CSMW WORKSHOP SERIES

Coastal Sediment Management Workgroup

RESOURCE PROTECTION GUIDELINE DEVELOPMENT RELATED TO COASTAL REGIONAL SEDIMENT MANAGEMENT

CSMW Workshop 7, 2010
August 4, 2010

Coastal Sediment Management Workgroup

- Introductions and Background
- Assessing Impacts of Sediment Management Projects
- Monitoring Sediment Management Projects
- Recommendations and Tools to Facilitate Protection of Resources
- Workshop Process and Products

SAIC From Science to Solutions

Introductions

Sponsor Agencies

- California Sediment Management Workgroup (CSMW)
- Monterey Bay National Marine Sanctuary (NMS)

Contract Agencies

- Beach Erosion Authority for Clean Oceans and Nourishment (BEACON)
- USACE, Los Angeles District (Moffatt & Nichol contract)

Project Manager/Moderator

- Science Applications International Corporation

Introductions

CSMW Co-Chairs

USACE:	George Domurat
	Heather Schlosser, Project Manager and lead coastal planner, Los Angeles District
CA Natural Resources Agency:	Brian Baird
	Chris Potter – Staff liaison
CSMW Project Manager:	Clif Davenport
Monterey Bay NMS:	Brad Damitz
SAIC Project Manager:	Karen Green

Background

- Coastal Sediment Management Workgroup Efforts and Work Products
- Biological Impact Analysis (BIA) Document
- Workshop Purpose and Objectives
- Resource Protection Guidelines and User's Guide Organization

Coastal Sediment Management Workgroup

Federal

USACE
- SPL
- SPN

USGS
NOAA
USEPA
MMS

State

Natural Resources Agency
- Boating & Waterways
- Coastal Commission
- Parks & Recreation
- Geological Survey
- Fish & Game
- Coastal Conservancy

SWRCB
Ocean Protection Council

Local

Cal Coast (local agencies)

Regional Entities

NGOs

CMANC (Ports & Harbors)

CSMW Mission and Goals

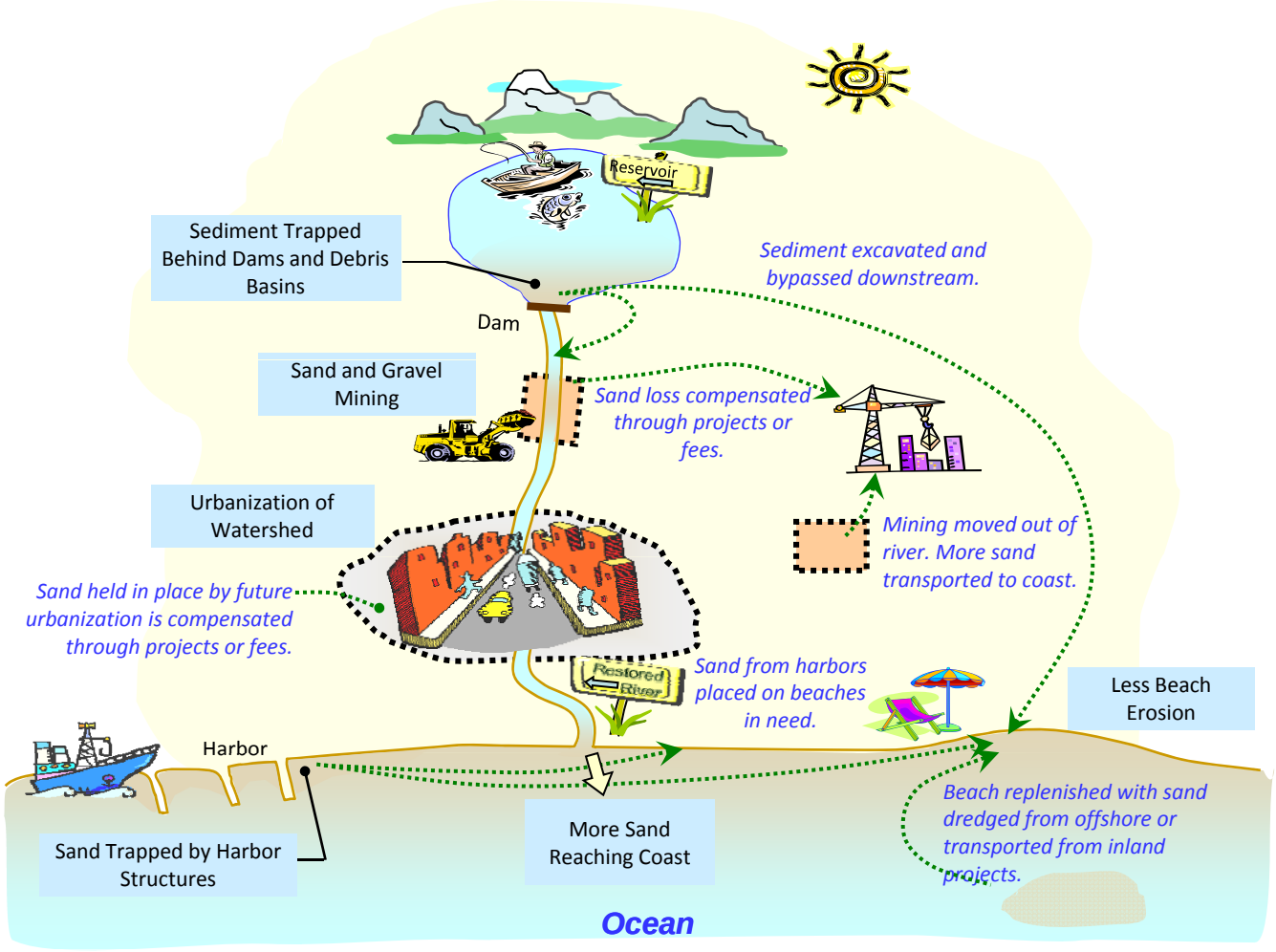
Mission

Conserve, restore, and protect California's coastal resources by developing and facilitating regional approaches to managing sediment imbalances.

