food packaging (also think about banning phthalates, hormones...)	Policy/Legislation	Ban - toxins					Breakout Group B (Blue)	Source/Producers
Zero waste mandates	Policy/Legislation	Ban - zero waste mandate				e.g., SF pushing efforts for single use	Breakout Group A (Green)	Source/Producers, might fit better in Consumers/Institutions if City-wide
Evaluate efficacy of current bans and policies (How are things from the first strategy? Is the city saving money? Litter reduction?)	Research/Monitoring	Ban/Policy - evaluation of efficacy	Monitoring is crucial (case studies that showcase scientifically credible evaluation of before and after - "we did activity A and it reduced litter on land by 10%"); Replicable research; Determine strategies that are working most efficiently				Breakout Group A (Green)	Source/Producers
Data for cities about costs saved from implementation of bag ban/litter reduction policies	Outreach/Education, Research/Monitoring	Ban/Policy - evaluation of efficacy			National campaign to preempt city laws Federal preemption	OPC/OST is appropriate entity to do that research Don't negate citizen science, when collected with rubrics	Breakout Group C (Red)	Source/Producers

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Music industry, festivals, concerts	Outreach/Education, Policy/Legislation (certification)	Business/Industry responsibility	Raise profile of green events - certification? (Business/Industry responsibility with assistance from muncipalities, NGO, etc.)				Breakout Group C (Red)	Consumers/Institutions
Sporting events	Outreach/Education, Policy/Legislation (certification)	Business/Industry responsibility	(Business/Industry responsibility with assistance from muncipalities, NGO, etc.)			Los Angeles as Olympics 2024 site	Breakout Group C (Red)	Consumers/Institutions
Film industry	Outreach/Education, Policy/Legislation (certification)	Business/Industry reponsiblity	Production-specific water bottle, refill station Craft services - food service permitting fee reduced for green practices Partner with bottle company, etc. Plastic audit - statement comes up during credits that this production was "green"			Ocean Recovery Alliance - plastic audit	Breakout Group C (Red)	Consumers/Institutions
Pressure tobacco industry to take responsibility	Policy/Legislation, Outreach/Education	Business/Industry responsibility	Make recyclable. Label cigarette packages that butts are not biodegradable and you can't toss them	Ban sale of filtered cigarettes across state – PR difficulty, not advised to do without careful calculation		Change Lab (Oakland) produced EPR – educate about and use local ordinance Cigarette filters are useless/illusion to make it seem safer – can make health worse – needs more education about this issue	Breakout Group C (Red)	Source/Producers
Education for employees (hotels)	Outreach/Education	Business/Industry responsibility					Breakout Group C (Red)	Source/Producers
Highlight companies that are acting "responsibly"	Outreach/Education	Business/Industry responsibility	NGOs/Government certification program??			Green Dot	Breakout Group C (Red)	Source/Producers
Restaurants (e.g., gelato shop) that have a trash can in front of shop should have to pay if it is overflowing	Policy/Legislation	Business/Industry responsibility - cleanup					Breakout Group A (Green)	Consumers/Institutions
Require commercial businesses to remove trash in front of their establishments on a daily basis	Policy/Legislation	Business/Industry responsibility - cleanup					Breakout Group B (Blue)	Ocean Litter in Transit
Resource guides for various industries (may be "tool" rather than solution)	Outreach/Education	Business/Industry responsibility - resource guide	Identify what already exists; Social media/online friendly	Must have direct incentive/financial piece to encourage businesses to use toolkit that is prepared (show cost-benefit analysis)	Social media metrics; Entity to guide industries through this process (NGO, volunteer); Are resource guides effective?	CA Product Stewardship Council; Plastics, Packages, and Colleges (EPA-funded); Last Straw Community Toolkit; Sustainable Purchasing Council	Breakout Group A (Green)	Consumers/Institutions
Cost-benefit analyses on transitioning to reusables for businesses (makes sense to transition to a more reusable operation)	Research/Monitoring, Outreach/Education	Business/Industry responsibility - resource guide					Breakout Group A (Green)	Source/Producers, would fit better in Consumers/Institutions
Outreach campaign to hospitals, public institutions, etc., to encourage BMPs	Outreach/Education	Business/Industry responsibility - resource guide	Water refill stations, food waste, food service waste Plastic audit of your institution - become public knowledge Report out what is being diverted Organizational toolkit - brought in from outside organization			SF banned use of bottled water at all city facilities, concerts, etc. - organizers are required to bring in water refill stations, coul dbe spread to other municipalites Ocean Recovery Alliance - plastic audit	Breakout Group C (Red)	Consumers/Institutions
Require remodeling/siting of new grocery stores to include bulk bins for certain dried commodity goods	Policy/Legislation	Business/Industry responsibility - reusables					Breakout Group A (Green)	Source/Producers, would fit better in Consumers/Institutions
Significant transition to reusable products - a % of products that are single use need to be transitioned to durable, reusable products (packaging - transport, food and bev, consumer products) (not specified WHO needs to transition to reusables, so assumed businesses/industry)	Policy/Legislation	Business/Industry responsibility - reusables					Breakout Group B (Blue)	Source/Producers, would fit better in Consumers/Institutions
Institutional dining system purchasing (university - CSUs, UCs - & corporate) transition away from disposable and towards reusable	Policy/Legislation, Outreach/Education	Business/Industry responsibility - reusables					Breakout Group B (Blue)	Consumers/Institutions
Require restaurants to have dishwashing capacity (reusables on site)	Policy/Legislation	Business/Industry responsibility - reusables					Breakout Group A (Green)	Source/Producers, would fit better in Consumers/Institutions

