Southern California Bight 2018
Regional Monitoring Program

Bight '18

Sediment Quality

Executive Synthesis

About this report

This report is the executive summary of an integrative study documenting how sediment contamination has impacted marine ecosystems across 1,539 square miles of Southern California's coastal waters. The Sediment Quality Executive Synthesis reflects the findings of five reports produced by the Southern California Bight 2018 Regional Marine Monitoring Program (Bight Program) that chronicle the multiple scientific approaches taken to assess ecosystem impacts: Sediment Toxicity (Volume I), Sediment Chemistry (Volume II), Benthic Infauna (Volume III), Demersal Fishes and Megabenthic Invertebrates (Volume IV) and Contaminant Bioaccumulation in Sport Fish (Volume V). This document, the Executive Synthesis, is Volume VI. In addition, summarized results from two other reports, Harmful Algal Blooms (Volume VIII), which document the persistence of harmful algal toxins in marine sediments and infauna throughout the continental shelf, and Trash and Marine Debris (Volume IX), which characterizes the spread of trash and marine debris across aquatic environments, are included as they are linked to sediment quality.

The detailed technical reports are available online at https://www.sccwrp.org/publications/. In previous iterations of the Bight monitoring program, the Sediment Quality Assessment was known as Contaminant Impact Assessment and Coastal Ecology. In addition to Sediment Quality, which focuses on sediment contamination, the Bight '18 Program examined two other aspects of Southern California's coastal ocean: a study characterizing chemical and biological impacts of ocean acidification on Bight coastal waters (Volume VII) and a comparison of microbial methods to evaluate beach water quality (Volume X), both of which will be published in 2022.

Introduction to Bight Monitoring

How has contamination in Southern California's coastal waters impacted the health of its marine ecosystems? Have these impacts intensified or lessened over time? Southern California's coastal managers need answers to these questions to more effectively protect the marine ecosystems of a region that is home to more than 22 million people.

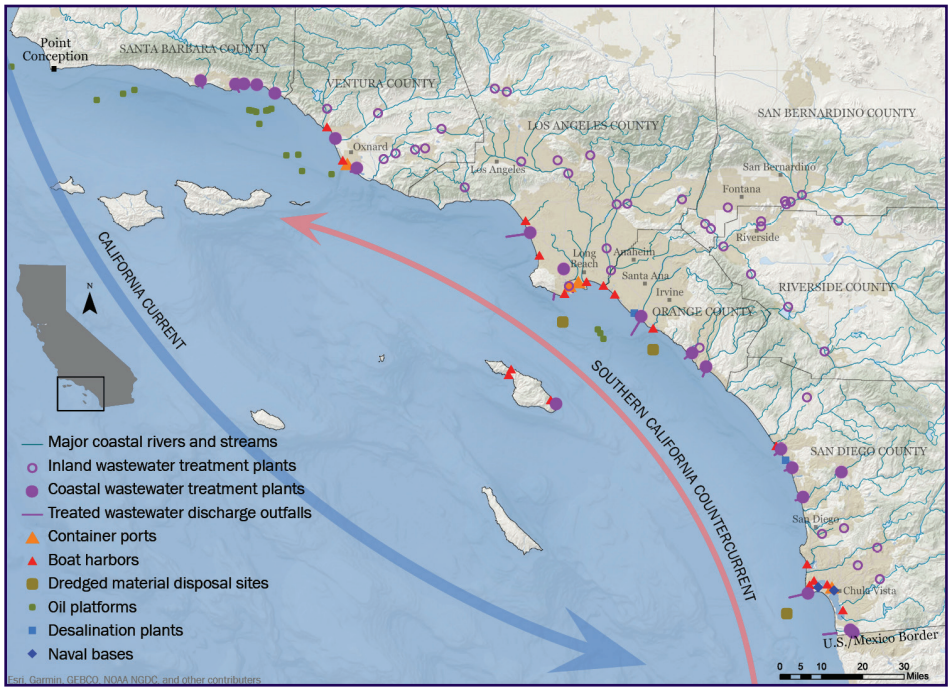
The Southern California Bight is the bend in the coastline stretching from Point Conception in Santa Barbara County to Punta Colonet in Mexico.

- Cold waters from the north mix with warm waters from the south in the Bight.

- This mixing of currents, together with seasonal upwelling, and varied habitat types, makes for a highly productive ecosystem that is rich in diversity, including more than 500 species of fish and thousands of invertebrates.

- This productivity sustains a diverse array of resident and migratory marine birds and mammals.

Sea lions in Channel Islands National Marine Sanctuary.
(Photo Credit: Robert Schwemmer, NOAA)



Southern California Bight showing major sources of contaminants to coastal waters, and regional ocean currents.

The Bight's coastal waters are vulnerable to human impacts.

- Approximately 5,600 square miles of watersheds across coastal Southern California drain to the Bight, nearly half of which have been intensively developed. Most runoff that enters storm drains is not treated prior to its discharge into coastal waters.

- There are 19 coastal wastewater treatment plants that discharge over 1 billion gallons per day of treated municipal and industrial effluent into the Bight.

- The Bight is home to the nation's largest commercial port complex, the second- largest U.S. naval facility and more than 30,000 boat slips and moorings.

The 2018 Southern California Bight Regional Marine Monitoring Program continues a 25-year monitoring collaboration designed to examine how human activities have affected the health of Southern California's coastal waters.

- The Program mobilizes participating agencies to collect data from across a much greater expanse than just their local discharge zones, enabling coastal managers to paint a broader picture of regional condition.

- The Program is question driven, prioritizing issues of highest concern among participating agencies.

- Both regulated and regulatory agencies, as well as non-governmental and academic organizations, come together to engage in highly productive dialogue as they collaboratively design the monitoring program and interpret its findings.

- The Program has a five-year cycle. Bight '18 is the sixth cycle and was initiated in 2018.

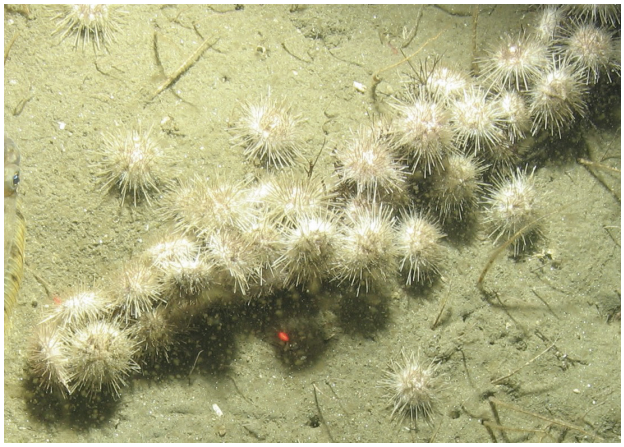
The Sediment Quality Assessment is the Bight Program's foundational assessment, tracking contaminant levels in coastal sediment and their potential impacts on Bight marine ecosystems.

- Soft sediment makes up the vast majority of the seafloor of the Bight, although it is also home to areas not evaluated by the Sediment Quality Assessment study, including rocky reefs, kelp forests, seagrass beds, and other habitats.

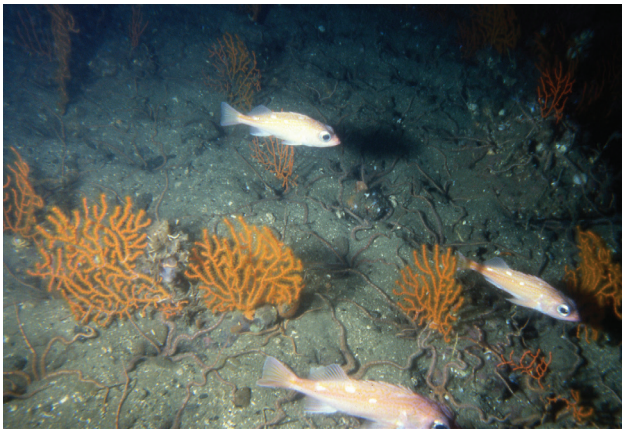
- Sediment can be an "integrator" of impacts over time, capturing the history of habitat quality for the region.

