



BIRCH AQUARIUM

A T S C R I P P S

Scripps Institution of Oceanography
University of California, San Diego



Eileen Maher
Assistant Director, Environmental Services
Port of San Diego
P.O. Box 120488
San Diego, CA 92112-0488

September 25, 2008

Dear Eileen,

The purpose of this letter is to provide a summary of Birch Aquarium's progress to date on the San Diego Bay display funded by the Port District (reference Document Number 53246). As you know, an initial meeting was held between the Aquarium's exhibit development team and key Port staff to:

- (1) revisit the proposed educational goals of the exhibit and confirm that they supported the Port District's education and outreach priorities;
- (2) view the tanks/space allocated for the display in the Hall of Fishes; and
- (3) explore science content/data sets/image resources available from the Port.

Since this meeting, the aquarium has completed the conceptual design phase. Planned interpretation will focus on the dual persona of the Bay as an "economic engine" and an "essential ecosystem," the ways in which these roles have clashed in the past, and how these roles must be balanced to optimize human and Bay health and wealth going forward. Emphasis will be placed on the value of the Bay's natural resources, the need for balance and sustainability, and the inextricable link between human activities, the health of the Bay ecosystem, and human health. As currently conceived, the display will include two adjacent tanks showcasing Bay wildlife, with surrounding interpretation provided via a mix of traditional graphic panels and digital touchscreen technology. The conceptual design plan is summarized in the enclosed document, which Kelly Makely as well as Port Communications Department staff have reviewed. Kelly and I met to discuss and refine the details of the plan on September 23.

Next steps: We are currently preparing an RFP as the first step in the process of hiring an exhibit design/build firm to design and implement all phases of a comprehensive interpretive makeover for the Hall of Fishes. Once the contractor is hired, we will proceed with final design, content acquisition/preparation, final review (both internally and by key Port staff), fabrication, and installation of the San Diego Bay exhibit. We hope to unveil the new display by the end of May 2009.

One important note: Our ability to execute the exhibit plan is strongly dependent on access to the data sets that will serve as the basis for the digital interactive. Kelly indicated that Phil Gibbons is willing to work with us on this aspect of the project.

Birch Aquarium-Museum
Scripps Institution of Oceanography
University of California, San Diego

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We are extremely grateful that the Port District has chosen to support the Birch Aquarium's development of a display that will increase our visitors' awareness of the value of San Diego Bay and its resources, as well as ways in which they can help keep the Bay and its watershed healthy. The new display is a cornerstone of the interpretive makeover underway in our Hall of Fishes aimed at helping the public understand a simple truth—"Human health and wealth are inextricably linked to the health and wealth of our oceans."

Sincerely,

A handwritten signature in black ink that reads "Debbie Zmarzly". The signature is written in a cursive, flowing style.

Debbie Zmarzly
Project Scientist

enc: San Diego Bay exhibit conceptual plan (text description and design renderings)
San Diego Bay live displays plan



NEW San Diego Bay Exhibit: Graphic Elements Conceptual Plan (9/20/08)

EXHIBIT GOALS: Provide a window into San Diego Bay to (1) increase awareness of its natural resources, regional value and environmental challenges, and (2) encourage behaviors that support the health of Bay.

[Grant funds will support “development of a display that highlights the Bay's wildlife and other natural resources, increases awareness that the Bay is part of an integrated watershed, educates about environmental challenges facing the Bay, discusses scientific research in the Bay, and shows people how they can help protect the Bay.”]

OVERARCHING TITLE: A DEEPER LOOK AT SAN DIEGO BAY

[1] INTRO

[establish “sense of place” by framing iconic skyline image as a post card; superimpose on top of image: Greetings from San Diego!]



OR



Image with caption: San Diego Bay is a defining feature of the city that has grown up on its shoreline.

[2] TWO VIEWS OF SAN DIEGO BAY



San Diego Bay is a valuable natural resource, serving as **both an economic engine for the region and an essential ecosystem for a diverse array of wildlife.**

["TWO VIEWS" TOUCHSCREEN INTERACTIVE: Google map of bay with different overlays, allowing visitor to explore the bay from 2 different points of view: as "ECONOMIC ENGINE" or "ESSENTIAL ECOSYSTEM."]

