Session Block 5 (9:30am – 11:30am)

LAND TO SEA

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Chris Webb
Moffatt & Nichol

BEACHES ARE A BEAUTIFUL THING

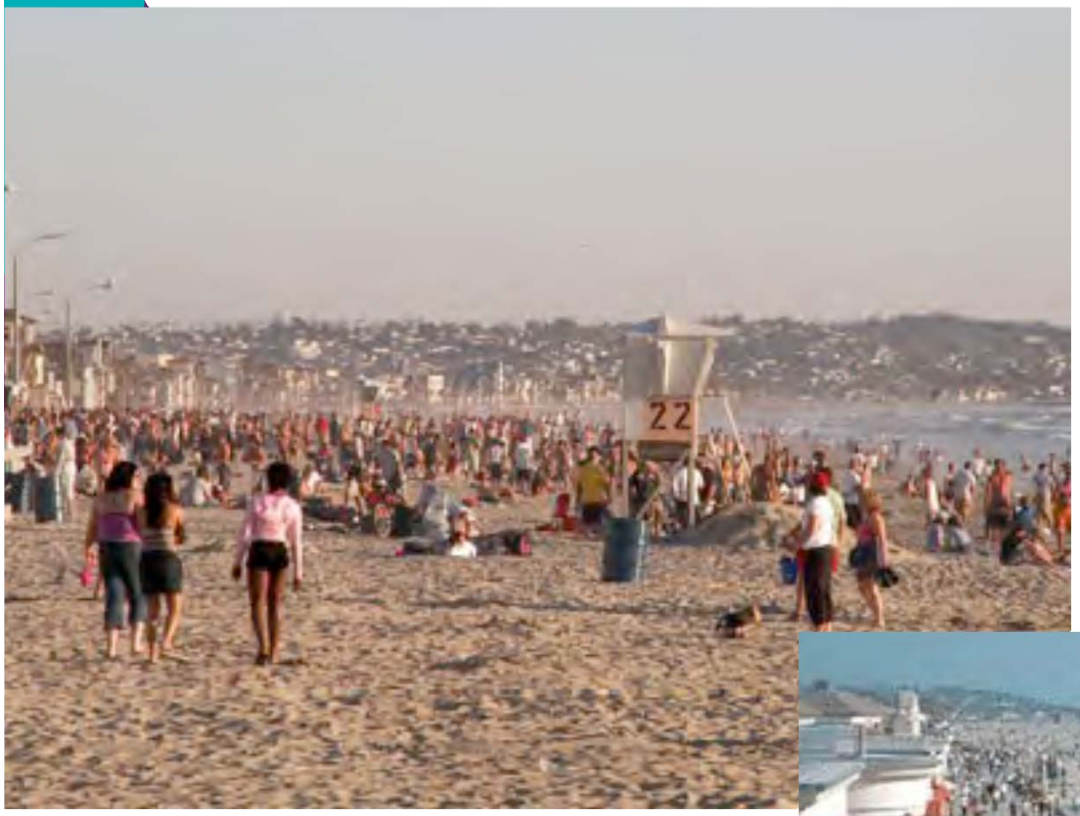
moffatt & nichol

Manage Shorelines With Sand

- Sand Provides Protection, Habitat, Recreation, and Income to Urban Costal Southern California
- Concerns center around:
  - Impacts to Sensitive Rocky Habitat
  - Costs Compared to Benefits
  - Personal Preferences

moffatt & nichol

Urban Southern California is Characterized by Beaches



Photos Courtesy of Bob Guza
And Ron Flick, 2007

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Beaches are Both Natural and Man-Made

- Natural – Sand gains exceed sand losses, or a geologic feature blocks sand movement
- Man-Made – Nourishment occurred to either build the beach or dispose of excess sand (or both)

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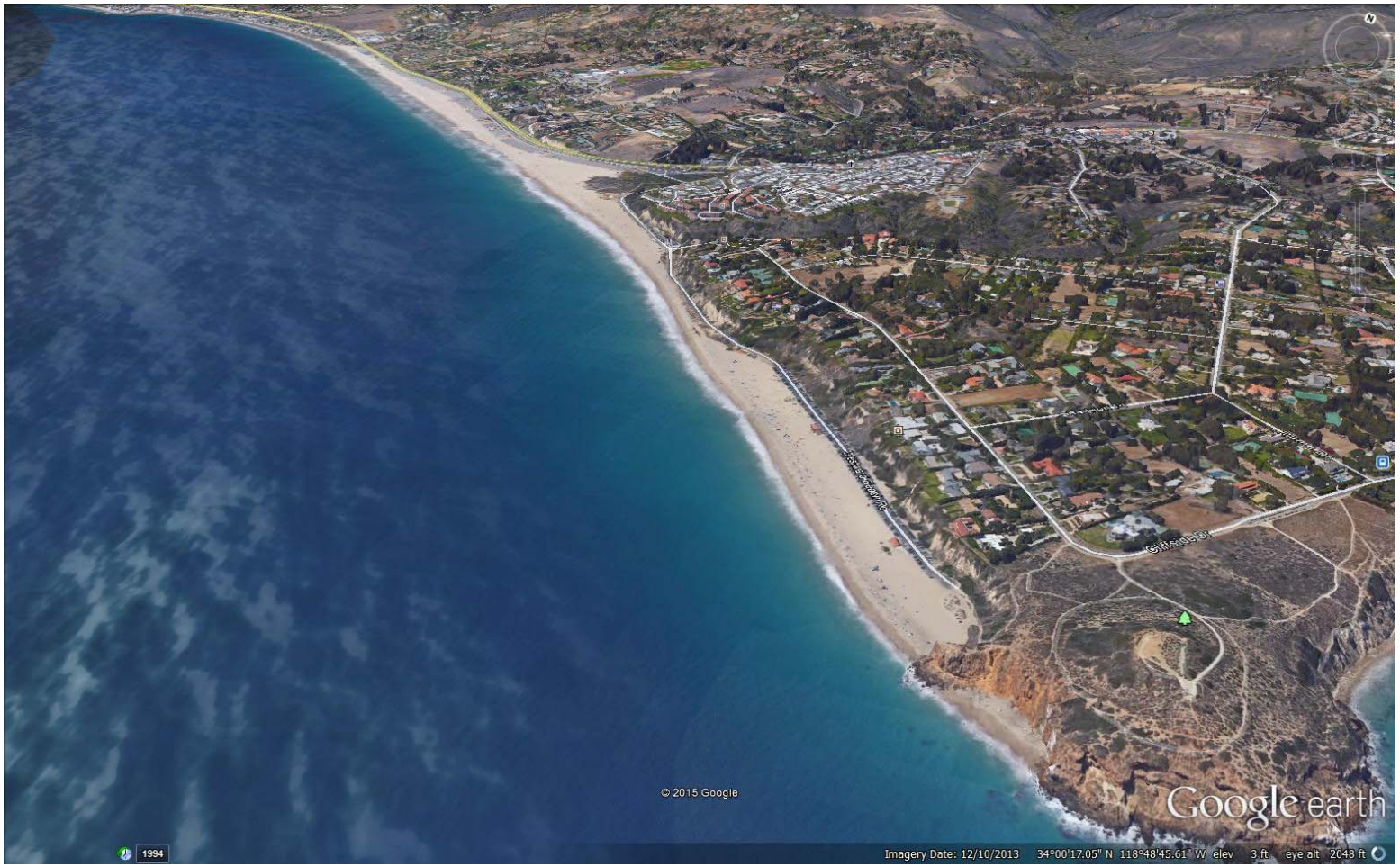
Natural Beach – Lechuza Pt.

moffatt & nichol

Natural Beaches – Pt. Dume



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Man-Made Beaches – Santa Monica Breakwater in 1940

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Man-Made Beaches – Venice Tombolo

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Challenges to Preserving and/or Enhancing Beaches

- Regulatory Requirements (Permitting)
  - Potential Habitat Impacts
  - Monitoring Requirements
  - Mitigation
- Funding
- Political Will
- Solutions: Do pilot projects in less sensitive areas to test effects and economic return

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Constraint: High Relief Reef at Lechuza Point in Malibu

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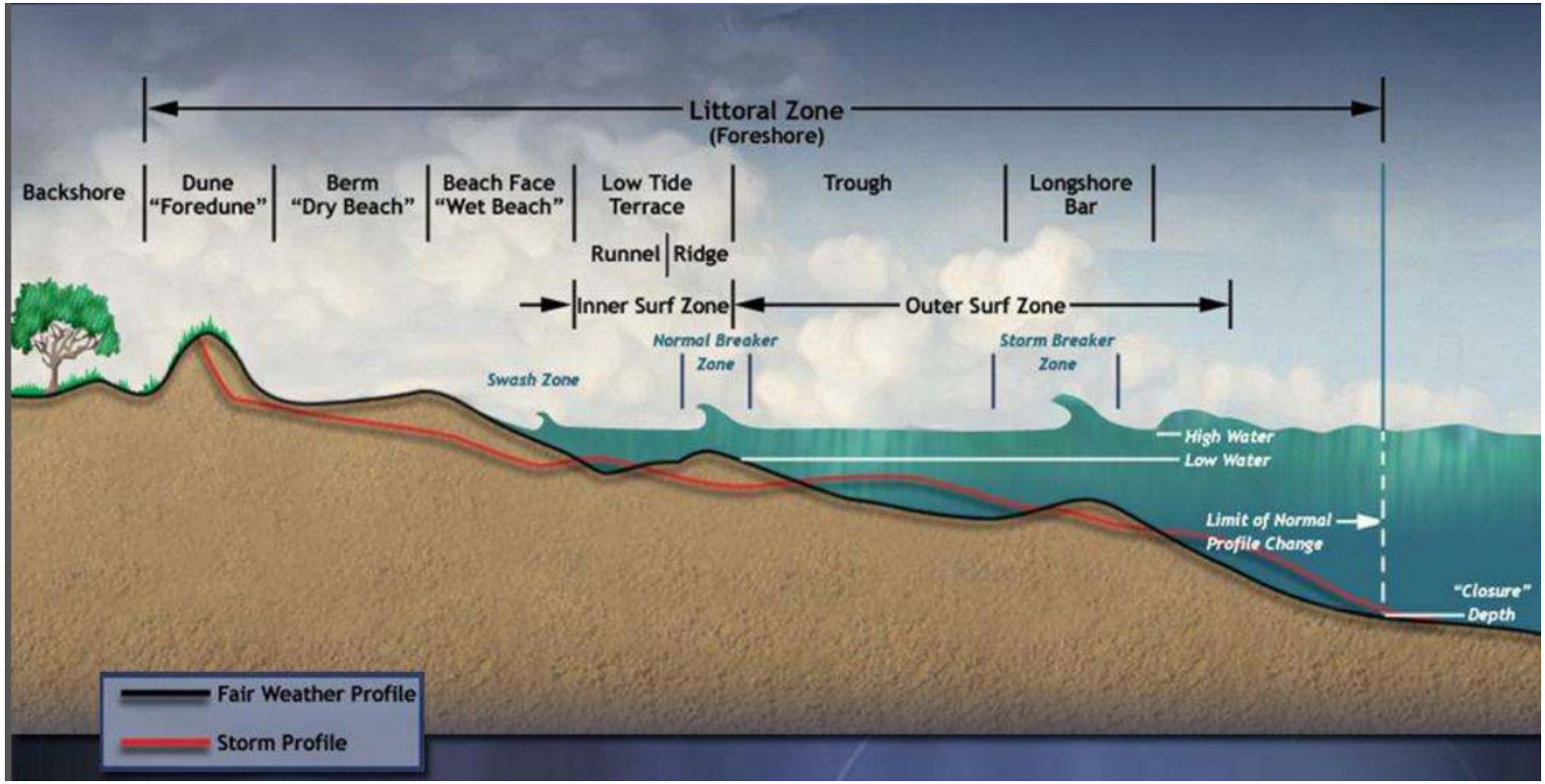
Climate Change Adaptation – Beaches Can Rise and Retreat



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Beach Habitat – Grunion, Invertebrates, Wrack, Birds

Photo: Dugan and Hubbard 2014

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Beaches and Recreation – U.S. Open, Huntington Beach

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Surfing, Sun, Sand Castles...

