

Using Scenario Planning to Shape the Future of the Southern California Bight and the Southern California Urban Ocean

THE RESULTS OF A FORUM SPONSORED AND ORGANIZED BY THE AQUARIUM OF THE PACIFIC'S MARINE CONSERVATION RESEARCH INSTITUTE (MCRI), JULY 24-26, 2012

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Urban ocean image from Aerial Photography of the Southern California Bight by Bruce Perry, Department of Geological Sciences California State University at Long Beach

Southern California Bight image courtesy of NASA/JPL-Caltech

**USING SCENARIO PLANNING
TO SHAPE THE FUTURE OF
THE SOUTHERN CALIFORNIA BIGHT
AND
THE SOUTHERN CALIFORNIA URBAN OCEAN**

July 24-26, 2012

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Jerry R. Schubel, PhD, Director of MCRI
Thomas W. Turney, Chair of MCRI Board

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I. INTRODUCTION

What is the future of the Southern California Bight and Southern California Urban Ocean? Forty-five individuals with diverse perspectives, experience, and expertise met in Long Beach, California July 24-26, 2012, to explore alternative futures that could address this question. The primary tool used was scenario planning (briefly described below). The ultimate goal was to identify three to five disruptive strategies that could move us off the present trajectory to one that would bring us closer to the future that captured the qualities and uses envisioned by members of this forum and by others.

The Aquarium of the Pacific is involved with exploring the future of the Southern California Bight and Southern California Urban Ocean because it is convinced that the Southern California Urban Ocean could be a model for the rest of the world of how to protect coastal watersheds, coastal and ocean ecosystems, marine biodiversity, recreational and aesthetic values, and accommodate a variety of human uses of the ocean to stimulate local and regional economies. No comparable area in the United States, perhaps in the world, has such a concentration of expertise in oceanography, ocean engineering, and marine technology industries; such a well-studied piece of the world ocean; and such a strong ocean ethic.

The July 2012 forum, *Using Scenario Planning To Shape the Future of The Southern California Bight and Southern California Urban Ocean*, was another in a continuing series of efforts by the Aquarium of the Pacific and its partners to influence and shape the future of the Southern California Bight and Southern California Urban Ocean to ensure healthy and productive coastal and ocean ecosystems and a robust ocean economy.

The focus of the forum was on the Southern California Bight and Southern California Urban Ocean including the contiguous coastline. Relatively little attention was given to the terrestrial environment although it was explicitly recognized that human activities on land are a major determinant of water quality in the Southern California Urban Ocean.

II. A BRIEF PRIMER ON SCENARIO PLANNING

Pierre Wack, one of the masters of scenario planning said: "Their purpose is to gather and transform information of strategic significance into fresh perceptions."

Scenario planning is a rigorous planning process that can be particularly valuable under conditions of great uncertainty such as those we face in the Southern California Bight and Southern California Urban Ocean. Each scenario is an internally consistent and plausible pathway to the future. It is not a prediction; only a story of how the future might turn out under certain conditions.

Scenario planning should have a focal issue—a driving issue. Our driving issue was:

What mix of uses of the Southern California Bight and Southern California Urban Ocean would increase the probability of achieving the qualities and uses desired by a broad cross-section of Southern Californians for the Bight in the future (2050 and 2100)?

Our group represents users of the Southern California Bight and Southern California Urban Ocean, in addition to regulators, academicians, planners, and public officials. As such our objective was to try to represent what we believe to be the interests of the public in our coastal waters and to envision what these waters might look like in 2050 and 2100 under a variety of conditions. The purpose of the forum was to help set the stage for public discussions about the future of these waters and to do so by suggesting a process that we believe would be useful.

As stated in the introduction, the challenge set for the forum was to develop three to five scenarios that bound the range of probable futures and then to search across those plausible pathways to the future and identify robust strategies—strategies that work across all, or at least most, of the plausible futures—to get us as close as possible to a future that captures as many of the qualities society desires as possible.

Pierre Wake: "The point is not so much one scenario that gets it right as to have a set of scenarios that illuminate the major forces driving the system, their interrelationships, and the critical uncertainties."

STEPS IN THE SCENARIO PLANNING PROCESS

Scenario planning is a strategy for exploring and shaping the future by influencing the interplay among driving forces, pre-determined elements, and critical uncertainties based upon examination of a set of plausible futures.

Step 1: Clarify and codify important qualities of the desired future, qualities that are embraced by a broad cross-section of society.

We began the forum with a working set of desired qualities. They were developed by surveying the forum participants, attendees of the 2012 H2O Conference, and attendees of the July 12, 2012 lecture, “Unlocking The Potential Of The Southern California Urban Ocean” by Jerry Schubel, President of the Aquarium and one of the organizers of this forum. The number of responses is small (225) and does not include a broad cross-section of the general public, but it represents a start.

Step 2: Use scenarios to map out a set of alternative pathways to the future, each of which is plausible and internally consistent. One scenario needs to be an extension of existing trends. The set of scenarios should bound the range of plausible futures.

Again, scenarios are not predictions; they are stories of how the future might turn out. Each must be internally consistent and plausible. They incorporate real data on trends, and they also capture values. (Note that while science plays a role, science is only one input.)

Step 3: Analyze each of these trajectories with special focus on our current trajectory and the one that gets us closest to the future with the desired qualities.

Determine which societal decisions made the difference. Focus on those. See if there is a “disruptive event or events” that can get us off one trajectory and onto the one that gets us as close as possible to the desired future.

The “raw materials” of scenarios are driving forces, critical uncertainties, and pre-determined elements. The same raw materials go into each scenario, but the critical uncertainties take different forms depending upon the theme of the story. The theme leads to a different story line in each scenario.

Scenarios are usually developed by several “theme teams” working in parallel. The teams often are formed by lottery. (Forum teams selected as described on page 8.) The challenge for each team is to develop the story consistent with the theme it is assigned whether the team likes that theme or not. It is a challenge to the team’s creativity.

TERMINOLGY EXPLAINED

Driving forces are forces that have a major influence on the future—on the future as it relates to the focal issue that, in our case, is the mix of human uses in the future consistent with the qualities we want for the Southern California Bight and the Southern California Urban Ocean. Driving forces may fall into several broad categories:

Social dynamics: the ability of a group of people—a society, culture, organization, family or team—to successfully adapt to the nature of change in

their system of function, purpose, and governance. For example, population growth in the Southern California Bight, size, strength and shape of the environmental community, etc.

Economic issues include jobs; unemployment; healthcare; social services, and education costs; national, state, and regional economies, etc.

Political/regulatory issues: Are the regulatory processes transparent and predictable? Are they too uncertain or too prescriptive? Do they facilitate or impede innovative and appropriate uses of the coast and ocean that could stimulate the regional economy?

Technological issues: Have new technologies made certain activities more acceptable? Are different combinations of activities that once were in conflict now compatible?

Environmental issues include impacts of climate change (sea level rise, frequency and intensity of coastal storms, changes in ocean chemistry); frequency and intensity of Harmful Algal Blooms (HABS); frequency of beach closures; degradation and/or restoration of ecosystems; etc.

Pre-determined elements are things that have already happened or whose effects are in the pipeline, and over which we have little control, e.g., population growth.

Critical uncertainties are driving forces **minus** those that are pre-determined elements.

The challenge: to identify those uncertainties that are critical to forum themes. How they get expressed in a particular scenario depends upon the interplay of Driving Forces and Pre-determined Elements, and the theme of the story. The same “factor” can fall into more than one category, e.g. sea level rise which is happening and will continue to happen is a pre-determined element, but the amount sea level will rise is not known so it is a “critical uncertainty.”

SCENARIO TITLES

The best scenarios have titles that capture the essence of each individual story and convey that information briefly, descriptively, and creatively. Catchy titles are always good! Movie and song titles are sometimes used. Forum participants were encouraged to use their imaginations in coming up with titles for their scenarios.

The importance of the title of each scenario should not be underestimated. Everything in the scenario must be consistent and the title guides how a scenario team converts the critical

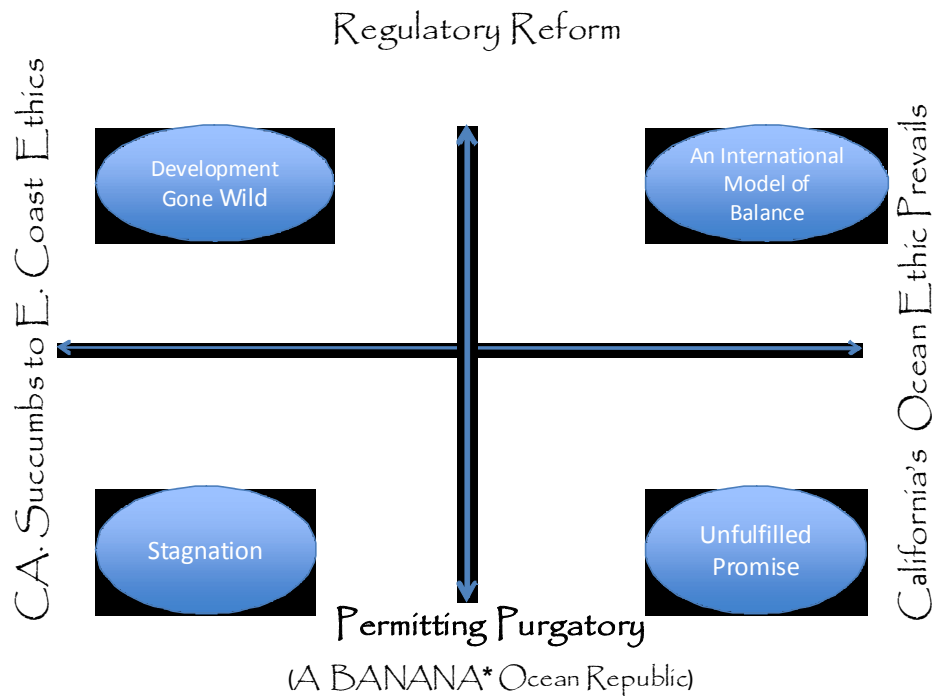
uncertainties into “actions”, including policy decisions. These actions must be coherent with the “theme” and will, therefore, differ from team to team, i.e. from scenario to scenario.

An example: If “the size, shape and strength of the environmental community is a critical uncertainty, then in a scenario with the title *Green Zone*, it would be strong and pervasive. But in a scenario with the title *Devil’s Playground* or *Up For Grabs*, the environmental community would be amorphous and ineffective.