- The Sediment Quality Assessment involved multiple types of studies that are analyzed and synthesized using a multiple-lines-of-evidence approach, providing greater confidence in the findings. This approach is used widely around the world.

Sheep Crab.



White Urchins.



Greenblotched Rockfish and Gorgonians.

Photo Credits: Institute for Applied Marine Ecology/Marine Applied Research and Exploration (IfAME/MARE)

Bight '18 Sediment Quality Assessment Study Questions

1. What is the extent and magnitude of sediment quality impacts in the Southern California Bight?
2. How does the extent and magnitude of sediment quality impacts vary over time?
3. What is the extent and magnitude of contaminant bioaccumulation in seafood?

Bight '18 Assessment Areas

Bight sediment assessments focus on the continental shelf and embayments, which make up about a third of the Bight area. The seafloor is divided into habitats defined by depth and/or use, called strata. Eleven strata were included with ~30 sites sampled in each stratum.

Assessment areas in Bight '18 included:

- Continental shelf - four strata in offshore areas at depths of 3 to 650 feet.
- Five embayment strata - brackish estuaries, marine estuaries, marinas, ports, bays.
- While not included in the Sediment Quality Assessment, limited assessment work was completed in deeper waters (two strata more than 650 feet deep), including chemistry and assessment of sediment-dwelling organisms.

Bay: San Pedro Bay.
(Photo Credit: Michael Hang, SCCWRP)

Marina: Dana Point Harbor.
(Photo Credit: Nick Miller, SCCWRP)

Continental Shelf: Newport Coast.
(Photo Credit: Karen McLaughlin, SCCWRP)

Port: Port of Long Beach.
(Photo Credit: Michael Hang, SCCWRP)

Brackish Estuary: San Mateo Lagoon.
(Photo Credit: Dana Schultz, SCCWRP)

Marine Estuary: Upper Newport Bay.
(Photo Credit: Karen McLaughlin, SCCWRP)

Sediment Sampling

Sample locations were selected via a stratified, random sampling design that reduces bias and ensures findings are statistically representative.

Sediment collection.
(Photo Credit: Ken Sakamoto, OC San)

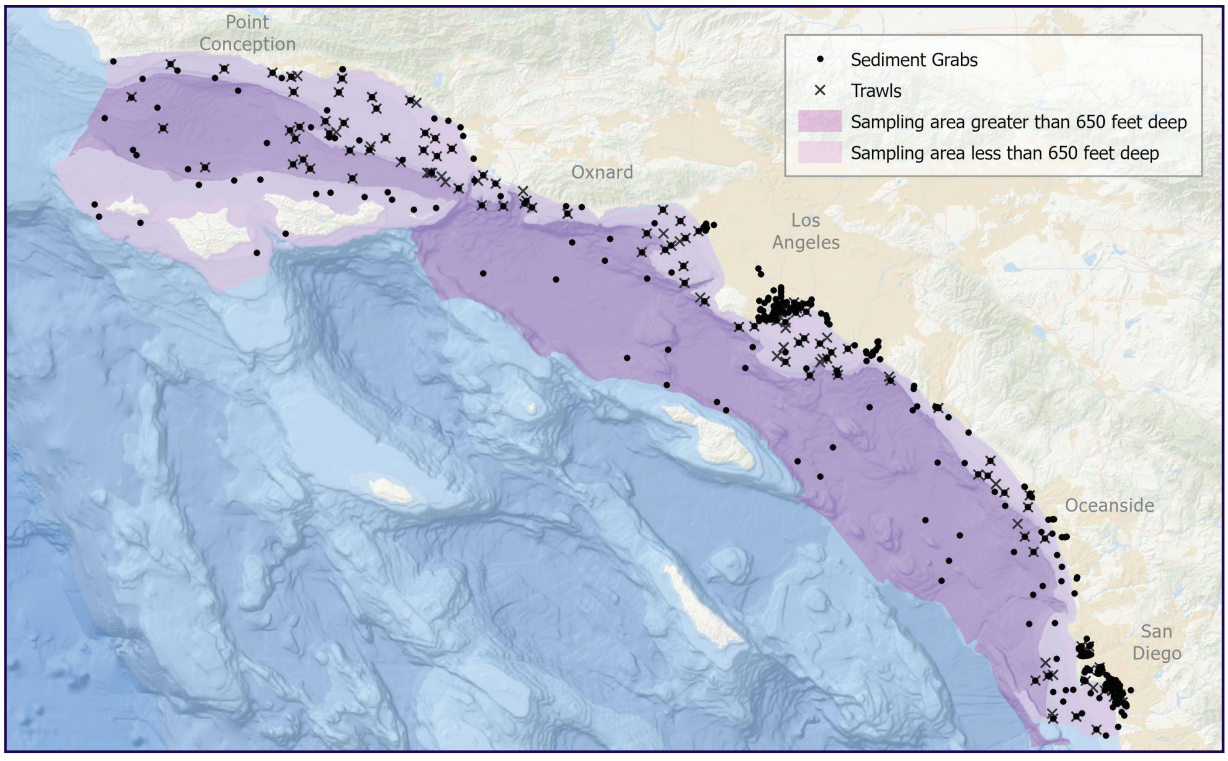
- As part of Bight '18, 377 sites were sampled for sediment quality and 138 sites were sampled for trawl-caught fish and invertebrates across 1,539 square miles.

- Sampling started at a depth of three feet along the shore and extended more than 20 miles offshore, to a depth of nearly 3,000 feet.

- Researchers performed a full analysis on sediment samples collected from sites less than 650 feet deep. The full analysis involved three distinct testing methods (toxicity, chemistry, and community composition of sediment-dwelling organisms) that were combined using a quantitative scoring tool. This method provided multiple lines of evidence for sediment quality.

- The full sediment analysis was performed at 245 out of the 377 sites, including 184 embayment sites.

- More than 2,000 sites have been sampled since the program was launched in 1994.



Bight '18 sediment sampling and trawl stations. The nine strata with depths less than 650 feet were included in the sediment quality assessment (light purple areas).

Training, quality assurance, and quality control are priorities of the Bight Program.

- With more than two dozen agencies collecting and analyzing Bight samples, quality assurance and quality control among participants is a major priority. All participants engage in field training and laboratory intercalibration exercises, ensuring that data and findings are comparable and of high quality.

- The quality assurance activities enable laboratories across Southern California to maintain a high degree of quality and rigor for all environmental samples they process and analyze, not just for the Bight Regional Monitoring Program. The close working relationship that participating agencies develop fosters a culture of collaboration.

Bight participants engaged in an intercalibration cruise before the 2018 survey launched.

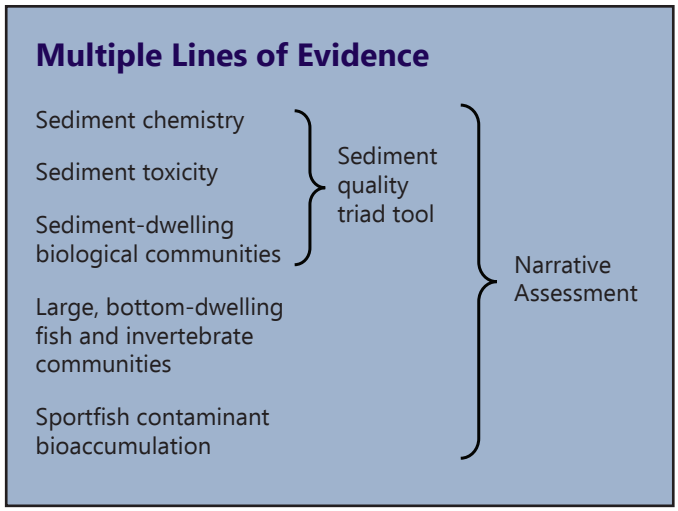
(Photo Credits: Dario Diehl, SCCWRP)

Multiple Lines of Evidence

The Sediment Quality Assessment relied on five lines of evidence to conduct a scientifically robust evaluation of how sediment contamination has affected the Bight.