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Beaches and Economics (Data from Houston 2008)

- Beaches generated more than $300 billion for the U.S. economy in 2007 (13 times more than the national parks)
- Beach visitors in the U.S. out-number those to national parks by 7 to 1
- Government collects $320 on every $1 it spends on beach nourishment annually
- Government spending is $100M/yr on beaches and $2.65B/yr for national parks

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Conclusions on Beaches

- Beaches are beneficial for shoreline protection, habitat, recreation and the economy
- Beach provide a climate change adaptation strategy in the near-term
- Beach preservation and/or enhancement is very difficult for multiple reasons
- Maintaining beaches as capital improvement projects (infrastructure) would yield greater benefits than costs

moffatt & nichol

Bronwyn Green, Environmental Planner
Amec Foster Wheeler Environment & Infrastructure, Inc.

GOLETA BEACH COUNTY PARK MANAGED RETREAT PROJECT 2.0

Goleta Beach County Park

Park Facilities

- 1,500-foot Pier
- Lawn area
- Play equipment
- Restrooms
- Picnic tables
- BBQ areas
- Restaurant
- Snack bar
- Parking areas

Beach has narrowed from historic wide beach of the late 1970's

El Niño events have caused sever erosion

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Recent Storms & Erosion

- March 2014 storm

- El Nino storms in 1982/83, 1997/98, 2006/07, 2009/10

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Response to Erosion

- Protect critical infrastructure and utilities
- 2008 Draft EIR examined to options
  - beach stabilization/ permeable pile groin
  - managed beach retreat
- Beach stabilization option denied in 2009
  - Potential impacts to downcoast sand supply
- Managed beach retreat option revised in **Goleta Beach 2.0** (2013 Project)

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Project Elements

- Remove Parking Lots 6 and 7 and Restore Sandy Beach

- Remove Revetments on the Western Portion of Goleta Beach

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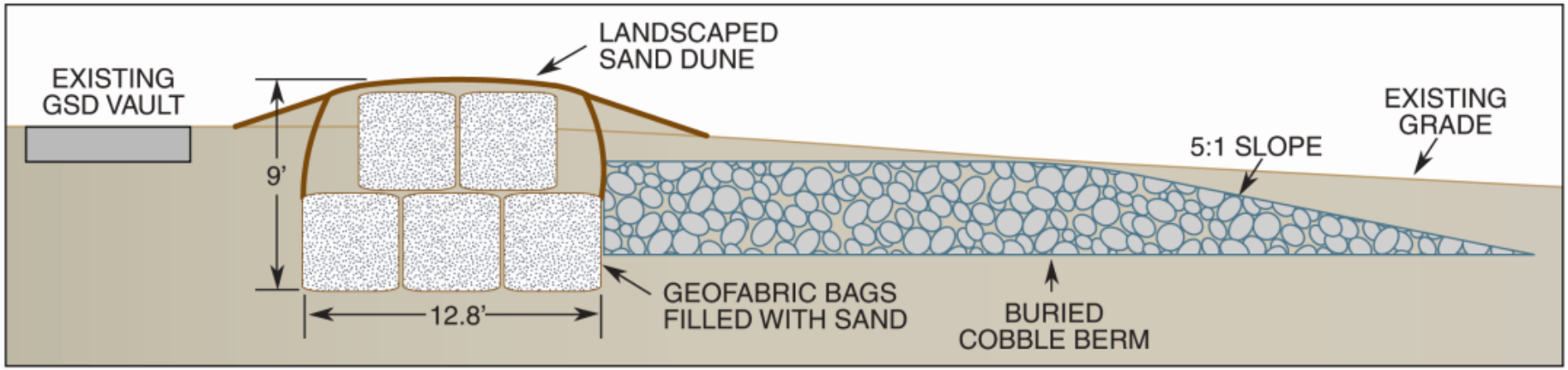
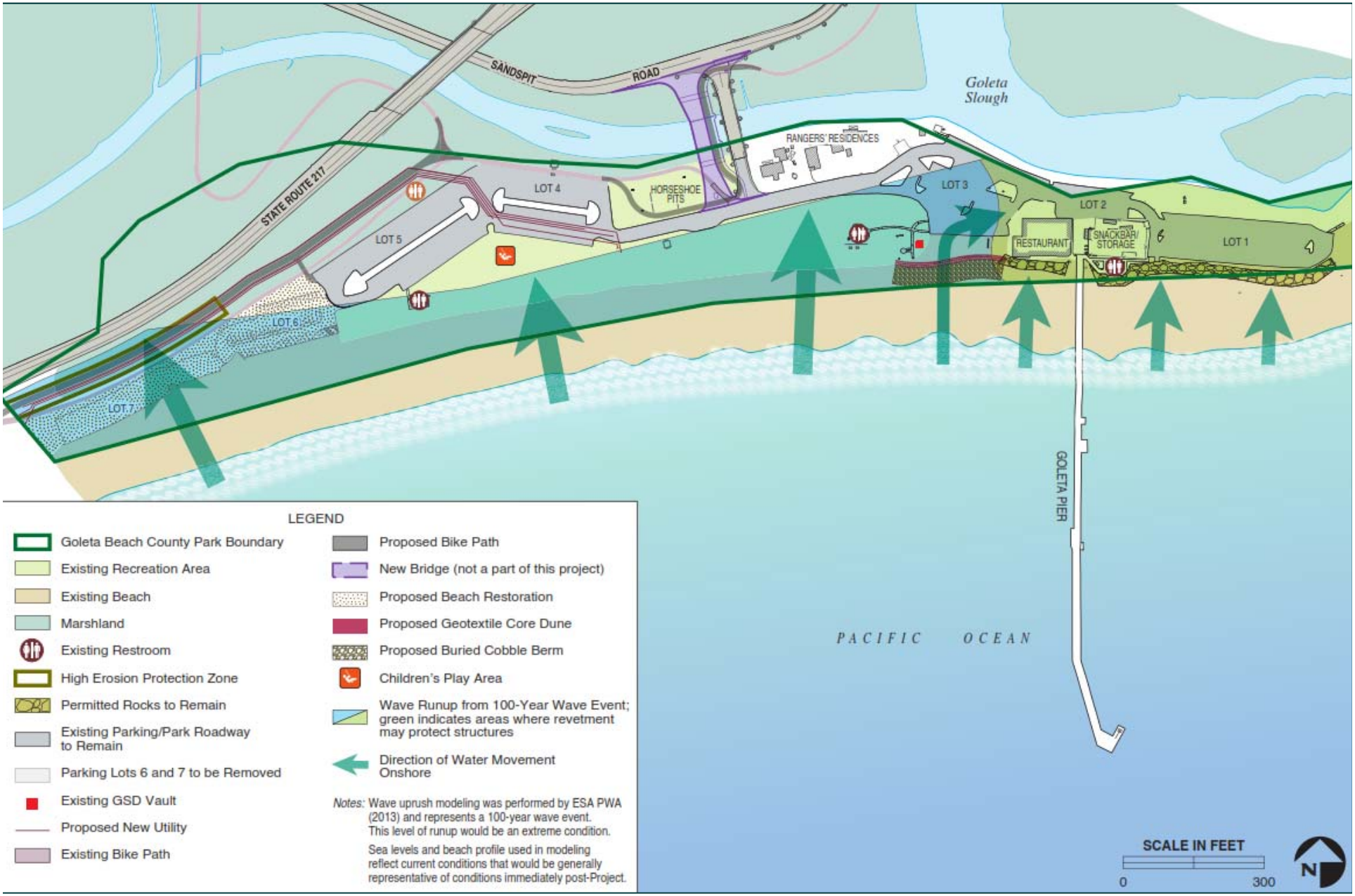
Project Elements (cont)

- Establish a Transportation and Utility Corridor
- Relocated at-risk utilities
- Relocate a portion of the bike path

Project Elements (cont)

- Protect the sewer line and vault in place
  - Geotextile dune
  - Cobble berm



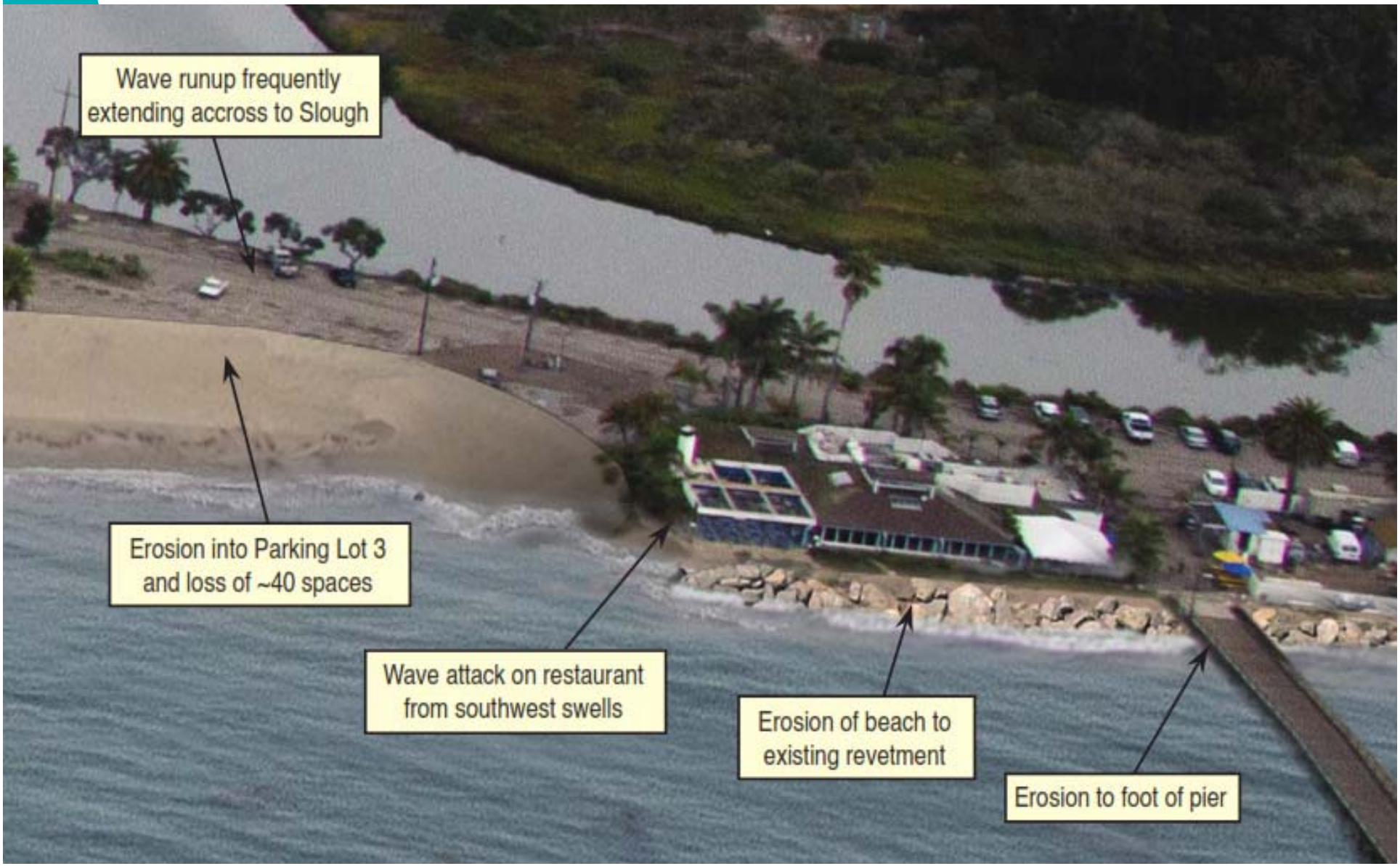


Analysis of Wave Run-up

Major Storm Impacts

- Severe storms erode park facilities
- Climate change may increase storm frequency/ intensity
- Existing revetments provide last line of defense