DEFINING A MATRIX

When possible, if the critical uncertainties can be bundled onto two orthogonal axes, then a matrix of four very different, but plausible quadrants of uncertainty can be defined. Each of the four quadrants corresponds to a plausible future.

For example, if the primary critical uncertainties are the regulatory/policy framework and the size, shape, and strength of the environmental community, the axes could be as shown below.



*Build Absolutely Nothing Anywhere Near Anyone—BANANA

III. THE FORUM STRUCTURE AND ORGANIZATION

IDENTIFYING A CORE SET OF DESIRED QUALITIES

Several weeks before the forum, participants were sent a list of potential desired qualities for the Southern California Bight and Southern California Urban Ocean. They were asked to select the five qualities most important to them personally. A week later, they were sent a list of the driving forces and asked to select the two that they felt would be most important in determining whether or not the future would have the qualities they wanted. The results became important inputs to the forum.

Recapping Forum Survey #1

Instructions to survey participants: Please indicate the five qualities that are your personal priorities for the Southern California Bight and Southern California Urban Ocean in 2050 and beyond. They do not need to be ranked, but you may rank them if you wish. If a quality you want is not included, please add it. Please e-mail the numbers of your top five choices to us by no later than July 1, 2012. These will be an important input to the forum.

1. A rich mosaic of healthy, productive coastal and marine ecosystems
2. A diverse and robust ocean economy consistent with healthy and productive coastal and marine ecosystems
3. Preservation of coastal ocean space where it is publicly accessible. A model of ecosystem-based management
4. Healthy coastal communities—in all dimensions, including economic
5. Enhanced public understanding of the interrelationships of land use & coastal water quality
6. Clean beaches and coastal waters
7. A balance of recreational & commercial uses
8. Well-managed fisheries—both recreational & commercial
9. A diverse portfolio of environmental education programs, formal and informal

The results of the survey are shown in Box 1

BOX 1: Ranked Results Qualities of the Southern California Bight and Southern California Urban Ocean Desired by Forum Participants

- 1.* A rich mosaic of healthy, productive coastal and marine ecosystems
1. A diverse and robust ocean economy consistent with healthy and productive coastal and marine ecosystems
2. Well-managed fisheries—both recreational & commercial
3. Healthy coastal communities—in all dimensions, including economic
4. A model of ecosystem-based management

** Each of the top two items received the same number of votes*

IDENTIFYING A CORE SET OF DRIVING FORCES

Recapping Forum Survey #2

The goal of this survey was to identify the most important and uncertain driving forces in determining the mix of uses of the Southern California Bight and Southern California Urban Ocean by humans consistent with a future that captures the top five qualities the majority of forum participants want, (shown in Box 1), in decreasing order of preference. Other groups we had consulted said that the driving forces they believed will affect future uses of the Southern California Bight and Southern California Urban Ocean are (unranked):

1. The size, shape, and power of the environmental community
2. Population growth
3. The economy
4. Climate change
5. The permitting and policy frameworks and processes
6. Social media
7. Growth of maritime cargo industry
8. The growing need for potable water
9. The nature of the energy environment: demand and mix of sources

Forum participants were asked to select from this list the two most important and uncertain driving forces that they believe will determine the mix of human uses of the

Southern California Bight and Southern California Urban Ocean in the future (2050 and 2100) consistent with the desired qualities (Box 1). If, in their opinion, key driving forces were not included in this list, they were invited to submit them.

The results for the top five ranked driving forces from this survey of forum participants are shown in Box 2.

**Box 2: Ranked Driving Forces Selected
by Forum Participants**

1. The permitting and policy frameworks and processes
2. The economy
3. Climate change
4. Population growth
5. The size, shape, and power of the environmental community

THE FORUM TEAMS

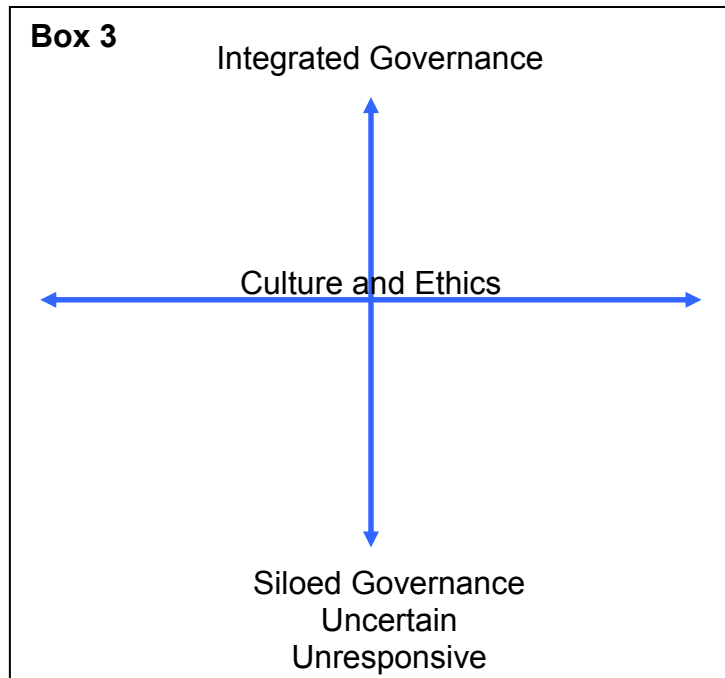
Selection and First Assignment



Forum participants in plenary session

Prior to the forum the organizers divided the participants into three teams—Pelicans, Sardines, and Squid. An effort was made to achieve diversity within each team and balance across the three teams. Each team had a facilitator and a rapporteur, both selected in advance of the forum.

On the first day of the forum, each team was asked to select the two most important and uncertain driving forces in determining whether or not the future would capture the qualities listed in Box 1. They started with the list in Box 2, but had the opportunity to identify other driving forces or to restate any of those listed. When the teams met again in plenary, they compared their results—which were quite similar, although the language used was somewhat different. The two competing sets of axes are shown in Boxes 3 and 4.

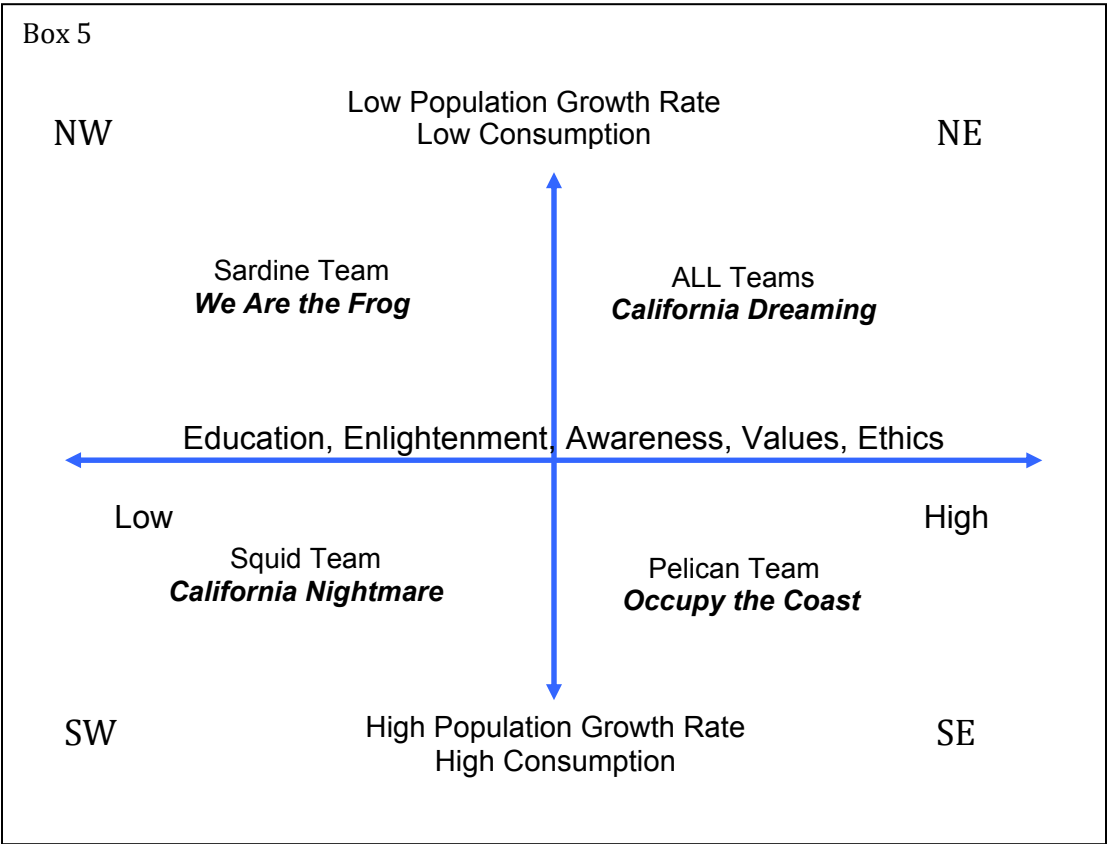
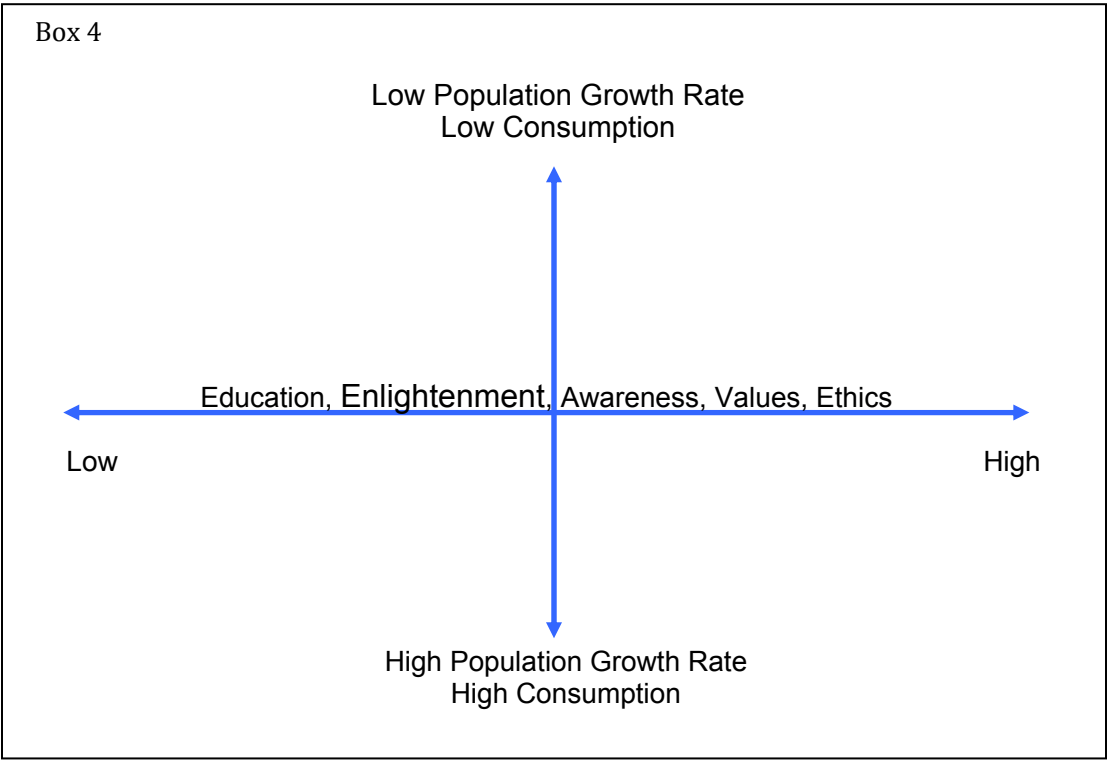