- Bight managers used three lines of evidence – sediment chemistry, sediment toxicity, and sediment-dwelling biological communities (benthic infauna) – to assess the quality of Bight sediment. These three lines of evidence are known as the sediment quality triad.

- The two other lines of evidence – bottom-dwelling fish and invertebrate communities, and sportfish contaminant bioaccumulation – added to the overall sediment quality assessment narrative.

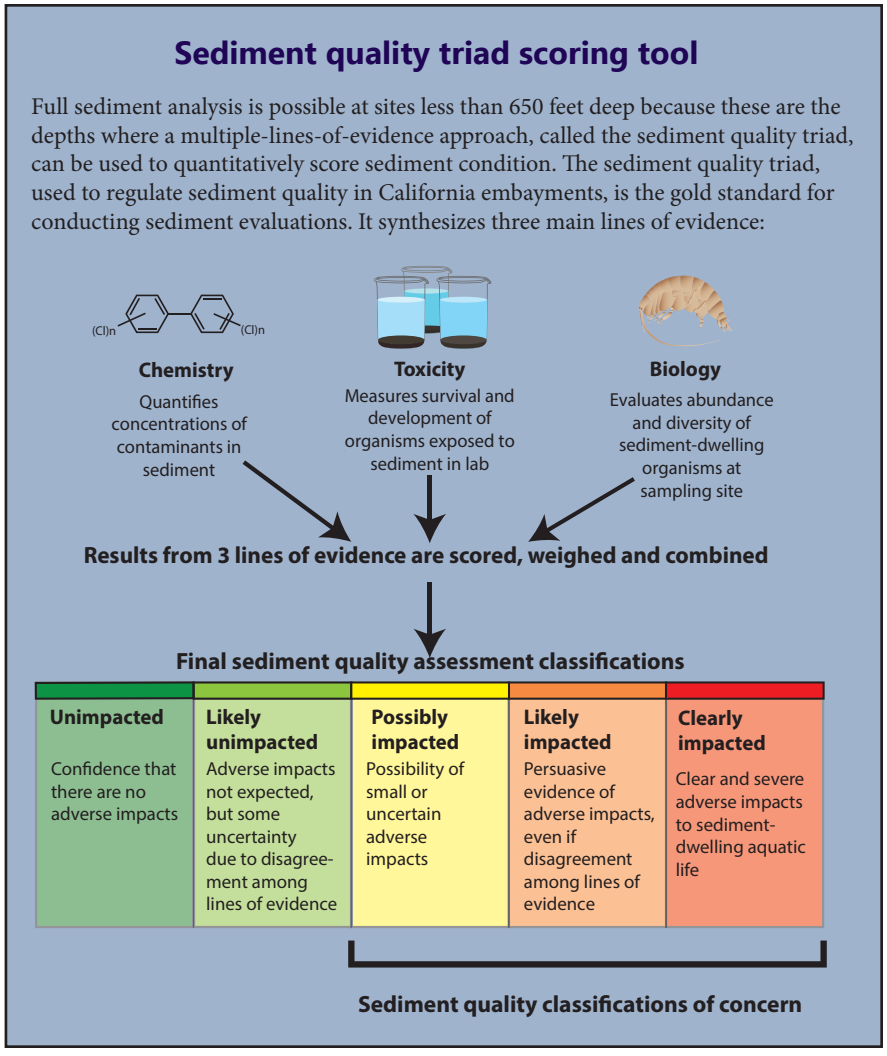


Sediment quality is an effective indicator of how contaminants impact ecosystems.

- While ocean currents can quickly disperse contaminants in the water column, many contaminants may bind with suspended particles and settle to the seafloor. Depending on their environmental persistence, some of these particle-bound contaminants may remain for decades, providing a record of contaminant exposure.

- Organisms living near the seafloor come into direct contact with sediment contamination via ingestion and absorption.

- When sediment-dwelling organisms are consumed by predators, the contaminants may build up – or bioaccumulate – in each successive predator that consumes its prey. In this way, contamination is transferred through marine food webs.



Key Findings

The Southern California Bight Regional Monitoring Program's Sediment Quality Assessment offers insights into how sediment contamination has affected 1,539 square miles of the Bight seafloor across time and space, as well as the disproportionate effects of this contamination on certain marine habitats. The Sediment Quality Assessment builds on two and a half decades of intensive sediment sampling, trawl surveys, and analysis across the Bight.

Palos Verdes at sunset.
(Photo Credit: Greg Lyon, CLAEMD)

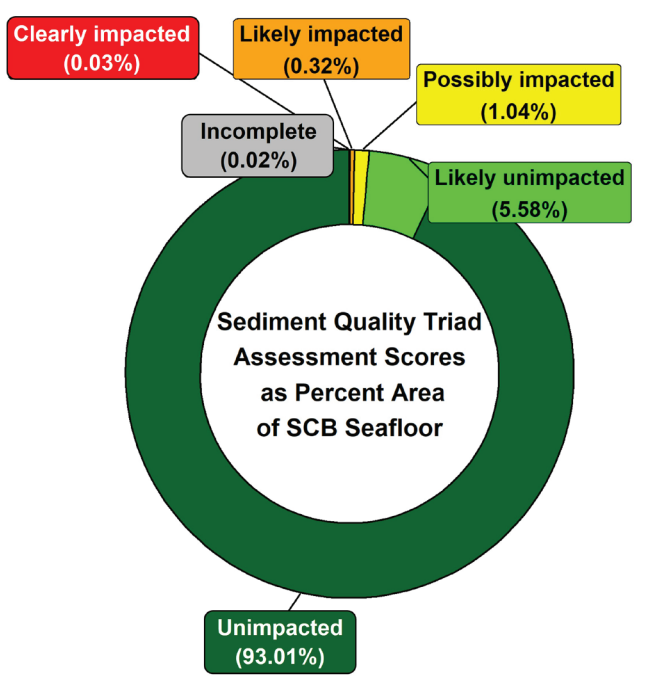
Bight '18 Study Question #1: What is the extent and magnitude of sediment quality impacts in the Southern California Bight?

Over 98% of the area assessed in Bight'18 is unimpacted or likely unimpacted by sediment contamination.

- The sediment quality triad approach indicates that 1% of the Bight seafloor area was possibly impacted by sediment contamination.
- Less than 0.4% was likely or clearly impacted.

Overall snapshot of Bight sediment quality

Although the majority of the area assessed in Bight'18 was unimpacted or likely unimpacted by sediment contamination, the area of concern is the 1.4% that was categorized as possibly, likely, or clearly impacted. Due to a missing line of evidence, 0.02% of Bight habitat were unable to be scored and were listed as "incomplete".



The continental shelf is not as impacted by sediment contamination as coastal embayments.

- The majority of the area assessed in Bight '18 is the continental shelf – specifically, the offshore area that starts at a depth of three feet and extends to a depth of 650 feet, excluding embayments.

- Just 1% of the shelf seafloor area is possibly impacted by sediment contamination.

About 30% of embayment areas have sediment quality that is possibly, likely, or clearly impacted by sediment contamination.

- Embayments are the mostly shallow, protected areas close to shore where relatively calm waters facilitate settling of contaminant-laden particles. Embayments make up roughly 2% of the total area assessed in Bight '18.

- Brackish estuaries were a new embayment habitat sampled by the Bight Program in 2018. While they represent a small portion of the total assessed area (0.1%), they had the largest percent of area categorized as possibly to clearly impacted by sediment contamination (67%).