ECONOMIC view has overlay of human uses (e.g., military, industrial, commercial, cruise ship terminal, fishing fleet, shipyards, marinas, whale watching/harbor excursions, hotels, 8 public beaches, boat launch ramps, etc.); possibly color code different uses. Provide ability for visitor to zoom in on areas of interest, or touch an economic use area to see images of San Diego's working waterfront.

ECOSYSTEM view would have bathymetry / habitat overlay (e.g., eelgrass meadow, artificial reef, soft bottom, salt marsh, etc.); visitor can touch habitats to see images, hear audio, etc. of some of the special species each habitat type supports. Notes: (1) Special focus on endangered and threatened species; (2) Call out boundaries of National Wildlife Refuge; (3) Jeff Babcock/Neal Driscoll will be producing 3D images of habitat and bathymetry through research funded by the Port, but they have not yet responded to emails asking when these products will be available.]

[TEXT for "Economic Engine" Screen:]
Explore Human Uses of San Diego Bay
What Occurs Where?

The sparkling waters of San Diego Bay support intense commercial, industrial, military and recreational activities. Take a deeper look at San Diego's working waterfront.

Touch the area you want to explore.

[TEXT for "Essential Ecosystem" Screen:]

Explore the Ecosystem

Who Lives Where?

San Diego Bay is a rich tapestry of natural habitats. The diversity of habitats supports a wealth of wildlife, including seven endangered species. Can you find where they all live?

Touch the habitat you want to explore.

Potential Feature Habitats

- Upland transitions
- Sandy beaches and dunes
- Salt works
- Artificial hard substrate
(pier pilings, rip rap, reef balls, buoys)
- Salt marsh

- Mud flats
- Eelgrass meadows
- Soft-bottom plains
- Shallow subtidal (South Bay)
- Deep subtidal

Potential Feature Species

- Birds
- Shorebirds (e.g., snowy plover), Nutall's lotus, coast horned lizard
- Shorebirds, seabirds, waterfowl, brine shrimp
- Sessile inverts, lobsters, seaweeds, seahorses, juvenile and
predatory fishes, pinnipeds
- Birds (CA least tern*), fishes, light-footed clapper rail, salt
marsh bird's beak*
- Benthic inverts, shorebirds
- Green sea turtles*, juvenile and predatory fishes, seahorses
- Benthic organisms (e.g., round stingray, clams, worms)
- Resident and migratory birds (e.g., brown pelican*)
- Seabirds, fishes (e.g., anchovy and top smelt), inverts
- *denotes endangered species

[NOTE: Delineate boundary of Wildlife Refuge]



CA least tern (Credit: Eileen Maher)



Green sea turtle



Saltmarsh bird's beak

[3] RESTORING THE BALANCE

[Use "I Live Downstream" stencil artwork to reinforce theme?]

[TEXT:]

In the past, San Diego Bay was used as a dumping ground, leaving a legacy of pollution. Today, activities throughout the watershed and on the Bay continue to take a toll on the system. The Port of San Diego is working to balance the many uses of the Bay to ensure economic, environmental, and human vitality.

[TOUCHSCREEN INTERACTIVE: A series of screens allow visitors to explore the impact of human activities throughout the bay's watershed on the health of the bay.]

[3A—"The Big Picture" Screen:]

[Basis for interactive is a Google-style map that allows visitors to zoom in and out between a close-up view of bay and entire watershed view, so they can see the bay's position as the terminus for drainage from a large, densely populated area. Notes: Delineate major communities in bay watershed, along with rivers, creeks, and location of storm drains that discharge into bay.]

[Endpoints of zoom:]



[TEXT for “The Big Picture”:]

San Diego Bay is the end of the line for runoff from a 470 sq. mile area. This drainage area, called a **watershed**, begins more than 50 miles inland in the Laguna Mountains. The watershed supports more than 1.5 million people, plus an annual influx of tourists.