After considerable discussion by the group as a whole, the axes that were agreed upon by the majority of the participants are those shown in Box 4. Those who advocated the axes in Box 4 believed that a well-educated, enlightened, aware public with strong values and ethics would insist upon good governance. Not all participants were convinced of this, but there was a strong consensus.

The schematic shown in Box 4 became the framework for the development of the scenarios—stories of how the Southern California Bight and Southern California Urban Ocean might turn out in the future. We assigned quadrant titles for the four scenarios, shown in Box 5. Scenario titles were the sole responsibility of the individual teams. The northeast quadrant, ***California Dreaming***, was assigned to all three groups. Each of the other three quadrants became the sole responsibility of one of the three teams.



The Squid team in a breakout session



IV. THE SCENARIOS—THE STORIES

Each of the three teams—Pelicans, Sardines, and Squid—developed three scenarios. All teams developed a scenario for the desired future, the Northeast Quadrant, *California Dreaming*. Each team then developed a scenario for one of the other quadrants (Box 5). In addition, each team was asked to describe what it envisioned the Southern California Bight and Southern California Urban Ocean would be like in the future if the present trajectory were continued.

The first challenge was to develop a scenario about how the Southern California Bight and Southern California Urban Ocean might turn out under conditions defined by each of the described quadrants. The criteria were that the story must be plausible and internally consistent with the conditions in that quadrant as defined by the axes and consistent with the title. Over the course of more than one and one-half days each team met independently coming together periodically to share its thinking with the other teams.

The teams used different approaches in developing and telling stories, all are rich and vivid, some perhaps fanciful, descriptions of how the future of the Southern California Bight and Southern California Urban Ocean might turn out. While some scenarios strain the criterion of plausibility, all contain valuable insights.

THE FIRST SCENARIO: THE DESIRED FUTURE—*California Dreaming*

California Dreaming presents the three versions of the most favorable future in 2050 as depicted in the northeast quadrant.

California Dreaming I

Pelican Team

Today, October 11, 2050, we celebrate the opening of City Dock III, another phase in the development of the enormous San Pedro City Dock Working Waterfront campus. This dock, as do City Dock I and II, includes dockside operations and housing of activities and supporting industries in reclaimed industrial and storage buildings in the Ports of Los Angeles and Long Beach. All the infrastructure incorporates construction materials derived from municipal and industrial waste.

City Dock III is the home of the Southern California Regional Stewardship and Technology Center (SCRSTC), a world-class marine and technology innovation center. Established to foster community engagement on coastal ocean issues, the center is an example of integrated planning by a number of stakeholders. Today we dedicate the center to our sponsor who funded City Dock III, the media conglomerate, “Robust Communication and Capital.”

SCRSTC hosts a fleet of biodiesel-fueled ships that are serviced and refueled at offshore biodiesel supply stations. Some ships offer modest ecotourism cruises that include opportunities for sustainable regional recreation and relaxation. Revenue derived from these cruises from shipboard hotels, sustainable seafood restaurants using locally-caught and farm-grown species, and spa facilities help finance the fleet of floating classrooms that largely provide the center's education component that is incorporated into the designs of City Dock I and II.

The floating classrooms navigate the waters surrounding the South Coast's network of Marine Protected Areas (MPAs). Students participating in these programs come predominantly from Southern California, but there are always some from other parts of the state. They are the product of a school curriculum that includes hands-on ocean experiences. These experiences have catalyzed renewed interest in STEM—Science, Technology, Engineering and Mathematics—education and have re-positioned California as a leader in education.

Students work alongside professional marine biologists, oceanographers, and other scientists to monitor and track ecosystem health inside the MPAs and in the productive fishing grounds adjacent to the MPAs. They study patterns of human activities along California's coast, and conduct coastal and open ocean research on topics of concern. Vessels are equipped with state-of-the-art electronic instrumentation that gives students and the general public onshore the ability to observe the below water activities and to interact with the students and scientists in real time. Data and information collected by shipboard scientists, both students and professionals, are provided in public accessible forms. The work is of such high quality that it often is used in policy decisions. The programs integrate into the curricula social sciences, arts, and humanities, along with natural and physical sciences. Field and laboratory work provide students with an interdisciplinary basis for developing skills that will contribute solutions to societal challenges.

Now let's look back to 2013, the first phase of development of what would become the San Pedro City Dock Working Waterfront (SPCDWW) began in 2013 with construction of a series of laboratories designed for DNA fingerprinting of contaminants in runoff from Southern California watersheds, following enactment of legislation that included severe penalties for violations of state and federal bans on improper waste disposal.

Several landmark achievements in the Southern California Bight and Southern California Urban Ocean have been a direct result of the start of a dynamic and long-range coastal and marine spatial planning (CMSP) effort that encompasses terrestrial areas reaching from the Inland Empire and its watersheds and extending out into the ocean to the limit of the EEZ—the Exclusive Economic Zone. By combining innovative public policy that balances environmental needs while promoting sustainable growth and by incorporating resilience that enables adaptation to a growing population, climate change, and evolving rational public policy and governance, the following goals have been achieved.

- Healthy and productive coastal ecosystems that start in the watershed and extend into the offshore marine environment to the limit of the EEZ
- A diverse and vibrant ocean economy
- Informed, invested, aware, and involved multi-cultural and multi-generational communities
- An integrated coordinated governance that uses science-informed and transparent processes in making planning and permitting decisions both on and off shore

At the grassroots level, revitalized rivers throughout the Southern California Bight watersheds bring clean water and sediments to estuaries and the nearshore coastal zone. In Los Angeles, for example, communities throughout the Los Angeles River basin are reducing polluted storm water, augmenting groundwater supplies by eliminating some impermeable surfaces, where possible, converting traditional landscaping to drought-tolerant vegetation, and capturing rainwater on site. The need for obtaining freshwater from other parts of the state has been reduced markedly.

The help of school groups in the removal of invasive plants from the riparian zone has been a factor in maintaining habitat and stream bank stability, and in reducing the threat of invasive species to native species. The state's long-term floodplain buyback program has facilitated multi-use seasonal parks along the river, allowing natural stream flows even during heavy rainstorms. The high flows bring sediments to the coasts helping with wetland accretion, beach nourishment, and rejuvenated nearshore rocky reefs that are important fish habitat. The cleaner waters and natural sediments support a healthy southern steelhead trout population. As a result, people throughout the watershed consume these and other local fish as a regular part of a healthy diet.

Offshore, community waste management agencies are utilizing marine algae in photo-bioreactors to produce "clean energy" biofuels in systems that clean the water, capture carbon dioxide from the atmosphere, retain important nutrients, and do not compete with agriculture for land or fresh water. The technology is based on OMEGA (Offshore Membrane Exposure for Growing Algae) piloted in San Francisco Bay in 2012. It is the result of research done in a City Dock laboratory.

Along with suites of distance-learning classrooms, City Dock I and II now have sustainable aquaculture development laboratories and grow-out facilities; algae-to-protein conversion tanks; state-of-the-art research laboratories; invasive species quarantine facilities; a rooftop organic mini-farm for locally grown produce that is fertilized with nutrient-rich byproducts from the aquaculture facilities; and a medicinal cannabis farm.

Transportation to the City Dock campus is by the Harbor Line Metro Transit Agency that uses ecofriendly equipment and improved multi-modal access, including water taxi. Service is well planned, frequent, reasonably priced, and energy efficient.

The working waterfront of the early 20th century has returned. It is vibrant, bustling with activity including sustainable fishing villages. The villages are largely a result of enlightened fisheries and aquaculture policies that now allow for a streamlined permitting process from the fisherman and fish farmer to the consumer's plate.

Alongside a 12,000 square foot dock, the world's largest wave tank attracts researchers from around the world to study wave processes and phenomena to better understand the impacts of sea level rise and storm surges on coastal areas.

The Waterfront Academy offers a wide range of educational opportunities from free choice learning to technical training for jobs in marine trades to advanced academic degree programs. The academy trains and educates 100,000 individuals each year, people who come from the greater metropolitan southern California region, in "K-grey" mixed age cohorts with hands-on experience in laboratories, with autonomous vehicle guidance stations that collect oceanographic and climatic data, and promote public education and stewardship. An education-debt forgiveness fellowship program encourages participation in certificate, post-baccalaureate, and doctoral level programs, and by those who simply want to learn more about the coast and ocean just for the sake of learning. The portfolio of programs includes technical and academic fields of study in commercial and scientific ocean and coastal-based enterprises.

City Dock I has a warehouse museum that shelters the historic buildings—some of which date back to 1903—that were relocated from Terminal Island after being impacted by sea level rise. The museum tells the story of the local tuna industry and also the story of how habitat restoration and scientific management of the tuna fishing industry has returned west coast tuna to a sustainable status.

The former Terminal Island Federal Correctional Institution, flooded out by rising sea level, is now the floating home of the green business incubator "*No More Dirty Hands On Deck*" and "*Waterworld*," a new underwater arcade.

The revitalization of the working waterfront could not have happened had there not been a change in governance from one that was siloed to one that is integrated with local, state, and federal entities working as partners with private sector organizations, NGOs, and academia.

