







# How Does Your Trash End Up in the Ocean?

## Overview:

Students will learn the difference between a city's storm drain system and its sewer system. They will learn that rain is not the only water that pushes trash into the ocean or rivers. This runoff ends up polluting the waterways and harming wildlife and humans. This lesson discusses ways humans can reduce this pollution.

## Objectives:

At the end of the lesson students will be able to:

-  **List** various items that pollute the watershed where they live (plastic, toxic pesticides, oil, toxic household detergents, cleaners used to wash cars, etc.).
-  **Describe** the different functions of a storm drain system and a sewer system and why a sewer system is designed to not pollute water systems.
-  **Analyze** ways pollution harms living things.
-  **Identify** steps they and their families can take to reduce pollutants getting into the storm drain system.

## Preparation:









-  Print out the images listed under Supplemental Materials or prepare equipment to project them.

## Vocabulary:



 storm drain

 sewer




## Materials:

-  One plastic six-pack ring
-  One sheet of paper for each student
-  Pencil/pen for each student
-  Garden gloves
-  Trash and recycling bins
-  Visual Aid: "Sewer (Wastewater) and Storm Water Systems"
-  Visual Aid: "The Pacific Gyres Full of Plastic"
-  Visual Aid: "What Plastic Does to Sea Animals"


## On the Board:




-  Vocabulary
-  Student Reflection Questions




## Supplemental Images:

-  "What Plastic Does to Sea Animals"
-  "The Pacific Gyres Full of Plastic"
-  "Sewer (Wastewater) and Storm Water Systems"

## Suggested Snack:

-  Nori (edible seaweed; can be purchased at most major markets)

 runoff  
 curb  
 biodegradable

 watershed  
 bio-  
plastics  
 gyre

### Other Resources:

-  Heal the Bay Educator Resources <https://healthebay.org/education/>
-  Brochure: "Plastic Debris from Rivers to Sea," [www.algalita.org](http://www.algalita.org)
-  Booklet: "Aqua Explorer Activity Guide: Protect Your Watershed" available from <https://www.healthebay.org/sites/default/files/Aqua%20Explorer%202009.pdf>
-  <http://knowtheflow.la>

### Learning Activities:

#### 1. Warm-Up (5 min.)

- A. Show students the photo of the turtle deformed because of getting entangled in a plastic six-pack ring and ask what they think happened. Ask how and why its body became deformed by this ring?
- B. Tell students that today we are going to talk about how trash gets into our waterways and things we can do to stop this from happening.
- C. Ask students how they think this plastic ring got into the waterway (through a storm drain)? Ask what the person who threw their six-pack ring on the street could have done to prevent this?

#### 2. Presentation/Discussion (15 min.)

- A. Explain the difference between a storm drain system and a sewer system.
  - Most cities are covered with hard solid surfaces (e.g., parking lots, streets, and buildings). When it rains the water cannot soak into the ground/soil. Then the water becomes "runoff." This runoff can cause our cities to flood. So to prevent flooding there are drains on our streets with underground pipes which carry the water to the ocean or another waterway.
  - What is the hole under the curb that opens to the street? That is the opening to the storm drain. Water carries trash like food wrappers, animal waste, plastic, and chemicals down into the pipes which go out to the ocean/waterway. Also, if we wash our cars on the street, over-water our yards, or hose down our sidewalks that water goes into the storm drains.
- B. How is the storm drain different from the sewage system/sewer? Sewage is dirty water that comes from a toilet, sink, or any drain from inside a building. The sewage goes in pipes to a wastewater plant which cleans the water before it goes into the ocean.
- C. Ask students what they and their families can do to conserve our watershed. Lead a discussion and list their ideas on the board.

- D. Pass out paper to each student and ask them to list at least three things they and their family could do to keep the watershed healthy.
3. Garden Activity (15 min.)
    - A. Distribute garden gloves, trash and recycling bins. Have students pick up plastic and other items from the garden or schoolyard that can be re-used, recycled, composted, or sent to a landfill.
    - B. Convene students and have them share what they found and specify which can be re-used, recycled, composted, or put in a landfill.
  4. Snack: Serve nori. (5 min.)
  5. Have students answer the Reflection Questions in their garden journals. (5 min.)

### Student Reflection Questions:

1. What are three things that you could do to prevent trash from ending up in the ocean?
2. What are some ways pollution harms living things?