Simulated Erosion: 1943 Shoreline



Agency and Environmental Organization Concerns

- Sand supply: Revetments deprive downcoast beaches of sand
- Erosion: Revetments cause erosion of beaches
- Biological resources: revetments impact biology by cause beach erosion
- Revetments impede lateral and vertical beach access and narrowing.

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CEQA Baseline

- Unpermitted revetments
- 1,200 feet of revetment with expired permits or no permits
- 3,600 feet of shoreline

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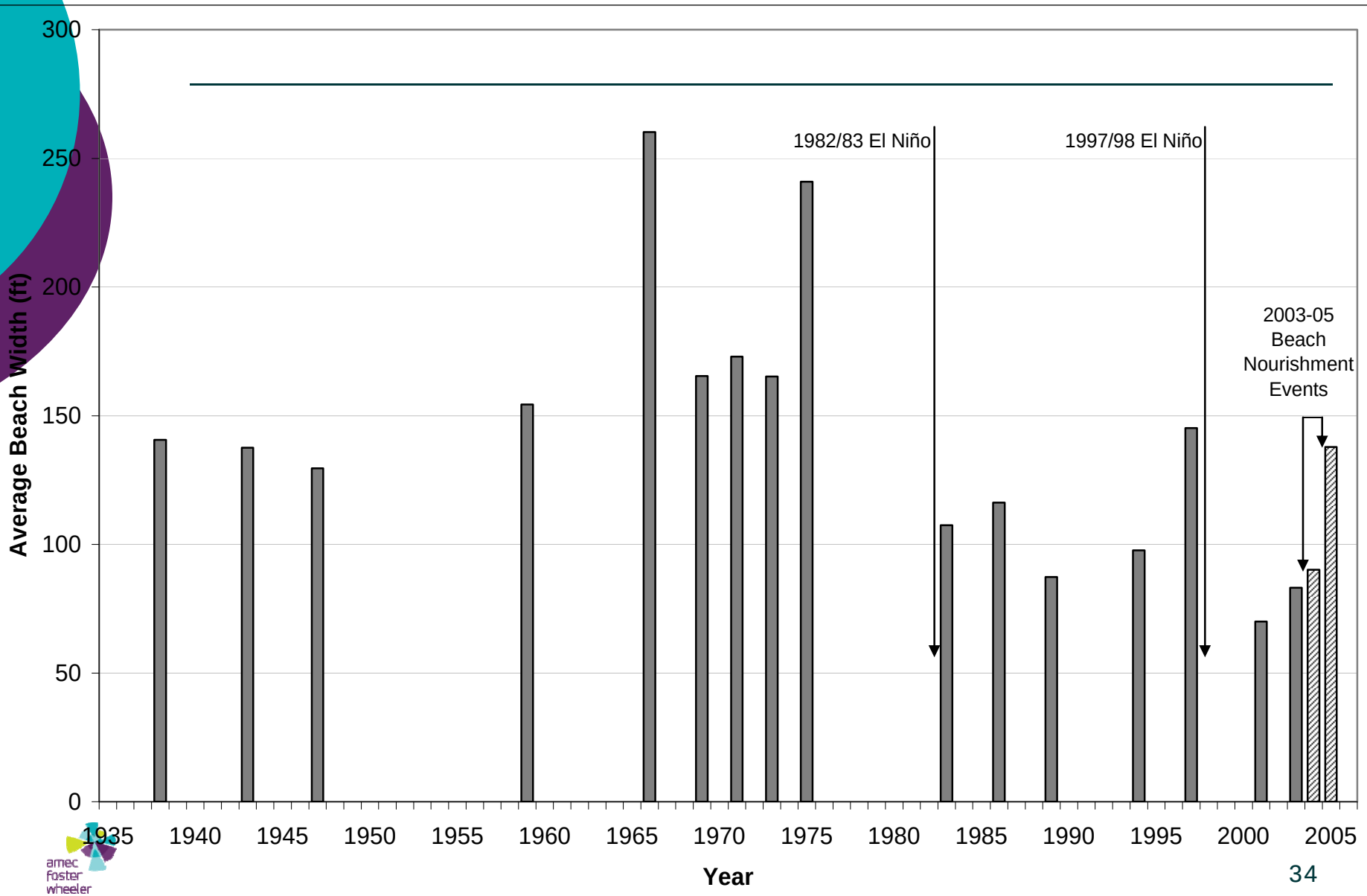
Key Findings of the EIR

Long Term Trend

- Beach and sand spit oscillate
  - Seasonally and over decades
  - Beach width has varied from 400 feet to 50 feet
- The shoreline is not currently in long-term retreat
- The shoreline may move into long term retreat with sea level rise post 2050

Average Beach Width



Key EIR Findings

- Analysis of shoreline issues must be site specific
- Revetments located low on the beach profile have greatest impacts
  - intertidal or sub-tidal zones
  - frequent interaction with surf may cause beach erosion/ other impacts
- Goleta Beach revetments-high on the beach profile, buried for last 10 years

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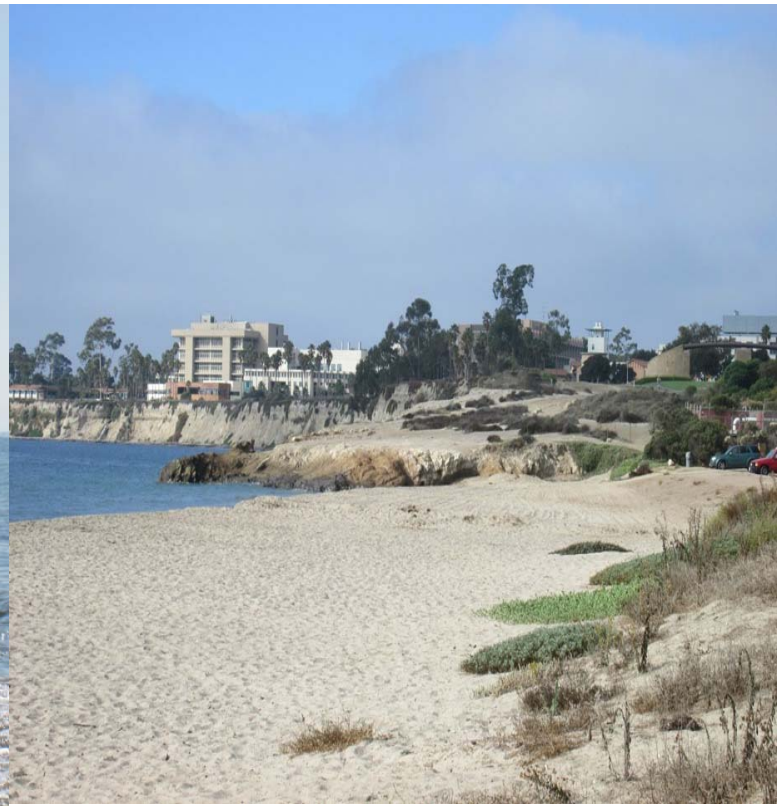
A Tale of Two Revetments



Sand Supply

- 90%-95% of sand in this area is from local streams and rivers
- Sand spit provides short-term storage, but is not a long-term source
- Revetments to not impeded downcoast sand transport

Lateral and Vertical Access

- Revetments do not impact access along Goleta Beach
  - Rocky point at the west end
  - Restaurant at the east end
- Vertical access would remain
  - Projected to remain buried until 2050
  - When exposed, similar to surrounding scarp
- Sea level rise may impact access post 2050

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A Tale of Two Revetments

Goleta Beach Spring 2015

Lessons Learned

- Shoreline management strategies must be site specific
- Apply rigorous fact based scientific analysis
- Consider shoreline position and beach width over long term
- Consider all shoreline management options and associated tradeoffs
- Question the dominant paradigm

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Melissa Ahrens, Environmental Planner

Marine Research Specialists

Former Coastal Planner at the California Coastal Commission

THE CA COASTAL COMMISSION'S ROLE IN SHORELINE MANAGEMENT

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Coastal Act Policies

- Key Coastal Act Policies relating to shoreline management:

1. 30235: Allows for approval of coastal protection structures to protect primary existing development(s) in danger from erosion

2. 30233(a): allows for the filling of open coastal waters for beach nourishment purposes

3. Environmental Protection Policies

- Marine Biology and Water quality: **30230 and 30231**
- Terrestrial Habitats/ ESHA: **30240**