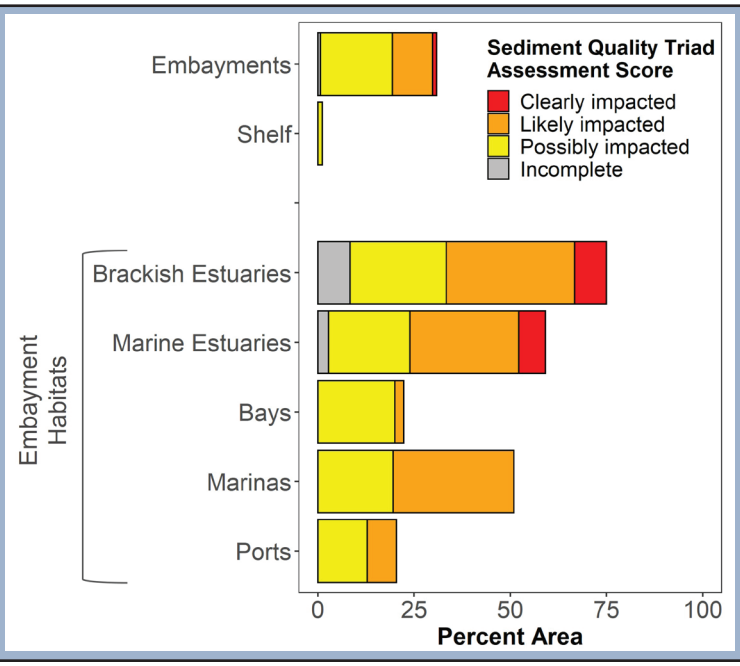
- In addition, marine estuaries and marinas had over half of their assessed areas categorized as possibly, likely, or clearly impacted by sediment contamination (56% and 51%, respectively).

Huntington Harbor.
(Photo Credit: Karen McLaughlin, SCCWRP)

Ballona Lagoon.
(Photo Credit: Nick Miller, SCCWRP)

Uneven impacts of sediment contamination

Just 1% of the continental shelf was possibly impacted by sediment contamination, whereas over 30% of embayment area was categorized as possibly to clearly impacted. Among the five embayment types, brackish estuaries, marine estuaries, and marinas, had more than twice as much of their area impacted by sediment contamination compared to ports and bays.

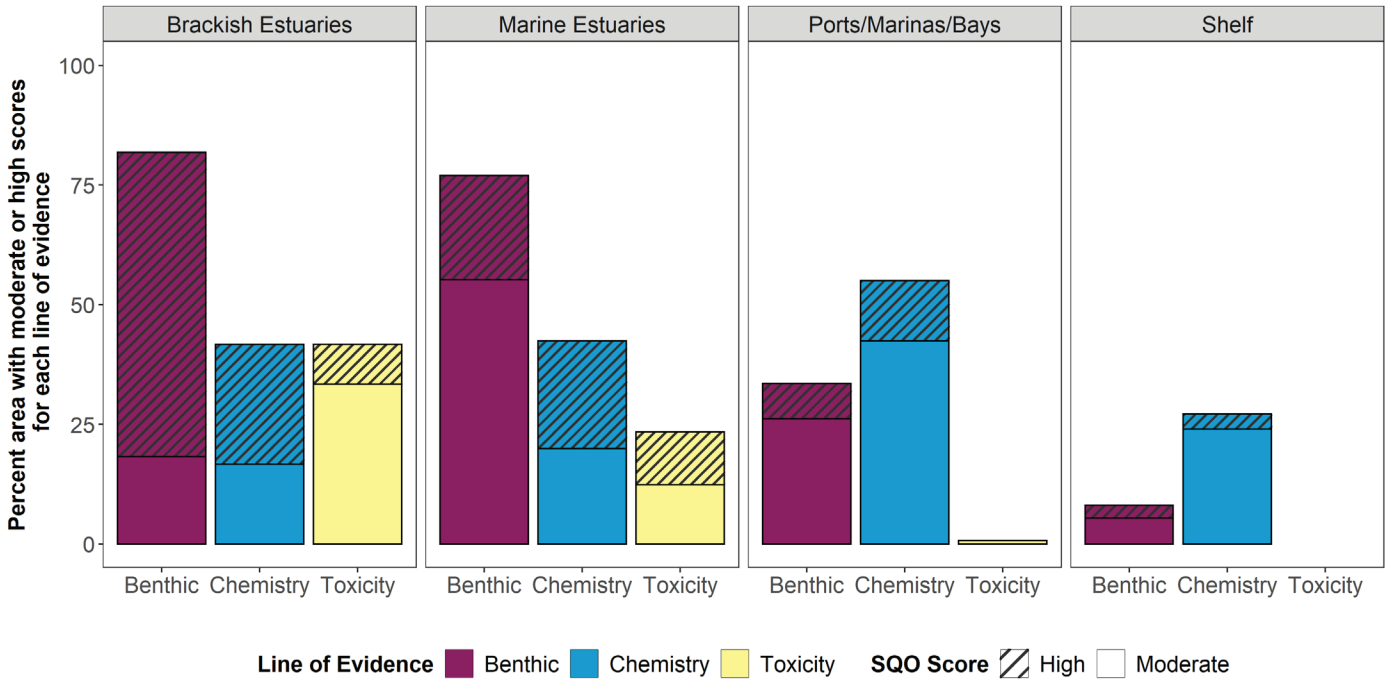


The main indicator of poor sediment quality assessment scores varied by habitat.

Understanding which lines of evidence contributed to poor sediment quality assessment scores can help managers understand the drivers of impairment, and focus remediation efforts on the most likely causes of degraded condition. In the Bight, the lines of evidence indicative of poor condition varied by habitat.

- In brackish and marine estuaries, the communities of sediment-dwelling organisms were in non-reference condition and the sediments had some of the region's highest toxicity, both of which contributed to poor sediment quality assessment scores in these two habitats.

- In ports, bays, and marinas, high levels of sediment chemistry exposure were the main indicator of poor sediment quality.



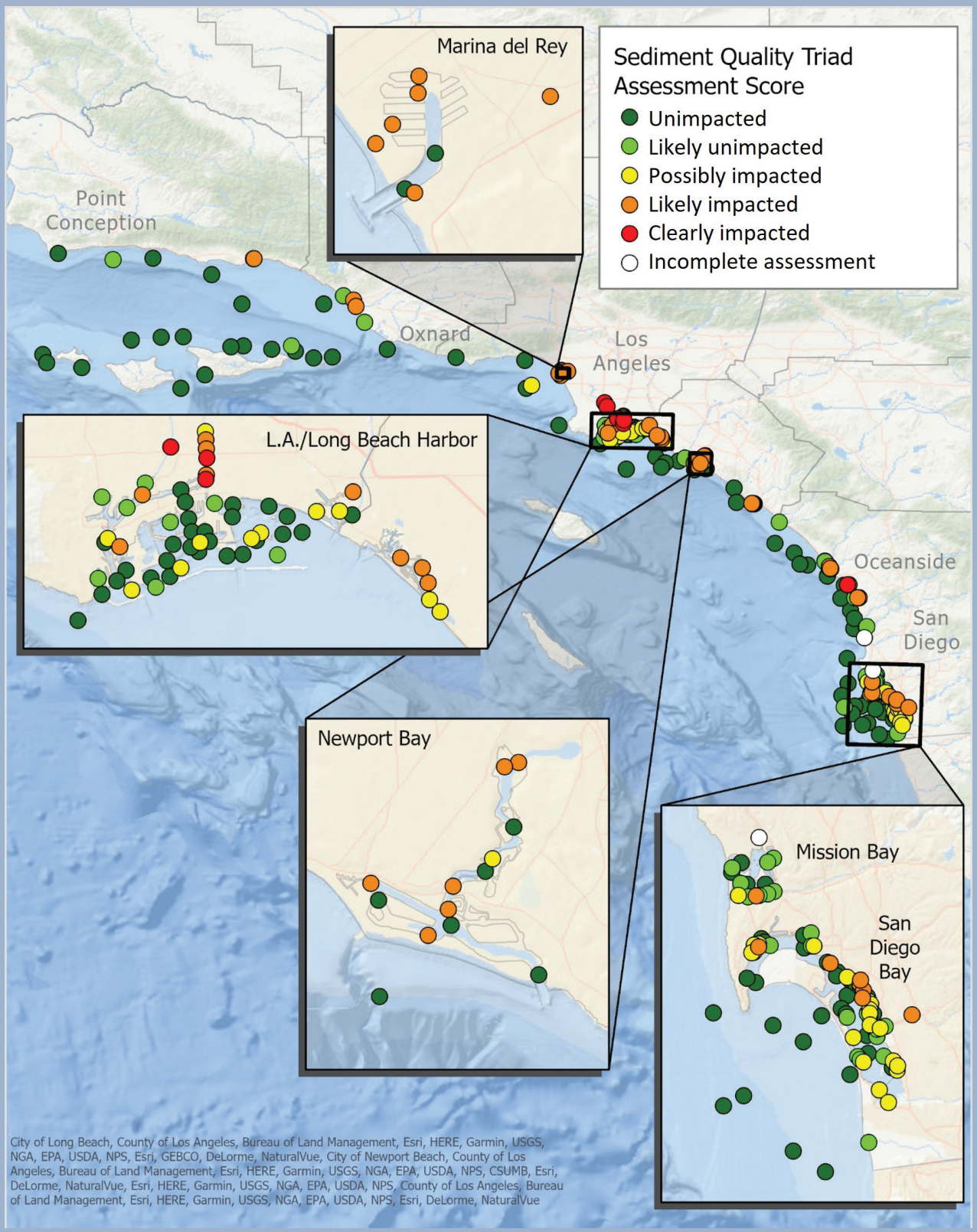
Benthic infauna on a sieve.
(Photo Credit: Kevin Stolzenbach, Wood PLC)