The San Pedro City Dock Working Waterfront is now a tourist destination and an important economic asset. It is a model for redevelopment of waterside facilities deemed to be non-coastal dependent operations, following enactment of one of California's suite of environmental laws passed as initiatives supported by a consortium of environmental and recreational organizations, the Department of Defense, "green tech" public corporations, and an informed and aware general public. This is the first such revitalized working waterfront campus established on the west coast. Similar facilities have been developed with the same vibrancy in San Diego and Santa Barbara, with one in planning at Port Hueneme.

The decommissioning of dams, which led to the increased transport of sediment to the coast, contributes to improved and expanded surf breaks that attract surfers from around the world. As a result, there are multiple venues in Southern California for worldwide surfing competitions.

Other characteristics of the revitalized Southern California Bight and Southern California Urban Ocean include:

- development of local affordable Low Impact Development (LID) housing along the coast;
- accessibility to technical training education for jobs supporting the waterfront industries;
- implementation of city tax incentives and regulations to stimulate appropriate coastal and ocean development strategies to generate, reclaim, and conserve fresh water; and
- integration of water plans, energy plans, and transportation plans have become the norm.

California Dreaming II

Sardine Team

The Sardine Team took the first part of the Pelican Team's scenario and expanded it.

The date is October 11, 2050. Several landmark achievements in the Southern California Bight and Southern California Urban Ocean have been a direct result of dynamic and long-range coastal and marine spatial planning (CMSP) combined with a host of paradigm-shifting cultural developments that resulted in revolutionary change. By combining innovative public policy that balances environmental needs while promoting sustainable growth with intensive recruitment of grassroots communities into social renewal, the following long-range goals have been achieved.

Most Southern Californians now enjoy healthy and productive coastal and marine ecosystems; a diverse and vibrant ocean economy; and healthy, engaged, informed, and self-sufficient communities.

Each of these systems incorporates resilience that enables adaptation to a growing population, climate change, and evolving public policy and governance. Importantly, subtle cultural shifts prompted by civic engagement, government leadership, and creative programs resulted in a tipping point—a paradigm shift that produced revolutionary changes. Mindfulness of individual impact, self-sufficiency and localism became a cultural norm, and the Southern California Bight and Southern California Urban Ocean became a global hotspot for adaptive, eco-based innovation.

At the grassroots level, revitalized rivers throughout the Southern California Bight watersheds bring clean water and sediments to estuaries and the nearshore coastal zone. In Los Angeles, for example, communities throughout the LA River basin are reducing polluted storm water and augmenting groundwater supplies by eliminating impermeable land cover, converting lawns to drought tolerant landscaping, and capturing rainwater on site.

School groups help remove invasive plants from the riparian zone to maintain habitat and enhance stream bank stability. Communities invested widely in community agriculture, water and resource reuse efforts that built and encouraged a local, community-based sense of self-reliance and engagement. An “opportunity corps” was created to enlist older citizens in community development projects, deploying new resources in civic projects such as rooftop and urban gardening, reforestation, water catchment, construction of bioswales, and local renewable energy projects.

Public laws encouraging greater permeability of urban surfaces, use of biodegradable packaging products, providing public land for urban renewal efforts, developing nutrient/pollution trading systems, advancing irrigation and fertilization techniques and efficiency, facilitating coastal retreat of infrastructure and structures worked hand-in-hand with these grassroots efforts.

Large supplies of fresh water were recovered through advances in water reclamation techniques, easing water supply concerns and restoring watersheds. A massive federal effort—driven by an historic presidential proclamation—set a level and schedule for attaining fuel switching for transportation and energy infrastructure in the areas of biofuels and solar technology.

Civic organizations such as the “Urban Green Corps” began to shift from “fixing things” to a more proactive, preventative mode. This emphasis alone stimulated paradigm shifts across a variety of areas—physical and mental health care, urban design, ecological restoration, education, and policing.

Similarly, waste reduction and marine debris concerns were transformed by re-cycling, use of degradable or reusable materials, and policies requiring producer responsibility for the full lifecycle of their products. Methods were developed and applied to process and utilize municipal and industrial waste. Use of bottled water and single use packaging or single use anything, disappeared from society before being banned, since cultural norms had shifted and such wasteful practices were shunned. So did consumption of processed food, resulting in reductions in diabetes, obesity and heart disease.

Sunny Southern California became a global leader in solar energy use and became an economic engine in solar technology and its production.

The state’s long-term floodplain buy-back program facilitated multi-use seasonal parks along the rivers, allowing natural stream flows, sediment transport to the coasts, wetland accretion, beach nourishment, and rejuvenated nearshore rocky reefs that are important for fishing. Healthy southern steelhead trout populations allowed residents a place-based source of recreational fishing. Community supported fisheries programs emerged to join farmers in helping reconnect food to its local origins through dockside sales and “fishers markets” and government wellness programs helped develop healthy communities ready and eager to engage in the work to green and renew their neighborhoods.

Citizens engaged in harbor and coastal water quality protection efforts as never before, helping to restore wetlands, kelp forests, eelgrass beds and other important nursery areas. Advances in methanol and algae-based power transformed transportation and energy production systems, greening and decentralizing these key infrastructures. Permeable roads and public transportation enjoyed a resurgence.

Each of these small achievements inspired residents and communities with optimism, a sense of personal responsibility and engagement in renewal, and awakening cultural norms, prompting industry and political leadership to redouble their efforts.

Key institutions emerged to support and extend these developments, including education, technology and science centers. A major new science center serving

numerous regional institutions helped stimulate and support cultural and technological shifts supporting ocean and social progress. Citizen-supported scientific research became a regular and effective technique to evaluate policies and improve conservation.

As a result of all this, ecological and economic renewal is well underway and growing. Measures of biodiversity and abundance, including formerly depleted species, among them whales, kelp forests, giant sea bass, and steelhead trout, have increased, restoring coastal and marine ecosystems and contributing to a vibrant maritime economy.

California Dreaming III Squid Team

“Hi folks, this is Joy Truetalk, reporting for Channel 7 Eye Witness News. It’s another beautiful day today, July 25, 2050, here in Southern California.

McDonald’s announced today that their new filet-o-sustainable fish sandwich is so popular that they have to limit customers to five per family per day to meet demand. Also, their new ‘kelp’ smoothie is selling well.

First to report is Jessica, our environmental reporter who will be reporting on marine issues. ”

“Thanks, Joy. As a result of efforts by Scripps Institution of Oceanography with the assistance of marine scientists from USC, Cal State Long Beach, Cal State Fullerton, UCLA, and, Cal State Dominguez Hills, the following developments can be reported for our local marine environment. By the way, all of this is due to the efforts started 38 years ago at the Aquarium of the Pacific in Long Beach in the area of scenario planning.

Aquatic invasive species are minimal. HABs (Harmful Algal Blooms) are far less frequent than in 2012. All of our local commercial and sport fisheries have become sustainable. Sustainable aquaculture has reduced pressure on some wild fish stocks through a combination of offshore submerged aquaculture in cages, some developed in partnership with offshore oil and gas platform operations. Most aquaculture today is what is called multitrophic which means that it combines algae with shellfish and finfish.

Today aquaculture in the Southern California Urban Ocean is a \$5 billion a year industry employing between 50,000 and 100,000 people in well-paying jobs. According to California Department of Fish and Game representatives, the current network of MPA’s has worked. Spillover of fish and invertebrates into surrounding areas has been successful and fishing has never been better. Also, according the Cal Fish and Game, three species of abalone (red, green, and pink) have returned to sustainable levels and support small commercial and sport fisheries.

On a cuter fluffier level, a big surprise has been the return of small numbers of southern sea otters to southern California. Due to the introduction of otter avoidance methods to keep otters out of the most prime shellfish habitats, it appears that some sea otters can co-exist with sustainable abalone populations. What a surprise!

On a slightly sadder note, kelp forest habitat has continued to shrink in size to only those areas where upwelling occurs very frequently.

Scripps Institution of Oceanography and the Center for Coastal Renewal have reported that Southern California's beaches are looking great now that we have moved people inland leaving an uninhabited coastal strip. Quite a few beaches have been allowed to return to their 'natural' state with dunes and dune vegetation. They have noticed that more sea otters inhabit these areas."

"Now, on to our political reporter—Jeff Newshound. What's happening, Jeff?"

"Well Joy, I've got some great news for you. The California State Government and the U.S. Government are now in compliance with the U.S. Clean Water Act standards. As a result of much more low impact development (LID), residential and commercial users have significantly improved the watersheds here in Southern California.

And efforts taken over the last 38 years have resulted in increasing resilience of our coastal wetlands, continued restoration of degraded wetlands, and even the creation of entirely new ones.

California leads the nation in dollars invested in the enhancement of sport fisheries instead of commercial fisheries. But even so, our fishery practices—both recreational and commercial—are improved to the point where we are now the role-model for much of the rest of the U.S.

Finally, whale, dolphin, and sea lion watching—via vessels—is now more popular in Southern California than Disneyland, Knott's Berry Farm, and Sea World combined. Whale species and populations abound off our coast—led by Blue and fin whales. Gray whales now enter Mission Bay and San Diego Harbor on a regular basis for mating and birthing.

"Back to you, Joy."

"Now let's turn to our Education Reporter—Mary Clark. What's new on the Education desk, Mary?"

"Hi Joy, I hope you are holding onto your desk:

The California State University and the University of California have expanded to six more campuses each. At the same time tuition has dropped to the lowest level since

1965 (the state now covers more than one-third of the total costs of the UC and CSU systems). Overall, California currently spends far more on education and far less on prisons than a few decades ago. This of course is due to the increased number of citizens who serve sentences for non-violent crimes at home are doing community service.

By the way Joy, Environmental Studies is now the most popular major at almost all UC and CSU campuses.”

“That’s great Mary, but what about overall education and enlightenment of our citizens – any measure there?”

“Yes, Joy, the U.S. Department of Education reports that California –in large part due to technological developments–has the largest ‘enlightened’ and best educated population of any other state of the union.”

“Great Mary, now we will head to our government reporter – Philip Hardnose – and find out the latest about our California government.”

“Hello, Joy, I have been working the halls in Sacramento and have some interesting news for you.

Jerry Brown, at age 116, has returned as Governor. Laws have been enacted allocating more resources to our Southern California environment. The government is the most accountable and transparent it has been in all of California’s history. There is far greater corporate citizenship today in efforts to cleanup corporate waste. There is also far more responsible and sustainable production.