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Customer education campaign to promote bringing reusable cup to coffee shop	Outreach/Education	Business/Industry responsibility - reusables	Have reusable cup with prominent sign at register with discount written on it Sign outside store - did you remember your cup? Bean bags - educating stores about reuse	Store dependent Employee education		Managers can be open about it if employees talk to them (personal experience)	Breakout Group C (Red)	Consumers/Institutions
Make it easier for consumers to take reusable containers to restaurants for take-out	Policy/Legislation	Business/Industry responsibility - reusables		Public health laws likely prohibit this			Participant index cards	N/A
Business responsibility toward using reusables/pooled fund towards trash cleanup	Policy/Legislation, Outreach/Education, Research/Monitoring	Business/Industry responsibility - reusables, cleanups	Identify "worst offenders"; Implement policy; Restaurant certification programs, breaks for good behavior				Breakout Group A (Green)	Ocean Litter in Transit, could fit in Consumers/Institutions as well
Innovation forum on trash capture. Showcase success stories.	Research/Monitoring, Outreach/Education	Capture - technology					Breakout Group B (Blue)	Ocean Litter in Transit
Improving street sweeping efficiency	Research/Monitoring	Capture - technology, Gaps/leaks in waste management					Breakout Group B (Blue)	Ocean Litter in Transit
Public campaign for picking up litter (engaging community in litter cleanup) - build off of coastal cleanup day, needs to become a habit. Creating a behavioral change to cleanup up community areas	Outreach/Education	Cleanups - community engagement	Similar to dog bags at parks - encouraging folks to pick up trash on their own, in public spaces; Ongoing education campaign - potential CalTrans funding?; How do you change behavior in a very urbanized area? Apt complexes? Municipalities funding (Track 2 in Trash Amendments)				Breakout Group B (Blue)	Ocean Litter in Transit
Incentivize fishers, etc to pick up trash for up-cycling (i.e. want to remove mylar balloons)	Policy/Legislation, Outreach/Education	Cleanups - community engagement	Use TeraCycle for up-cycling of marine debris/ocean litter	Inconvenient for people to have another avenue for recycling Time and Money		TeraCycle	Breakout Group D (Ocean-Based)	Ocean Litter in Transit
Increase opportunities for DIY stations for cleanups at beaches (non-profit ran)	Outreach/Education	Cleanups - community engagement					Breakout Group C (Red)	Ocean Litter in Final Destir
Focusing cleanups on specific items (i.e., golf balls, needles, balloons), with the goal of banning specific items (e.g., banning the sale of balloons near the coast)	Policy/Legislation	Cleanups - data		Safety hazards			Breakout Group A (Green)	Ocean Litter in Final Destination, could fit in Source/Producers as well (bans)
Identify and direct resources to trash hotspots on the coast (removal/cleanup)	Policy/Legislation	Cleanups - hotspots					Breakout Group B (Blue)	Ocean Litter in Final Destination
Alignment and compilation of beach cleanup efforts	Research/Monitoring, Other: Collaboration/Integration of existing efforts	Cleanups - standardized methodologies, database, collaboration	Bring together existing resources or create a single system/database (gov't curated?); Decide upon best-practice for data collection; Creation of a data hub; Improved technology to characterize/analyze litter (possible in GIS); Create a calendar to align all beach cleanup efforts (use colors to indicate regions); Ensure that there is a targeted objective for this alignment	Different ways of collecting data	Brand data; Technological capabilities to categorize trash?	Existing databases	Breakout Group A (Green)	Ocean Litter in Final Destination
Creative technological solutions (sorting trash, cleanup, packaging design)	Research/Monitoring	Cleanups - technology	Lasers/optical sorting; Roomba for the beach; Better packaging; Hold a challenge for packaging design (connect with universities)			Mr. Trash Wheel	Breakout Group A (Green)	Ocean Litter in Final Destination
Explore effectiveness of skimmers and other removal gear, expanded use of skimmers/gear for trash removal nearshore; EPR/producers should fund cleanup in marinas	Research/Monitoring, Policy/Legislation	Cleanups - technology					Breakout Group B (Blue)	Ocean Litter in Final Destination
Mr. Trash Wheel	Outreach/Education	Cleanups - technology			- Maintenance, who would take over after it is built? Will the State be in control of it? - Crowdfunding needed? - Trash wheel/trash boom considered full capture system?	- Baltimore - Mr. and Dr. Trash Wheel - Georgia Aquarium to be looking into it	Breakout Group C (Red)	Ocean Litter in Transit
Incentive program for individuals to collect litter items. Collect/Turn in items for second use?	Policy/Legislation, Outreach/Education	Consumer responsibility - cleanup, incentive programs					Breakout Group B (Blue)	Consumers/Institutions

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Set targets for the quantity of packaging generated by residents that need to be reduced over time (e.g., 25% reduction of food and bev, consumer product, and transport packaging put into the market place by 2025)	Policy/Legislation, Outreach/Education	Consumer responsibility - waste reduction	Determine how to measure reduction [3 possible ways to measure: 1) No. lbs per person per year (not the right measure), 2) No. pieces/units of packaging per person per year, 3) Volume of packaging per person per year]; Evaluation of what's coming through the waste stream?				Breakout Group B (Blue)	Source/Producers, would fit better in Consumers/Institutions
Develop incentive programs - reduce volume of trash at home, for example - to get at reducing garbage fee	Policy/Legislation, Outreach/Education	Consumer responsibility - waste reduction, incentive programs					Breakout Group B (Blue)	Consumers/Institutions
More containers for cigarette disposal	Policy/Legislation Outreach/Education	Gaps/Leaks in waste management		Enforcement needed	How effective are these kinds of programs? Data needed	- Terracycle, Surfrider SD - cigarette butt containers near bars - Law in SF that requires cigarette ash trays within 20 ft of front door of buildings - most buisnesses don't - Surfrider has been putting up ash trays in SF - Smoke Free LB (Long Beach) - no smoking in public areas, designating very specific areas where smoking is allowed	Breakout Group C (Red)	Ocean Litter in Transit
Address direct discharge hotspots - areas that do generate trash but are out of MS4 (homeless encampments, regional parks and high use beaches, schools and transportation ways); Better education and enforcement of discharge hotspots	Policy/Legislation, Outreach/Education, Research Monitoring	Gaps/Leaks in waste management - direct discharges					Breakout Group B (Blue)	Ocean Litter in Transit
Preventing illegal dumping	Policy/Legislation, Outreach/Education, Research/Monitoring	Gaps/Leaks in waste management - direct discharges					Breakout Group B (Blue)	Ocean Litter in Transit
Ensure closed receptacles and proper schedule for maintenance exist at all access points to ocean	Policy/Legislation	Gaps/Leaks in waste management - direct discharges					Breakout Group B (Blue)	Ocean Litter in Final Destination, could fit in Ocean Litter in Transit as well
Improving trash transfer from can to truck (leakage in waste management system)	Research/Monitoring	Gaps/Leaks in waste management - improve efficiency					Breakout Group B (Blue)	Ocean Litter in Transit
Better outreach about existing large item pickup programs	Outreach/Education	Gaps/Leaks in waste management - improve efficiency					Breakout Group B (Blue)	Ocean Litter in Transit
User-friendly lids for trashcans (beaches, parking lots); more signage to pack it in, pack it out (could use children's art--effective to reduce vandalism)	Outreach/Education	Gaps/Leaks in waste management - improve efficiency	Provide guidance for management to increase uniformity and improve pickups so trash doesn't overflow	Different locations want different things for management (trash)--standardize without going against design ideas for the area			Breakout Group C (Red)	Ocean Litter in Final Destir
Establish oversight of areas without trash/recycling receptacles (e.g., Route 1 - trails to recreation areas where litter accumulates), place receptacles where there aren't any, think about automobilie crashes/cleanups	Policy/Legislation, Other: Closing gaps in waste management	Gaps/Leaks in waste management - oversight					Breakout Group B (Blue)	Consumers/Institutions, would fit better in Ocean Litter in Transit
Health Inspectors, Green Business Certification Programs, mandated to inspect packaging/amount of litter produced by businesses; Local business education	Policy/Legislation, Outreach/Education	Government responsibility - oversight, education					Breakout Group B (Blue)	Consumers/Institutions
Statewide Adopt a Storm Drain program	Policy/Legislation Outreach/Education	Government responsibility - oversight, education	Oakland share resources with other municipalites - program exists in a box that can be handed off to other municipalities - Department of Public Works		Need people in other Public Works Departments to be willing to take it on	City of Oakland - Lake Merrit has been under a trash TMDL - their program should go statewide: Adopt a Storm Drain. Get notice a few days before storm is expected for org to clean storm drain, offer tools to do this. Activates 100s of people across the city to clean trash out before it gets swept out	Breakout Group C (Red)	Ocean Litter in Transit