Goals

- ***To reduce shoreline erosion and coastal storm damages;***
- ***restore and protect beaches and coastal habitat by restoring natural sediment supply from rivers, impoundments and other sources to the coast; and***
- ***optimize the use of sediment from ports, harbors, and other opportunistic sources.***

Regional Sediment Management- Road to Solutions

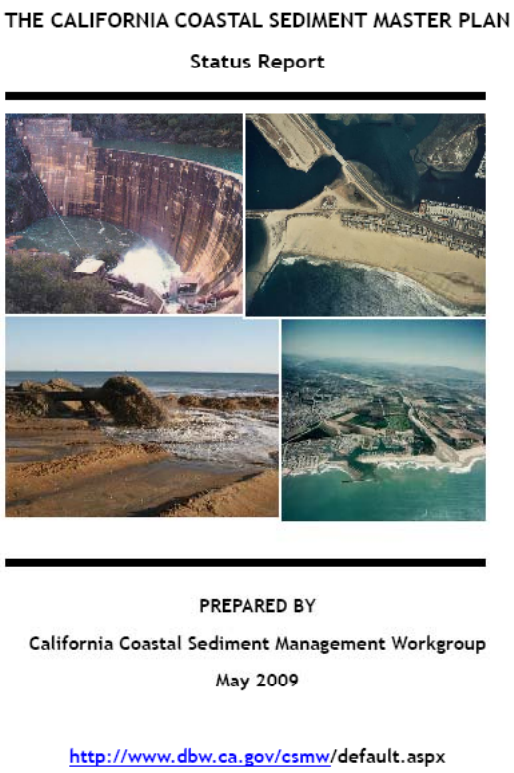


Regional Sediment (Sand) Management

COASTAL SEDIMENT MASTER PLAN

Deliverables:

- ✓ Educational materials, reports & data
- ✓ Computer-based decision support tools
- ✓ Regional-based Coastal RSM Plans.
- ✓ Agency outreach to incorporate RSM


THE CALIFORNIA COASTAL SEDIMENT MASTER PLAN

Status Report

PREPARED BY

California Coastal Sediment Management Workgroup

May 2009

http://www.dbw.ca.gov/csmw/default.aspx

Educational & Informational Reports and Data

- Biological Impacts Analysis and Recommendations
- Cumulative Loss of Sediment Due to Dams
- The Economics of Regional Sediment Management in Ventura and Santa Barbara Counties
- Beaches, Littoral Drift and Littoral Cells -understanding California's Shoreline and Beach Nourishment
- Beach Restoration Regulatory Guide
- Sand Compatibility and Opportunistic Use Program (SCOUP)
- SMP Status Report and Brochure
- Development of Sand Budgets for California's Major Littoral Cells
- Tijuana Estuary Demonstration Program
- Sources, Dispersal & Fate of Fine Sediment Supplied to Coastal California
- Public Outreach & Workshops
- Conceptual Plan to Capture/Reuse Coastal Sediments Lost to Submarine Canyons
- California Beach Erosion Assessment Survey (CBEAS)

Biological Information Analysis (BIA) Study

✓ Eight public and three technical workshops in 2004: Broad spectrum of attendees

✓Participants asked to identify biological issues of concern (amongst other things)

✓General consensus: better information needed to better determine whether and when sediment management activities could cause environmental problems

✓CSMW commissioned a study to:

- ✓Assess what was known about critical biota and habitat,
- ✓ compile adverse and beneficial impacts from sediment management activities
- ✓ summarize important findings for educational perspectives, and
- ✓Provide mitigation guidance for consistent project methodologies to facilitate environmental assessments and permitting

✓ CSMW commissioned academic and obtained agency review:

- ✓ Reviews all generally positive and supportive
- ✓ Reviewers had recommendations for improvements or requested additional information.

Academic and Agency Review

Peer Review commissioned for academic balance:

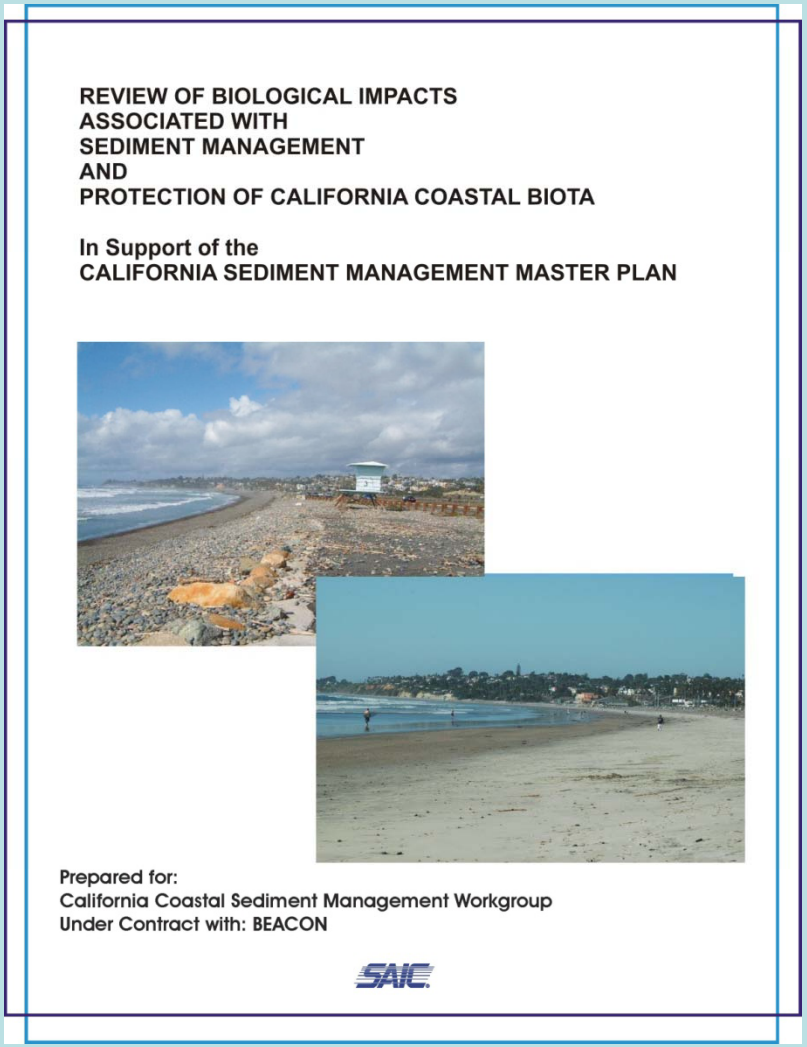
- Dr. Steven Schroeter – UCSB and CCC-SAP
- overall positive commendations and support.

CSMW's cochair requested additional review:

- Resource & Regulatory Agencies
  CDFG, NMFS, USACE Regulatory
- Coastal Managers of Sanctuaries and Protected Areas
  ONMS-WRCO, MBNMS
- Coastal Wetlands Biologist
  SCCWRP

Reviews were all generally positive and supportive on what and how we were trying to accomplish. Several reviewers had recommendations for improvements or requested additional information above and beyond that contained within the report.

Biological Impact Analysis (BIA) Report



REVIEW OF BIOLOGICAL IMPACTS
ASSOCIATED WITH
SEDIMENT MANAGEMENT
AND
PROTECTION OF CALIFORNIA COASTAL BIOTA

In Support of the
CALIFORNIA SEDIMENT MANAGEMENT MASTER PLAN

Prepared for:
California Coastal Sediment Management Workgroup
Under Contract with: BEACON

SAIC

Comprehensive Summary Document

- 10 Chapters
- 4 Appendices

- Technical Summaries - California coastal habitats and biological resources - increase understanding of how sediment management may affect them.
- Balanced summaries of types of impacts and issues of concern.
- Review of mitigation measures, monitoring, and effectiveness considerations.
- Science-based recommendations to protect coastal biota during sediment management activities.