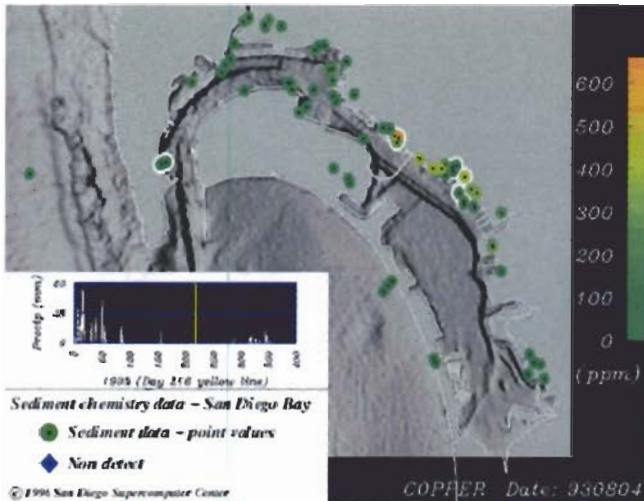
Rivers and creeks collect runoff from yards, pavement, businesses, farms, and natural areas throughout the watershed. They ultimately deposit their load in the waters of San Diego Bay, along with the discharge from more than 200 storm drains.

[3B-“Human Impacts” Screen:]

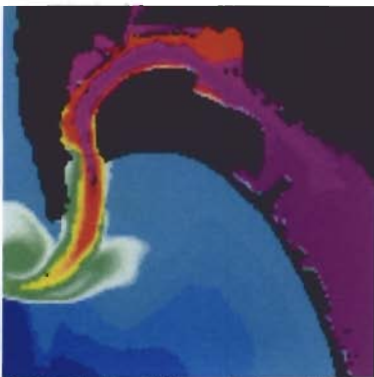
[TEXT for “Human Impacts”:]

Due to historical actions and ongoing impacts of human activities, the Bay continues to be challenged by degraded water quality, sediment toxicity, and invasive species.

[Include feature on Scripps researcher Carlos Neira and his current Port-funded study of Cu^{2+} pollution in sediments and fauna and tidal flushing animation developed by UC San Diego’s SuperComputer Center.]



[Source: <http://www.nceas.ucsb.edu/nceas-web/projects/2295/nceas-paper1/compecol-cu.gif>; Note: This is not Carlos’s data, but is representative of type of data that could be used as an overlay in the touchscreen interactive.]



[Tidal flushing animation available at coastalchange.ucsd.edu/st3_basics/waves.html]

Caption: A computer model of tidal flushing in the Bay reveals why pollution hotspots persist in some areas. Animation courtesy of John Helly, UC San Diego Supercomputer Center.

[3C–“Saving the Bay” Screen:]

[TEXT for “Saving the Bay”:]

Since cleaning up pollution has proven to be expensive and time-consuming, it is far wiser to prevent pollution in the first place.

Whether you live in the San Diego Bay watershed or are just visiting, you can help protect the Bay. Here are a few ideas for keeping waste out of our waters:

- Reduce use of chemical pesticides and fertilizers in your yard
- Put litter in its proper place
- Pick up your pet’s waste
- Recycle styrofoam peanuts or seal tightly in a trash bag
- Fix your vehicle’s oil leaks promptly

[4] TOXIC PINBALL (potential additional interactive designed especially to appeal to children)

[See http://www.biodiversity911.org/swf/pinball_1024.html for general idea. Visitors choose a toxin/source and follow its pathway into water, sediments, or wildlife of the bay, and, in some cases, to humans. Notes: We would use toxins, pathways and ultimate repositories specific to SD Bay.]



NEW San Diego Bay Exhibit: Live Displays Plan (9/20/08)

Habitat:

The displays will depict the vegetated shallow subtidal environment, with an eelgrass meadow transitioning to a soft bottom where artificial reef jacks may be added (if feasible to obtain small-scale models) to promote the gathering of pelagic fishes. In the wild, these areas serve as nurseries, providing a refuge for a variety of small fishes. The eelgrass meadows also support a diversity of invertebrates and camouflaged fish species. In the larger of our two tanks, we envision schools of juveniles swimming above the eelgrass beds and down around the artificial reef. Along the soft bottom will be several species of juvenile flatfish and juvenile round rays. The adjacent smaller tank will recreate the natural habitat of seahorses and pipefishes, which are visitor favorites.