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Prioritize procurement of products where safer alternatives are found (items that are littered, items that are particularly harmful, for example)	Policy/Legislation	Government responsibility - procurement					Breakout Group B (Blue)	Consumers/Institutions
NGOs/communities educate local government to push them towards reusables (show gov'ts the variety of solutions available to them)	Outreach/Education	Government responsibility - procurement					Breakout Group A (Green)	Source/Producers, would fit better in Consumers/Institutions)
All (local, state, federal) government lead by example by minimizing/stopping the use of single-use products, both through internal procurement and through education of businesses	Policy/Legislation, Outreach/Education, Other: Statutory	Government responsibility - procurement, education	Procurement (could happen voluntarily or through mandate): 1) Identify the decisionmakers (e.g., Dept of General Services); 2) Analysis of alternative options Education: Green Business Certification Programs, ReThink Disposable	Procurement: Lack of political will; Inconvenience; Enforcement; Low priority in current climate; Bureaucracy Education: Lack of funding; Lack of people power; Low priority; Lots of work/resource intensive; Interest from food businesses in participating in voluntary programs; Big turnover in food industry --> constant training of staff			Breakout Group B (Blue)	Consumers/Institutions
Integrate marine debris curriculum into school programs (curriculum already exists)	Outreach/Education	K-12 education					Breakout Group B (Blue)	Consumers/Institutions
End incineration of packaging (including waste to energy conversion)	Policy/Legislation	Legislation					Breakout Group B (Blue)	Source/Producers
"Next Generation" trash laws	Policy/Legislation, Research/Monitoring	Legislation	figure out which types of trash could be the next big type of litter and pass a law accordingly				Breakout Group C (Red)	Ocean Litter in Final Destir
Correct labeling – "not recyclable" label as well (would this change consumer behavior?)	Policy/Legislation, Outreach/Education	Legislation	Label cigarette packages that butts are not biodegradable and you can't toss them		Community by community – not even within/across counties Regulatory consistency across state	Labeling is regulated by FDA – federal issue, not state	Breakout Group C (Red)	Source/Producers
Attach lids to bottles	Policy/Legislation Research/Monitoring	Legislation				Crystal Geyser to make an attached lid (still water, not carbonated water yet) Retrofitted by June in CA, it will be recyclable (HDPE) Patents do exist for carbonated water!	Breakout Group C (Red)	Source/Producers
Pass bill that does away with cigarette filters	Policy/Legislation	Legislation					Participant index cards	N/A
Address under 5 mm microplastics. Including fragments of consumer products, cigarette butts, fibers (could include a statewide ban on Styrofoam products)	Policy/Legislation, Outreach/Education, Research/Monitoring	Microplastics - discharge					Breakout Group B (Blue)	Ocean Litter in Transit
Wastewater treatment plants to stop discharge of microplastics	Research/Monitoring, Policy/Legislation	Microplastics - discharge					Breakout Group B (Blue)	Ocean Litter in Transit
Microfiber solutions	Research/Monitoring, Outreach/Education, Other: Product Design	Microplastics - technology, product design, education	Technical solutions for more efficient washing machines; Technical solutions for apparel; Recycling water mandates (co-benefits); Education about microfibers, encouraging people not to have plastic-based clothing; Biggest manufacturer's pay into wastewater treatment upgrades, or largest sellers/retailers pay into upgrades; Complementary marketing (rozalia balls with synthetic clothing); Sponsorship with washing machines/add-ons	Possibly cost prohibitive; Circular economy trend (i.e. clothes made from bottles)	We need field data, and where the hotspots are; A lack of alternatives; Eliminating a next-life solution for recycled plastic; Which kinds of plastic fabrics shed the worst? Recycled PET? Fleeces? Any polyester fabric?	5 Gyres webinar and Surfrider microfibers blog; Patagonia's report; SFEI is launching a 2 year study on microplastics in the Bay; Rozalia Project	Breakout Group A (Green)	Ocean Litter in Transit, could fit in Source/Producers as well (product design/source reduction)
EPR – need to build political power	Policy/Legislation, Outreach/Education	Producer responsibility					Breakout Group C (Red)	Source/Producers
EPR	Policy/Legislation	Producer responsibility					Breakout Group A (Green)	Source/Producers
Promoting packaging redesign efforts, direct corporate engagement	Research/Monitoring	Product/Packaging design					Breakout Group A (Green)	Source/Producers
Technological solutions for packaging (i.e. shellfish)	Research/Monitoring	Product/Packaging design					Breakout Group A (Green)	Ocean Litter in Final Destination
Design products that are commonly littered to have less plastic	Research/Monitoring, Other: Product Design	Product/Packaging design	Create a venue for sharing innovative designs, support the innovators (e.g., take-out paper cups with no plastic resin liner)				Breakout Group B (Blue)	Source/Producers