The best and most current science now is incorporated into most environmental policies and management decisions concerning our ocean.

As a result of efforts at birth control and family planning, the California population has been stabilized at 40 million and only 20 million now live in the coastal zone of Southern California.

The joint U.S. Coast Guard and California Marine Resources Agency Task Force agreed on a process that resulted in all merchant ships operating in Southern California waters being equipped with transponders that warn whales of approaching ships and keep them out of major shipping lanes. No whale strikes have been reported in over two years.

Southern California water reclamation now leads the nation. All sewage is now treated to the point that it is recycled for drinking water. Significant rainfall is captured and saved as almost all houses are now required to have water collection systems. Southern California has met and slightly surpassed our regional water supply needs.

California is now approaching 75% energy self-sufficiency due to a combination of wind farms on the coastal mountains and in the ocean, solar power development, and far greater energy efficiency.”



“Thanks, Philip. Look at this view of our beautiful coast and ocean taken by Claire.

So there you have it folks, the California report for July 25, 2050, or as we call it— A Great Big Beautiful Tomorrow. This is Joy Truetalk signing off for Channel 7 Eyewitness News telling you the way it is in Southern California.”

THE SECOND SCENARIO: STAYING ON THE PRESENT TRAJECTORY

The three teams developed scenarios that described what they felt the Southern California Bight and Southern California Urban Ocean would look like in 2050 if we continued on the present trajectory.

Business as Usual—A Crystal Ball Look into Possible Futures

Pelican Team

Looking into our crystal ball as we project the established trends of 2012, we find that in the next four decades, Southern California will be a mad and messy mosaic of demographics, land use, and environmental quality. Coastal ocean and shoreline resources that play a major role in determining quality of life will be placed under increasing and unrelenting pressure by a growing population, waste disposal, global warming, conflicting uses by commercial and recreational interests, along with the need for more food production, more potable water, and more energy.



By looking at sets of issues along with countervailing forces that both exacerbate and mitigate these factors, we arrive at a pointillist picture of our region.

Water quality issues stemming from the disposal of waste from the sprawling coastal metropolis may be mitigated by advancements in treatment technologies, trends toward conservation, and heightened efficiencies.

Pressures on marine ecosystems from commercial fishing and, to a greater extent, recreational fishing, may be lessened by the establishment of an expanded network of Marine Protected Areas and the existence of a larger National Marine Sanctuary encompassing Santa Catalina and San Clemente Islands.

Changes in marine ecosystems resulting from increased ocean acidification fueled by global warming may not be mitigated by anything other than robust and healthy ecosystems.

Development pressure on adjacent coastal land driven by the rights of private property owners may be lessened by existing and forthcoming state and local regulation on the type and nature of that development.

Southern California ports are growing because of the increased demand for products from the Pacific Rim. The effects of that growth may be mitigated by regulatory trends toward greener ports, including cold-ironing, use of cleaner fuels by ships entering the Bight, more stringent emission requirements for trucks and other yard equipment, and enhanced use of intermodal transportation.

The effect of population growth in urban centers, characterized by socio-economic stratification and the influx of new residents, may be mitigated by adult education and public information campaigns.

The extreme economic pressures placed on educational facilities serving the youth population bubble may be mitigated by a strong public will for improving instruction, which would include requiring higher levels of teacher training and education, access to strong technical training education, and the growing strength of informal learning centers such as aquariums and museums.

Degraded watershed environments stemming from development of landscapes with impermeable surfaces may be mitigated by enlightened land use policies, including Low Impact Development (LID), along with education and planning reforms initiated by NGO's, some of whom partner with state and federal regulators.

Danger to coastal infrastructure and recreation resulting from a rising sea level may be mitigated by a growing emphasis on adaptation policies that foster managed retreat and where, if necessary, some combinations of hard and soft protection.

In Conclusion: We place a heavy emphasis on opportunities for mitigation. Whether or not these would be seized is uncertain. If they are not, the situation in 2050 will be as first described: "A mad and messy mosaic of demographics, land use, and environmental quality."

The Downhill Slope—2012 to 2050

Sardine Team

If present trends continue to 2050, these are some of the qualities we see characterizing the Southern California Bight and Southern California Urban Ocean.

Continuing the trend of less public money going to pollution prevention and response, by 2050 there is an assumption of “It’s OK to pollute as long as I don’t get caught.” Officer presence has been reduced to only responding to spills that are greater than two billion barrels and not to preventative actions.

Real estate values in 2050 are at all-time lows due to the fact that the area is less desirable to live in, because of the lack of public money going into infrastructure, education, and the environment.

Employment levels continue to drop as the area’s value and appeal degrade and companies take their business elsewhere.

Shipping routes are affected by the lack of public funds going into the infrastructure of the ports. Companies and industries are shifting their business to northern ports.

As the morals and ethics of the local people degrade and they become more selfish, there is less and less public funding as the few with money and power protect their assets from taxation.

Poaching of marine fisheries becomes common as funds for enforcement are lost.

Marine and coastal recreation, an important Southern California industry declines as water quality is constantly in doubt and as beaches are no longer maintained and restored after loss of sand.

The collapse of the public higher education system means there are fewer environmental experts in the area to bring attention to the declining quality of the coastal and marine environment as well as fewer qualified researchers and regulators.

With fewer people versed in environmental issues, the younger public in K-12 are less aware of the importance of the marine environment.

Social disorder further inhibits visitors from coming to Southern California.

The State of California has not been able to balance a budget in 30 years, and there is less federal money going to the California Department of Fish and Game, to the Office of Spill Prevention and Response, to State Lands, and to the California Air Resources Board. All have decreased their work forces after years of attempting to maintain compliance with dwindling budgets through increased furloughs, and the appearance of acceptance of this policy.

Nature is a curious world. For example, if you drop a frog into a pot of boiling water, it

will hop right out. However, if you put the frog into a pot of cold water and turn on the heat slowly. The frog will stay in the pot until the water boils, and the frog dies.

Over the past 50 years, Southern Californians didn't realize that **We Were the Frog** (See page 32 for expanded **We Are the Frog**) and the water was heating up. Today, we have to face the fact that we are the frog and the primary factor that caused our water to boil was the decrease of public funding that's been going on since 2010. The negative impact of less public money came on gradually and increasingly became more serious.

For example, in 2010, to reduce state expenses, we furloughed state employees one day out of 30. In connection with oil spills, this meant that we raised the threshold of the size of spill we would respond to. Increasing the furlough to two days out of 30 meant a higher threshold to trigger a response. But we kept on doing that until we stopped having any sort of officer presence and prevention programs—all of which put us on the trajectory to today when all that happens is administrative fines that often are ignored. And that's what gives us such poor water quality in the Southern California Bight and Southern California Urban Ocean.

The "We are the frog" theme is explored more fully in the scenario for the northwest quadrant in a later section.

California Nightmare Squid Team

The great grandchildren of the members of the Squid team from the July 25, 2012 Scenarios and Marine Spatial Planning Forum at the Aquarium of the Pacific assembled to review what the Southern California Bight and Southern California Urban Ocean is like today (2050) compared to what their great grandparents predicted back on July 25, 2012 —50 years ago today— if present trends continued. These were their observations.

Water quality standards for trash, metals, and toxins have been met. Dry weather standards have been met. Wet weather standards have shown progress, but much improvement remains to be achieved. Continued improvement in water quality has occurred nearshore and in harbors.

Low Impact Development (LID) is Southern California's ONLY new development.

Southern California's population has grown from 22.2 million to 33 million people.

Sea level has risen by 0.5m; some armoring has been accomplished and some managed retreat has occurred.

Shoreline habitats—sandy beaches and rocky intertidal areas—have been reduced because of seawall construction. Although we have lost some wetlands, some damaged wetlands have been restored—but not enough.

Fish catches have changed for many species. Squid catches have gone down because of habitat loss. Lobster and urchin catches are slightly improved. Finfish catches have increased. Recreational fishing has been doing well. Size of fish caught has increased. There is still conflict between commercial and recreational fishing. There seems to be increased pressure on fish stocks because of more recreational fishing.

Renewable energy and aquaculture still are not present in state waters. In federal waters there are experimental aquaculture and pilot projects for renewable energy. There appears to be a continuing conflict between existing and future uses.

Potable drinking water supplies have increased. Coastal desalinization is ongoing. Increased recycling and reclamation of wastewater along with increased conservation efforts are occurring. However, aquifers continue to be polluted, and there are increased water conflicts resulting from increased human population.

Energy production is being maintained, 33% of production from renewable sources as required by law. Because of technology developments, additional increases are possible. Demand for electrical energy is up, but not as much fossil fuel is used to produce it as in 2012.

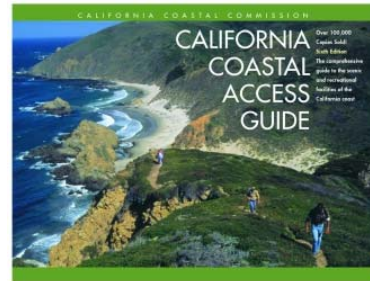
Transportation has improved and is more efficient. Transportation methods are being used, including mass transportation, that have resulted in improved mobility. Because vehicles are cleaner and more energy efficient, air quality standards have been met and improved. Cleaner air quality regulations for cargo ships are in place, and there is increased shipping, trucking, and train use. Shifts in shipping lanes have occurred to protect whales.

Economically, the job market shows improvement in some areas. Unemployment hovers at 10%. There is an abundance of low paying jobs. Biotech has expanded, and there is a continued demand for those qualified for technology-based careers.

Education has improved in some areas and declined in others. There has been a partial implementation of the EEI (Education and Environment Initiative). Home schooling and charter schools have increased, while the quality of public K-12 education has continued to decline. Degradation of the quality of media coverage has led to increased polarization of positions on environmental issues. Learning methodology, formal and informal, is more inquiry-based. The perceived value of informal and environmental education has increased. Education continues to be underfunded.

Government has not improved. The initiative process has continued, along with continued corruption, lack of leadership, and legislative gridlock. Sector-based planning and decision-making continue, along with lack of transparency and an inability to implement existing plans and enforce existing laws. Finally, the retirement of the Baby Boomer Generation will result in a change of leadership.

Coastal access is the same or slightly better than in 2012 but because of lack of funding, an updated guide has not been published since 2012 and access signs are not maintained.