Potential species list is for tank 10:

- School of juvenile surfperch (dwarf perch, shiner perch, black perch)
- Schools of bait fish (top smelt, etc.)
- Flatfishes (CA halibut, diamond turbot, fantail sole, C-O turbot, tonguefish, sanddabs)
- Black croaker (juveniles)
- Longjaw mudsuckers
- Killifish
- Round rays (juveniles)
- Spiny sea stars
- Navanax
- Bulla (will be consumed by the Navanax/must replace often)
- Mantis shrimp (in tank inset)
- Wavy top snails
- May also include be bonefish, halfbeaks

Potential species list is for tank 11:

- Pacific seahorse
- Bay pipefish
- Tunicates (live or artificial)
- Sponges
- Eelgrass (artificial)
- Grass shrimp (this is food for the seahorses; would like to maintain in display)
- Spiny sea stars

NOTES:

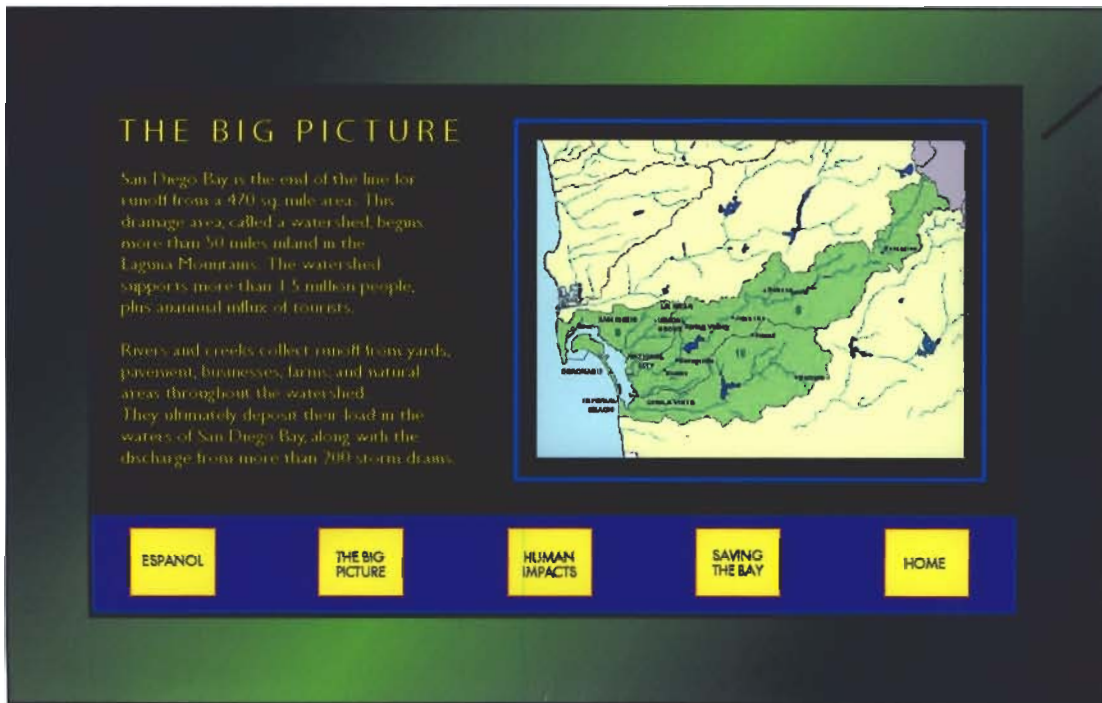
- We must use a more coarse sand to simulate the Bay's muddy bottom.
- The water clarity in our tanks is much greater than in San Diego Bay