4. Public Beach and Shoreline Access: **30211, 30212**

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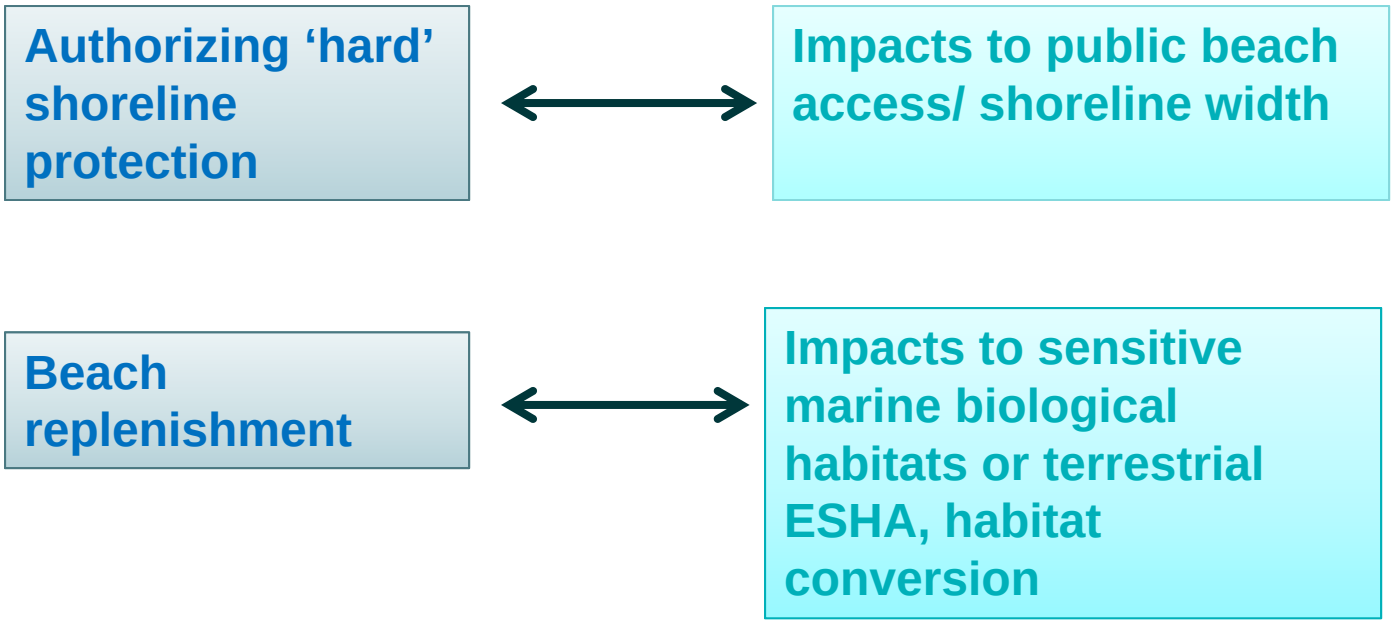
Policy Conflicts and Resolutions



How does the CCC resolve these policy conflicts?

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Permitting: Coastal Development Permits

Alternatives Analysis:

- Determination of the least environmentally damaging feasible alternative

Key Conditions of Approval:

- Revised project plans (alignment, design)
- Biological monitoring
- Habitat impact mitigation measures
- No future shoreline protection deed restriction
- Lateral access easements
- Public access program
- Time limitations on approval of development

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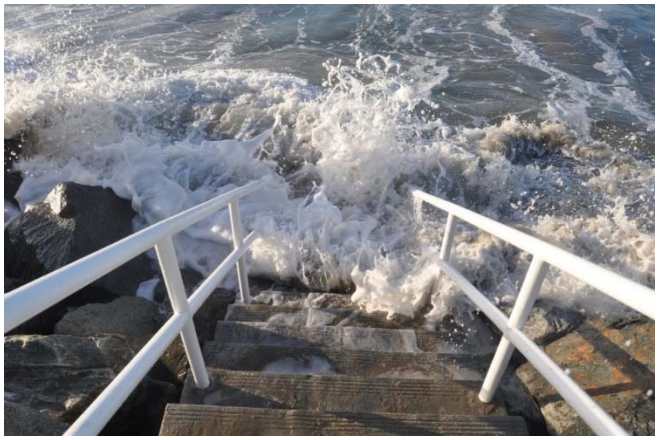
Long Term Planning: Local Coastal Programs (LCPs)

- LCP amendments, updates, or new certifications
- Long term planning for sea level rise
- Examples of new LCP policies related to shoreline management



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Emerging Issues at the CCC

- Adaptive management techniques in light of sea level rise - Sea Level Rise Guidance Document

Beach Nourishment:

- Thresholds for determining impacts to sensitive marine habitats (e.g. 1ft/yr of coverage)
- Sand grain sources and analysis
- Sensitive habitats monitoring and mitigation methods

Shoreline Protective Devices:

- Policy 30235 and interpretation of ‘existing structures’

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BROAD BEACH: COASTAL COMMISSION SHORELINE MANAGEMENT POLICIES IN ACTION

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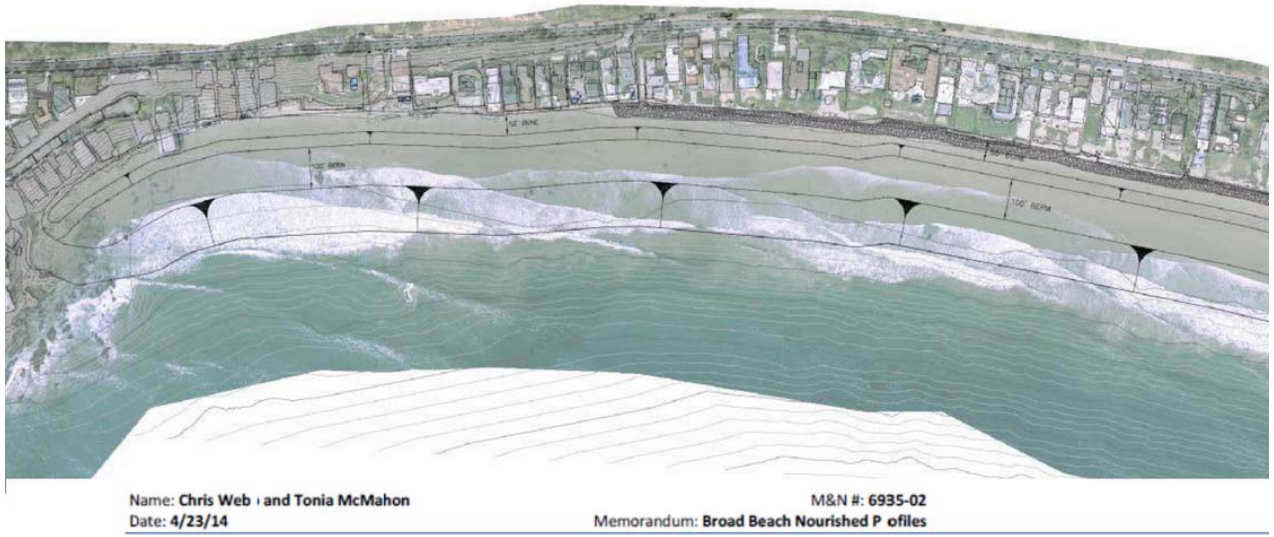
Proposed Project Highlights

- Protect existing primary residences in danger with a 4,150 ft. long, 12-15 ft. high, as-built, emergency rock revetment
- 600,000 cubic yards of Beach Replenishment
- Dune Habitat Creation/Restoration



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Broad Beach: Unique Shoreline Management Issues

- Privately funded project; Geologic Hazard Abatement District Applicant
- Large scale periodic beach nourishment program with backpassing and re-nourishment event

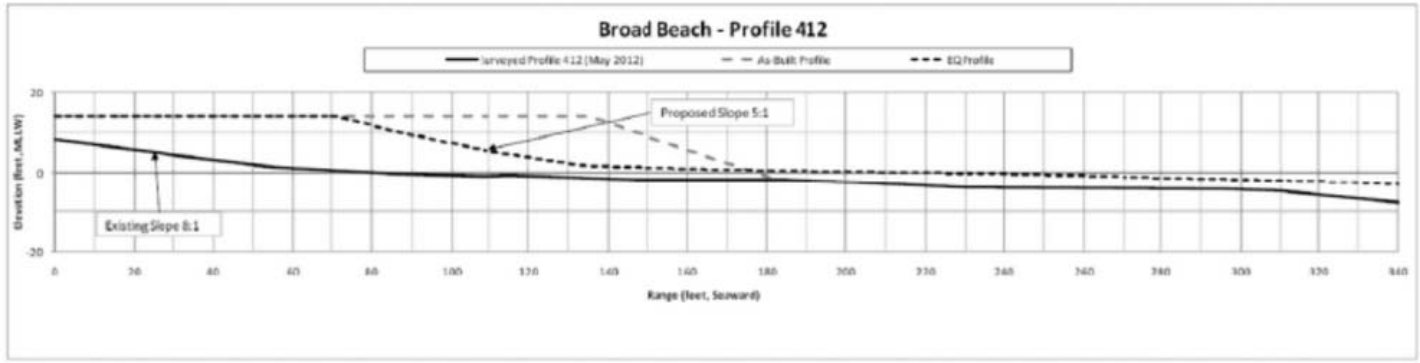

Figure 4. Beach Profile Slopes at Transect 412
for Existing Conditions (Solid Line) and Proposed Equilibrium Conditions (Bold Dashed Line)

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Broad Beach: Unique Shoreline Management Issues

- Septic systems and leach fields located seaward of residences

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Details of Proposed Project – East Central Reach

Exhibit 7b. – Proposed Project Footprint – East Central Reach (600,000 c. yds.) 4-12-043 (Broad Beach GHAD)

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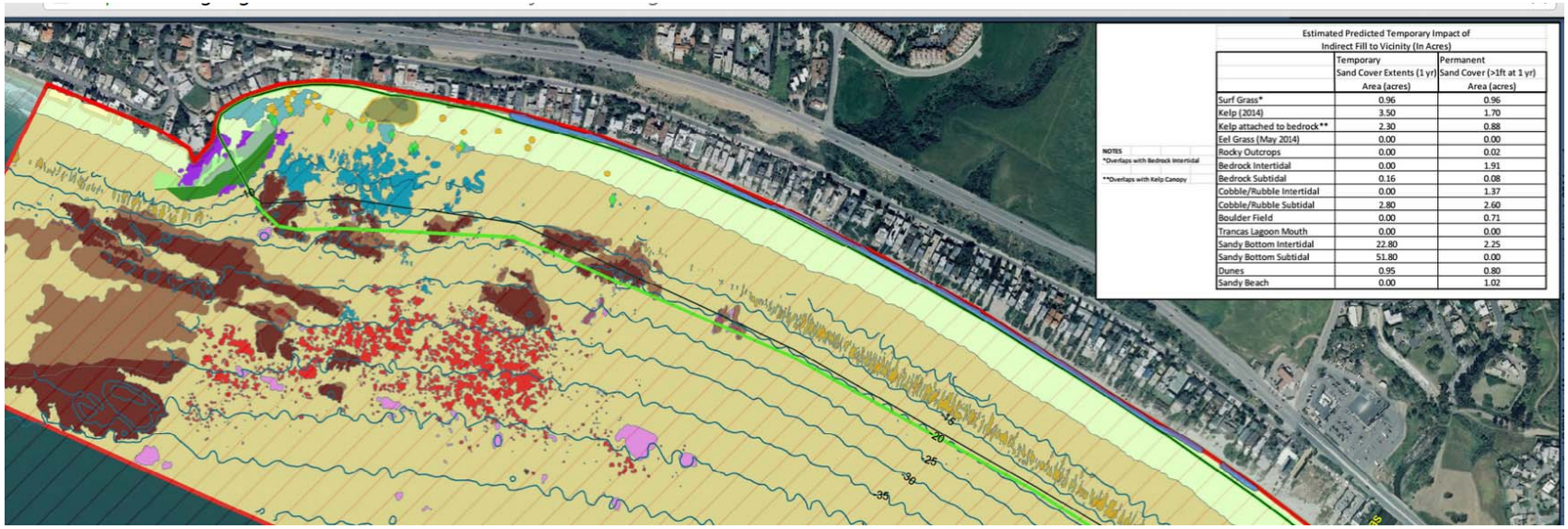
Broad Beach: Unique Shoreline Management Issues