Standardized Ecological and Response Information

- Regulatory Status
- Distribution
- Functions & Species Supported
- Life History Facts
- Resilience
- Reported Responses
- Case Studies

Habitat and/or Species:

Habitat	
Species Common Name	
Species Scientific Name	

Regulatory Status:

Endangered	
Threatened	
CDFG Managed	
Essential Fish Habitat	
Other	
None	

Distribution:

Life Stage or Function	California			On Land	Inter-tidal	Near-shore < 30 ft	Off-shore > 30 ft	Exposed and/or Protected Coast
	South	Central	North					
Primary Habitat								
Foraging Habitat								
Nesting/Spawning Habitat								
Resting/Roosting Habitat								

Functions:

Associated Species	Primary Habitat	Forage Habitat	Spawning Nesting Habitat	Resting Habitat	Fisheries Habitat		Forage Prey
					Commercial	Sport	
Invertebrates							
Reptiles							
Birds							
Vegetation							
Mammals							
T&E Species							

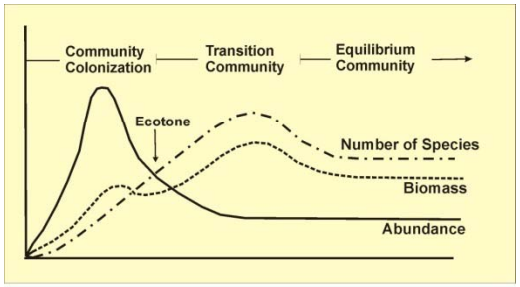
Life History Facts:

Reproduction		Growth Season	Dormancy Season	Migratory Season	Longevity Life Span	Motility
Method	Season					
Egg/Nest Egg/Spawn Flower/Seed Planktonic Spores Vegetative	Months	Months	Months	Months	Annual 1-3 Years > 3 Years	Sedentary

SAIC From Science to Solutions

Summaries – *Understanding the Impact*

- **Technical Data by Issue Area**
  - Equipment
  - Burial, Sedimentation
  - Water Quality



Distance or Time from Disturbance

Unconfined hydraulic discharge

Hydraulic discharge behind dike

Photos from SANDAG

Table 5.3-1. Noise levels associated with operation of different types of construction and marine equipment.

Dredges and Construction Equipment	Airborne Noise dBA at 50 ft (15 m)	Dredges and Other Marine Equipment	Underwater Noise dB (re 1 μPa)
Clamshell dredge[2]	76	Large clamshell bucket dredge (sands)[3a]	99 to 124 (RMS) at 500 ft (150 m)
Bucket dredge	75-88	Small clamshell bucket dredge (soft sediments)[3a]	107 (RMS) distance not reported
Hopper dredge, dredging[1]	82	Bucket dredge[3b]	150 to 162 distance not reported
Hopper dredge, discharging[1]	79	Barge loading[3a]	108.6 (RMS) at 500 ft (150 m)
Backhoe (average)*	72-90	Barge discharge[3a]	96 to 108.7 (RMS) at 1,035 ft (316 m)
Backhoe**	84-93	Trailing suction hopper dredge[4]	183 to 195 normalized at 3 ft (1 m)
Bulldozer **	85 -103	Trailing suction hopper dredge[4]	162 to 175 normalized at 33 ft (10 m)
Compressor (average)*	73-88	Trailing suction hopper dredge[4]	142 to 155 normalized at 328 ft (100 m)
Crane (average)*	74-89	**Other Marine Equipment**	
Crane **	90 - 102	Vessel Traffic (ambient)*	130 (peak)
Excavator (average)*	81-97	Ferry Terminal*	131-136 (peak)
Front loader (average)*	72-90	Cable laying[5]	160 at 800 ft (244 m)
Front-end loader**	86-94	Sonar devices*	150 to 215 distance not reported
Generator (average)*	71-82	Pile driving[6]	177 to 220 (peak) at 33 ft (10 m)
Grader (average)*	79-93		
Heavy trucks (average)*	82-96		
Pile driver (peak)*	81-115		
Pumps (average)*	68-80		
Roller (average)*	72-75		

Sources:
Construction equipment: WSDOT 2006*, http://www.cdc.gov/elcosh/docs/d0500/d000573/d000573.html**
Dredges (dBA) = Chambers Group 1992[1], Helix cited in Chambers Group 2000[2], Boeing 2005[7]
Dredges and other marine equipment (dB re 1 μPa) = Dickerson et al. 2001[3a], Miles et al. 1986 and 1987 cited in Dickerson et al. 2001[3b], Bassett Acoustics 2005[4], City of Pittsburg 2005[5], Hastings and Popper 2005[6]
Note: Underwater noise values may be referenced as peak, RMS, or either of these reference levels may not be reported.

Mitigation Summaries – *What Has Been Implemented*

Coastal Sediment Management Workgroup

Table . Schedule and prohibition zones used in association with beach nourishment and/or replenishment projects to protect sensitive fish species.

Document	SAND Volume (cy)	% Fines	Species	Schedule	Prohibition Zone	Other Measures
USACE 1998 Crescent City EA	65,000	sandy	Rockfish	late Aug-Sep		To avoid spawning
Chambers 2002. Biological Analysis (Goleta Beach Winter Dike)	4,000 to 8,000	NA	Grunion	Fall/winter		Coordinate berm removal prior to Memorial Day weekend outside predicted grunion run, grunion monitoring conducted, and removal operations limited to areas with no grunion or will cease until no grunion present.
Chambers 2001, Mitigated Negative Declaration (BEACON South Central Coast)	100,000	Up to 25	Grunion Steelhead	Schedule between Sept 15 and Mar 15 avoids spawning season at most sites.		(1) Monitor grunion if project conducted during spawning season with curtailment of construction and/or construction of protective berms as necessary to protect and allow eggs to hatch. (2) Monitor inlets of Goleta Slough, Carpinteria Creek and Ventura River, if sedimentation closes inlets, will be opened with bulldozers.
SANDAG and U.S. Navy 2000, EIR/EA, San Diego Regional Beach Sand Project)	2,000,000	1-51, mainly <10	Grunion	Pre-construction surveys to determine habitat suitability, monitoring during construction, buffer or move operations		

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Summaries – *Monitoring Requirements*

Table . Representative water quality monitoring requirements associated with beach nourishment and/or sand placement projects in California.