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Make packaging recyclable	Policy/Legislation, Outreach/Education	Product/Packaging design	Biodegradable to original organic form Compostable and/or reusable Incentivize producers to use recyclable materials more		Need list for what kind of materials are actually biodegradable/reusable – needs to be mandated, not just recommendation, needs label	Walmart – economics of the stores influenced entire supply chain to reduce volume of packaging by 5% (better for their bottom line) – get them to talk to other companies Walmart has internal goal so they are leveraging the companies in charge of products (Proctor and Gamble, etc.)	Breakout Group C (Red)	Source/Producers
Create new nursery products	Policy/Legislation, Outreach/Education	Product/Packaging design					Breakout Group C (Red)	Source/Producers
Manufacturers of clothes washing machines add filtration to remove microfibers - or something to add to the washing machine to filter/collect microfibers	Research/Monitoring, Policy/Legislation	Product/Packaging design, Microplastics					Breakout Group B (Blue)	Ocean Litter in Transit
Changing composition of plastics so they break down easier, making them less likely to emit toxins (marine degradable plastics/products? --- requires caution, standards)	Research/Monitoring, Other: Product Design	Product/Packaging design, Toxicology	Give incentive to companies to make this happen? State dollars/state procurement?				Breakout Group B (Blue)	Source/Producers
Target gap in young adults for cleanups and reduced littering	Outreach/Education	Public education	Target 18-30yr olds; Game/app to incentivize	Hard to engage with some workplaces/groups		Snapchat (Snaptrash), collect data on location of trash; working with Salesforce	Breakout Group C (Red)	Ocean Litter in Final Destir
Education about low-waste lifestyle	Outreach/Education	Public education	fund DIY workshops, educate people about how to affordably have a lower-waste lifestyle/helping those who have less access to these resources/stores				Breakout Group A (Green)	Source/Producers, would fit better in Consumers/Institutions)
Education of consumers on reuse and recycling	Outreach/Education	Public education	Engaging media/starpower; Using uplifting/positive stories (avoid doom and gloom!); Creating documentaries that highlight successes; what does recycling really mean? how much tax payer money is being applied to aggressive mandates? Compelling communication strategies that reach other parts of the state (inland - make everyone care about ocean issues)	Language; Cost of outreach (time, face-to-face); Measurement/sustained results	What is the best way to communicate to the population of CA (i.e., millennials); create targeted messaging		Breakout Group A (Green)	Consumers/Institutions
Public education (street litter goes to the ocean)	Outreach/Education	Public education					Breakout Group A (Green)	Ocean Litter in Transit
Turn-in-your-trash programs	Outreach/Education	Public education					Breakout Group A (Green)	Ocean Litter in Transit, could fit in Consumers/Institutions as well
Behavior modification (single-use plastic, littering)	Outreach/Education	Public education			Research on how to change behaviors		Breakout Group A (Green)	Ocean Litter in Final Destination
Truth campaign about cigarette filters	Outreach/Education	Public education					Breakout Group C (Red)	Consumers/Institutions
Education campaign for recycling/biodegradable and how it actually works/means	Outreach/Education	Public education	Providing toolkit for local high school/college students for how they can educate people in their specific communities			Heal the Bay runs high school club program - educate public, grocery stores, etc. - college students?	Breakout Group C (Red)	Consumers/Institutions
Majority of people still don't understand that trash on city street can end up as marine debris	Outreach/Education	Public education	- Utilize billboards - find other ways to message other than talks/outreach - Education system - get it into the curriculum - State of CA should focus on regulation, legislation, and then research - not education (NGO fill gap) - Tie in health system to community health/environmental health to take responsibility for education/informing - State provided funding for research for health effects - especially in seafood	Language does not include most current science/stats - still technically appropriate but hasn't kept up - also doesn't encourage behavior change because public schools aren't allowed to do that		- Outreach and education, stenciling stormdrains, etc. has already happened but myabe not reaching enough - There is an existing state curricula that includes plastic - EEI, education and the environment initiative - Has worked with "Don't Mess with Texas" campaign - saw massive amounts of trash reduction, and once they stopped spending money on the campaign then roadside litter went up again - Keep California Beautiful - funded by ACC - Tobacco Control Program within Department of Public Health working on PSA - LA Times followed cigarette butt to ocean	Breakout Group C (Red)	Ocean Litter in Transit
Public education on reusable, non-wasteful women's menstruation products that everyone can have access to (affordable)	Outreach/Education	Public education	subsidies for lower income people to have access to affordable feminine hygiene; make it possible to purchase the products with your food stamp card?				Breakout Group A (Green)	Source/Producers, would fit better in Consumers/Institutions

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Focus on corporations, but a lot of consumers are disconnected - how to balance corporations and consumers being responsible? Consumers wouldn't buy the products if they didn't want it…	Outreach/Education	Public education - consumer behavior resarch					Breakout Group C (Red)	Ocean Litter in Transit
Survey (with small incentive) to look at consumer behavior - convenience, choices, incentives	Research/Monitoring	Public education - consumer behavior research					Breakout Group B (Blue)	Consumers/Institutions
Engage consumers in corporate targeting campaigns focused on companies that are generating the most products that end up as marine litter	Outreach/Education	Public engagement - brand trageting					Breakout Group B (Blue)	Consumers/Institutions
West Coast Pacific Protection Initiative	Policy/Legislation	Regional collaboration	Refocus resources from West Coast Governor's Alliance to broader resource protection – MOU to be signed by Pacific, set target reductions Take smaller regional efforts and increase momentum to create larger regional effort – support UN direction of global plastic bag ban			Marine Debris Alliance doesn't have a lot of political power – this could make things more formal	Breakout Group C (Red)	Source/Producers
Look at effectiveness of social programs (homeless communities, other vulnerable communities (inmates?)?)	Research/Monitoring	Social programs - effectiveness	Look at San Jose program, Russian River program, and analyze effectiveness				Breakout Group B (Blue)	Ocean Litter in Transit
Engagement with homeless communities	Outreach/Education	Social programs - homeless community engagement	Mapping hotspots of encampments that have litter associated with them; Credit towards programs that tackle homelessness (municipalities are getting credits if they have foam bans, could extend to get credit for creating programs to tackle homelessness); Interagency effort, pull in variety of expertise	Homeless peoples' rights groups (political correctness); Administrative coordination/bureaucracy; Moving target, appearance of new homeless encampments	Funding sources; Multidiciplinary expertise; Governance/politics of specific communities; Focused study on relationship between homeless encampments and litter	Downtown Streets Team	Breakout Group A (Green)	Ocean Litter in Transit
Create economic rubric/template for other municipalities to use when measuring litter reduced, costs, saved, etc	Outreach/Education Research/Monitoring	Standardized methodologies - monitoring					Breakout Group C (Red)	Source/Producers
Develop standardized monitoring and compliance methods for trash and microplastics	Research/Monitoring	Standardized methodologies - trash monitoring					Breakout Group B (Blue)	Ocean Litter in Transit
Increase reporting and standardize data collection on debris that is being removed	Research/Monitoring	Standardized methodologies - trash monitoring					Breakout Group B (Blue)	Ocean Litter in Final Destination
Standardize data collection	Research/Monitoring	Standardized methodologies - trash monitoring				Many groups already use Ocean Conservancy app (shoreline and at sea)	Breakout Group C (Red)	Ocean Litter in Final Destir
Standardization/alignment in trash research (microplastics, larger-sized trash)	Research/Monitoring	Standardized methodologies - trash research					Breakout Group A (Green)	Ocean Litter in Transit
More scientific methodologies to determine measurable reductions of litter; more tools in our toolbox	Research/Monitoring	Standardized methodologies/Metrics - litter reduction					Breakout Group A (Green)	Ocean Litter in Transit
Charge businesses a fee/tax/etc if they produce a high volume of takeout food to pay into City/County fund that pays for cleanup efforts (could be exempt if they go through a certain program (e.g., transitioning to different packaging))	Policy/Legislation	Tax/Funds					Breakout Group A (Green)	Source/Producers, would fit better in Consumers/Institutions