- Sensitive marine habitat impacts
- Dune ESHA impacts



Mapped Marine Resources Project Footprint Direct and Indirect Impact Area; Source: Moffat and Nichol/ CCC Staff Report 4-12-043

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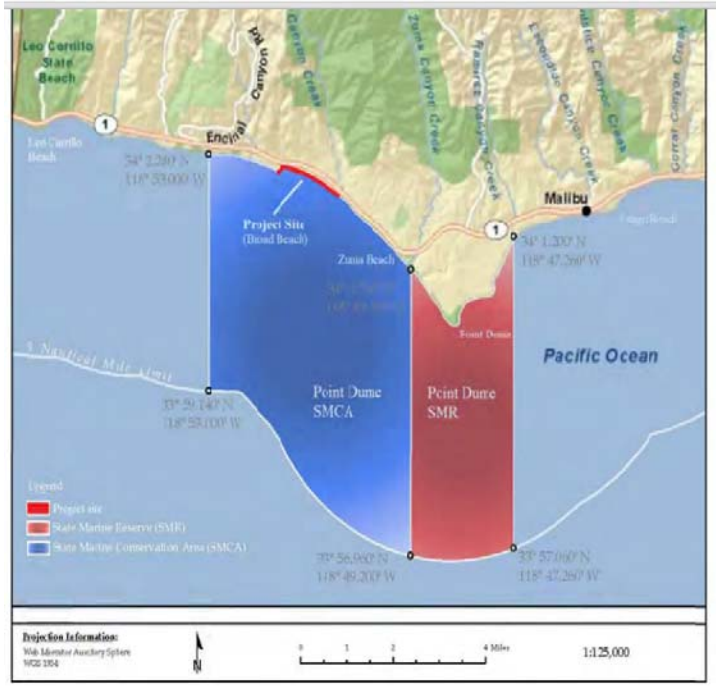
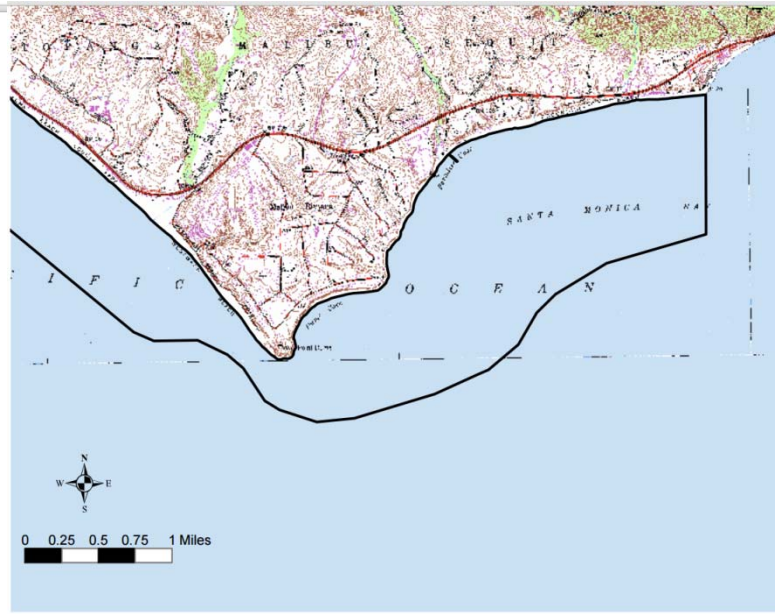
Broad Beach: Unique Shoreline Management Issues

- ASBS and SMCA designations within project area; policy considerations and mitigation implications





Ref. Maps: USGS Point Dume, CA
USGS Malibu Beach, CA

D. E. Gregorio
C. S. Bianchi
Division of Water Quality
January 2003

Source: Adapted from CDFW 2011.

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Nick Meisinger, Environmental Planner/Biologist
Amec Foster Wheeler Environment & Infrastructure, Inc.

SUBTIDAL AND INTERTIDAL MARINE HABITAT MITIGATION

Broad Beach Overview

- 46-acre beach nourishment
- 600,000 cubic yards of beach and dune quality sand
- Wide sandy beach up to 322 feet backed by restored dune
- Annual backpassing and one renourishment event

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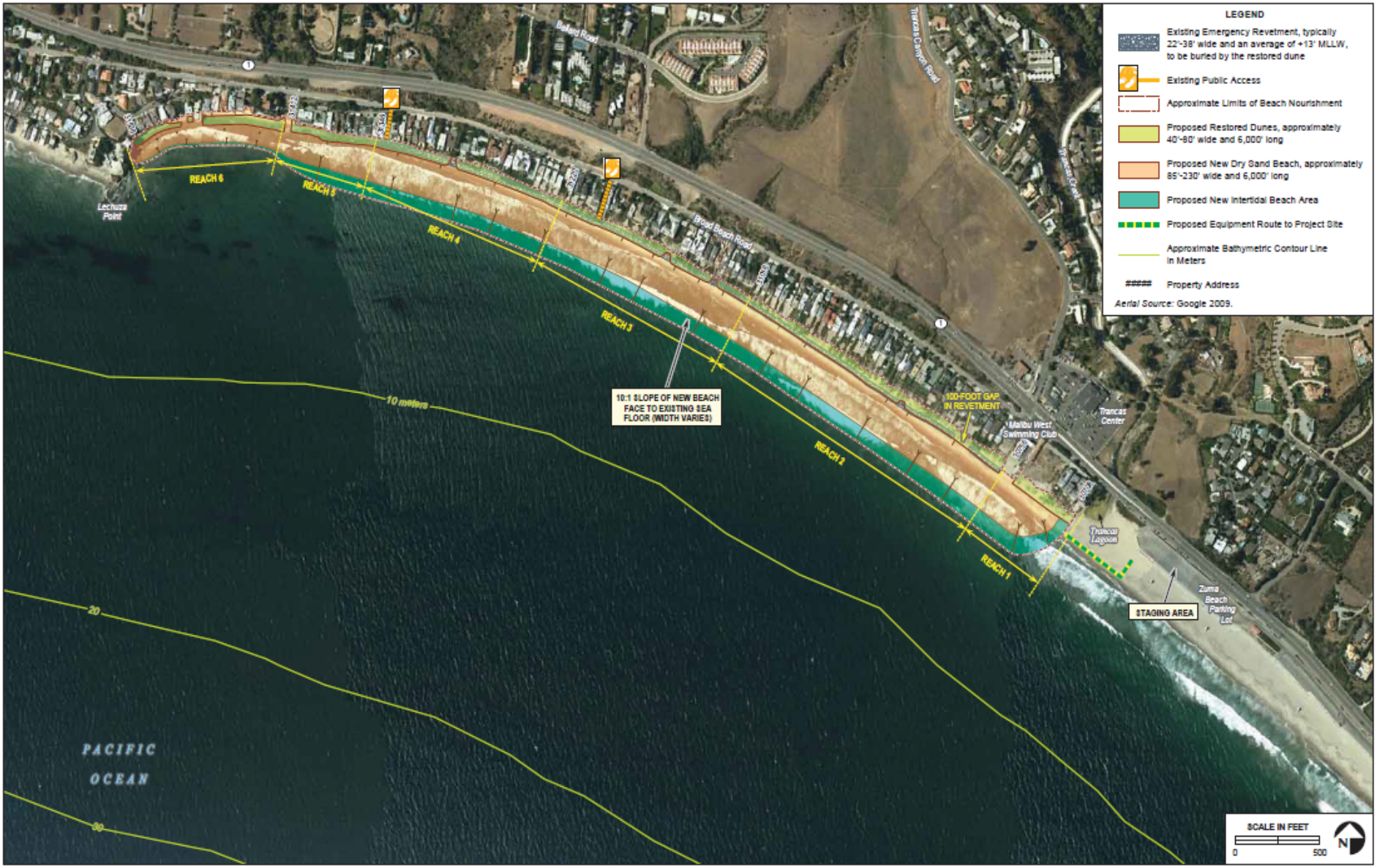
LEGEND
Existing Emergency Revetment, typically 22'-38' wide and an average of +13' MLLW, to be buried by the restored dune
Existing Public Access
Approximate Limits of Beach Nourishment
Proposed Restored Dunes, approximately 40'-80' wide and 6,000' long
Proposed New Dry Sand Beach, approximately 85'-230' wide and 6,000' long
Proposed New Intertidal Beach Area
Proposed Equipment Route to Project Site
Approximate Bathymetric Contour Line in Meters
Property Address
Aerial Source: Google 2009.
Lechuza Point
REACH 6
REACH 5
REACH 4
REACH 3
REACH 2
REACH 1
Broad Beach Road
Trancas Canyon Road
Trancas Creek
10 meters
20
30
10:1 SLOPE OF NEW BEACH FACE TO EXISTING SEA FLOOR (WIDTH VARIES)
100-FOOT GAP IN REVETMENT
Malibu West Swimming Club
Trancas Center
Trancas Lagoon
STAGING AREA
Zuma Beach Parking Lot
PACIFIC OCEAN
SCALE IN FEET
0
500
N

Major Impacts

- **Coastal Processes, Sea Level Rise, and Geological Resources**
- Recreation and Public Access
- **Marine Biological Resources**
- Terrestrial Biological Resources
- **Marine Water Quality**
- Scenic Resources
- Air Quality
- Traffic and Parking
- Noise
- Public Health and Safety, Hazards
- Utilities and Service Systesm

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Quantifying Habitat

- Transect Dive Surveys (2010, 2012, 2014)
- Kelp Canopy Survey (Summer 2012)
- Intertidal Sampling (2012, 2013)
- Subtidal Reef Survey (December 2012)
- Eelgrass Mapping (2013)
- Sidecar Scan Sonar (May and June 2014)

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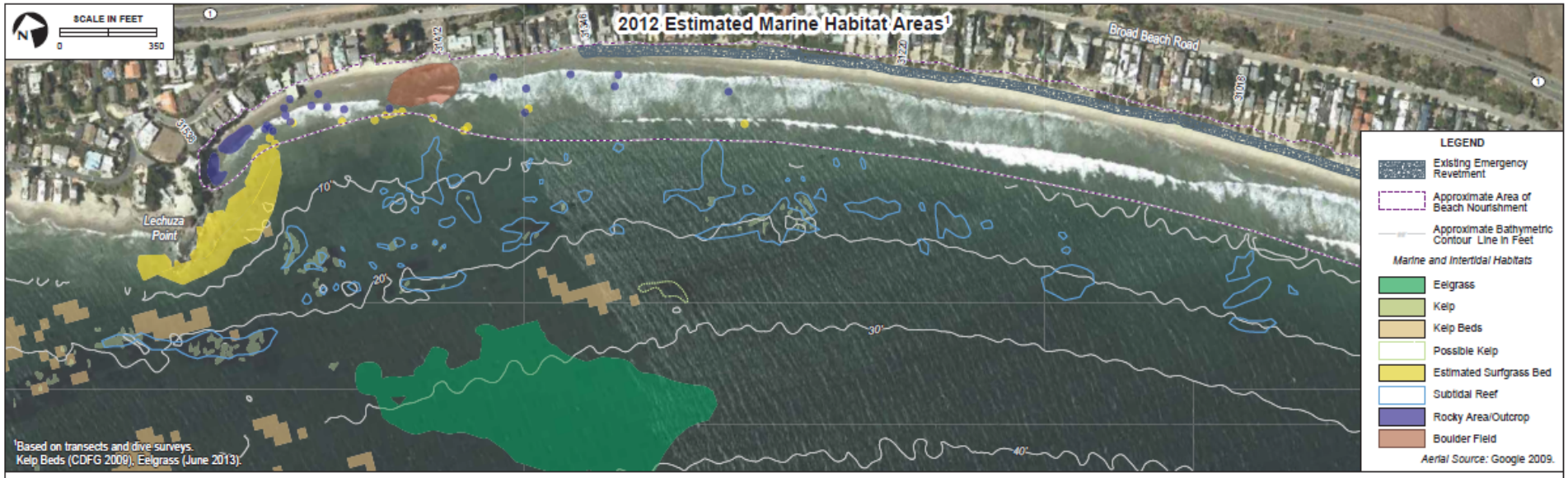