Coastal development is still overseen by the California Coastal Commission which continues to have a strong positive influence on coastal development as coastal cities contend with rising sea levels and the need for protection against coastal flooding.

Environmental protection and management, although chronically underfunded, have improved. While kelp forest coverage has been reduced to the few areas with constant upwelling, rockfish populations have increased. The Endangered Species Act and the Marine Mammal Protection Act are both still being enforced. Individual MPAs are successful, but the network is only partially so. DDT and PCB concentrations, along with many other pollutants, have been reduced.

SCENARIOS BY QUADRANT

In this section we present the scenarios representing plausible futures for the conditions of the remaining three, SE, SW, and NW.

The Occupy Movement The Pelican

Southeast Quadrant: High population growth rate and high consumption.
High education, enlightenment, awareness, values/ethics

Privatization of beaches, parks, and other public lands; charging to ride a wave; a siloed government —these are only some of the reasons the Pelican Team felt led to the Occupy Movement that started in 2050.

On this national July 4, 2050 holiday private security forces failed to remove Occupy the Coast Participants (Occupiers) from Bain Capital Beach in southern California's Orange County.

This particular occupancy is the most recent in numerous such events that are part of the Occupy Movement. "Occupy the Coast" groups say they are frustrated by the privatization of natural resources such as water, open space, and parks. They are demanding local control of coastal parks and uplands open space to be managed by citizens together with cadres of educated citizen scientists. The ability of Occupiers to organize rapidly, almost instantaneously, as a result of utilization of communication telepathy is confounding private security forces in their attempts to stifle the movements.

Occupiers believe that years of over-reliance on technological solutions to meet food and energy needs have not allowed society to keep up with the consumption rates of an educated and prosperous population. In parallel, the failure of public institutions to meet technological advancement with environmental protection has exacerbated the degradation of beaches, water quality, and fisheries. Looking for the resources for a quick fix to these problems, a poorly informed society largely influenced by the power of the deep pockets of the private sector's ability to buy the media has accepted privatization of common goods and public lands.

Occupier Mercury Waxwing Villa-Levine describes the movement's goals.

"We want to take back the resources of the prized Southern California coast, that have been sold off in chunks—big tracts sold to meet our energy needs, to run air conditioning for a population unwilling to suffer the heat effects of climate change, and even just to acquire more income to run the siloed government. Extreme heat events in Southern California have quadrupled since 2012, forcing people indoors four days of every week but the government did not begin to plan for adaptation to become resilient until it was too late. The result? Allowing the private sector to take over."

California's water resources have been so impacted by rising temperatures that there are few local sources of potable water. Unable to afford the transport of water, even if there were any available given the dire status of Sierra Nevada snowpack at an all-time low, the state has encouraged corporate investment in a series of canals and pipelines to bring water from the Great Lakes to California's south coast. Now that they own the only sources of water, corporations are charging citizens for water at profit-making rates that exceed the cost of fuel. Fortunately, fuel needs have actually declined since this prosperous population has embraced electric and hybrid vehicles.

The Occupy Movement is a highly organized effort of citizens of all ages to take back our now private parks, rivers, and beaches; to take back the now privately owned surf break at DuPont Beach which was created in the 1970s as a mitigation requirement for a nuclear energy generating station by erecting an artificial reef. Surfer Dana Moonstar Chan objects so strenuously to having to "pay per ride" that she has made her body glove wetsuit into a pirate flag that she waves aloft from her board as she surfs naked down the wave's crest.

In an expansion of the Occupiers movement, the few who still consume animal based protein, are protesting the price of seafood. "I can't afford to take the toll road to the beach to save myself the five hour ride from Torrance and while I live a short but miserable bus ride away from the ocean, I can't afford local fish from the private marine reserve," complains Pisces Whipped. "In addition, chemical contamination of fish from southern California waters has become a huge issue impacting food safety." Legacy contamination from wastewater and agricultural runoff from the last century are other

issues that make the consumption of local seafood problematic. Fish shipped from farms in Asia, farms that have been carved out of mangrove swamps, is less and less available since industrialization of coastlines has removed natural protection from rising sea level. Although there is a niche market for “organo-clean” purified fish, most production is shipped overseas and is not locally available. Some elite restaurants do offer these fish at premium prices but only to their club members.



Police radios are now broadcasting a second Occupy the Beach protest. Occupiers have now stormed the last remaining sandy beach in Malibu. Standing atop the Kardashian Seawall at Carbon Beach, Occupiers lament the nearly complete loss of recreational opportunities on the coast. The Occupiers say that the southern California beach lovers have all been forced onto the same few beaches where they have to remove plastic debris just to find enough room for their organic cotton blankets.

There is a strong belief among the Occupiers and other Californians that one of the factors—and a major one—contributing to the private sector’s takeover is the lack of coordination among local, state, and federal agencies responsible for coastal and marine spatial planning. Governance is mired in silo, single-agency management of individual resources, separating regulation of fisheries from issues of water quality. Added to this is the tendency of legislative bill writers to incorporate non-science based regulations into their bills. And despite successful implementation of science literacy and education programs, the well-educated citizenry has thus far failed to organize sufficiently to challenge the trend toward allowing privatization of the public wealth. Hence, the Occupy Movement.



In addition to beaches and parks, private acquisition of offshore assets is a point of contention for Occupiers. Visitors to Catalina Island are now greeted with neon signs proclaiming the island is the property of Chevron/Exxon Enterprises. No longer can we answer the question “Where does the Catalina Express go” with a simple “Catalina,” chant the Occupiers.

There is some hope. The Occupy Movement seems to be gaining some traction among citizens who now recognize that they must take back responsibility for developing sound policies that while economically beneficial, still protect and enhance coastal and marine resources and nurture best practices in the southern California watershed.

“We hope it’s not too late.”

Chavez Cesar Singh, co-founder of The Occupy Movement

The Way It Was and Why It No Longer Is
Sardine Team

Northwest Quadrant: Low population growth rate and Low consumption
Low education, enlightenment, awareness, values, and ethics

This article, written by the Sardine Team appears in the final publication of the Long Beach Press Telegram which is closing its doors today, May 13, 2050, a victim of the replacement of traditional newspapers by electronic media. The article describes the situation in the Southern California Bight and Southern California Urban Ocean in 2050 resulting from the lack of working infrastructure and the emigration caused by a major earthquake that devastated the area. Reasons for the changes are given in the **We Are the Frog** section where the team explains how this once vibrant part of California changed to what it now is.

THE LONG BEACH PRESS TELEGRAM

Friday, May 13, 2050

Looking back to the Southern California Bight and Southern California Urban Ocean 30 years ago

Three seniors look back in time to 2012 and the Southern California coast and ocean they knew

By the Sardine Team

A grandmother returns to the beach with her grandson. This is his account.

Yesterday, I went to the beach with Gran. The last couple weeks, my parents have been in Texas looking for work, and I have been stuck with Gran. Dad says: "Jobs are hard to find around here." Gran can be a little boring at times, with her long stories. So, to perk me up, Gran proposed a trip to the beach. We live in Downey, and

we don't have a car, so I hadn't ever been to the beach before. Honestly, I was conflicted: A long hot ride on multiple buses with Gran and her stories. But on the other hand, I have only seen the beach in pictures.

We caught the bus and headed out on our adventure. For once, Gran was quiet. Too quiet, I realized. After a while, I started to hear her murmur things like, "Unbelievable", and "So sad." I asked her what was wrong. "I hate this ride," she said. "Every neighborhood used to be so open, vibrant and clean. It's all so shabby now, except for the tops of the fancy houses we see above the concrete walls. It never used to be this patchwork of gated communities and poor

neighborhoods. Those walls speak of fear and selfishness. And next to the fancy neighborhood, do you see that abandoned building? That's where I went to high school. All the kids in the gated communities go to new private schools behind the walls. I don't know where everyone else goes."

When we got to the beach, I was speechless. So much water and it went on forever. I couldn't see the end of it. I immediately dropped my bag and ran for the water. Gran called after me "No, slow down". But I was too excited. But the farther I ran, the louder and more urgent she sounded. Finally, she screamed, "STOP! Don't touch it". I walked back,

and Gran explained that the water may look pretty, but I can't swim in it. It wasn't that way in her day. She used to swim here every day. Gran told me how thousands of families crowded the beach on weekends, swimming, surfing and picnicking. But the city, county and state no longer spend the money needed to keep the beach and water clean, and people don't pay much attention either. They drop their trash on the sidewalks, and people who have cars dump their used oil down the storm drains. It all washes up here.

We laid out our towels and sat down, but it wasn't very comfortable. It was rocky. "Oh my," Gran said. "It didn't used to be this way. It was sandy. There was almost as much sand as water. I use to bury my brother in the sand. But the beach has eroded over time, and we no longer can afford the beach replenishment programs."

"On the bright side," Gran says, "we have the beach to ourselves. "It used to be there were people from all over the world. But not many come anymore. The rich people go to Australia instead. Here, they miss the sand, and they don't want to surf and swim in the dirty water. And if they can't eat the fish, it's not as much fun to fish."

"But I see some people out there fishing, Gran." "They really shouldn't be. I know why they do it. Like your folks, they are having trouble finding jobs that put enough food on the table. But there are so many pollutants in the fish that they shouldn't be eaten." "Why doesn't the government do

something about that, Gran?" "They used to. The government used to make sure that people and businesses didn't dump pollutants in the water. But the economy is so bad, that we cut out a lot of the pollution prevention programs. And the sewer and storm water systems haven't been maintained in years."

"If it is so bad, who are those people fishing?" "A lot of them are from the Marshall Islands." "Where are the Marshall Islands?" "They used to be in the Central Pacific. When climate change accelerated and the sea level rose, the islands were swamped and the people had to evacuate. Many of them came here, but just like everyone else, they had trouble finding jobs."

Gran said that since it's mostly rocky, we should be able to see some cool stuff in the tide pools. That's Gran for you. Always thinking on the bright side. We started climbing over the rocks, but we didn't find much. I could see the disappointment on Gran's face so I asked her to tell me what it used to be like. We found a small patch of sand, and Gran drew pictures of hermit crabs, urchins, anemones, and starfish for me.

"Gran, how do you know so much about this?" "I learned about it in school, of course. Don't they teach you about science?" "They show movies about it sometimes on rainy days, but that is about it." "How sad. I loved school. We studied the earth and plants and animals and ecosystems. We took fieldtrips to the aquarium and to the beach to explore the tide pools. One

year, every child had to pick a sea animal, research it and then stand up in front of the class and give a presentation."