### Assessment Questions:

1. Name three items that can pollute the watershed where you live.
  - **plastic, pesticides, oil, detergents**
2. How are sewer and storm drain systems different?
  - **Water from sewer systems is treated and cleaned before entering the ocean, river, or other water source, whereas water in storm drains is not.**

### Standards:

#### Next Generation Science Standards

- MS-ESS3-4 Earth and Human Activity

Construct an argument supported by evidence for how increases in human population and per-capita consumption of natural resources impact Earth's systems.

#### Common Core State Standards

- CCSS.ELA-LITERACY.SL.8.1

Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 8 topics, texts, and issues, building on others' ideas and expressing their own clearly.

# STORMWATER SYSTEM

## Fact Sheet

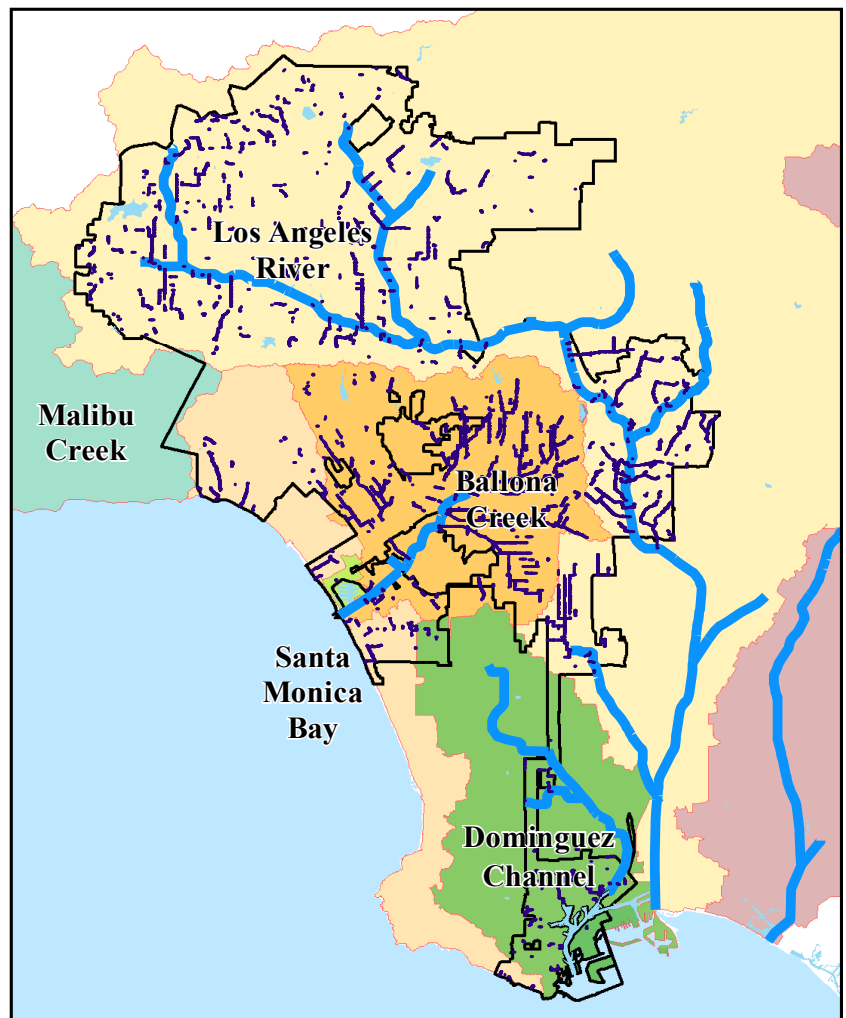
### OVERVIEW

- o 4 watersheds - over 1,300 square miles
- o Managed by City, County and USACE
- o Stormwater flows are tens of million gallons on dry days and over 10 billion gallons on rainy days

### SUPPLEMENTARY FACT SHEETS

LADWP is currently developing the Stormwater Capture Master Plan, which will serve as a guide for policy makers and will outline strategies for the next 20 years to implement stormwater and watershed management programs, projects, and policies in the City of Los Angeles that will contribute to a more sustainable local water supply. *(Please Refer to Water Supply Fact Sheet)*

LA Sanitation's (LA SAN) Watershed Protection Program focus is to protect the beneficial uses of receiving waters while complying with all flood control and pollution abatement regulations. There are many efforts underway to ensure compliance with water quality regulations. One of these efforts is the development of the Enhanced Watershed Management Program (EWMP). *(Please Refer to Watershed Protection Program Fact Sheet)*