[1] "RESTORING THE BALANCE" TOUCH MONITOR INTERACTIVE

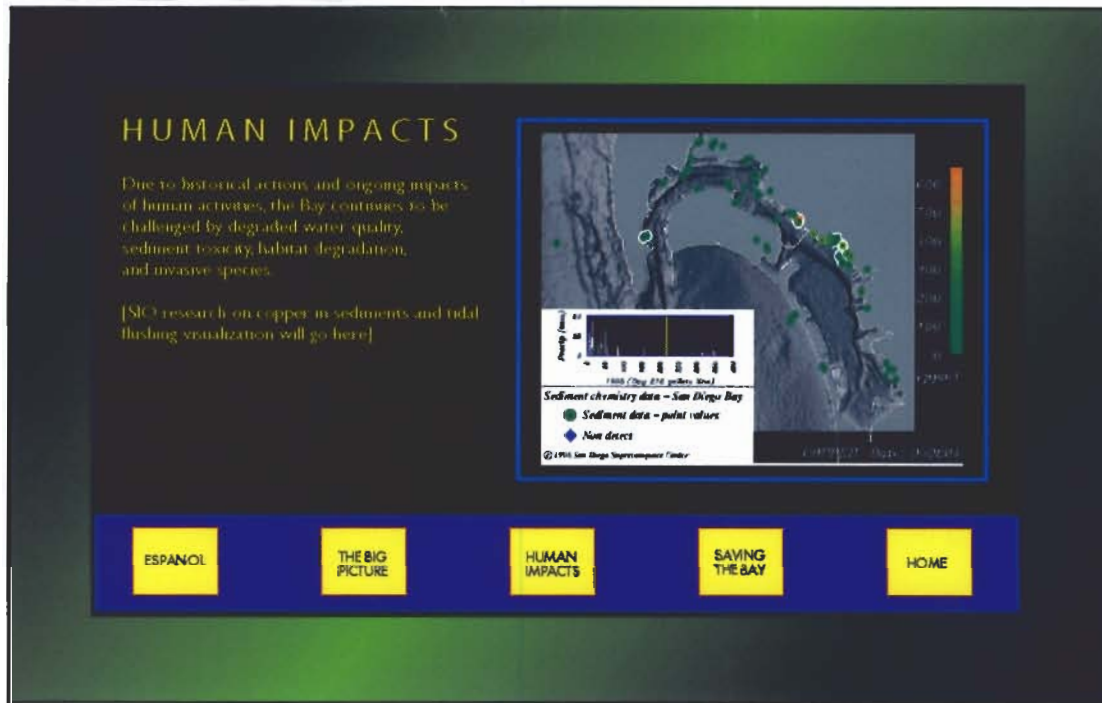


DIGITAL MAP INTERACTIVE:

Basis for interactive is a Google-style map that allows visitors to zoom in and out, from close up of bay out to entire watershed view, so they can see the bay's position as the terminus of drainage from a large, densely populated area.

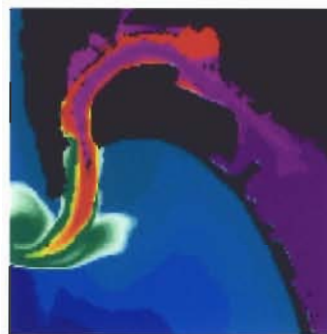


Notes: Delineate major communities in bay watershed, along with rivers, creeks, and location of storm drains that discharge into bay.