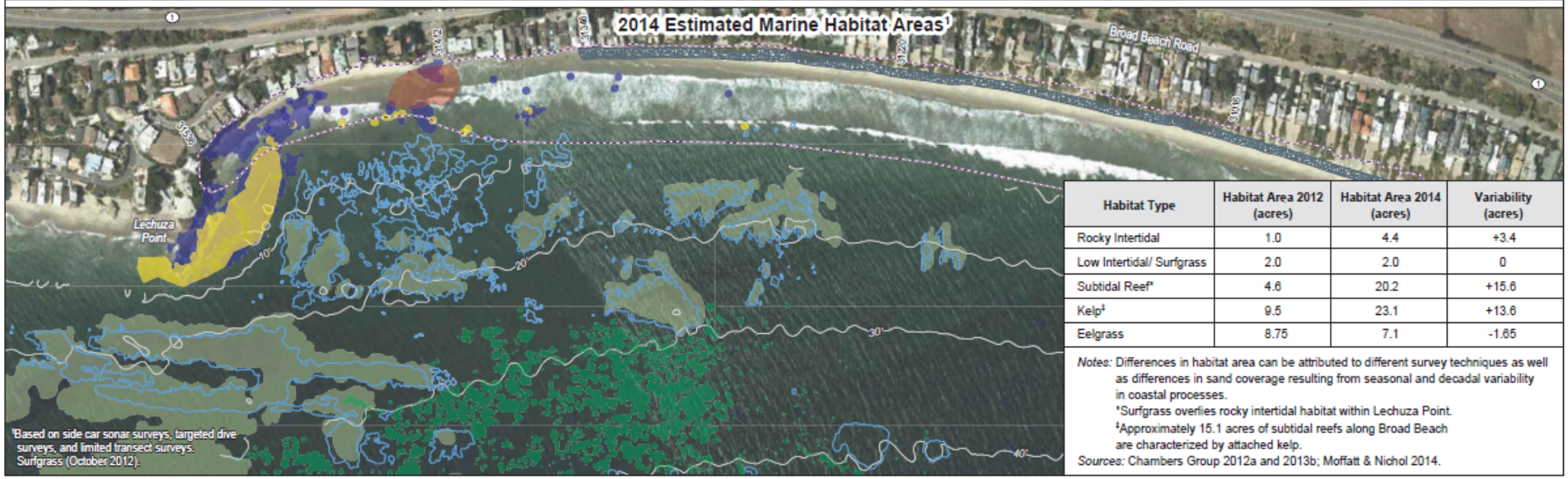

Habitat Type	Habitat Area 2012 (acres)	Habitat Area 2014 (acres)	Variability (acres)
Rocky Intertidal	1.0	4.4	+3.4
Low Intertidal/ Surfgrass	2.0	2.0	0
Subtidal Reef*	4.6	20.2	+15.6
Kelp‡	9.5	23.1	+13.6
Eelgrass	8.75	7.1	-1.65

Notes: Differences in habitat area can be attributed to different survey techniques as well as differences in sand coverage resulting from seasonal and decadal variability in coastal processes.
*Surfgrass overlies rocky intertidal habitat within Lechuza Point.
‡Approximately 15.1 acres of subtidal reefs along Broad Beach are characterized by attached kelp.
Sources: Chambers Group 2012a and 2013b; Moffatt & Nichol 2014.

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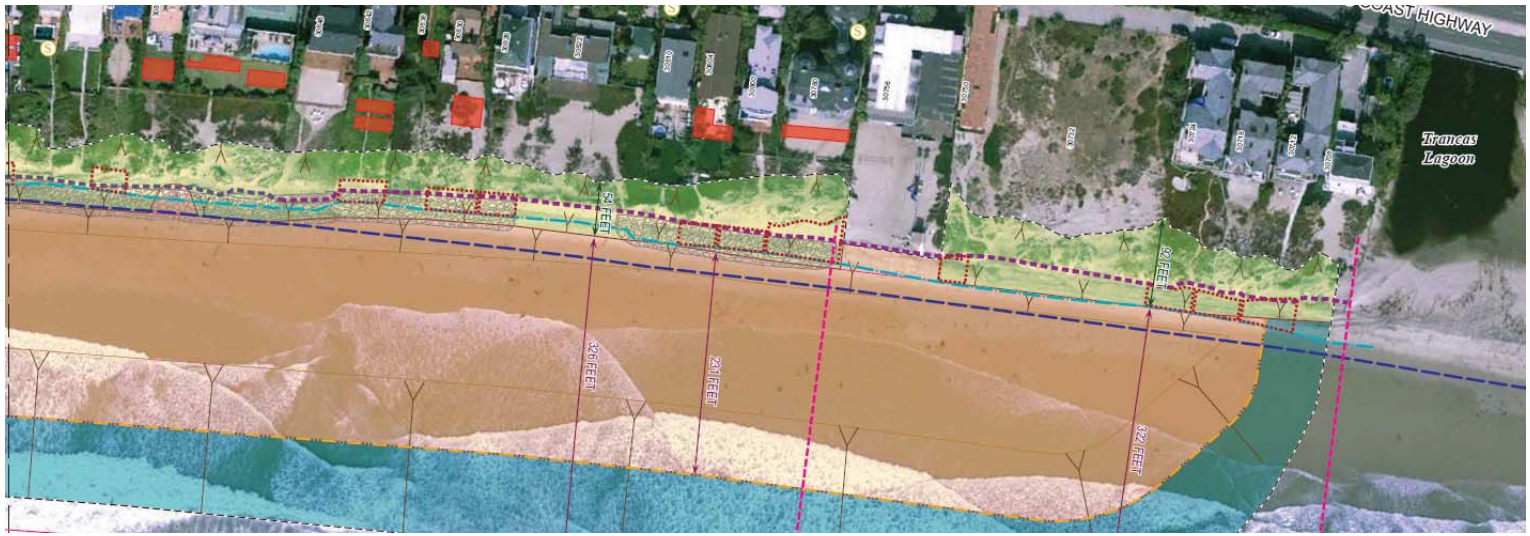
Subtidal and Intertidal Habitat Impacts

- Initial revetment placement and armoring
- Burial and increased turbidity
- Loss of surfgrass in Lechuza Cove
- Increased turbidity and sand redistribution
- Backpassing impacts to sandy intertidal



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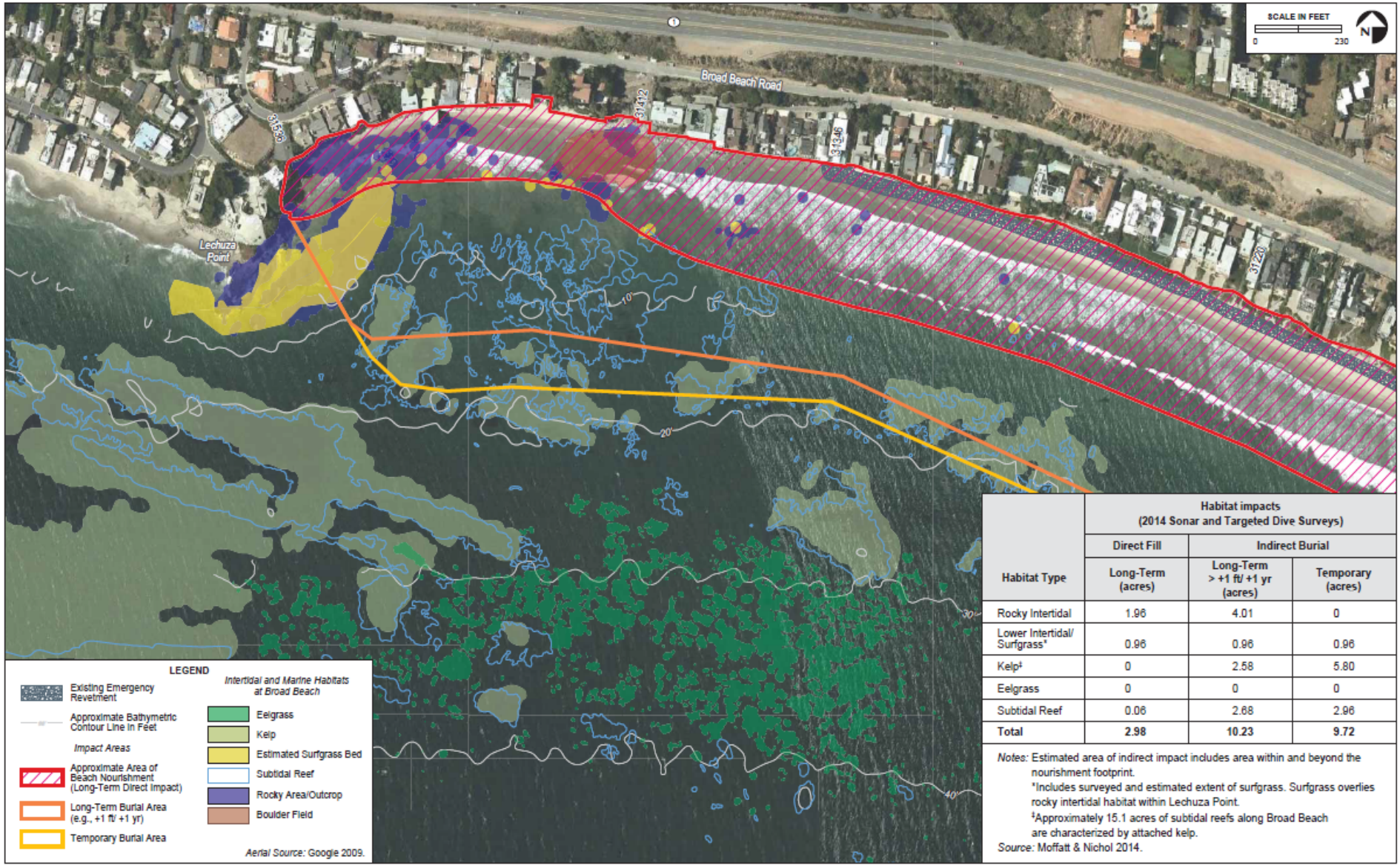

Habitat Type	Habitat impacts (2014 Sonar and Targeted Dive Surveys)		
	Direct Fill	Indirect Burial	
	Long-Term (acres)	Long-Term > +1 ft/ +1 yr (acres)	Temporary (acres)
Rocky Intertidal	1.96	4.01	0
Lower Intertidal/ Surfgrass*	0.96	0.96	0.96
Kelp‡	0	2.58	5.80
Eelgrass	0	0	0
Subtidal Reef	0.06	2.68	2.96
Total	**2.98**	**10.23**	**9.72**

Notes: Estimated area of indirect impact includes area within and beyond the nourishment footprint.
*Includes surveyed and estimated extent of surfgrass. Surfgrass overlies rocky intertidal habitat within Lechuza Point.
‡Approximately 15.1 acres of subtidal reefs along Broad Beach are characterized by attached kelp.
Source: Moffatt & Nichol 2014.