"Gran," I said, "I'm getting thirsty." "Okay, sweetie, let's go find a soda and a burger." We walked up to the boardwalk. This time it was grandma's turn to be surprised. She looked lost. "The boardwalk has changed so much. It used to be full of small colorful shops—family businesses like the kite store and the t-shirt shop. I guess the shops started to fail when the tourists stopped coming. It happened so slowly that it takes a long time for people to start paying attention, and then it often is too late."

We eventually found a lunch truck, and sat on a bench to eat our burgers. It was pretty looking out over the harbor, but Gran said it was much too quiet. "We used to see ships coming and going all day long. They came from everywhere. Everything has changed so much, and not for the better. I failed you. We all failed you. How could we have let this happen? I am so sorry."

A grandson visits San Pedro Bay to relive his grandfather's stories

Joe worked for the International Longshoremen's Association (ILA) for 30 years. On his retirement in 2050, he traveled to San Pedro Bay. He started as a casual laborer and retired as a crane operator. During his career he worked at the Port of Savannah watching it grow from the 4th largest port to the 2nd largest port in the United States behind the Port of New York/New Jersey, displacing both the Ports of

Los Angeles and Long Beach which had been numbers one and two.

Joe had always wanted to go to Los Angeles, and on his retirement he had the time to fulfill his grandfather's wish to scatter his ashes in San Pedro Bay. Grandpa Harry moved in with Joe after Harry retired as a member of the International Longshore and Warehouse Union (ILA). Harry had worked his entire career in San Pedro Bay and would fill Joe's house with his stories of how big the San Pedro Bay ports had been and the massive amounts of cargo that were moved in their glory days.

Joe finally arrives in San Pedro and is totally dismayed by the vision he sees and he has a very difficult time reconciling what he sees with his grandfather's stories. As he is crossing the Vincent Thomas Bridge he is able to see all of San Pedro Bay and is very surprised by the few ships in port. When he arrives at Terminal Island there are very few trucks moving. The rail lines are covered with weeds, and he finally finds a gate that has a security guard to try and get access for the scattering of Harry's ashes.

Joe can't help but talk to the security guard about why it was so quiet. The guard is surprised by Joe's questions and relates that in the ten years he had the job, this was the way it was. The guard was very happy to have a job as he used to be an ILWU member for fifteen years and was able to transition from working the terminal to manning the gate ten years earlier.

As Joe drove across the vacant

terminal—something Joe had never seen during his career at Savannah, he reminisced about the stories his grandfather told him of ships waiting their turn to get to the docks in San Pedro. And how everyone was envious of ILWU members and wanted to become union members.

On his way back out of the terminal Joe stopped to ask the guard what had happened. The guard was happy to have someone to talk to and he described the general loss of cargo being diverted from San Pedro to the Midwest and East Coast via British Columbia and the Panama Canal. The guard reminisced about the local community being opposed to infrastructure improvements that would have allowed the ports to more efficiently and effectively compete with the developing competition. As the cargo diversions increased, the ports had less money to invest in infrastructure. When the cargo slowdown was noticeable and businesses in San Pedro closed down, there was a push for increased infrastructure spending, but by that time the ports no longer had the cash flow to support development

The guard went on to describe the impacts of the Great Earthquake of 2025. For all the investment in seismic upgrades to the terminals, bridges and freeways there was a catastrophic failure of the infrastructure. Even though there was massive federal aid, it took years for the freight moving infrastructure to be replaced. During that time numerous retail stores abandoned their Southern California warehousing to other parts of the United States

because of their need for resiliency. Shipping lines then quickly cancelled leases for terminal spaces. As the warehousing left and the containers stopped arriving, local businesses started to fail and more and more places were boarded up. The local unemployment rate hit 25% only to fall farther as more and more people moved out of the area looking for work elsewhere.

A fisherman recalls the way it was

As the son of a Slavic immigrant, seafood is an important component of our diet and culture. My son and I went to the market to look for local seafood for our traditional dinner. Searching the display case for a local selection in a sea of imports, I couldn't help but think that my son may never savor fresh, local seafood caught by a fisherman from our local community. I began to tell my son about a time when I fished alongside my father on the FV St. Jude. It was a time when the waterfront was alive and local fisheries supported active fishing communities. One could walk on the docks and see and take home a variety of seafood fresh off the boat.

Standing beside me, my son looked up from his iPod 12 and said, "Stop living in the past. Fish is fish no matter where it comes from." I told him it matters because fishing has supported his family for generations. "It's who you are. Your grandfather came to this country with the promise of jobs and a better life, which he found with the rich fishing off Southern California. The

collapse of our local fisheries have robbed you and future generations of that significant cultural connection and eliminated seafood from our local economy. It's my hope that you and your generation will once again load these seafood cases with fresh, local seafood and reconnect with your heritage."

We Are the Frog

Nature is a curious world. For example, if you drop a frog into a pot of boiling water, it will hop right out. However, if you put it into a pot of cold water and turn on the heat and increase it slowly, the frog will stay in the pot until the water boils, and the frog dies.

Over the last 50 years, Southern Californians didn't realize that **We Were the Frogs**



and the water was heating up. Today, with the ending of this newspaper, we have to face the fact that we are the frogs and the factor that caused our water to boil was the decrease of public funding that's been going on since 2010.

The negative impact of less public money for environmental programs came on gradually and increasingly became more serious. For example, in 2010 to reduce state expenses, we furloughed state employees 1 day out of 30. In connection with oil spills, this meant that we raised the threshold for when we'd respond. Increasing the

furloughs to 2 out of 30 days meant a higher threshold before acting. But we kept on doing that until we stopped having any sort of officer presence and prevention programs—until we get to today when all that happens is administrative fines that often are ignored. And that's what gives us such poor water quality in the Southern California Bight and Southern California Urban Ocean.

Another turn of the dial that caused the pot to heat up even more was the decrease in public funding of education. As a result, the study of environmental issues was seen as a luxury—and people stopped seeing the connection between what they did (or didn't do) and the quality life they wanted to enjoy. People stopped seeing the connection between what they drove and the quality of the air they breathe, between what they ate and their health, between what they did with their trash and the quality of the land that grew their food. I hate to put it this way, but we became too stupid for our own good.

If we'd been smart, we would have realized the water was getting dangerously hot. But we weren't. So we decided it was cheaper to deal with the heat just by putting on shorts, t-shirts and flip-flops and letting the temperature continue to go up.

So...

We invested less and less in all sorts of infrastructure that had made Southern California a great place to live—roads, bridges, improved air and water quality, clean beaches, nutritious edible seafood...

promises of this infrastructure made Southern California a less attractive place to live, and companies had a harder time attracting employees to this region. So companies started moving operations to other states. Real estate values started going down.

When the water started to bubble, people started to panic, but by then it was too late. California hadn't balanced its budget in 30 years, so the state was unable to help the area. Federal funds dried up years ago, so no help was coming from Washington. Everyone decided it was time to "look out for number one" and we lost any sense of community and concern for the public good. The minority wealthy population moved into fortified communities, isolated from society, creating a "patch" social system. Outside of the fortresses, informal economies then emerged to cope with economic insecurity.

Today we have a roiling boil, and we have to say goodbye. That's sad. But what's sadder is that the water never had to get this hot in the first place.

And the picture at fish markets is one of empty chairs.



California Nightmare

Squid Team

Southwest quadrant: High population growth rate and high consumption
Low education, enlightenment, awareness, values, and ethics

Both the Sardine and Squid Teams chose a form of media for their quadrant scenarios. The Sardine Team used a newspaper article for its production; whereas, the Squid Team chose public television.

“And now we go to Joe Shmoe with the last installment of SoCal’s week-long report on the state of things in the Golden State.”

“Thanks Shirley Anchorbabe. This past week I’ve been reporting on the state of things in California, and I’ve covered everything from the mountains to the Central Valley to the high deserts. Today I finish up with the coastal and marine areas of the Southern California Bight and Southern California Urban Ocean. A 360-degree view from the top of the 25-foot Malibu seawall essentially captures this sad story. We can only see out to sea a few miles because of the haze and smog that creates a ghostly image of the dozens of oil platforms in this area alone, black market aquaculture pens, the 2nd generation offshore wind farms going up behind the 1st generation turbines that are now out of operation, and the hundreds of cargo ships transporting imported goods to and from this dense urban landscape. What we cannot see are swimmers, surfers, sunbathers, boaters and others enjoying coastal recreation. They have no beaches to play on or clean seas to swim in, no wildlife viewing to speak of. It’s just as well, since they could scarcely wedge themselves in amongst all the other ocean users. Plus, no one wants to get too close to the offshore LNG depot or the briny outflows from the desalination plants.

Up and down the coast, the view is no better. The shore is heavily armored to protect the populace against the sea, now 1.5 meters higher than it was just 35 years ago. The walls don’t always work, especially since our storms are more extreme now. The beaches, estuaries, and low-lying areas that provided nurseries for fish and other wildlife and enjoyment for recreation are long gone. Mounds of trash, pipeline landfalls, and cable substations have replaced the massive beachside homes of the rich and famous. Trash cleanup occurs around the clock, but it can barely keep up with the refuse that flows down from the upland residences and businesses. We can’t see it from here, but further southwest, the historic Queen Mary is now a flop house. The oil islands off Los Angeles house hundreds of homeless and transients thanks to President Barbara Bush’s housing initiative.

It is harder to see the changes that have occurred beneath the waves and harmful algal blooms. Our commercial fisheries have collapsed from overfishing and habitat degradation, hence the unregulated fish farming. We still need our seafood after all,

although we can't be sure what's in the McDonald's Mystery Fish Fillet. The Blue Whale is a distant memory due to all the disturbance and ship strikes from the shipping vessels. Gray whales are still around, but their population has declined for the third time. Smaller marine animals are gone...the nearshore fish, the shellfish that can no longer thrive in these warm, acidic waters, and the seabirds and shorebirds that ate them. Marine scientists decry the loss of biodiversity in coastal and marine species and the fact that invasive species are now more common than native species.

We can still see some semblance of the marine environment of our past in the Aquarium of the Pacific in Long Beach. The kelp is still plastic, just like all the other kelp in southern California, and the fish operate on highly sophisticated robotic systems, but our kids can see what scuba divers used to see.