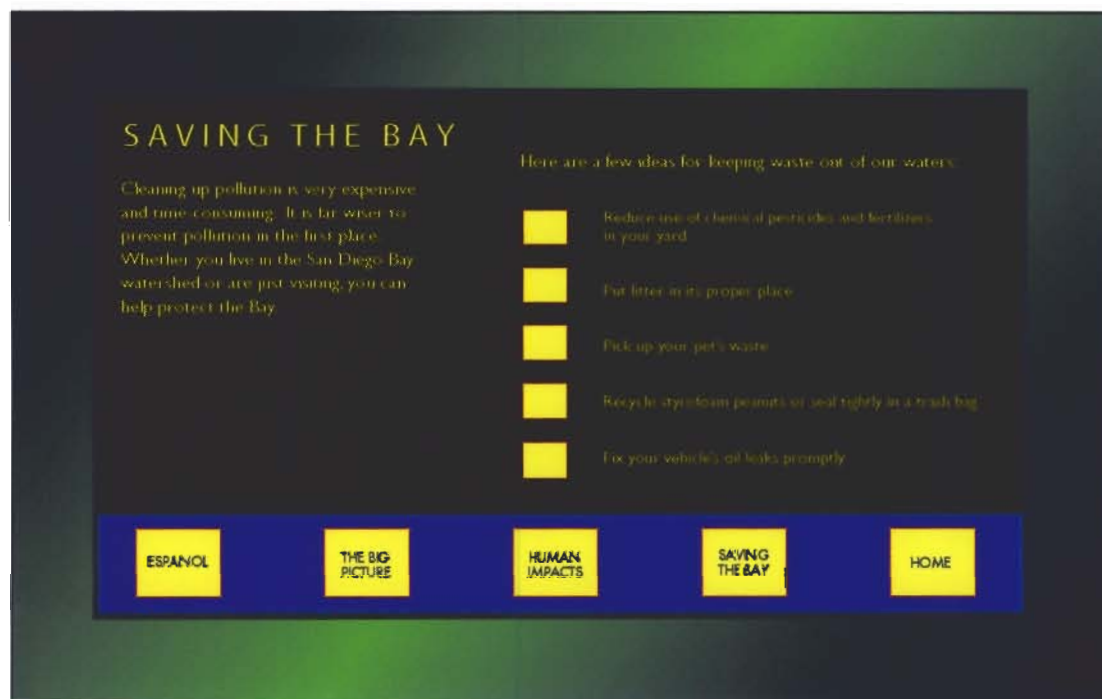


DIGITAL MAP INTERACTIVE:

Source: <http://www.nceas.ucsb.edu/nceas-web/projects/2295/nceas-paper1/compecol-cu.gif>
 [Note: This is not Carlos's data, but is representative of type of data that could be used as an overlay in the touchscreen interactive]



Tidal flushing animation
 [Animation courtesy of John Helly, UC San Diego Supercomputer Center]