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Avoidance and Minimization Measures

- Multi-Agency Collaboration for Sensitive Marine Habitat Impacts
  - Coordination with CCC, CDFW, NMFS, USACE, and CSLC for review and endorsement of all marine habitat baseline surveys, impact analyses, and appropriate monitoring and any compensation for impacts
- Sand Placement Footprint Limitation
  - Fill within Lechuza Cove limited to 120 feet
  - Placed in two separate intervals

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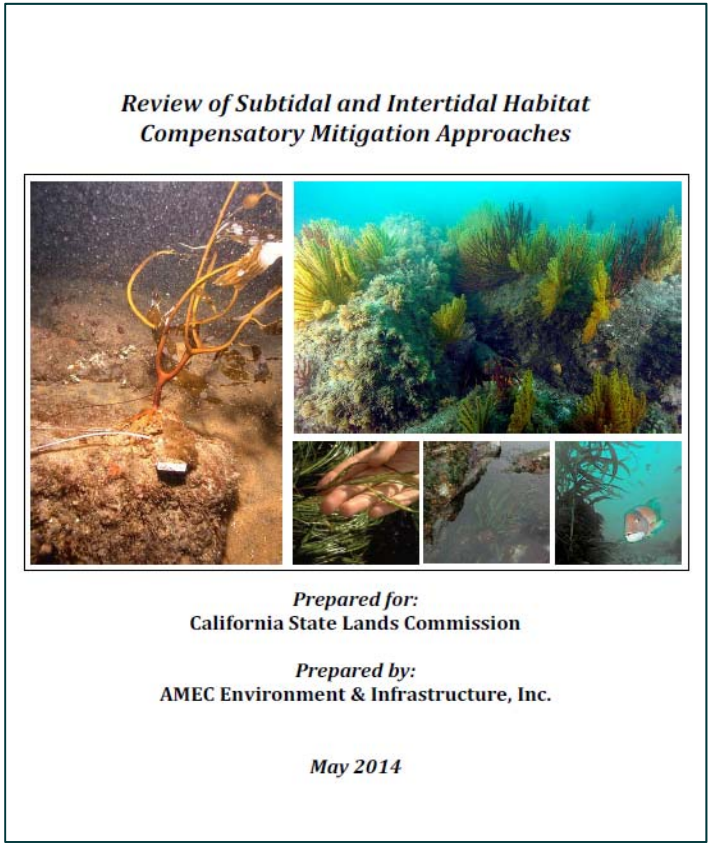
Review of Mitigation Approaches

- Describes approaches and examples
  - Offshore rocky reefs
  - Rocky intertidal and surfgrass
  - Eelgrass



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Approaches & Mechanisms

- Approaches
  - Restoration
  - Enhancement
  - Establishment
  - Preservation
- Mechanisms
  - Permitee-responsible compensatory mitigation
  - Mitigation banks
  - In-lieu fee mitigation

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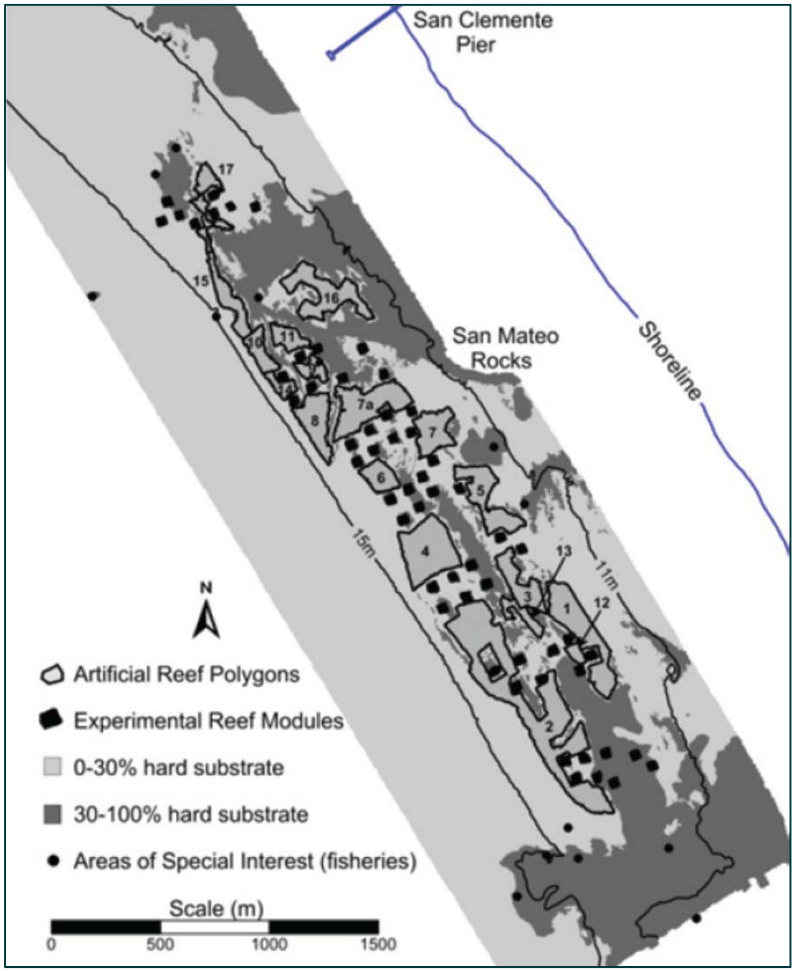
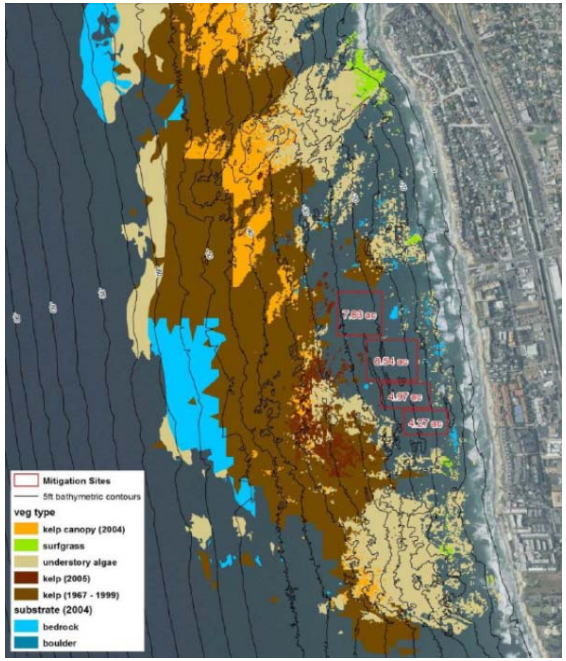
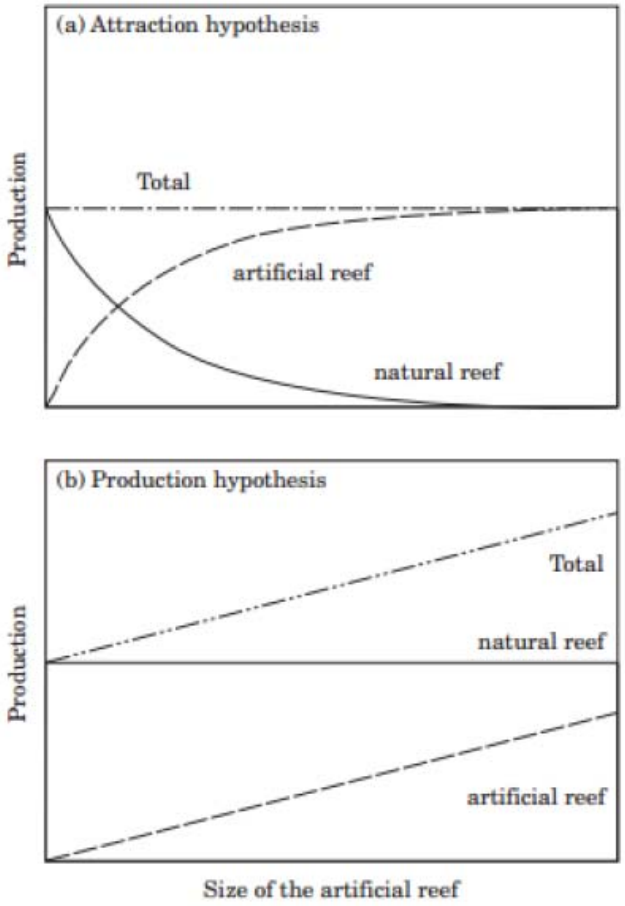
Offshore Rocky Reef Establishment





Offshore Rocky Reef Establishment (Continued)

- Artificial reefs both increase production and redistribute fish
- Effectiveness depends on design, depth, exposure to nutrients



Rocky Subtidal & Intertidal Enhancement

- Limited to planting of kelp beds or sea urchin removal (e.g., Santa Monica Bay Restoration Foundation)
- Rocky intertidal restoration limited due to dynamic, high stress environment
- Artificial intertidal structures do not typically support assemblages of mobile intertidal species

Surfgrass Restoration

- Recovery of surfgrass following disturbance is slow
- Long-term burial of hard substrate inhibits recovery
- Outplanting seeds/seedlings more affective in the subtidal zone than intertidal zone
- Selection of an appropriate site most important