Example Projects	Permit and/or Document	Monitoring Observations	Dredge and/or Nearshore Disposal Receiving Water Monitoring	Beach Monitoring
San Diego Beach Sand Project 2001	RWQCB 401 Certification File No. 00C-063 (Project implemented per described in application, including monitoring water column). USACE 1999-15076-RLK, USFWS Biological Opinion FWS Log. No. 1-6-01-F-1046.	Visual observations during water quality monitoring: 1. current speed/direction 2. tidal stage, 3. trash, debris, 4. odors	1. Daily Water Quality for first week, followed by weekly. Sampling Locations: A. 250 ft (75 m) downdrift, B. 500 ft (150 m) downdrift, C. 250 ft (75 m) updrift, D. 500 ft (150 m) updrift, E. Control 1000-1500 ft (300-450 m) from dredge, F. 1000-1500 ft (300-450 m) from dredge and at least 500 ft (150 m) from first control. Analyzed for dissolved oxygen, turbidity (NTU and Secchi disk), temperature, conductivity, pH. *Monitoring Plan Criteria:* turbidity not to exceed ambient by more than 20%. 2. Water clarity within top 3 ft of water column < 3ft with Secchi disk. *USFWS/USACE Criteria:* reduction in water clarity no more than 2.47 acres (1 hectare).	1. Daily nearshore water clarity within top 3 ft of water column < 3ft with Secchi disk immediately west of active wave break on beach. *USFWS/USACE Criteria:* reduction in water clarity no more than 2.47 acres (1 hectare). 2. Weekly Bacteria. Three replicate samples collected offshore discharge point. Analyzed for total and fecal coliform. *Monitoring Plan Criteria:* If any sample exceeds 200/100 ml, notify and additional sampling until standards met for 3 consecutive days.
Oceanside Harbor Dredging 1998	RWQCB Waste Discharge Requirements W98B0016 (Jan 1998 Modification)	Daily visual observations for: 1. current speed/direction 2. tidal stage, 3. trash, debris, 4. oil/petroleum materials, 5. discoloration/ extent of visible turbidity plume, 6. odors	1. Daily Turbidity - Secchi disk or turbidity meter. Sampling locations at dredge and nearshore disposal site: a. 30 m (100 ft) downdrift, b. 75 m (250 ft) downdrift, c. 150 m (500 ft) updrift, d. control 300-450 m (1000-1500 ft) updrift, e. control 300-450 m (1000-1500 ft) updrift and at least 150 m (500 ft) from first control. *Criteria: none specified.* 2. Water Samples each dredge cycle. Sampling locations a-c, f-h. Analyzed for TSS, hydrogen sulfide, polar & non polar oil & grease. *Criteria: none specified.*	1. Daily Turbidity - Secchi disk or turbidity meter. Sampling locations: k. 900 m (3000 ft) updrift and 150 m (500 ft) offshore, l. 450 m (1500 ft) downdrift and 150 m (500 ft), m. directly offshore in plume. *Criteria: none specified.* 2. Bacteria weekly. Three replicate samples. Sampling location: 30 m (100 ft) downdrift. Analyzed for total and fecal coliform. *Criteria*: If any sample exceeds water contact standards, notify and additional daily sampling at 30, 60, 150, 300 m (100, 200, 500, 1000 ft) downdrift daily until no exceedance for 3 consecutive days.

Response to Comments and Completion of Biological Impact Analysis (BIA) Document

Coastal Sediment Management Workgroup

- Conduct Workshops
- Develop Resource Protection Guidelines
- Finalize BIA Document
- Prepare Abbreviated User's Guide
- Develop Work Plan

SAIC From Science to Solutions

Workshop Purpose:
Assist Development of Resource Protection Guidelines

Coastal Sediment Management Workgroup

Objectives:

Identify Opportunities to Refine Existing Guidelines, Improve Coordination with Other Relevant Programs, and Identify Guideline Considerations to Improve Resource Protection During Sediment Management Projects Relative to:

- ✓ **Assessing Impacts**
- ✓ **Monitoring**
- ✓ **New Tools**

SAIC From Science to Solutions

Workshop Series

Date (2010)	Location	Key Topics
February 18	Long Beach NOAA	General Approach to Guideline Development, Resource Agency Coordination
February 24	Sacramento EPA	Water Quality, Water-Sediment Resource Protection in Watersheds, Resource Protection Managed Areas
June 16	Carlsbad USFWS	Habitats: Sandy Beach, Dune/Strand, Sandy Subtidal
July 1	Monterey MBARI	Habitats: Rocky Intertidal, Rocky Subtidal, Surfgrass, Kelp Beds
July 13	Oakland SEI	Habitats: Bays, Lagoons, Eelgrass
July 14	Eureka Humboldt BRCD	Habitats: Bays/Wetlands and Commercial Fisheries
August 4	San Diego SCCWRP	Impact Assessment, Monitoring, Database Tools

User's Guide Organization

Objective: Streamline Document to Facilitate Practical Use to Agencies, Planners, Scientists

- Condensed Version BIA Document
- Overview Summaries
  - Key Elements (Sediment Management Activities, Project Types, Impact Issues By Project Phase, Monitoring, Performance Evaluation)
- Resource Protection Guidelines
  - Habitat-Based
  - Flow Path Approach (Resources, Impact Issues, Protective Measures, Monitoring Considerations)
  - Cross-Reference Tables (e.g., Habitat, Species, Impact Type, Project Phase)

Resource Protection Guideline Format

Habitat Based

Guidleline Descriptions

- Issue Statement
- Guideline Description
- Rationale
- References (As Applicable)
- Effectiveness Considerations

ASSESSING IMPACTS OF SEDIMENT MANAGEMENT PROJECTS

Coastal Sediment Management Workgroup

Round Table Discussion

- Types of Impacts
- Significance Criteria
- Impact Thresholds
- Guideline Considerations

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Types of Impacts

- **Direct Impacts**
  - Sediment Addition, Removal
  - Equipment Operation (Crush, Damage, Entrain),
  - Accidental Spills
- **Indirect Impacts**
  - Turbidity, Sedimentation
  - Sediment Properties
  - Forage Reduction
  - Disturbance (Noise, Lights, Activity)
- **Cumulative Impacts**

Types of Impacts - Cumulative

"…Results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions ..." (40 CFR 1508.7).

- Time lags – delayed effects; Cross boundary – away from the source.
- Time crowding – repeated effects from an action in the same area.
- Space crowding – high density of different impacts in the same area.
- Additive – multiple sources that all add to an overall impact.
- Compounding – multiple sources that interact to yield impact greater than additive effects of individual source impacts.
- Nibbling – combination of effects taking place slowly, incrementally or decrementally.
- Fragmentation – impact results in change of landscape pattern.
- Triggers and thresholds – fundamental change in system behavior or structure.

Impact Assessment - Issues

CEQA/NEPA

- Inconsistent significance criteria
- Inconsistent thresholds of significance
- Data Gaps

Significance Criteria – *What Has Been Used*

Table D.1. Significance criteria that have been used for evaluating potential impacts to biological resources associated with representative California sediment management projects.