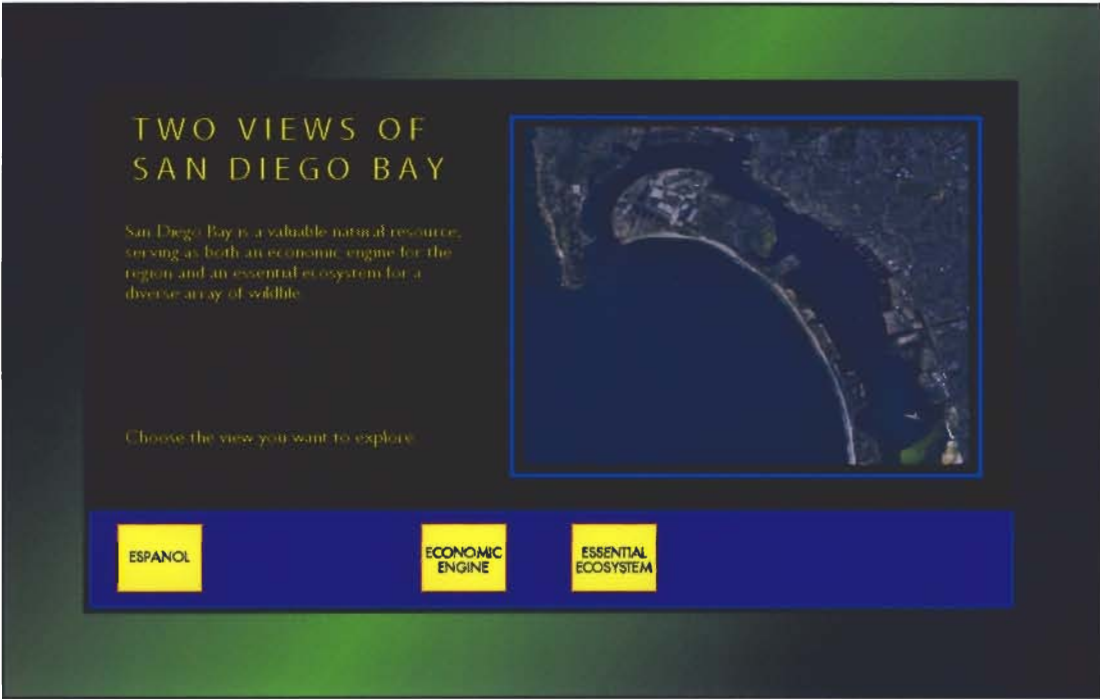


Touch Monitor Concepts
 SAN DIEGO BAY EXHIBIT
 TODE HALL OF FISHES

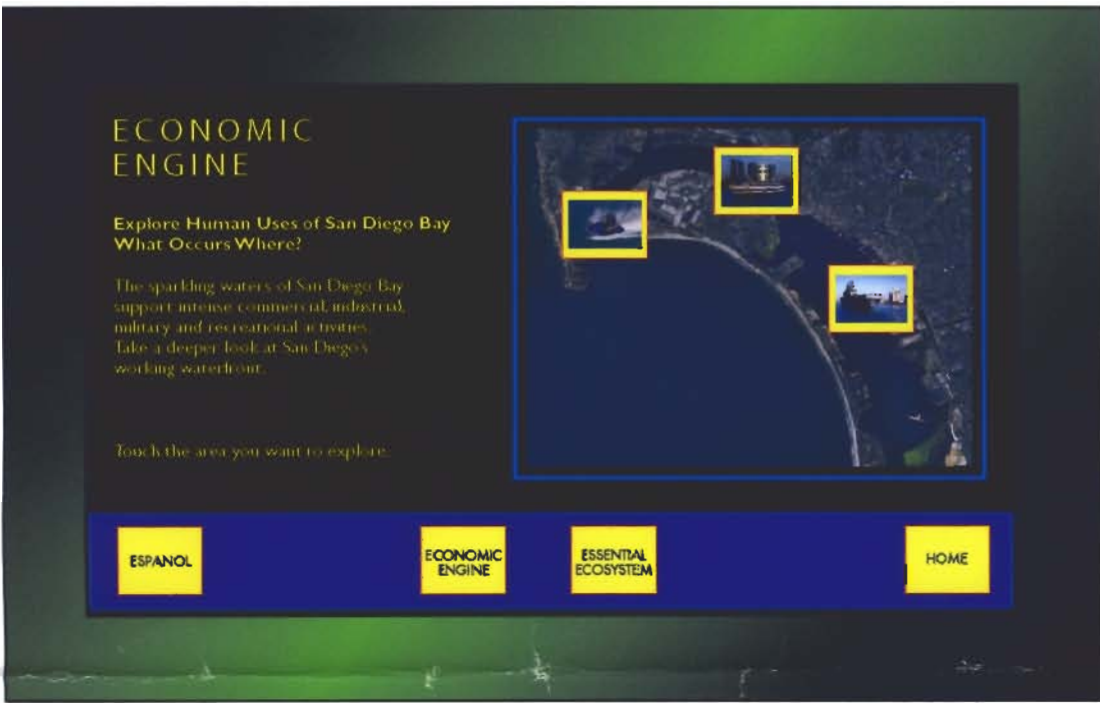
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[2] "TWO VIEWS" TOUCH MONITOR INTERACTIVE