Chemical analysis.
(Photo Credit: Keith Mayura, SCCWRP)

Toxicity testing.
(Photo Credit: Chris Stranksy, Wood PLC)

Sediment quality triad assessment scores by site.

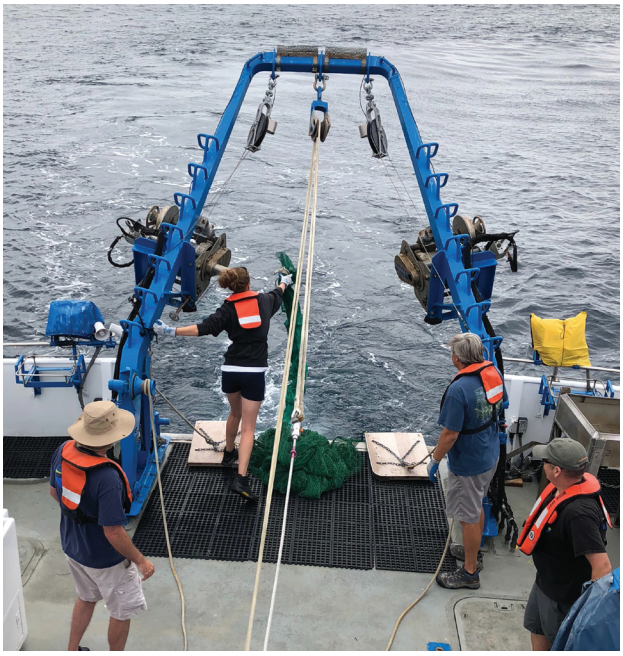
A full sediment quality triad analysis was conducted for 245 sites, generating quantitative assessment scores that fall into a five-part classification system. Three sites (two marine estuaries and one brackish estuary) were considered incomplete due to a missing line of evidence.



In Bight ’18, fish communities living near the seafloor were generally healthy, with 99% of the area assessed in reference condition.

- Demersal fish – or fish that live near the seafloor – are a key focus of monitoring efforts because they consume sediment-dwelling organisms and can come into direct contact with contaminated sediment.

- Abnormalities such as fin rot, lesions and tumors are considered indicators of stressed individuals and were found in less than 0.05% of all 46,000+ fishes sampled; the lowest of any Bight survey and within expected background levels for fish populations.



Deployment of trawl net.
(Photo Credit: Curtis Cash, CLAEMD)

Spotted Sand Bass.
(Photo Credit: Chris Stranksy, Wood PLC)

Graceful Rock Crab.
(Photo Credit: Greg Lyon, CLAEMD)

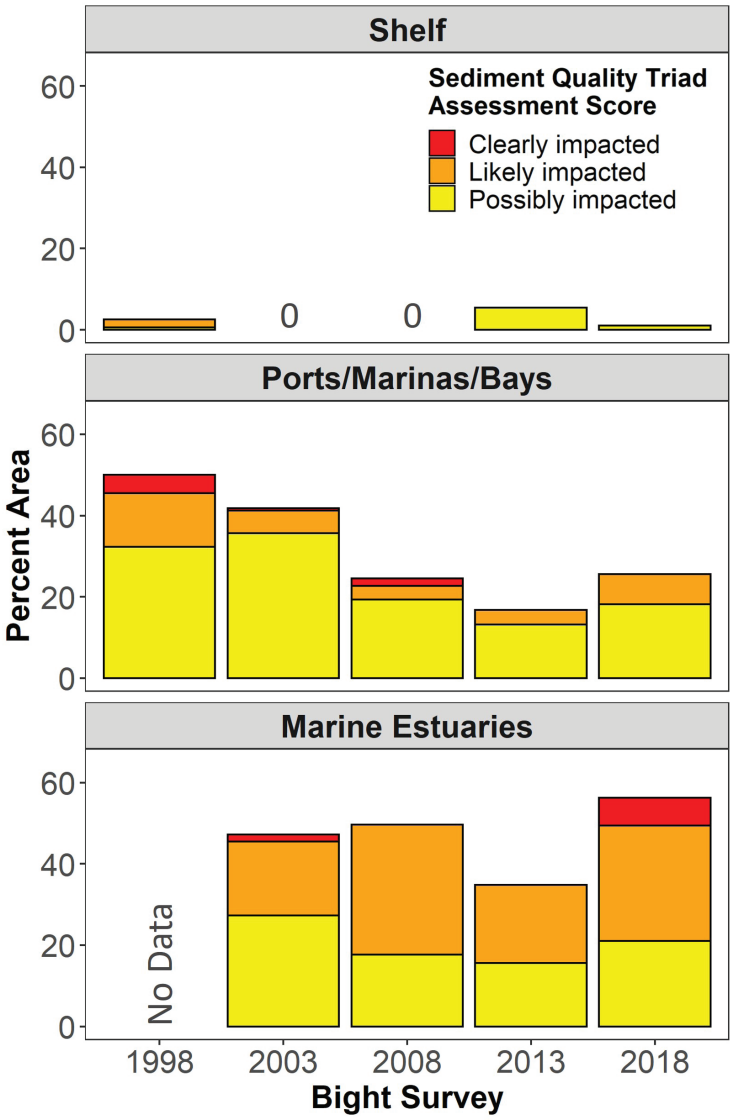
Processing a trawl catch.
(Photo Credit: Ken Sakamoto, OC San)

Organisms are identified, counted, and measured (body length and/or weight) at sea.
(Photo Credit: Ken Sakamoto, OC San)

Bight '18 Study Question #2: How does the extent and magnitude of sediment quality impacts vary over time?

Sediment quality on the continental shelf continues to remain in good overall condition; sediment quality in embayments has not improved over the past decade.

- The continental shelf has had consistently good sediment quality over time.
- The total area of ports, bays, and marinas impacted by sediment contamination initially decreased between the 1998 and 2008 assessments but has not improved since then.
- The percent of impacted habitat has not significantly changed in marine estuaries since they were first assessed in 2003 although more area has a "clearly impacted" score.



Channel Islands National Marine Sanctuary was found to be in good condition in 2018.

- In 2013, the Channel Islands sediment-dwelling communities (the only indicator collected there during that survey) suggested that the areas sampled may have early signs of stress; however, in 2018, those communities were in reference condition.
- In 2018, all three lines of evidence were assessed and 100% of the Channel Islands area was likely unimpacted or unimpacted.

Channel Islands National Marine Sanctuary
(Photo Credit: Robert Schwemmer, NOAA)

Bight '18 Study Question #3: What is the extent and magnitude of bioaccumulation in seafood?

Bioaccumulation monitoring provides a direct linkage to human health.

Over six million sportfish were caught by recreational anglers in 2018; however, much of the Bight coastline is under one or more sportfish consumption advisories, that recommend limiting the amount and frequency of fish consumed from coastal waters. By measuring contaminants in the fish species people consume from the Bight and comparing them to established "safe to eat" advisory thresholds developed by the California Office of Environmental Health and Hazard Assessment (OEHHA), managers can assess magnitude of risk.