Type of Criteria					
Federal and/or State Listed Sensitive Species	**Essential Fish Habitat**	**Native Species and/or Other Sensitive Resources**	**Wildlife Movement**	**Commercial Fishing**	**Environmental Policies**
Northern California					
USACE 1998c, Crescent City Harbor O&M Dredging, Del Norte County California, EA and FONSI					
Forceful effect causing change in existing conditions.		Forceful effect causing change in existing conditions.	Forceful effect causing change in existing conditions.		
USACE 2002c, Operations & Maintenance Dredging of the Moss Landing Harbor Federal Channels, Monterey County, California, EA and FONSI					
If it is expected to affect the population status of a State or Federally listed, proposed, or candidate species or is expected to affect the breeding or foraging habitat of such a species so as to result in increased mortality or reduced reproductive success.		Causes the loss or long-term degradation of any environmentally sensitive habitat. Causes a measurable change in species composition or abundance of a sensitive community or causes a substantial change to marine habitat within the harbor or bay for a period of five years or longer. An impact is a forceful effect causing a change in conditions.	Interferes substantially with the movement of any resident or migratory fish or wildlife species.		
Central California					
USACE 2001, Morro Bay Harbor Six-Year Maintenance Dredging Program, Final EA					
Not specified, but potential to impact threatened and endangered species assessed.	Not specified, but potential impacts to grunion and essential fish habitat assessed.	Not specified, but potential impacts to plankton, invertebrates assessed		Not specified, but potential for impacts to commercial oyster bed assessed.	

Categories of Significance Criteria

- Federal- and/or State-Listed Sensitive Species
- Other Sensitive Species (Rare, Unique)
- Essential Fish Habitat (EFH).
- Native Species and Habitats
- Wildlife Movement
- Commercial Fishing
- Environmental policies

Thresholds of Significance

CEQA Implementing Guidelines

An identifiable quantitative, qualitative or performance level of a particular environmental effect, non-compliance with which means the effect will normally be determined to be significant by the agency and compliance with which means the effect normally will be determined to be less than significant (§15064.7).

Significance Considerations

- Magnitude of effect
- Duration of effect
- Sensitivity of resource
- Resiliency of resource
- Scale of impact
- Duration of impact
- Potential for habitat loss
- Potential for habitat degradation
- Potential for population impact
- Potential for cumulative impact
- Other?

Impact Factors – *Project Scale*

Table 5.2-5. Reported adverse effects by project size for representative sediment management projects.

Project Size	Volume (cy)	Beach Nourishment	Dredging
Very Small	1,000 to 25,000		McCauley et al. 1977
Small	25,000 to 100,000	Chambers Group 2004	VanDolah et al. 1984
Moderate	100,000 to 500,000	AMEC 2005, Culter and Mahadeven 1982, Coastal Planning and Engineering 2004b**, Lindeman and Snyder 1999**, Marsh and Turbeville 1981*, Peterson et al. 2000a*, SAIC 2006, Saloman and Naughton 1984	Culter and Mahadeven 1982 Courtenay et al. 1972**, Johnson and Nelson 1985, Marsh and Turbeville 1981*, Saloman et al. 1982, Sabol et al. 2005*
Moderately Large	500,000 to 1,000,000	Coastal Planning and Engineering 2004a,c Gorzelany and Nelson 1987, Parr et al. 1978	
Large	1,000,000 to 5,000,000	Coastal Planning and Engineering 2004a** Jutte et al. 1999, Reilly and Bellis 1983*	Jutte et al. 2002
Very Large	> 5,000,000	Burlas et al. 2001, Rakocinski et al. 1996*, Versar 2004*	Burlas et al. 2001

*Adverse impact to recovery of benthic infaunal invertebrates reported, ** adverse impact to hard bottom habitat reported

Sensitive Species
Endangered, Threatened, Rare, Unique

Potential to Affect Individuals

- Direct impact of individual
- Indirectly disturb or harass
- Increase noise and/or night-time lighting above ambient to level proven to adversely affect

Potential to Affect habitat

- Habitat loss
- Adversely impact critical habitat
- Substantially impact [degrade] critical foraging habitat
- Substantially impact [degrade] breeding habitat

Sensitive Species
Individual, Habitat, Population

Potential to Affect Populations

- Breeding impaired
- Restriction of range
- Impact regional long-term survival
- Impact 5 percent or more of a listed-species population within local region

Essential Fish Habitat

Waters-Substrate Necessary for Spawning, Breeding, Feeding, Growth to Maturity

Potential for Adverse Effect (50 CFR 600.810(a)).

- Reduces quality and/or quantity of EFH - direct or indirect physical, chemical, or biological alterations of the waters or substrate .
- Loss of, or injury to, benthic prey and their habitat, and other ecosystem components, if they reduce the quality and/or quantity of EFH.
- Adverse effects may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Potential for Substantial Adverse Effect

- Pose a relatively serious threat to EFH; e.g., major harbor development with significant dredging and filling, channel realignments, or shoreline stabilization near EFH.

Essential Fish Habitat

Waters-Substrate Necessary for Spawning, Breeding, Feeding, Growth to Maturity

Examples of criteria and significance thresholds that have been applied to California sediment management projects:

- Adversely affect fisheries protected under essential fish habitat designation.
- Substantial adverse effects would occur to fish species or habitat listed in the Fishery Management Plans.

Need to Address Both Habitat Quantity and Quality

Native Habitats and Resources

County of Santa Barbara (2006) :

- Substantially reduce or eliminate species diversity or abundance.
- Substantially reduce or eliminate quantity or quality of nesting areas.
- Substantially limit reproductive capacity through losses of individuals or habitat.
- Substantially fragment, eliminate, or otherwise disrupt foraging areas and/or access to food sources.

Native Habitats and Resources

County of San Diego (2006) :

- Prevent wildlife access to foraging habitat, breeding habitat, water sources, or other areas for their reproduction.
- Substantially interfere with habitat connectivity or substantially interfere with wildlife corridor or linkage.
- Create artificial wildlife corridors that do not follow natural movement patterns.
- Increase noise and/or nighttime lighting in a wildlife corridor or linkage to levels proven to affect the behavior of the animals identified in a site-specific analysis of wildlife movement.

Native Habitats and Resources

Sediment Management Document Examples :

- Burial of ≥10 % of a shoreline or subtidal habitat for a period > 1 year that is attributable to the sediment program.
- Substantial loss of native population or habitat (e.g., change that is detectible over natural variability for a period of 5 years or longer).
- Net loss in habitat value of a sensitive biological habitat including marine mammal haul-out site or breeding area, seabird rookery, or Area of Special Biological Significance.
- Loss of a population or habitat for a period of time that would substantially reduce the ability of the resource to recover.
- Create a long-term (over 10 years) measurable change in species composition and/or abundance beyond that of normal variability, and/or measurable change in ecological function within a localized area.

Water Quality
Thresholds of Significance

- Violate water quality criteria in the California Ocean Plan.
- Adversely affect water quality over the long-term.
- Endanger public health by creating or worsening health hazards conditions.
- Objectionable aquatic growths or development of nuisance species was enhanced
- Damage or threaten sensitive habitats or unique biological characteristics due to turbidity.