### EXISTING MAJOR FACILITIES/PROGRAMS

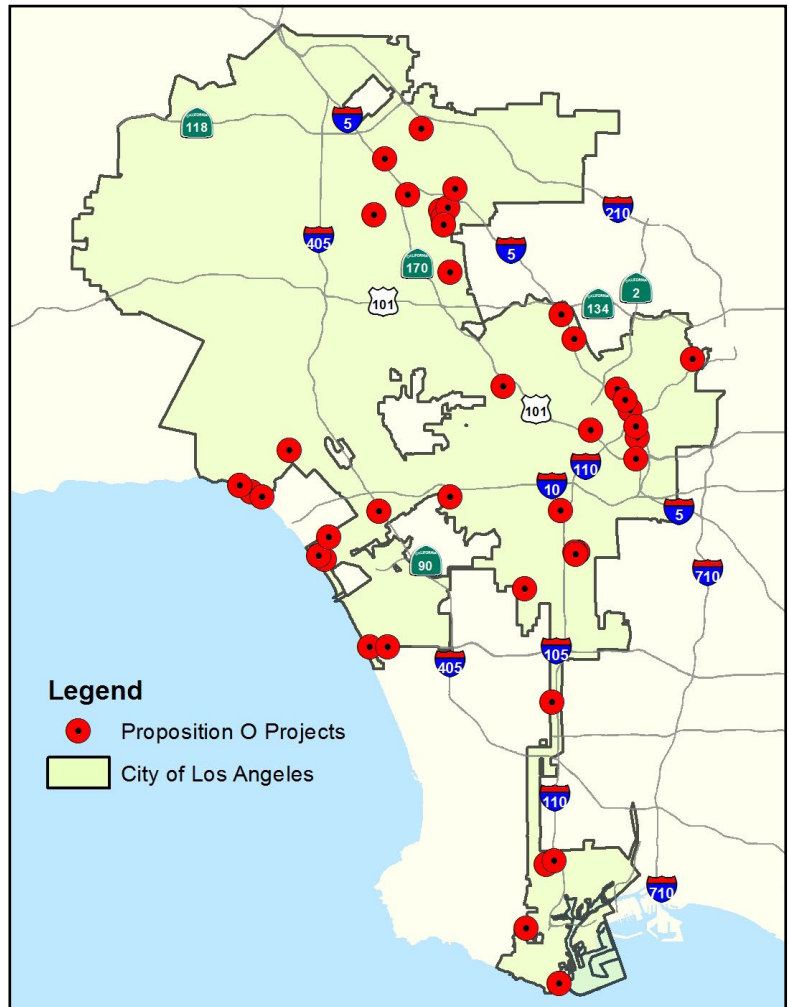
The City's stormwater management system consists of a combination of both "gray" and "green" infrastructure. Gray infrastructure refers to storm drains, catch basins, and low-flow diversion structures. Green infrastructure refers to infrastructure resulting from Low Impact Development (LID), Proposition O projects, Green Streets and Green Alleys, etc. Existing and planned green infrastructure helps the City efficiently manage stormwater and prevent stormwater pollution, offset potable water use, improve flood avoidance, and augment green spaces within the City.

#### Gray infrastructure includes the following items:

- o 1500 miles of pipes
- o 100 miles of open channels
- o 38,000 catch basins
- o 13 low-flow diversion structures

## Green infrastructure includes the following items:

- **LID Ordinance** - Effective in 2012, it requires all runoff generated from a 3/4 inch storm to be managed on site. It applies to all development and redevelopment projects that require a building permit to create, add, or replace an impervious area of 500 square feet or more. Over 200 projects are reviewed and approved each month.
- **Proposition O Projects** - Passed in November 2004, it authorized the City to issue a series of general obligation bonds for up to \$500 million for projects to protect public health by reducing pollution in the City's watercourses, beaches and the ocean, to meet Clean Water Act requirements. Numerous storm water projects with multiple benefits are funded by Proposition O and are either planned, under construction, or have been completed.
- **Green Streets/Green Alleys** - This program is led by the Green Streets Committee, an inter-departmental committee that identifies storm water capture and infiltration opportunities within City streets and alleys and develops guidelines and standard plans to implement green elements. Numerous projects and seven standard plans and design guidelines that developers can follow when building green streets and green alleys have resulted from this program.