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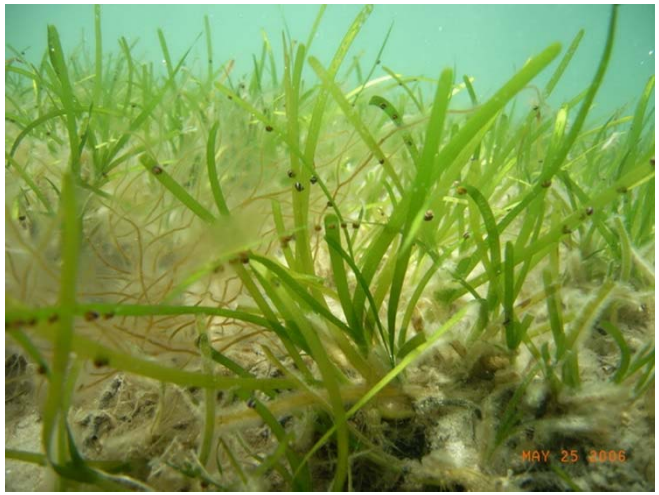
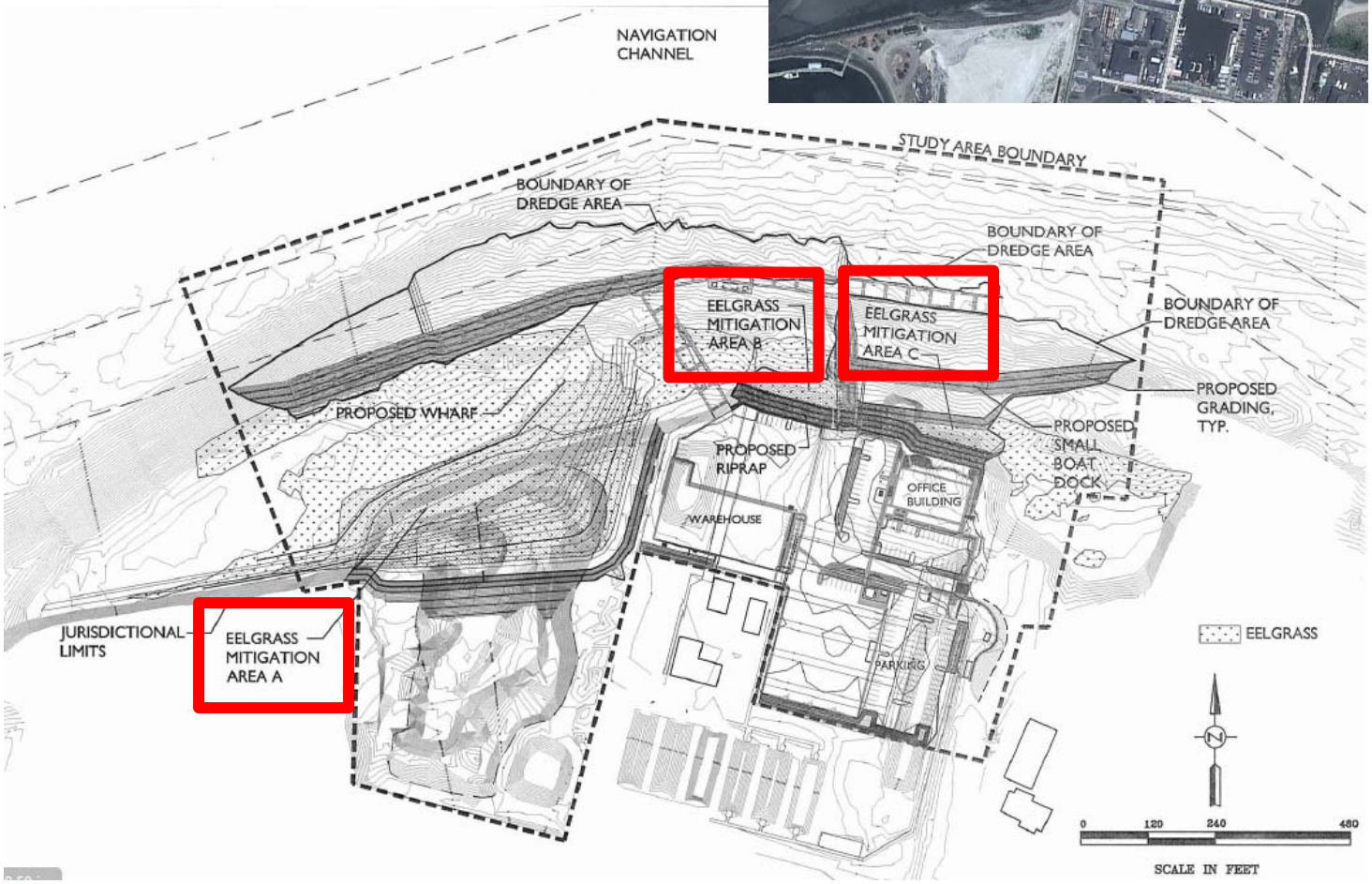
Eelgrass Establishment & Enhancement

- Eelgrass impacted by increased turbidity, dredging, construction
- 36 eelgrass transplant projects in California
- Frenchy's Cove, Anacapa Island
- NOAA-MOC-P, Newport Oregon

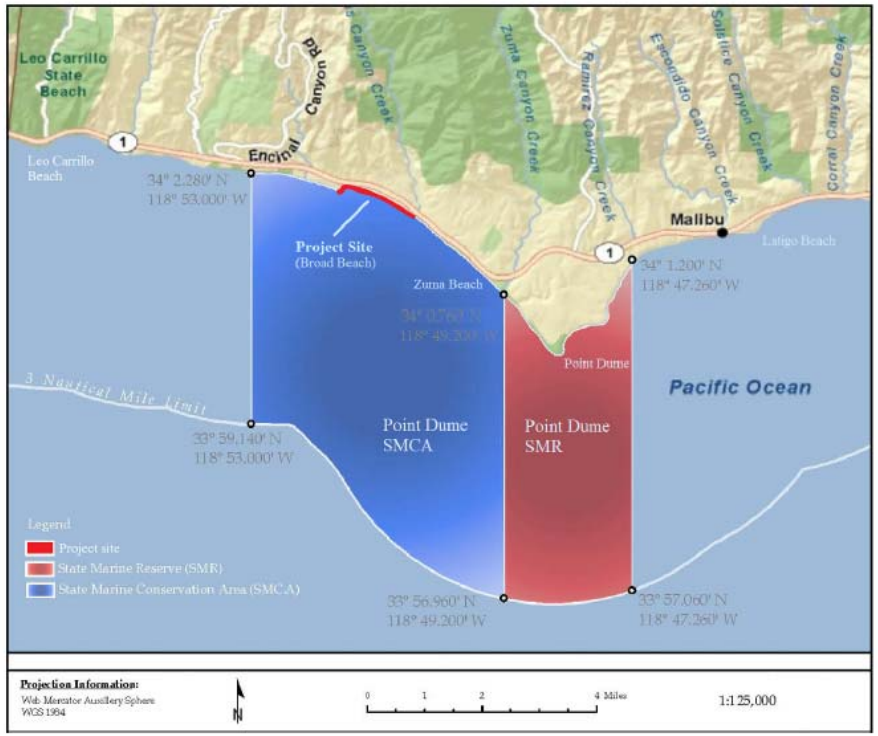


NOAA-MOC-P

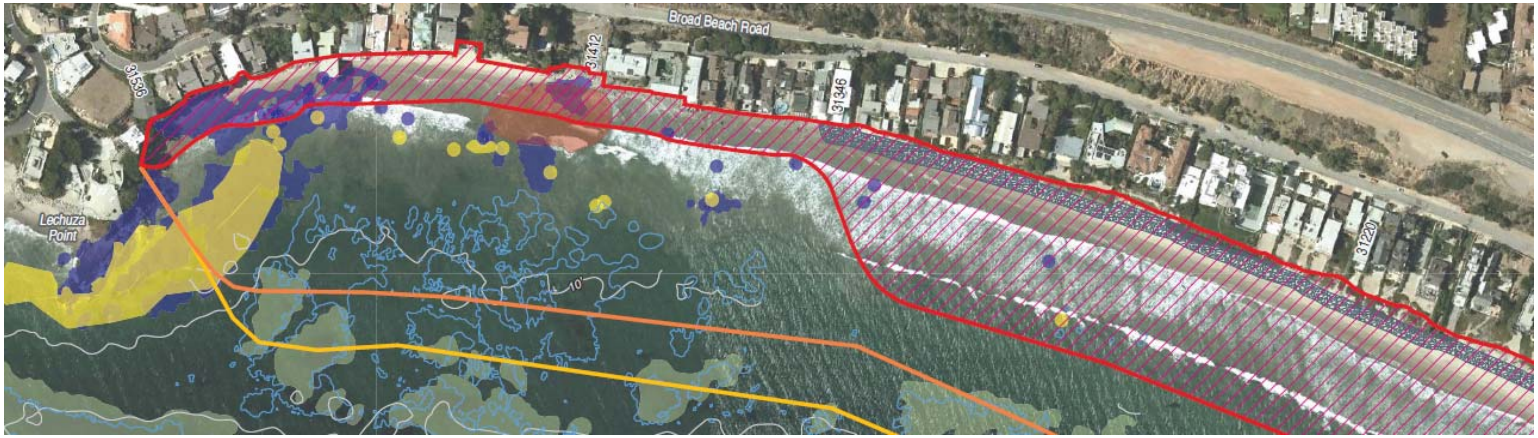

NAVIGATION CHANNEL
STUDY AREA BOUNDARY
BOUNDARY OF DREDGE AREA
BOUNDARY OF DREDGE AREA
BOUNDARY OF DREDGE AREA
EELGRASS MITIGATION AREA B
EELGRASS MITIGATION AREA C
PROPOSED WHARF
PROPOSED GRADING, TYP.
PROPOSED SMALL BOAT DOCK
PROPOSED RIPRAP
OFFICE BUILDING
WAREHOUSE
JURISDICTIONAL LIMITS
EELGRASS MITIGATION AREA A
PARKING
EELGRASS
0
120
240
480
SCALE IN FEET

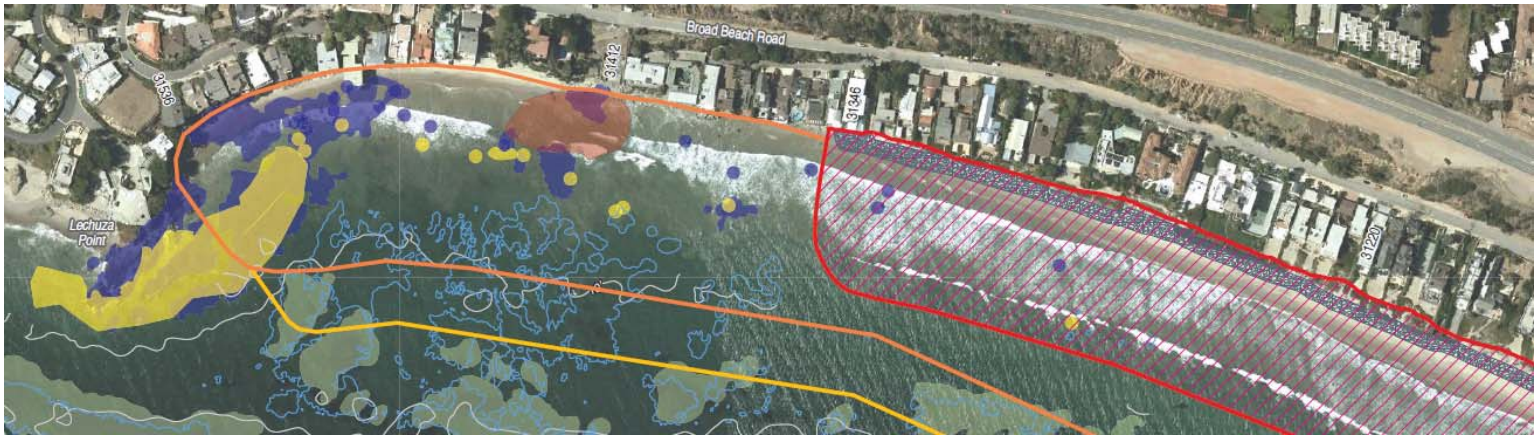
Preservation

- Does not result in a net gain of aquatic habitats
- Preservation is best applied in conjunction with restoration and/or enhancement



Alternatives





amec foster wheeler

QUESTIONS?