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Charge consumers for disposables (don't hand out disposables for free anymore)	Policy/Legislation	Tax/Funds				worked with bag ban	Breakout Group A (Green)	Source/Producers, could fit in Consumers/Institutions also
Use tax on plastic bottles	Policy/Legislation	Tax/Funds					Breakout Group A (Green)	Consumers/Institutions
Charge for single use food service packaging. Use money to fund local government educating consumers and food service industry to use less packaging OR money is spent by the EPR system to do education work	Policy/Legislation, Outreach/Education	Tax/Funds					Breakout Group B (Blue)	Consumers/Institutions
Create alternative funding mechanism for local government and municipalities to fund stormwater trash programs (prop 218 for trash collection?)	Policy/Legislation	Tax/Funds					Breakout Group B (Blue)	Ocean Litter in Transit
Research toxicological impacts of ocean pollution on marine life and human health	Research/Monitoring, Outreach/Education	Toxicology	Commission a study (focusing on youth, reproductive impacts, long-term); Research on single-use items (i.e., foam) and their effects on humans; Establishing labs dedicated to this type of research; Survey of existing information	Funding; Timescale; FDA regulations	Ensure research method is appropriate for the problem/question; Historical data of populations with high fish diets	Chelsea Rochman (researcher); Sam Mason; Scripps researchers; Marcus Erikson; 5 Gyers; Point Blue (bird datasets)	Breakout Group A (Green)	Ocean Litter in Final Destination
Test chemicals that are in products that dominate beach litter (brand recognition, report, media outreach)	Research/Monitoring, Outreach/Education	Toxicology	Test chemicals in products common in beach litter, identify brand of products, write a report, conduct media outreach (very important!)			Example: DTSC work on fast food packaging (PFAS's), nail products	Breakout Group B (Blue)	Source/Producers
Research on plastic toxicity, human health, combined toxicity	Research/Monitoring, Outreach/Education	Toxicology	Translate plastic + human health aspects (current and past research) for the layman		Learn what universities are doing currently (sustainability)	EPA compilation paper, plastic is toxic to humans; LA is doing this (translate and publicize the science)--modeling for the State, bring up in coastal communities; Monterey Bay and Delta programs (toxicitity in seafood & environment); Universities (with grant money) could contribute to research on toxicity; engage student groups for projects; competitions and community projects through schools to Go Green!	Breakout Group C (Red)	Ocean Litter in Final Destir
Research food chain toxicity	Research/Monitoring	Toxicology	fingerprint debris, more than brand information, hold business accountable	Difficult to identify; push back from industry			Breakout Group C (Red)	Ocean Litter in Final Destir
Strengthen State's oversight of food packaging [chemicals] under the Dept of Public Health	Policy/Legislation	Toxicology - government oversight, Government responsibility	Identify chemicals in food packaging, and ensure that carcinogens and endocrine disruptors are not included in packaging				Breakout Group B (Blue)	Source/Producers
Target reductions of trash - zero trash by 2026 (Trash Amendment)	Policy/Legislation	Trash Amendment	- State needs to think about how to implement this in a regulatory way - 25% trash reduction by 2022 (for example) in order to each 2026 goal - Identify high littering businesses - charge them more for permit, opportunity to get fee reduced when positive changes are made - Consumer "pay as you throw" policy - if consumers have to pay for what they are throwing away then they will reconsider how much they throw away - Couple public facing institutions as the example for how to achieve this Fishing companies that interact with public, as example as well - Update on trash amendment and where we are now - come back to this conversation after listening to tomorrow's session	- Industry/retail institutions will push back on additional costs - Bioplastic - what does that mean to the public (communication issues)? What are the scientific data regarding life cycle (do we have them)? - Trasparency - are data available? - Environmental justice issues - communities that can afford reusable - Individual behavior is hard to track, hard to remain consistent over time, this is why institutions should lead charge	- Knowing what alternatives are/their pros and cons - Has this been working in areas that already have pay as you throw policies? - Socioeconomic study/focus - systemic change	- Never underestimate the power of shaming! (Individual and corporate) - Voluntary program - like LEED certification, Seafood Watch, etc. - defined metrics - Rwanda - countrywide bag ban	Breakout Group C (Red)	Consumers/Institutions

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Producers have shared responsibility to help municipalities achieve/pay for Trash Amendment requirements	Policy/Legislation	Trash Amendment	- Capturing brand information would be powerful - source ID studies, incentivize, include in local permits - can promote better assessment - NRDC trash in our waterways study from 2013 - how much is it costing local jurisdictions - should we keep this updated every 5 years (for example)? - Effectiveness study will insulate from preemption - Question of how to measure and what to measure - weight, number of units, overall volume - State can't tell producers they have to pay for it - but local governments could do that - so state could write narrative language saying that local governments should do that, incentivize source ID - encourage local NGOs - Recommendation for executive orders related to litter reduction for state facilities specifically	- Not enough? The beaches are still trashed even in areas that have brand names on the bins like they adopted it. - Gaps in the study - didn't look at costs saved for source reduction - Trash booms are designed to break during a storm - they are collected during a storm to allow for water to flow through - also only captures floating debris - Is Prop 218 actually a limitation? Refuse collection is not covered - sotrm water is - Costs with assessment at local level - Costs for enforcement	- Research needed for how effective bins are? Are more bins more effective? Are having bins available making it become an area for dumping and attracting more trash? - Anyone over a certain number of units of trash has to do XYZ? - Funding needed - Funding needed	- Pepsi has done research that 1/3 of single use materials are from people "on the go" - area where there is not a public recycling bin - tried to install 2000 recycling machines around the South and have had some success - when brands see how much their brand is captured then they could "adopt" areas and pay for the bins or other ways that litter is in transit - take "responsibility for geographic area" which is also good for their branding - Policy letters to state of CA CalRecycle EPR program - state litter policy could echo	Breakout Group C (Red)	Ocean Litter in Transit
Microplastics research (effects on humans - finding microplastics in fish in grocery stores, quanitfy costs to fishermen/analyzing impacts on fishermen livelihoods and tourism)	Research/Monitoring	Trash research - impacts					Breakout Group A (Green)	Ocean Litter in Final Destination
Robust statewide studies on the impact of marine debris on marine resources, to demonstrate how important of an issue it is (ecosystem impacts, species, habitat, ecosystem function) [negative impact of microplastics in fish well demonstrated].	Research/Monitoring	Trash research - impacts	Start with lit review and gaps analysis, studies need to be collated, working group to flesh it out.				Breakout Group B (Blue)	Ocean Litter in Final Destination
Mapping hotspots; determining target areas (large trash inputs)	Research/Monitoring	Trash research - inputs/hotspots					Breakout Group A (Green)	Ocean Litter in Transit
Coming up with highest priorities for reducing ocean litter - focus on a few specific products and the brands [and who is purchasing/making decisions, e.g., retailers, institutions, food service providers, gov't, etc.]; Identify products that can be minimized or banned (diff solutions for diff products - solutions include fees, bans, corporate advocacy campaigns, etc.)	Research/Monitoring, Other: Planning for future action	Trash research - inputs/hotspots	Look at data that already exists, OR Take specific data on litter that ends up in storm drains, on streets, on beaches, etc. (baseline data), OR Look at market data to determine biggest producers of straws, for example; Identify entities/institutions making decisions to use those products - what is the ultimate source? [e.g., fast food packaging companies, schools, other sources]; Provide data to local community?; Perhaps create an environmental/economic "incentive" for brand to work toward achieving reduction goals (reward them for doing so); [advocates can "target" brands, State can "work with" brands]; State and local government engage those sources in meeting measurable reductions (could utilize government purchasing to drive market)				Breakout Group B (Blue)	Source/Producers
Statewide program to model and monitor microplastics and macroplastic transport - modeling of movement through water column. Perhaps modeling of trash degradation too. Need for basic science.	Research/Monitoring	Trash research - transport, degradation	Identify funding - EPR producer funded; Develop modeling framework and methods (ASTM)	Funding; Variety of types of monitoring (habitat types vary, etc)	Funding	SCCWRP, BASMA modeling approach, NSF socioeconomic grants	Breakout Group B (Blue)	Ocean Litter in Transit

Ocean-based litter ideas generated by the participants at the first Ocean Litter Strategy Workshop.