## PLANNED MAJOR FACILITIES/PROGRAMS

- **LA River Revitalization** - Completed in 2007, the LA River Revitalization Master Plan identifies issues affecting the Los Angeles River revitalization and recommends a series of management actions and proposed projects to improve the Los Angeles River environment. For more information, please visit [www.lariverrmp.org](http://www.lariverrmp.org).
- **Enhanced Watershed Management Plans (EWMPs)** - The City, along with other agencies, organizations and stakeholders, is working to develop EWMPs for each of LA's watersheds. Each EWMP will identify current and future multi-benefit projects that will improve water quality, promote water conservation, enhance recreational opportunities, manage flood risk, improve local aesthetics, and support public education opportunities. EWMP plans must be developed and submitted to the Los Angeles Regional Water Quality Control Board by June 2015. *(Please refer to Stormwater Program Fact Sheet)*
- The Green Streets Committee will develop additional standard plans and design guidelines.

## CHALLENGES AND OPPORTUNITIES

- Continuing to plan for flood avoidance
- Continuing to comply with water quality regulations
- Balancing flow reductions downstream resulting from upstream capture/infiltration
- Providing sufficient water to maintain habitat in LA River





# Sewer (Wastewater) and Storm Water Systems

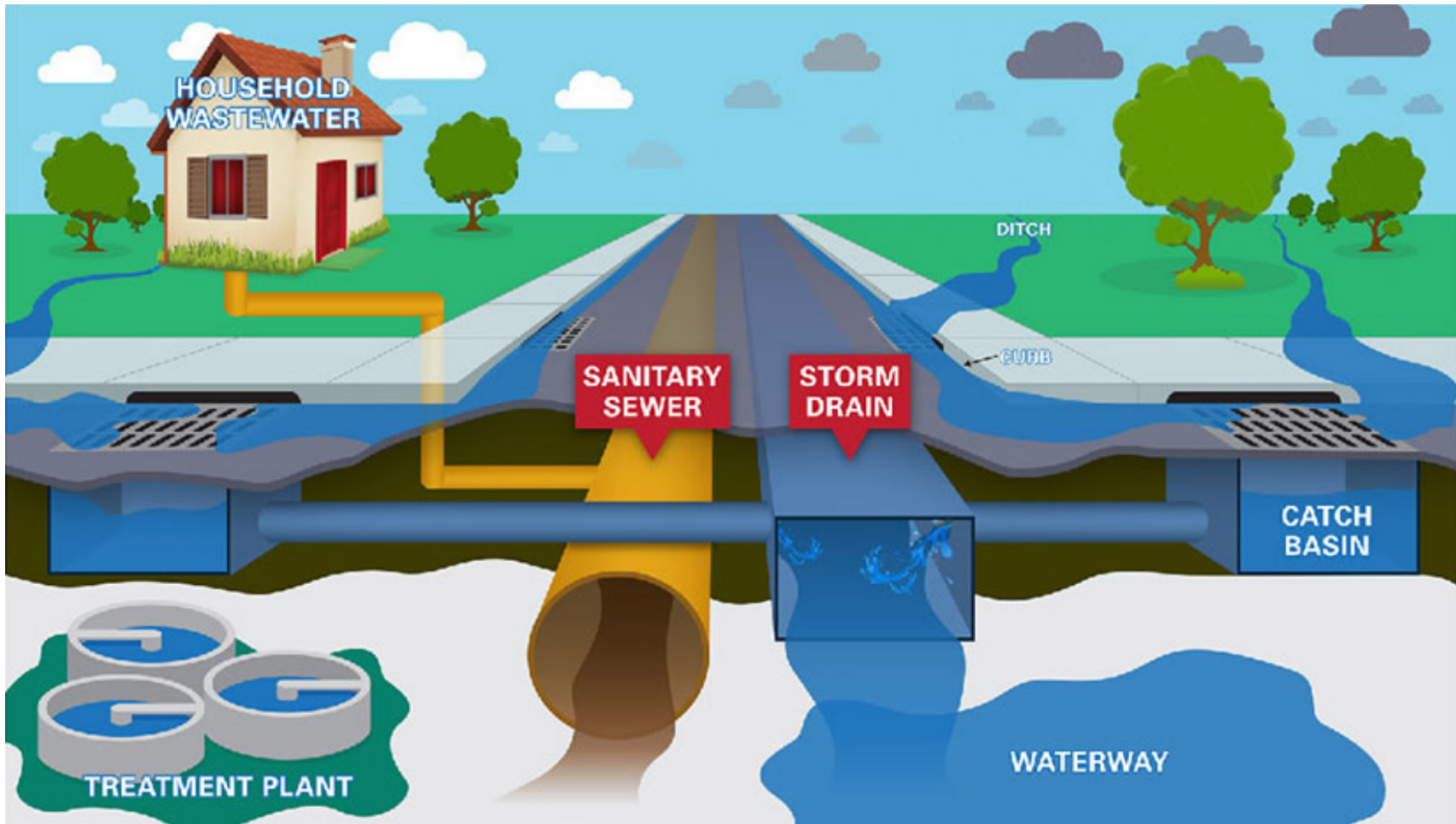


Image from: <https://www.azstorm.org/stormwater-101/storm-vs-sanitary-sewer>



# The Pacific Gyres Full of Plastic

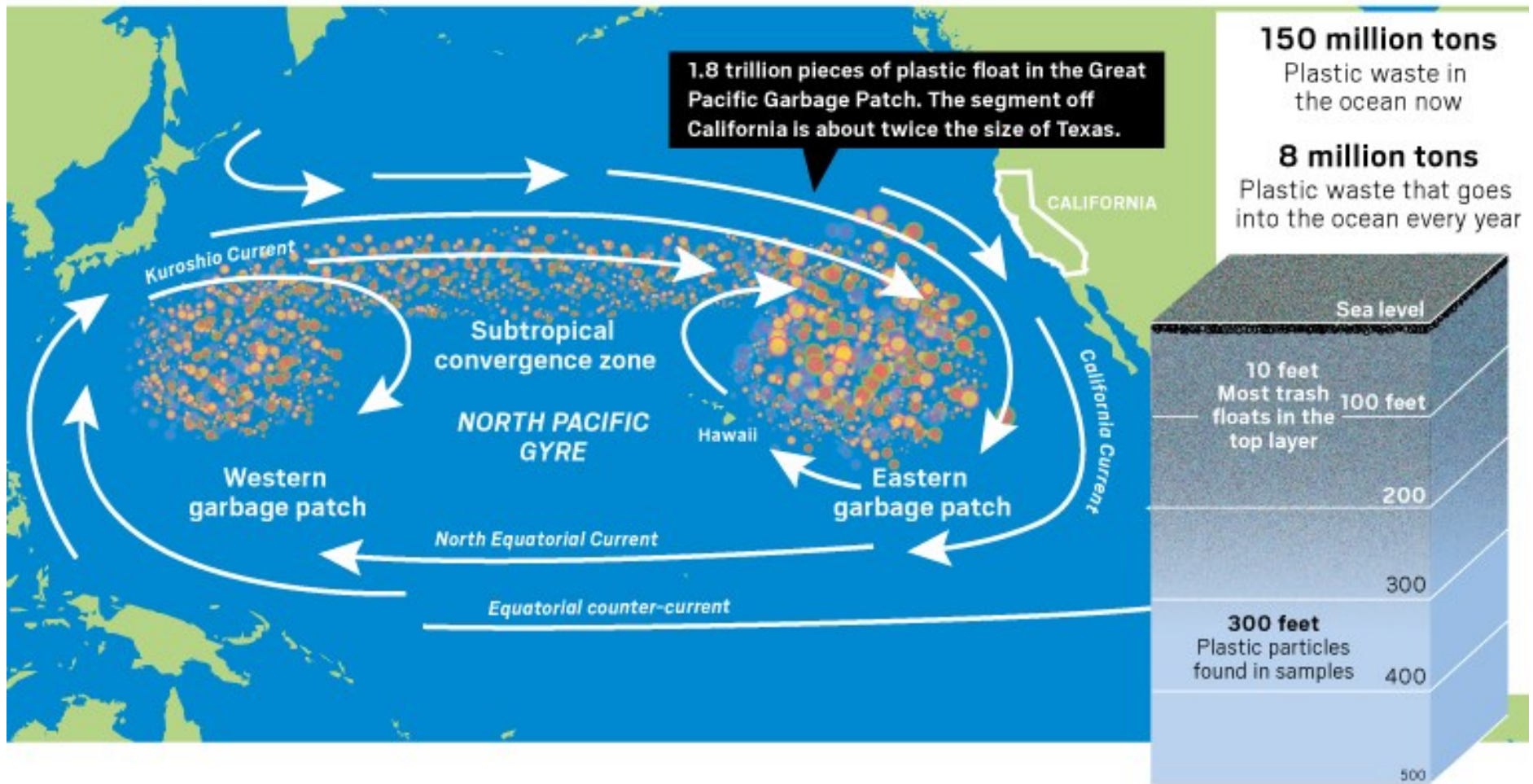


Image from: <https://www.ocregister.com/2018/09/04/new-system-to-clean-up-plastic-in-the-ocean-is-launching-from-california-this-month/>



# What Plastic Does to Sea Animals

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