Bioaccumulation assessment – a collaborative effort.

To generate a regional assessment of sportfish contamination, the Bight Program partnered with California's Surface Water Ambient Monitoring Program (SWAMP). Together they collected and analyzed over 900 sportfish comprising eight different species across 27 fishing zones from San Diego to Point Conception. Edible tissues were measured for the four pollutants thought to carry the most risk to seafood consumers: mercury, selenium, total PCBs, and total DDTs.

Sportfish tissue contamination was moderate but widespread in the Southern California Bight.

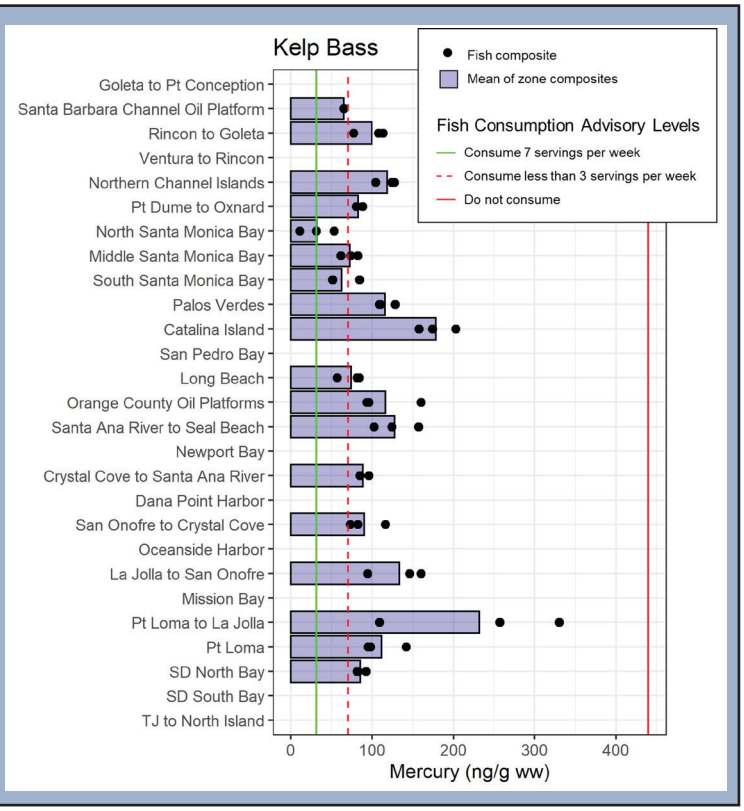
- All fish tissues collected during the 2018 survey were below the "do not consume" threshold.

- Some tissues exceeded OEHHA thresholds for mercury and total PCBs, that advise limiting fish consumption to fewer than three servings per week.

Balboa Pier, a popular recreational fishing location.
(Photo Credit: Richard Le Clair, SCCWRP)

Kelp Bass was one of the targeted species that had the largest regional coverage. Of the species assessed, it had the highest average tissue concentrations of mercury (represented by the blue bars on the graphic); although variability among fish within each region was sometimes large (represented by the black dots). Kelp Bass tissue mercury concentrations were higher than the thresholds that recommend limiting consumption to less than seven servings per week in all regions. One serving is eight ounces before cooking.

Kelp Bass.
(Photo Credit: Miranda Haggerty, CDFW)



Other Notable Findings

The Bight Program is a platform for innovation in regional monitoring.

- The wide range of collaborating agencies in the Bight Program allows for researchers to borrow effort from existing elements to learn more about human impacts on coastal ecosystems.

- The Bight Program provides an opportunity to determine if emerging contaminants are widespread or in high enough concentrations to warrant further investigation. This survey included an assessment of trash and marine debris, domoic acid—a harmful algal bloom toxin—in shelf sediments, and fipronil pesticides in embayment sediments.

- It is also a mechanism to explore new habitats not typically assessed to broaden our understanding of the fate and transport of pollutants. This survey investigated brackish estuaries, as described in the sections above, for the first time.

- It is also a platform to test new monitoring techniques and technologies that help fill in gaps in our existing monitoring or make monitoring more effective and more efficient (better, faster, and cheaper). In this survey, cell bioassays and non-targeted chemical screening tools were tested to understand impacts of emerging contaminants in Bight sediments and fish tissues.

Fipronils, a class of pesticides and contaminant of emerging concern, was not widespread in embayments.

- Fipronil is a broad-use insecticide used frequently in urban areas. This compound and its biologically active degradation products (Fiproles) have been detected in urban runoff at concentrations exceeding toxicity thresholds for sensitive aquatic organisms, which led to its inclusion in the Bight '18 study.

- Fiproles were detected in 8% of the Bight embayment area, with the highest percent of area documented in brackish (35.2%) and marine estuaries (12.0%). Fiproles were found at concentrations indicative of low risk of acute effects (based on comparison to established thresholds for the amphipod *Eohaustorius estuarius* and midge *Chironomus dilutus*).

Los Angeles River carries particles to the coast during a storm.

(Photo Credit: Darrin Greenstein, SCCWRP)

Amphipods are benthic organisms particularly sensitive to many pesticides.

(Photo Credit: Darrin Greenstein, SCCWRP)

New, rapid screening tools proved useful to prioritize contaminated sediment samples.

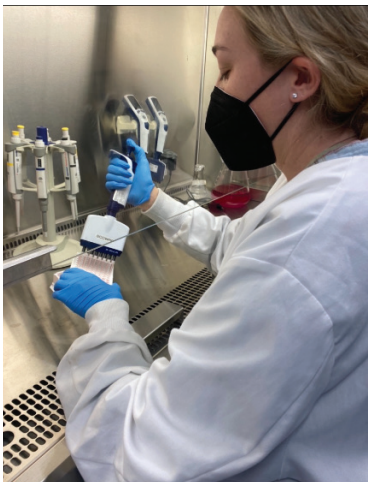
- Monitoring traditionally focuses on legacy contaminants and priority pollutants; however, other unknown or unexpected chemicals represent a large portion of what is present in the environment. The impact of these unknown chemicals is poorly understood.

- Bight '18 piloted the use of two screening methods to better understand the diversity of chemical contaminants and their effects in Bight sediment. The first method, cell bioassays, consists of cell lines capable of rapidly detecting the presence of toxic contaminants that effect biological activity. Two cell bioassays were applied to measure effects of two classes of chemicals (estrogenic- and dioxin-like). The second approach was non-targeted chemical analysis, which was used on a smaller set of samples to identify unique fingerprints of the chemicals present in samples and new toxicants.

- Cell bioassay responses, specifically the aryl hydrocarbon receptor assay which focuses on dioxin-like compounds like PCBs and PAHs, showed promise for identifying impacted sites.

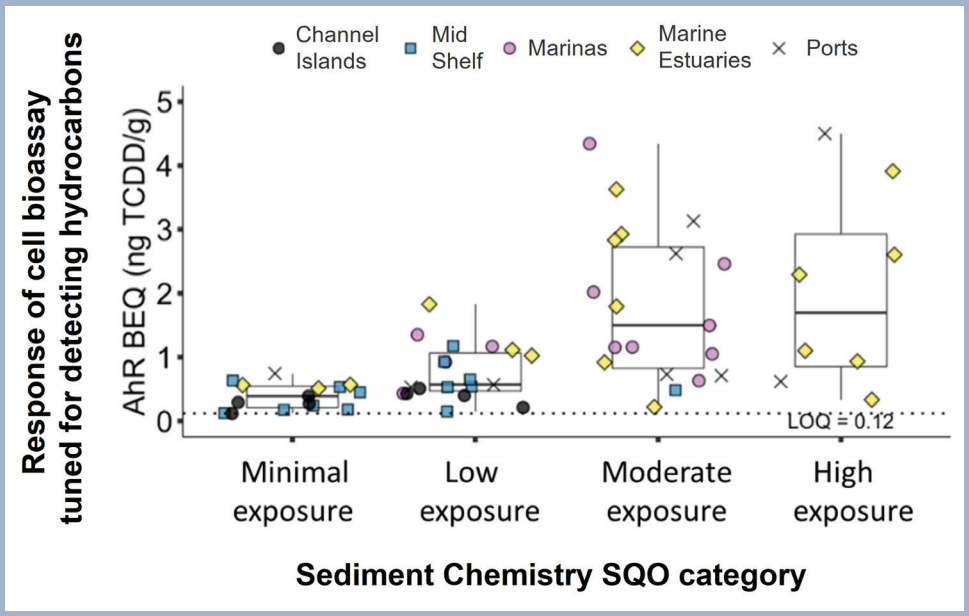
- Chemical fingerprints from the non-targeted chemical analysis showed that different Bight habitats had unique chemical signatures, demonstrating how this analysis could be used in source tracking.