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Boater, fisherman, diver participation in cleanup programs (incentivized?, or fund fuel costs and any permitting required for fishermen to bring people on boats).	Outreach/Education, Policy/Legislation	Cleanups - community engagement			Funding is important (e.g., collaboration amongst oyster growers in Tomales and Grigg's Bays might be more robust if there was funding)		Breakout Group B (Blue)	Ocean Litter in Final Destination
Develop working groups to collaborate in addressing marine debris (e.g., Tomales Bay - oyster growers, kayak companies, neighbors)	Outreach/Education, Other: Collaboration	Cleanups - community engagement			Identify problem areas, where debris is found, etc.		Breakout Group B (Blue)	Ocean Litter in Final Destination
Cleanups: industry (aquaculture) taking the initiative	Outreach/Education	Cleanups - community engagement	Partner with others Map of coverage along the coast (who does what)	Money		ArcGIS online	Breakout Group D (Ocean-Based)	Ocean Litter in Transit
Get fishing gear off beach, organize on-going/annual/quarterly program for cleanups (Santa Barbara Channel/Channel Islands/Tomales Bay/etc), monitor trash over time	Research/Monitoring Other: Cleanup	Cleanups - data	Partner/coordinate with others (industry: fishers, aquaculture) for cleanups (e.g. BBQs), keep on same page (central calendar) Collect data to get funding (from State), create database; outreach to tell people to keep track of what they cleanup	Money Permits People power Get collectors to record data and keep it in centralized place Risk of perception (retrieve gear fishers they lost in first place)	Standardized/central database to input data	Some databases available Ocean Conservancy database for cleanups; used for Coastal Cleanup day NOAA Marine Debris tracker and other apps Adopt-A-Beach program (applies to any waterway)	Breakout Group D (Ocean-Based)	Ocean Litter in Transit
Identify funding mechanism and start a program to remove commerical boats (a partner program to the Dept of Boating and Waterways which can only remove rec boats)	Policy/Legislation	Derelict Fishing Vessels			Funding, Statutory mandate		Breakout Group B (Blue)	Ocean Litter in Final Destination
Develop plan and promulgate plan among managers, hold onto found gear that's been cleaned up and record that data to improve process (Parks, etc.); regional	Policy/Legislation, Outreach/Education	Government responsibility - oversight, education					Breakout Group D (Ocean-Based)	Source/Producers
Biodegradable fishing line (monofilament)	Policy/Legislation, Outreach/Education, Research/Monitoring	Lost gear - entanglement reduction	Acoustic release ballons for traps (Scripps prototype); Using powerful imagery to engage the public				Breakout Group A (Green)	Ocean Litter in Final Destination
Reduce repetitive equipment losses	Outreach/Education, Research/Monitoring	Lost gear - prevention	Improve technology to ensure they don't get lost (better attachments)	Lack of control (storms, etc.)			Breakout Group A (Green)	Ocean Litter in Final Destination
Highlight issues to focus policy and funding on prevention and recovery share what we've learned, via action documents, lectures, events, testimony, film at legislative/regulatory procedings -- try to distill needs for next 5 years and start to implement them. Channel Islands - county, state, feds	Outreach/Education Research/Monitoring	Lost gear - prevention, Government responsibility - oversight					Breakout Group D (Ocean-Based)	Source/Producers
Update Fish and Game Commission policies: aquaculture best management practices (new and renewed leases)	Policy/Legislation	Lost gear - prevention, Government responsibility - oversight, education		These groups may disagree on issues			Breakout Group D (Ocean-Based)	Ocean Litter in Transit
Update Fish and Game Commission policies to include BMPs for certain trap fisheries (lobster, crab, etc.)	Policy/Legislation	Lost gear - prevention, Government responsibility - oversight, education					Participant index cards	N/A
Incentivize or require before becoming licensed to use best fishing practices and be educated before entering the fishery	Policy/Legislation, Outreach/Education	Lost gear - prevention, Government responsiblity - oversight, education					Breakout Group D (Ocean-Based)	Source/Producers