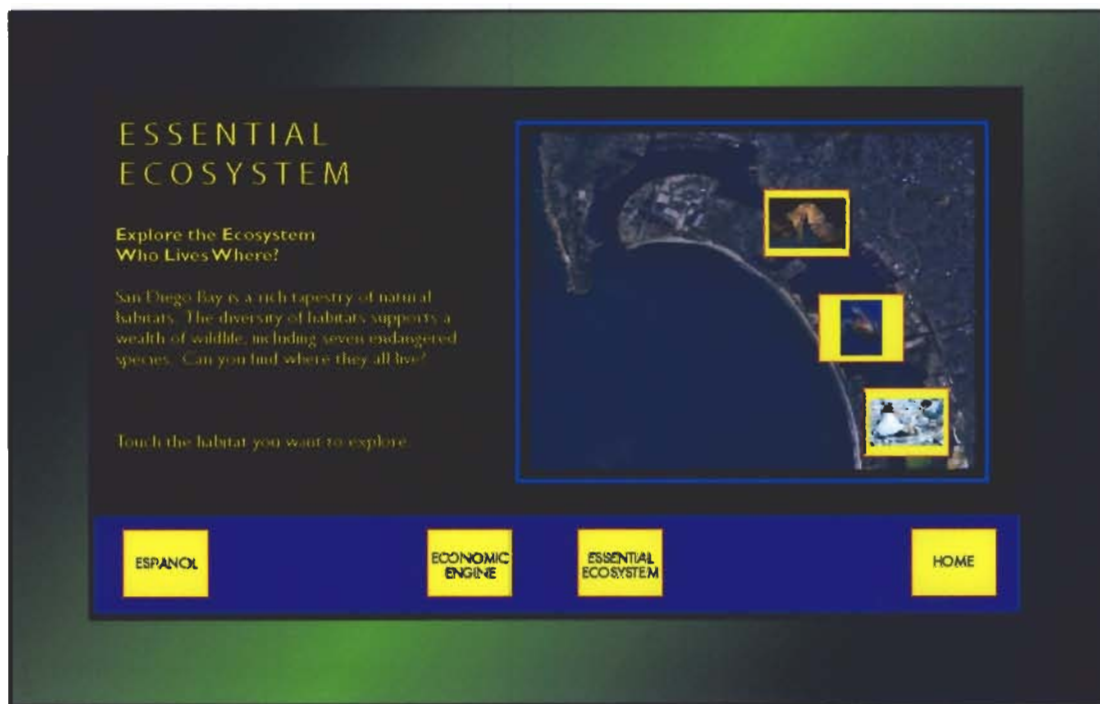


DIGITAL MAP INTERACTIVE:



DIGITAL MAP INTERACTIVE:

ECONOMIC view has overlay of human uses (e.g., military, industrial, commercial, cruise ship terminal, fishing fleet, shipyards, marinas, whale watching/harbor excursions, hotels, & public beaches, boat launch ramps, etc.); possibly color code different uses. Possibly have ability to toggle between human uses and water quality/sediment pollution maps so people can draw relations between the two. Provide ability for visitor to zoom in on areas of interest?



DIGITAL MAP INTERACTIVE:

ECOSYSTEM view would have bathymetry/ habitat overlay (e.g., eelgrass meadow, artificial reef, soft bottom, salt marsh, etc.); visitor can roll over habitats to see images, hear audio, etc. of some of the special species each habitat type supports. [Notes: (1) Special focus on endangered and threatened species; (2) Call out boundaries of Natl Wildlife Refuge; (3) Jeff Babcock/ Neal Driscoll will be producing 3D images of habitat and bathymetry through research funded by the Port]

Touch Monitor Concepts
SAN DIEGO BAY EXHIBIT
TODE HALL OF FISHES

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d-3

d-2

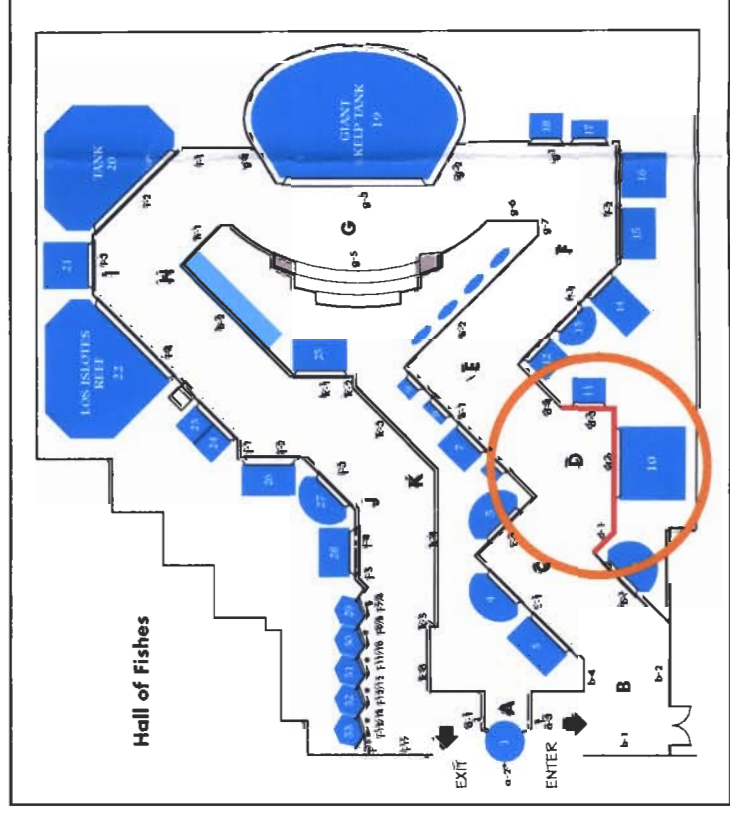
d-1



[2] "TWO VIEWS" TOUCH MONITOR INTERACTIVE

[1] RESTORING THE BALANCE TOUCH MONITOR INTERACTIVE

Specifications:
 Two 32" Touch Monitor Interactives
 Backlit Graphic Panels?
 Backlit Header Panels?



Wall Elevation Design Concept
 SAN DIEGO BAY EXHIBIT
 TODE HALL OF FISHES

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