And what about people? The 50 million of us living in this drainage area, the 22 million of us living near the coast? Well, there's the ongoing health crisis. Paper masks and even respirators are commonplace on the folks who do venture outside. And I'll just say it: we're fat. The obesity epidemic has worsened significantly since outdoor recreation is so limited. 'Survival of the Fittest Care' in our overtaxed medical centers can't get control of our high rates of disease, cancer, and infant mortality. But hey, the economy could be worse. Since China controls much of our commerce from Silicon Valley to our working waterfronts, Little Shanghai is thriving. Much of this commerce is poorly regulated, of course, but at least there are some jobs. However, the divisions among social classes have grown even more vast in this oligarchic state.

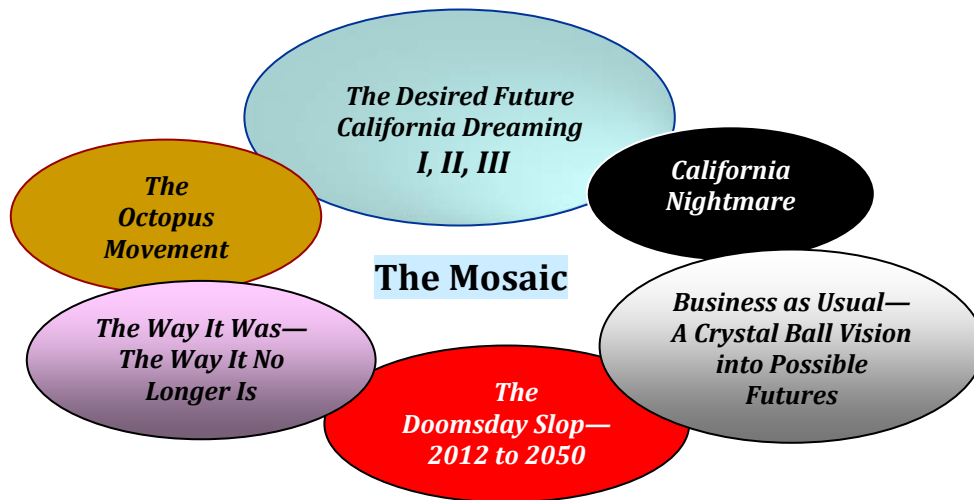
Is the education system to blame? It's hard to defend the Governor's decision to combine all the state universities into one online system. My nephew just enrolled in the one course offered by the one professor along with thousands of other online students. The title: 'Everything 101.' His parents can scarcely afford the \$10,000 per unit tuition. I still think it has worked out better than the \$90 billion bullet train that only runs from Fresno to Bakersfield. Back to you Shirley..."



PBS

"This is Shirley Anchorbabe signing off for SOCAL, your public television station. Please support your public television station so we can continue to bring you news about the decline of the Southern California Bight and the Southern California Urban Ocean."

V. A SUMMARY OF THE MOSAIC OF ALTERNATIVE FUTURES



It is clear from these scenarios—alternative futures for the Southern California Bight and Southern California Urban Ocean—what the members of the forum teams thought was plausible under the conditions defined by each of the quadrants in Box 5 which are...

- low population growth rate; low consumption; high education, enlightenment, awareness, ethics;
- high population growth rate; high consumption; high education, enlightenment, awareness, ethics;
- low population growth rate; low consumption; low education, enlightenment, awareness, ethics; and
- high population growth rate; high consumption; low education, enlightenment, awareness, ethics.

These are not predictions, but only stories of how the future might turn out. All are very different from the desired future described in **California Dreaming**. None captures the qualities the participants identified before the forum as qualities they wanted for the Southern California Bight and Southern California Urban Ocean in 2050.

It also is clear from the scenarios based on the extension of existing trends, that none leads to the desired future. Some of the scenarios strain one of the two criteria of good scenarios—plausibility—but all offer valuable insights. It is clear that if the future Southern California Bight and Southern California Urban Ocean are to have the qualities desired by forum participants, significant changes will be required. Many of these critical uncertainties are societal choices. The historians, Will and Ariel Durant, were correct: “The future never just happened, it always was created.” The question is will it be created purposefully to achieve the desired qualities or will it be created without purpose, planning, and forethought. The choice is ours.

VI. DISRUPTIVE STRATEGIES

The final challenges given the forum teams, and perhaps the most important, were to:

1. compare the qualities of the desired future captured in the northeast quadrant with the other possible futures including the extension of the present trajectory; and
2. identify potential disruptive strategies that would move California closer to the trajectory leading to the desired future.

For this assignment the teams met independently and then in plenary to search for and reach strong consensus on strategies that would put California onto a trajectory that would bring the Southern California Bight and Southern California Ocean closer to the desired future.

THE DISRUPTIVE STRATEGIES

This next section summarizes the disruptive strategies for which there was a very strong consensus.

- Reform, coordinate, and integrate governance at all levels to restore public trust and enhance effectiveness in balancing environmental protection and responsible uses of the coast and ocean to benefit society. Specific critical elements include:
 - **Streamline** the permitting process to make it more transparent and predictable without sacrificing environmental standards.
 - **Ensure** that all propositions and laws have funding sources identified for every action proposed.
 - **Pass** a new bill—the “Big Blue Bill” or B3—that includes incentive-based water quality management to improve enforcement and compliance.
 - **Create** a stable and adequate revenue stream to support ocean management efforts.
 - **Evaluate** potential funding sources including user fees, carbon tax, oil extraction tax and AB32 mitigation funds.
 - **Evaluate** establishment of Regional Marine Councils such as Washington State has done as forums where the development and fate of offshore waters can be discussed, debated and planned.

- Promote the Southern California Bight and Southern California Urban Ocean as an international model of using the best science and technology to balance protection of coastal and ocean ecosystems with opportunities for appropriate ocean industries to stimulate local and regional economies.
- Establish the nation's first offshore R & D Ocean Enterprise Zone that nurtures pilot projects of smart/green ocean industries, e.g. ocean renewable energy, sustainable aquaculture, and that offers opportunities for successful pilot projects to scale up to viable
- Design, launch, and sustain a public education campaign with public input that develops a bold compelling vision for the Southern California Bight and Southern California Urban Ocean and an action plan to achieve it and a dedicated funding stream.
- Identify and support regional champions who are leading sustainable efforts in the Southern California Bight and Southern California Urban Ocean.
- Recruit and support a constellation of existing institutions including free choice learning organizations to become regional champions to establish the Southern California Bight and Southern California Urban Ocean as an international model of responsible ocean use to protect nature and benefit society.
- Catalyze K-12 STEM education to prepare today's students to become tomorrow's marine scientists and engineers in both formal and informal settings.
- Develop formal and informal, community, and outreach education programs that result in an aware, informed, and involved citizenry across a broad spectrum of society, a citizenry that nurtures the California ocean ethic and entrepreneurial spirit.

VII. NEXT STEPS

A strong consensus of the participants expressed satisfaction that the process had been worthwhile and had provided them with new insights. All agreed that this is only the beginning of the process; that more such sessions should be held with a core group from this forum, perhaps one-third of the participants, combined with people with different areas of experience, expertise, and concern. Among the additional areas of expertise identified were recreational fishermen, policy-makers, the shore-based recreational industry, and offshore sustainable energy.

The Aquarium of the Pacific indicated that it would seek funding for such a forum.

Participants

Name	Position	Organization
Anderson, Sean	Assistant Professor	CSU Channel Islands
Atkinson, Claire	Communications Manager	Aquarium of the Pacific
Baker, Dennis	Co-founder and Board Director	Orange Coast River Park
Basta, Dan	Director	NOAA Office of National Marine Sanctuaries
Bertelli, Bob	Chairman	California Sea Urchin Commission.
Birney, Kristi	Marine Conservation Analyst	Environmental Defense Center
Caldwell, Meg	Executive Director	Center for Ocean Solutions
Ehler, Charles (Bud)	Consultant/President	Ocean Visions Consulting
Fawcett, James	Dir. Marine Science & Policy	USC-Sea Grant Program
Fried, Elliot	Professor Emeritus	California State University, Long Beach
Gold, Mark	Associate Director	UCLA
Grifman, Phyllis	Associate Director	Sea Grant Program USC
Grove, Robert (Bob)	Senior Scientist	Southern California Edison
Guiltinan, Sara	Prs. Mgmt Fellow-Leasing Spec	Bureau of Ocean Energy Management
Haussener, Jim	Executive Director	Ca Marine Affairs & Navigation Conf
Hayes, Jolene	Transportation Development Manager	Port of Long Beach
Heberer, Craig	Fisheries Biologist	NMFS-Southwest Region
Helms, Greg	Manager, Pacific Program	Ocean Conservancy
Helvey, Mark	Assistant Regional Administrator	NOAA Fisheries Service
Kamer, Krista	Director of COAST	CSU (COAST)
Kats, Lee	Vice Provost and Professor	Pepperdine University
Kelly, Dennis	Professor	Orange Coast College-Marine Science Dept
Luce, Shelley	Executive Director	Santa Monica Bay Restoration Commission
Mathes, Kera	Education	Aquarium of the Pacific
McAfee, Skyli	Director	California Ocean Science Trust
McCorkle, Mike	Board Member	Trawlers Asso. Member
McIntyre, Kimberly	Program Director	USCSD Sustainability solutions Inst.
McKenna, Dick	Executive Director	Marine Exchange of Southern California
Monroe, Corinne	Research Associate	Aquarium of the Pacific
Parnell, Ed	Associate Research Oceanographer	Scripps Institution of Oceanography
Perry, Bruce	Lecturer, Environmental Sciences	CSULB
Pieper, Richard (Rick)	Professor	Fish Harbor Marine Laboratory
Pitchon, Ana	Assistant Professor	California State University Dominguez Hills
Prahler, Erin	Early Career Fellow	Center for Ocean Solutions
Preslo, Lynne	President and Founder	GeoEco, Inc.
Schubel, Jerry	President	Aquarium of the Pacific
Sekich, Stefanie	Policy Manager	Surfrider
Shane, Mike	Research Scientist	Hubbs-SeaWorld Research Institute
Stein, John	Director of Science & Research	Northwest Fisheries Science Center

Sullivan, Kathleen (Kate)	Assistant Professor	Department of Anthropology-CSULA
Thompson, Jocelyn	Partner	Alston & Bird LLP
Thompson, Kim	Program Manager	Seafood for the Future/Aquarium of the Pacific
Weaver, Dallas	Consultant	Retired
White, Thomas	Director	Loyola Marymount University
Wonder, Spencer	Fisherman	Orange Coast College Public Aquarium