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Better feedback loop betwen gear manufacturers/producers and users, or between different growers, on what methods produce the least waste. There is a need to come up with the most efficient design.	Outreach/Education, Other: Collaboration	Lost gear - prevention, Product/Packaging design					Breakout Group B (Blue)	Ocean Litter in Final Destination
Design and put into practice durable and long-lasting gear (aquaculture gear)	Outreach/Education Research/Monitoring	Lost gear - prevention, Product/Packaging design					Breakout Group D (Ocean-Based)	Source/Producers
Education/BMPs: Understand how different gear types can be tailored to specific areas (aquaculture gear)	Outreach/Education Research/Monitoring	Lost gear - prevention, Product/Packaging design	Keep record of lost gear and why, respond proactively; research and monitoring				Breakout Group D (Ocean-Based)	Source/Producers
Biodegradable fishing line (monofilament)	Research/Monitoring Other: Technology	Lost gear - prevention, Product/Packaging design	Depends what you mean by biodegradable, don't want a source of microplastics, could break apart and increase lost gear, need long-term studies, no fluorocarbon				Breakout Group D (Ocean-Based)	Source/Producers
Best practices guide for fishing industry	Outreach/Education	Lost gear - prevention, resource guide	Seafood labeling style - incentivize consumer to purchase "green fishing practices"		Could this be built into Seafood Watch rubric?	MBA Seafood Watch does consider entanglement/sustainability factors	Breakout Group C (Red)	Consumers/Institutions
Education/Best Fishing Practices: Keep track of weather, move fishing gear to deep water when weather is bad	Outreach/Education	Lost gear - prevention, resource guide		Picking up gear is difficult (harder for some fisheries than others, e.g. Dungeness crab) Scheduling/time and weather conditions			Breakout Group C (Red)	Source/Producers
Compile and enforce consistent BMPs for aquaculture growers/fisheries	Outreach/Education, Policy/Legislation	Lost gear - prevention, resource guide				Coastal Commission has list of BMPs for the permitting process already	Breakout Group B (Blue)	Ocean Litter in Final Destination
Education/Best Fishing Practices: New fishers need to be educated before they start fishing, apprenticeship	Outreach/Education, Policy/Legislation	Lost gear - prevention, resource guide	Implemented by CDFW/FGC Send best practices guide out to fishers	People have tried to get apprenticeship, unsuccessful because people don't want to; make adaptable to different fisheries			Breakout Group D (Ocean-Based)	Source/Producers
Regular inventory of gear so post-storm, know lost gear (done using GPS), record keeping (aquaculture)	Research/Monitoring, Outreach/Education	Lost gear - reporting/database		Scheduling and weather, need more education & best practices			Breakout Group D (Ocean-Based)	Source/Producers
Central database for reporting for lost fishing gear	Research/Monitoring	Lost gear - reporting/database			What to do with the gear once returned? What gaps were noticed from the reporting?		Breakout Group A (Green)	Ocean Litter in Final Destination
Outreach to fishing community to improve reporting of lost gear. Reporting system for lost gear (data) that does not penalize fishermen.	Outreach/Education, Research/Monitoring	Lost gear - reporting/database				SeaDoc society? Database that SeaDoc maintains - doing outreach with fishing communities to report lost gear, in a way that doesn't penalize them. Better tracking how much it costs, how much habitat is affected	Breakout Group B (Blue)	Ocean Litter in Final Destination
Analysis of existing fishing gear data to better understand benefits	Research/Monitoring	Lost gear - reporting/database					Breakout Group B (Blue)	Ocean Litter in Final Destination
Establish website to report GPS location for traps	Research/Monitoring	Lost gear - reporting/database	Lobster Fishery Management Plan will allot 300 tags per permit (will hopefully reduce trap loss)	Not used very often		Already have a database in place (UC Davis, SeaDoc, CDFW)	Breakout Group D (Ocean-Based)	Ocean Litter in Transit
Research and monitoring how many traps are lost and found yearly	Research/Monitoring	Lost gear - reporting/database	Groups of people survey for lost traps, report			ACCESS (Applied California Currents Ecosystem Studies) cruises - to count whales and crap traps	Breakout Group D (Ocean-Based)	Ocean Litter in Transit
Data on recreational fishing gear loss (why/how/where/what of losses/abandonment of recreational trap gear). Tie to permit number - fees associated with losing certain number of traps?	Research/Monitoring	Lost gear - reporting/database					Participant index cards	N/A
Ensure researchers retrieve gear	Outreach/Education	Lost gear - retrieval					Breakout Group A (Green)	Ocean Litter in Final Destination
Removing derelict/lost fishing gear; address loopholes for out of state fishermen in permitting or fee process	Policy/Legislation, Outreach/Education, Research/Monitoring	Lost gear - retrieval				SeaDoc society? Database that SeaDoc maintains - doing outreach with fishing communities to report lost gear, in a way that doesn't penalize them. Better tracking how much it costs, how much habitat is affected	Breakout Group B (Blue)	Ocean Litter in Final Destination

Solution idea	What type of solution?	Detailed solution type	How would you achieve this?	Barriers	Needs/Gaps	Resources available, sample/model projects	Idea attribution	Breakout session
Improve fishing line program	Research/Monitoring, Outreach/Education	Lost gear - retrieval	Develop collaborations with industry, use Periscope to retrieve line (containers are on-board)	Stores complain about interior decorating, don't want to include PVC pipe that contains returned fishing line in their stores			Breakout Group D (Ocean-Based)	Ocean Litter in Transit
Research policy barriers to lost gear and understand barriers to ocean-sourced marine cleanup	Research/Monitoring Other: Technology	Lost gear - retrieval	Create concise summary of policy barriers, go to legislators to remove those barriers; make a map of jurisdictions (lots of overlap) to simplify/speed up (e.g. for cleanups); MOU between different Fed/State agencies	Current barrier: policy (permitting) and jurisdiction - restrictions on collecting gear Effort and advocacy			Breakout Group D (Ocean-Based)	Source/Producers
Establish permanent fund/program at State to remove debris from ocean; need to inventory the problem	Policy/Legislation	Lost gear - retrieval, Government responsibility - oversight	Pass legislation to create a fund or use a fund recovery process Create an action agenda Put forth a bill to create a permanent fund Solicit foundations	Time and Money Need permits Need best management practices Foundations not want to fund this type of project		Trust fund for oil spill response	Breakout Group D (Ocean-Based)	Ocean Litter in Transit
Require marking of gear for aquaculture	Policy/Legislation	Lost gear - retrieval, Government responsibility - oversight					Breakout Group B (Blue)	Ocean Litter in Final Destination
Pilot project testing best gear tagging/marking methods for aquaculture, different fisheries	Research/Monitoring	Lost gear - retrieval, Product/Packaging design		Doesn't have to be plastic, but paint can be covered by algae, heat stamping can make gear weaker (need alternative methods)			Breakout Group B (Blue)	Ocean Litter in Final Destination
Microchip, GPS tracking for gear	Research/Monitoring, Other: Technology	Lost gear - retrieval, Product/Packaging design	Silicon Valley, start-up; analogous to PIT tag in fish (cheap per tag)	Cost $$ Short range on PIT tags			Breakout Group D (Ocean-Based)	Source/Producers
Buy-back program (recycle old gear afterward)	Policy/Legislation	Producer responsibility	Make easier to get rid of gear	Accessibility (need in every port) Cost			Breakout Group D (Ocean-Based)	Source/Producers
Direct Coastal Commission mitigation funding for debris removal, fishing gear removal	Policy/Legislation	Tax/Funds			Data needs: GPS tagging where fishermen report where they lose their gear - track where they lose gear (don't penalize people for this), better tracking how much removal costs, impacts to ecosystems		Breakout Group B (Blue)	Ocean Litter in Final Destination

APPENDIX C
CA Ocean Litter Strategy Update Workshop #1
Participant List

Contact Name	Organization	Organization Type
Alys Arenas	Heal the Bay	NGO
Amy Vierra	CSU Coast	Gov - State/Academic
Angela Howe	Surfrider Foundation	NGO
Brian Baird	Bay Institute	NGO
Carolynn Box	The 5 Gyres Institute	NGO
Cassidy Teufel	CA Coastal Commission	Gov - State
Conrad Mackerron	As you Sow	NGO
Dale Bowyer	San Francisco Regional Water Quality Control Board	Gov - State
Daniel Cortez	Hog Island Oyster Co.	Industry - Aquaculture
Daphne Molin	CA Department of Toxic Substances Control	Gov - State
Eben Schwartz	CA Coastal Commission	Gov - State
Erik Schlagenhauf	Hog Island Oyster Co.	Industry - Aquaculture
Erin Eastwood	Monterey Bay Aquarium	NGO
Gayleen Perreira	State Water Resources Control Board	Gov - State
Genevieve Abedon	EcoConsult	NGO
Heather Benko	California Fish and Game Commission – CA Sea Grant State Fellow	Gov - State
Heidi Sanborn	California Product Stewardship Council	NGO
Irina Irvine	National Park Service, Pacific West Region	Gov - Fed
Jeff Kirschner	Litterati	NGO
Jim Hill	CalRecycle	Gov - State
Joe McKenzie	Coast Seafood Co.	Industry - Aquaculture
Katherine O'Dea	Save our Shores	NGO
Kirsten Gilardi	California Lost Fishing Gear Recovery Project, UC Davis	NGO
Leslie Tamminen	Seventh Generation Advisors	NGO
Luhui Isha	Wishtoyo Foundation	Tribal
Martin Seiler	Tomales Bay Oyster Co.	Industry - Aquaculture
Megan Sedlak	San Francisco Estuary Institute	Industry- Research
Meri Soll	StopWaste	Gov - Local
Miriam Gordon	UPSTREAM Policy Institute	NGO
Richard James	Coastodian.org	
Richard Ogg	Commercial Dungeness Crab Fisherman, Bodega Bay, F/V Karen Jeanne	Industry
Sam Shrout	Commercial Lobster Fisherman, Santa Barbara	Industry- Fishing
Sheri Shrout	Commercial Lobster Fisherman, Santa Barbara	Industry- Fishing