Sandy Habitats (Dune, Beach, Subtidal) and Resources -Thresholds of Significance

Beach

- Sensitive Resources – Snowy Plover
- Critical Habitat – Snowy Plover
- Managed Resources – Grunion Spawning, Pismo Clam
- Wildlife Considerations
  - Recovery of Invertebrate Prey
  - Shorebird Foraging, Breeding, Resting
  - Marine Mammal Haul Outs
- Adversely affect an individual or population of a threatened or endangered species or their critical habitat.
- Adversely impact grunion spawning or laid eggs.
- Result in a long-term reduction in diversity and abundance of the invertebrate prey base.
- Reduce habitat quality (foraging, breeding , resting) for native wildlife.

Rocky Habitats (Intertidal, Subtidal) and Resources -Thresholds of Significance

- Loss or disturbance or reduction in the numbers of or a restriction in the range of any unique, rare, threatened, or endangered species.
- Irreversible removal, loss, or substantial degradation of sensitive hard bottom habitats.
- Sensitive habitats include high relief reefs and vegetated low relief reefs. Indicator species are feather boa kelp (*Egregia menziesii*), giant kelp (*Macrocystis pyrifera*), surfgrass (*Phyllospadix* spp.), large sea fans (*Muricea* spp.), and sea palms (*Eisensia arborea*).

Vegetated Habitats (Eelgrass, Surfgrass, Kelp Beds) – Thresholds of Significance

Document Examples

- Irreversible removal, loss, or substantial degradation of sensitive vegetated habitats.
- Sedimentation for a period of time that would substantially reduce the ability of the resource to recover; e.g.,
  - Surfgrass with > 2/3 sand burial for > 6 months.
- The loss of 10 percent or more of surfgrass habitat which does not recover over a period of one year following shoreline sediment placement activities.

Wildlife Movement
Interference, Barriers to Movement

- Interferes (or impedes) substantially with the movement of any resident or migratory fish or wildlife species.
- Cause the introduction of any factors that could hinder the normal activities of wildlife or cause a deterioration of their habitat.
- Introduction of barriers to movement of any resident or migratory fish or wildlife species and/or introduction of any factors which could hinder the normal activities of wildlife (e.g., light, fencing, noise, human presence, and/or domestic animals) .

Wildlife Movement
Interference, Barriers to Movement

Sediment Management Projects – Impact Factors

Physical alteration of habitat

- Berms, Scarps
- Channels
- Degradation

Barriers

Shoaling (inlet closure)

Pipelines, Equipment

Interference, Disturbance

Turbidity

Noise

Night-time Lighting

Increased activity

Commercial Fisheries

- Potential for impacts to commercial oyster beds.
- Permanently exclude 10% or more of a local fishing area.
- Preclusion from productive fishing grounds for more than 10% of the open or peak season.
- Precluded fishing activity by 10% or more during the peak season.
- Commercial fish/shellfish population reduced by 10% or more in the local area.
- 10% or more of the fishermen regularly using fishing grounds in the project area are precluded from fishing for 10% or more of the open or peak season.
- Increase in loss or damage to traps and nets.

Environmental Policies

- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

MONITORING SEDIMENT MANAGEMENT PROJECTS

Round Table Discussion

- Project Phases
- Permit Requirements
- Monitoring Objectives
- Methodology
- Performance Evaluation

Monitoring – Objectives

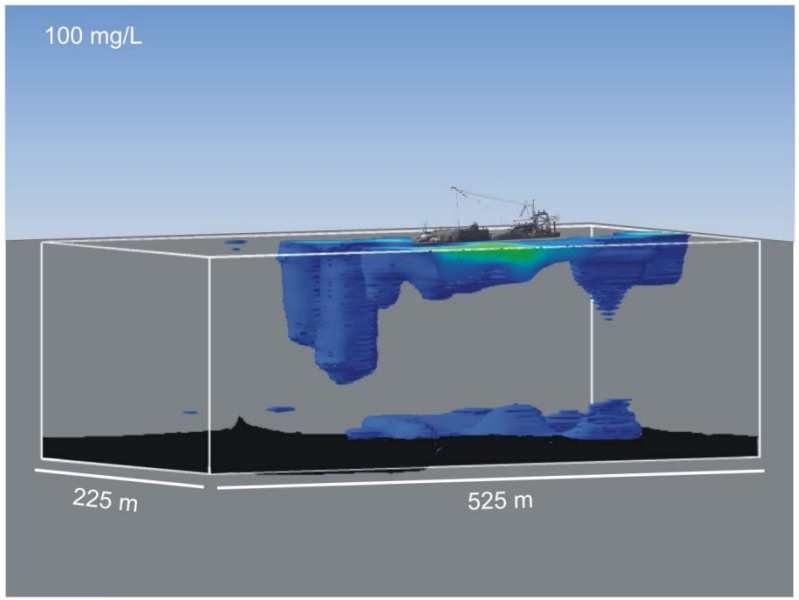
- **Pre-construction Monitoring**
  - Constraints surveys
  - Sensitive species or habitat verification
  - Nuisance species verification (e.g., Caulerpa)
- **Construction Monitoring**
  - Compliance
  - Sensitive Species Protection
- **Post-Construction Monitoring**
  - Impact Verification
  - Performance Evaluation

Water Quality Monitoring – Objectives

- **401 Water Quality Certification**
  - **Compliance**
    - **Ocean Plan**
    - **Enclosed Bays and Estuaries**
    - **AB-411 Bacteriological Standards**
  - **Measurements**
    - **Visual – Discoloration, debris, odors, oil-grease**
    - **Turbidity – Secchi Disk, NTU, TSS**
    - **Dissolved oxygen, pH**
    - **Bacteria**
    - **Objectionable aquatic growths**

Turbidity Monitoring – *Sediment Compatibility & Operational Controls*

- **Nearshore biota adapted to short term high turbidity levels, vulnerable to prolonged exposures** ***(Published general consensus).***
- **RWQCB requirement inconsistencies - monitoring variables and distances (*Limit comparisons among projects, and understanding of appropriate buffers distances)*.**
- **Turbidity control measures often employed, but often not reported – (*Limit understanding of effectiveness of measures).***



Monitoring Requirements Inconsistent

- **Measurement Locations**
  - (a) within plume and (b) in waters unaffected by discharge
  - Stations
    - 200 ft
    - 100, 200, 500 ft
    - 100, 300, 1,000, 1,300 ft
    - 250, 500, 1,000-1,500 ft
    - Close to discharge, one-half mile upcoast, one-half mile downcoast
- **Methods**
  - Turbidity (e.g., Secchi depth, NTU, transmissometer, TSS, plume)
- **Criteria**
  - Within 20% of ambient
  - Turbidity instantaneous maximum 225 NTU, 30-day average 75 NTU, daily average 100 NTU
  - Turbidity Near Source no more than 20% over Control Station.