- Together, the cell bioassays and the non-targeted analysis could improve toxicity identification and narrow the search for sources of contaminants.



Preparing a cell bioassay analysis.
(Photo Credit: Alvine Mehinto, SCCWRP)

The aryl hydrocarbon receptor assay, which detects biological impacts of compounds like PCBs and PAHs, was similar to the Sediment Quality Objective (SQO) sediment chemistry exposure line of evidence score (e.g., higher biological response in the cell assay cooresponded with moderate and high chemical exposure), demonstrating its use in prioritizing sites for further investigation.



Leveraged Bight Program Elements provide additional insight into Sediment Quality.

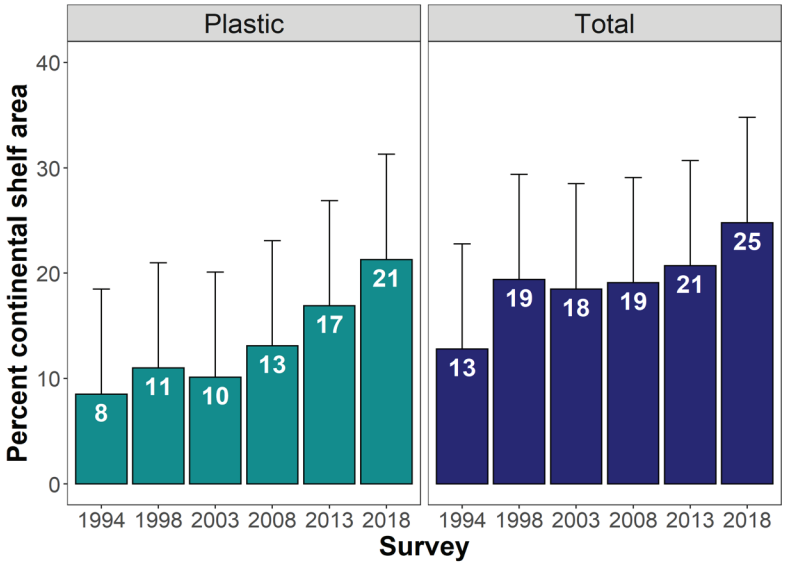
Benthic habitat quality can be negatively impacted by other stressors besides chemical contaminants from land-based sources. The Bight Program provides leverage to investigate additional factors to better understand what is affecting coastal habitat quality throughout the region. Two of these stressors were examined in the Bight '18 Program as independent elements: trash and marine debris and harmful algal bloom toxins, the results of which are summarized below.

Trash was pervasive offshore, and the area affected is increasing.

- During Bight '18, an estimated 25% of the continental shelf seafloor area contained at least one trawl-caught debris item. However, the abundance of trash caught in each trawl was low.

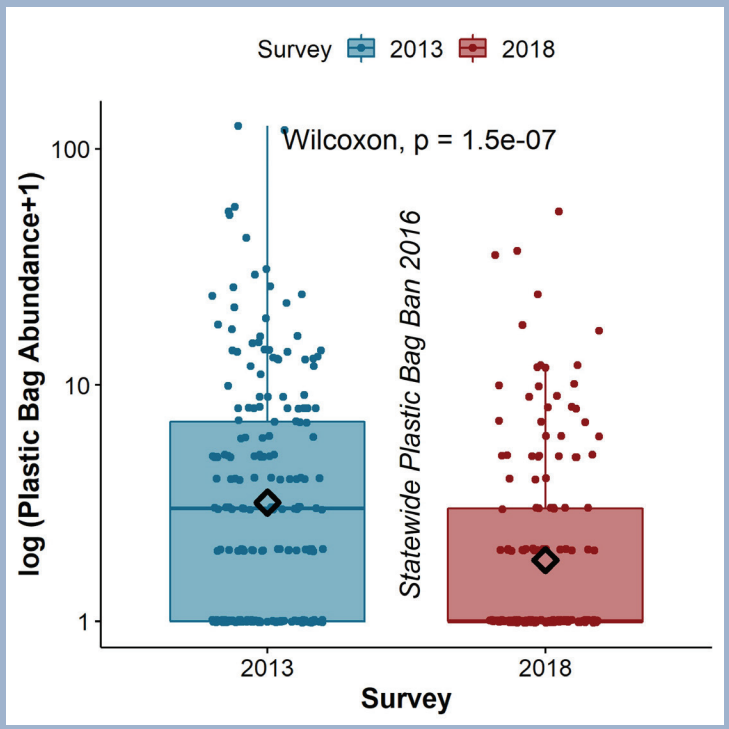
- Plastic was the most pervasive of all debris types, with at least one piece of trawl-caught plastic occurring on an estimated 21% of the shelf area.

- The extent of trash, particularly plastic, occurrence on the shelf has been increasing through time.



The Bight '18 Trash and Marine Debris program demonstrated that trash management policies can have a positive impact on trash. The Southern California Stormwater Monitoring Coalition regional monitoring program of wadeable streams found that there was a significant decrease in plastic bag abundance in streams following implementation of the State's bag ban in 2016.

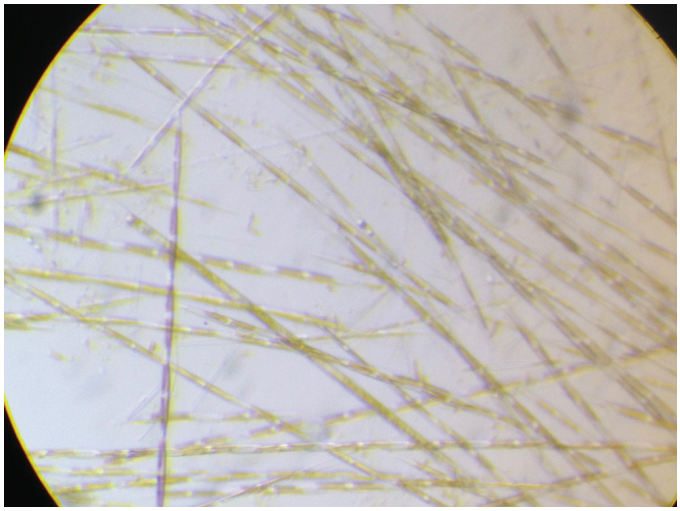
(Photo Credit: Karin Wisenbaker, Aquatic Bioassay & Consulting Laboratories)