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CA Ocean Litter Strategy Update Workshop #1

Participant List

Sam Ziegler	US EPA (Region 9 Office of Water)	Gov - Fed
Samantha Sommer	Clean Water Fund, Clean Water Action	NGO
Sarah Allen	National Park Service	Gov - Fed
Sean Bothwell	California Coastkeeper	NGO
Sophie De Beukelaer	Monterey Bay National Marine Sanctuary	Gov - Fed
Stiv Wilson	Story of Stuff	NGO
Theresa Talley	CA Sea Grant	Gov - State/Academic
Vivian Matuk	California State Parks - DBW	Gov - State
Whitt Strain	Point Reyes Oyster Co.	Industry - Aquaculture

Workshop Moderators and Facilitators		
Aubrie Fowler	Channel Islands National Marine Sanctuary - Sea Grant State Fellow	Gov - Fed
Elizabeth Lam Gagneron	CASG State Fellow - State Coastal Conservancy	Gov- State
Grace Chon	NOAA Marine Debris Program	Gov - Fed
Holly Wyer	CA Ocean Protection Council	Gov - State
Miho Ligare	CA Sea Grant	Gov - State/Academic
Nina Venuti	CA Sea Grant	Gov - State/Academic
Nir Barnea	NOAA Marine Debris Program	Gov - Fed
Sara Briley	CA Ocean Protection Council - Sea Grant State Fellow	Gov - State
Sherry Lippiatt	NOAA Marine Debris Program	Gov - Fed
Tova Handelman	CA Ocean Protection Council - Sea Grant State Fellow	Gov - Fed

APPENDIX D: Status of Actions in the 2008 OPC Strategy to Reduce and Prevent Ocean Litter

This appendix provides a brief explanation of the progress on actions and priorities outlined in the 2008 OPC Strategy to Reduce and Prevent Ocean Litter. The action items outlined below served as a foundation for the new and updated action items in the California Ocean Litter Strategy.

The Big Picture:

- A number of actions have been completed or are in-progress.
- In some cases, the State's regulatory or agency landscape has changed. This means that items that were previously listed out separately are each being addressed under a single program, but there may be elements of those items that still need to be addressed.
- Our understanding of the ocean litter problem has changed considerably since 2008; some of the specific actions listed below may no longer be the best way to go about solving a problem.
- Some of the actions included in the 2008 Strategy were written in an open-ended or ongoing way. This makes it difficult to determine whether an action is "complete." Some of the "complete" actions below include more details.

The Details:

Strategy Action	Status	Comments
Priority Action 1: Implement a producer take-back (EPR) program for convenience food packaging.	**In Progress**	CalRecycle is currently developing a policy model for packaging, which includes a mandatory approach to producer responsibility.
Priority Action 2: Prohibit Single-Use Products that pose significant ocean litter impacts where a feasible less damaging alternative is available.	**See below under each action**	See below under each action
• Polystyrene food packaging prohibition	**In Progress**	Local polystyrene bans have passed, but a statewide ban has not.
• Plastic Bag Fee	**Complete**	The voters ratified the statewide bag ban in November 2016.
Priority Action 3: Assess fees on commonly littered items	**In Progress**	Local jurisdictions have passed litter fees, but this has not been implemented on a statewide level.
Minimize Toxics in Packaging: Determine which plastic additives threaten human health and the marine environment, educate the public, and prepare a plan for a possible prohibition	**In Progress; but continuing opportunities for further action or projects**	Initial OPC-funded project is complete. DTSC now has a Safer Consumer Products program that examines product-chemical combinations that may impact human health or the environment.

Develop Alternative Products and Promote Sustainable Alternatives	**In Progress**	This action is currently part of the Safer Consumer Products Program. The regulations require that manufacturers perform an alternatives analysis to determine whether they could make their product without the chemical of concern.
Increase Enforcement of Pre-Production Plastic Laws	**Complete**	The Water Board has trained their enforcement staff and industrial permit staff on how to correctly implement the law banning release of pre-production plastic pellets.
Increase Enforcement of Anti-Litter Laws	**In Progress**	This is an ongoing activity. Some local jurisdictions have increased litter fines in problem areas (like main beach in Santa Cruz).
Public Education: Coordinate an education and outreach campaign	**Complete**	The OPC has partnered with NOAA on the Thank You Ocean campaign, which includes public outreach on marine debris.
Public Education: Direct state funds for litter education to the Environmental Education Initiative	**Incomplete**	This remains incomplete, the Environment Education Initiative provides model curriculum to teachers on environmental issues.
Engaging the Public: Develop an ocean litter data card to be used by Adopt-A-Beach Volunteers through the year, and an online database to house data.	**Complete**	The West Coast Marine Debris Partnership has developed a standardized data card and database for beach cleanup efforts.
Engaging the Public: Develop an Adopt-A-Beach Advisory Committee and work with local beach managers to provide necessary support for Adopt-A-Beach efforts.	**Complete**	The Adopt-A-Beach program is supported and organized on a county-by-county basis. (You can find more information on the Coastal Commission website).
Ensure municipalities prevent litter from entering the storm drain system	**Complete, but continuing opportunities for actions with implementation.**	This action was completed through adoption of the statewide trash policy; we are now in the process of implementing the policy.
Increase lost fishing gear cleanup by creating a deposit program on fishing gear, and conduct outreach to the fishing community and publicize Sea Doc Society's hotline	**Complete, but continuing opportunities for further action or projects**	Legislative action has created a program that requires owners to pay for lost gear for some fisheries. The OPC has funded the Sea Doc Society to perform cleanups of fishing gear off the coast, and their hotline is available to report lost gear.
Work with the West Coast Governor's Agreement participants and invite the participation of Alaska, Hawaii, British Columbia, Baja California, and Baja California Sur	**Complete**	This action evolved into an Action Team under the West Coast Governor's agreement, and now into the West Coast Marine Debris Partnership, which includes British Columbia.