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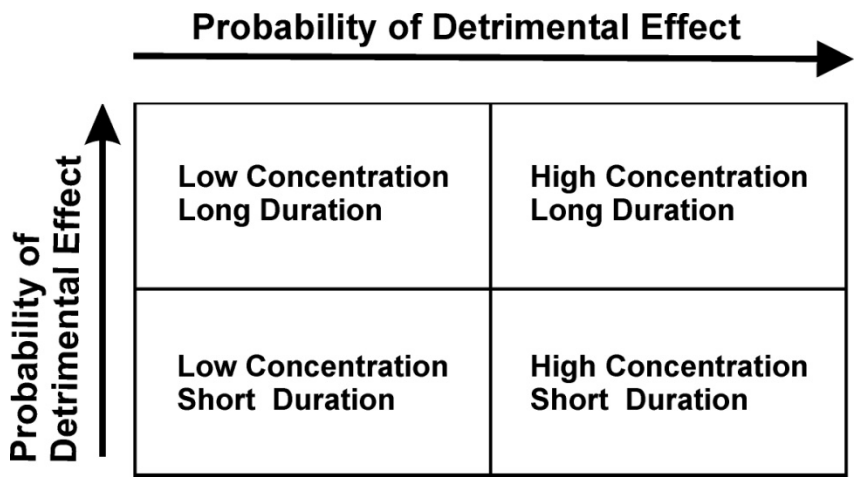
Issues and Guideline Considerations

- **Existing Methods and Criteria**
  - 20% of ambient – appears precautionary, but may be exceeded
  - Inconsistent distances limit understanding of impact gradients
  - Not biologically based
  - Exceedances due to natural environmental conditions (e.g., >20%) does not permit evaluation of whether impact thresholds are exceeded
- **Biological Issues**
  - Bird Foraging – Water Clarity
  - Fish Foraging/Respiration – Water Clarity, Total Suspended Solids
  - Invertebrate Recruitment/Feeding – Total Suspended Solids
  - Vegetation Growth – Light Transmission

Biological Impact Considerations



Redrawn from: Clarke and Wilber 2000

Figure 5.5-12. Categories of potential impact risk from turbidity.

LaSalle et al. 1991 – 500 mg/L generally "safe" value

Strand and Dune Vegetation

Issue of Concern

Direct damage

Resource Protection

- Flag and establish no work zones to protect vegetation.
- Establish 50-ft vehicle corridors to minimize disturbance.
- Support pipelines above ground if they must cross dunes or strand vegetation.

Monitoring Considerations

Construction Phase – Compliance verification.

Beach Wrack

Issue of Concern

Indirect reduction in food quality and quantity if removed

Resource Protection

- Retain wrack on beach (move or replace, as appropriate).

Monitoring Considerations

Construction Phase – Compliance verification.

Invertebrates

Issues of Concern

Direct loss, disturbance,
Indirect interference of recruitment
Recovery

Resource Protection

- Minimize difference in grain size characteristics unless change represents enhancement.
- Minimize shell, coarse substrate, debris.
- Avoid repetitive disturbance in same year.
- Incorporate refuge areas to promote recovery, if appropriate.
- Avoid stockpiling below the ordinary high water line.
- Minimize change to bathymetry and hydrodynamics.
- Schedule outside peak (spring-summer) recruitment period if possible.

Photo credit: Danny Heilprin, SAIC

Invertebrates

Monitoring Considerations

Pre-Construction Phase

- Sediment testing
- Invertebrate function

Construction Phase

- Sediment compatibility inspections
- Water quality compliance

Post Construction Phase

- Sediment Testing
- Invertebrate function

Pismo Clam

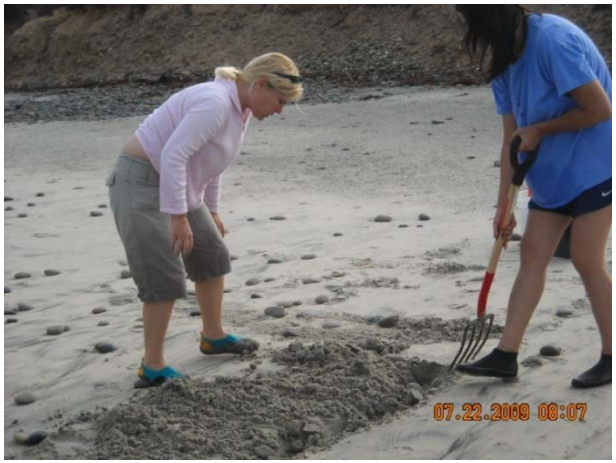
Issues of Concern

Direct impact to Pismo clam beds

Indirect interference with recruitment

Resource Protection

- Avoid burial
- Minimize turbidity



Monitoring Considerations

Pre-construction Phase – Verify presence/absence

Construction Phase – Water quality compliance

Dungeness Crab

Photo credit: http://www.noaa.gov

Issues of Concern

Direct damage, entrainment

Resource Protection

- Environmental work windows in areas where there is breeding or recruitment concentration.
- Avoid hydraulic pumping operations if the cutterhead or dragarm is within 3 ft of the bottom.
- Reduce turbidity near nursery areas (e.g., silt curtains, operation controls, as appropriate).

Monitoring Considerations

Construction Phase – Water quality compliance.

Grunion

Issues of Concern

Direct loss of spawned eggs

Indirect interference with beach spawning

Resource Protection

- Schedule outside spawning season.
- Avoid working in the areas where and when the eggs are incubating.
- Redirect or halt work to protect spawning fish or eggs.

Monitoring Considerations

Pre-construction Phase - Verify habitat suitability

Construction Phase – Monitor predicted runs to verify presence/absence

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Salmonids

Chinook Salmon, Coho Salmon, Steelhead

Photo credit: Danny Heilprin, SAIC

Issues of Concern

Direct entrainment

Indirect sedimentation, turbidity, noise, lights

Protection Considerations

- Schedule within approved environmental work windows.
- Avoid hydraulic pumping operations if the cutterhead or dragarm is within 3 ft of the bottom.
- Avoid night-time dredging in areas of salmonid outmigration.
- Minimize sedimentation and turbidity of nursery habitat.
- Avoid obstructing tributaries used by salmonids.

Monitoring Considerations

Construction Phase – Water quality compliance.

Pacific Herring

Photo credit: Warren E. Savary and Luis A. Solorzano, californiabiota.com

Issues of Concern

Direct damage
Indirect sedimentation, turbidity

Protection Considerations

- Schedule within approved environmental work windows.
- Minimize sedimentation and turbidity of eelgrass meadows and other spawning sites.

Monitoring Considerations

Construction Phase – Water quality compliance.

Snowy Plover

Breeding Season
March 1-September 15

Issues of Concern

Direct disturbance

Protection Considerations

- Consult with USFWS if project area is within critical habitat, supports nesting, or overwintering.
- Schedule outside breeding season if within 1,500 ft (457 m) of nest sites during the breeding season (RGP 67).
- Use measures to minimize invertebrate recovery.
- Maintain noise at ambient levels or < 60 dB at nest sites.
- Direct or shield lights away from nest sites.