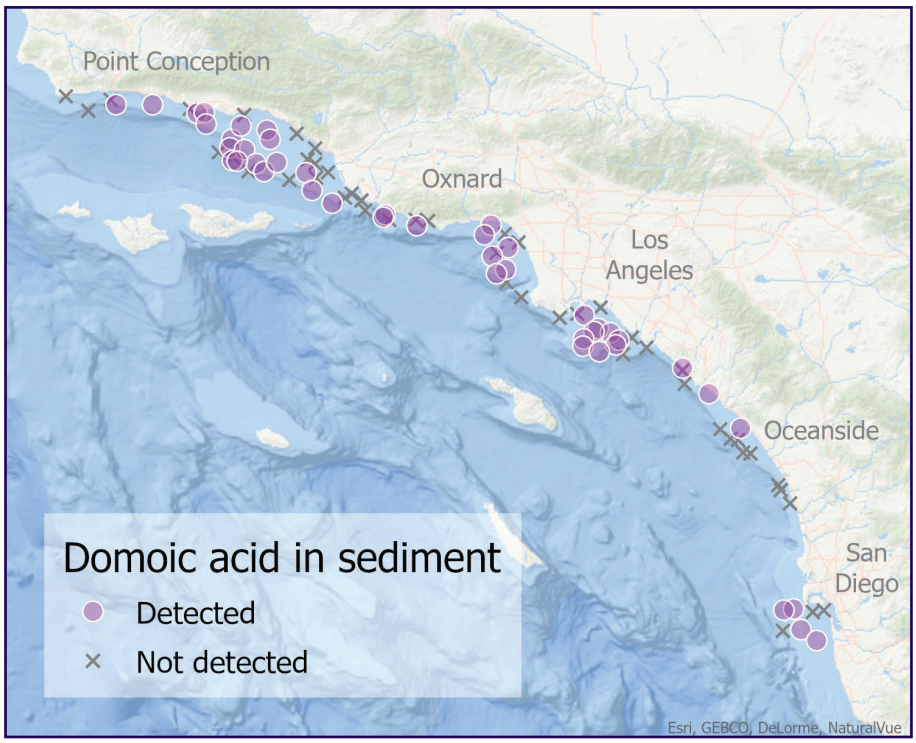
Persistence of the harmful algal bloom toxin, domoic acid, was widespread in sediment over a year after a significant toxic bloom.

- Blooms of the phytoplankton *Pseudo-nitzschia* are a common occurrence in the Bight, particularly during the spring upwelling period. These algae can produce a toxin called domoic acid, which can cause amnesic shellfish poisoning in exposed humans and wildlife.

- Previous studies in the Bight have focused on water column effects of these blooms but increasing evidence has suggested that these toxins can end up in the sediments where they persist for extended periods of time, contaminating ecologically and economically important animals long after the end of water column blooms.



***Pseudo-nitzschia* as seen under a microscope.**
(Photo Credit: Jayme Smith, SCCWRP)



- The Bight '18 study found detectable domoic acid in sediments during summer 2018, over a year after the last large water column bloom in spring 2017.

- Domoic acid was widespread, detected in 54% the continental shelf area.

- Domoic acid was also persistent in the sediment-dwelling organisms, even when there was little to no detectable domoic acid in the sediment, providing a pathway to contaminate higher trophic levels.

Benthic organims were collected with sediment at some sites.
(Photo Credit: Dana Schultz, SCCWRP)

Domoic acid was present in benthic organisms in the Bight.
(Photo Credit: Dana Schultz, SCCWRP)

Implications of the Findings

The Bight program uses a multiple-lines-of-evidence approach to assess the ecosystem impacts of sediment contamination across 1,539 square miles of the Bight. How can Southern California's coastal management community translate these findings into actions? This section explores some of the key management recommendations of the program.

Managers need to identify the causes of the disproportionately poor sediment quality in embayments.

- Bight '18 showed that embayments are disproportionately impacted by sediment contamination. Understanding the drivers behind this contaminantion can lead to successful mitigation of impacts. For managers to take the next steps, these coastal areas should be the focus of causal assessments and sediment toxicity identification evaluations (TIEs), including source tracking and attribution. Within the causal assessment framework, cell bioassays, such as those piloted in Bight '18, could help to narrow down the classes of chemicals of concern.

- Of the five embayment strata, marine and brackish estuaries had the greatest relative extent of poor sediment quality. Marine estuaries have not shown strong trends in extent or magnitude of impacts since monitoring began in 1998, and the percent of area with clearly impacted scores has increased. Recently developed methods for assessing ecological function in estuaries, in addition to sediment quality assessments, can help managers diagnose which stressors need to be mitigated and can inform effective restoration efforts.

Newport Bay.
(Photo Credit: Karen McLaughlin, SCCWRP)

Fipronil pesticides are a contaminant of emerging concern that can be deprioritized in embayments.

- A key aspect of the Bight Program is to investigate new contaminants typically not part of required monitoring to determine if they are widespread or in high enough concentrations to require site-specific monitoring and/or management actions.

- The Bight '18 survey found that fipronils – a current use pesticide – were not commonly detected in sediments from coastal embayments and, when they were detected, concentrations were not typically at levels high enough to generate toxicity.

Managers should invest in trash source control and effects-based research for continued progress in trash reduction.

◆ Trash continues to be a widespread problem for coastal ecosystems. The Bight Program found evidence that source control was an effective strategy for reducing trash.

◆ The extent to which trash, plastic in particular, is causing impacts to beneficial uses is poorly understood. Human and aquatic life effects should be characterized so we can better understand the implications of plastic pollution and identify endpoints for when clean is clean enough.

◆ Plastic doesn't degrade overtime, but it does break down into smaller and smaller pieces. The Bight '18 survey did not include an assessment of microplastics, which may be even more pervasive than the macroplastics that were monitored. Standardized methods are being developed for water, sediment, and tissue, and should be considered for assessing the extent and magnitude of microplastics in Bight '23.

Trash boom in the Ballona Creek.
(Photo Credit: Bill Macdonald, Algalita)

Deep water seaslug, polychaete, and amphipods.
(Photo Credit: Institute for Applied Marine Ecology/Marine Applied Research and Exploration (IfAME/MARE))

Managers need to develop new tools for unassessed Bight habitats and update existing tools to increase accuracy and relevance of regional monitoring.

◆ Current Bight Sediment Quality Assessments are limited to depths between three feet and 650 feet. However, the continental slope and basins, with depths greater than 650 feet, represent 63% of Bight area and are currently unassessed for sediment quality impacts. Moreover, discovery of DDT barrels in the deep coastal basins down to 3,000 feet adds urgency for developing assessment tools to characterize the status and trends of contaminant impacts in these deep water habitats.

◆ Our current assessment tools, particularly those relying on biological community composition (e.g., benthic infauna and demersal fishes), may increasingly be susceptible to non-contaminant effects on scoring due to climate change. Several Bight species have documented range shifts and impacts on abundance due to changing temperatures and water chemistry related to climate change. Managers need to understand the effects of the community composition changes on assessment tools to untangle local contaminant impacts from global climate changes.

Bight '18 Sediment Quality Element participating organizations

Anchor QEA
Aquatic Bioassay and Consulting Laboratories
City of Avalon
City of Los Angeles
City of Oxnard
City of San Diego Public Utilities Department
Dancing Coyote Environmental
EcoAnalysts
Encina Wastewater Authority
Eurofins
Los Angeles County Department of Public Works
Los Angeles County Sanitation Districts
Los Angeles Regional Water Quality Control Board
MBC Aquatic Sciences
National Oceanic and Atmospheric Administration
Natural History Museum of Los Angeles County
Nautilus Environmental
Naval Information Warfare Center Pacific
Occidental College Vantuna Research Group
Orange County Public Works
Orange County Sanitation District
Physis Environmental Laboratories
Port of Long Beach
Port of Los Angeles
Port of San Diego
Riverside County Flood Control and Water Conservation District
San Diego County Department of Environmental Health
San Diego Regional Water Quality Control Board
San Diego State University
San Elijo Joint Powers Authority
Santa Ana Regional Water Quality Control Board
Southern California Coastal Water Research Project
State Water Resources Control Board
U.S. Environmental Protection Agency, Region IX
U.S. Fish and Wildlife Service
Weck Laboratories
Weston Solutions
Wood Environment and Infrastructure Solutions, Inc.

Southern California Bight Regional Monitoring Program Technical Reports

Planning documents and assessment reports for the Bight Program are available online: https://www.sccwrp.org/about/research-areas/regional-monitoring/southern-california-bight-regional-monitoring-program/bight-program-documents/

Volumes cited in this report include:

Volume I – Sediment Toxicity

Volume II – Sediment Chemistry

Volume III – Benthic Infauna

Volume IV – Demersal Fishes and Megabenthic Invertebrates

Volume V – Contaminant Bioaccumulation in Edible Sport Fish Tissue

Volume VI – Sediment Quality Synthesis

Volume VII – Ocean Acidification

Volume VIII – Harmful Algal Blooms

Volume IX – Trash and Marine Debris

Volume X– Shoreline Microbiology

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(Photo Credit: Craig Sawa, CLAEMD)