Monitoring Considerations

Pre-construction Phase - Verify presence/absence.

Construction Phase – Monitor disturbance effects.

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Least Tern

Breeding Season
April 1-September 15

Issues of Concern

Direct disturbance
Indirect turbidity interference

Protection Considerations

- Consult with USFWS if project is ≤1 mile (1.6 km) of a nesting colony.
- Schedule outside breeding season if within 3,000 ft (914 m) of nest sites during the breeding season (RGP 67).
- Use measures to reduce turbidity (e.g., silt curtains, operation controls, as appropriate).
- Maintain ambient or near surface water clarity near nesting sites (e.g., Secchi depth ≥ 3 ft or the same as ambient).
- Maintain noise at ambient levels or < 60 dB at nest sites.
- Direct or shield lights away from nest sites.

Monitoring Considerations

Construction Phase – Water quality compliance.

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Rocky Reef / Kelp Beds

Photo credit: San Diego Nearshore Program
http://nearshore.ucsd.edu/

Issues of Concern

Direct damage

Indirect sedimentation, turbidity

Resource Protection

- Minimize turbidity and sedimentation based on considerations such as distance, project Size, duration, or sediment characteristics.
- Minimize reduction of near bottom light levels to <15% of surface irradiance.
- Establish vessel corridor routes to avoid kelp beds.
- Establish anchor and pipelines plans to avoid hard bottom areas.

Monitoring Considerations

Construction Phase – Water quality compliance, turbidity plume.

Post-Construction Phase – Impact verification

Rocky Intertidal/Surfgrass

Issues of Concern

Direct burial, damage

Indirect sedimentation, turbidity

Resource Protection

- Avoid direct burial.
- Measures to minimize sedimentation
- Prepare anchor, dredge, and pipelines plans to [illegible] potential disturbance near eelgrass areas.

Monitoring Considerations

Construction Phase – Water quality compliance, turbidity plume.

Post-Construction Phase – Impact verification

Eelgrass

Photo credit: Annie Eicher
*www.dfg.ca.gov/marine/abmp/**eelgrass**.asp*

Issues of Concern

Direct damage

Indirect sedimentation, turbidity

Resource Protection Considerations

- Avoid equipment in eelgrass meadows.
- Prepare anchor, dredge, and pipelines plans to avoid or minimize potential disturbance near eelgrass areas.
- Minimize reduction of near bottom light levels to <20% of surface irradiance.

Monitoring Considerations

Construction Phase – Water quality compliance, turbidity plume.

Post-Construction Phase – Impact verification

Marine Mammals

Issues of Concern

Indirect Disturbance, Turbidity

Resource Protection

- Minimize turbidity and sedimentation.
- Minimize use of construction equipment within 1,000 feet of seal haul-outs or within 2,000 feet if pups are present.
- Buffer distance to attenuate noise < 60 dB or ambient near areas of concentration.

Monitoring Considerations

Construction Phase – Water quality compliance.

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RECOMMENDATIONS AND TOOLS

Round Table Discussion

- Data Gaps and Recommendations
- Database and GIS Tools
- Models

Issues of Concern - Data Gaps

Data Gaps

- **Adequate buffers - sensitive habitats and/or species.**
  - **Turbidity (gradient) for biologically relevant water quality data (suspended solids, water clarity, light transmission).**
  - **Post project sedimentation (depth, persistence) risk in areas with sensitive nearshore reefs and vegetated habitats.**
- **Project volume relationships to environmental constraints.**
- **Effectiveness of protective measures.**

Consequence

- **Difficult to advance progress with environmentally sensitive designs**
- **Lack of substantial weight of scientific data to address challenges**

RECOMMENDATIONS - *Protective Design*

- ***Match Design to Environmental Constraints***

  Design to avoid and/or minimize impacts to sensitive resources

- ***Biological Evaluation and/or Survey***

  Avoid sensitive resources

- ***Project Size (volume, duration)***

  Consider constraints. - e.g., smaller volumes at multiple sites more sensitive than large fill

- ***Buffers***

  Reduce potential for indirect impacts to sensitive resources

- ***Sand Compatibility***

  Match to minimize impact and speed recovery

Fill Critical Data Gaps

- ***Impact Processes - Turbidity and Sedimentation***
  - ***Monitoring Standardization,***
  - ***Increased Biological Relevance***
  - ***Buffers***
- ***Environmental Benefits***
  - ***Sandy Beach Habitat***
  - ***Shoreline Protection, Sea Level Rise***
  - ***Ecosystem Benefits in Cost-Benefit Ratio Formulations***

Increase Consistency and Standardization

- CEQA/NEPA – Adopt Thresholds of Significance
- Establish Resource Protection Guidelines
- Standardize Monitoring
  - Water quality gradient distances, parameters
  - Indicators
  - Protocols
- Document Mitigation Effectiveness
- Monitoring Feedback – Adaptively Improve Design

Database and GIS Tools

- Regional Sensitive Biological Resources
- Regional Cumulative Projects
- Monitoring

Sediment Transport Models

- **Validate performance**
  - *Compare predictions with beach profile monitoring data*
- **Gain Better Understanding of Model Assumptions**
  - *Beach Nourishment Sediment Compatibility*
- **Tailor for California Local Conditions**
  - *Validate and Improve Accuracy of Sediment Transport Models*

Final Remarks

Workshop Process and Products

- ✓ Workshops
- ✓ Summarize Received Input
- ✓ Develop Draft Guidelines
- ✓ Guideline Review
- ✓ Incorporate Guidelines into Documents
  - BIA Document
  - User's Guide

Next Steps

- Workshops - Feb-August 2010
- Draft Guidelines - Oct 2010
- Guideline Review - Oct-Nov 2010
- Finalize BIA Document - Dec-Jan 2010
- User's Guide - Dec 2010 - Jan 2011
- Work Plan - Dec 2010 – Jan 2011

Workshop Series

Date (2010)	Location	Key Topics
February 18	Long Beach NOAA	General Approach to Guideline Development, Resource Agency Coordination
February 24	Sacramento EPA	Water Quality, Water-Sediment Resource Protection in Watersheds, Resource Protection Managed Areas
June 16	Carlsbad USFWS	Habitats: Sandy Beach, Dune/Strand, Sandy Subtidal
July 1	Monterey MBARI	Habitats: Rocky Intertidal, Rocky Subtidal, Surfgrass, Kelp Beds
July 13	Oakland SEI	Habitats: Bays, Lagoons, Eelgrass
July 14	Eureka Humboldt BRCD	Habitats: Bays/Wetlands and Commercial Fisheries
August 4	San Diego SCCWRP	Impact Assessment, Monitoring, Database Tools

Next Steps

Workshop Participation

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Document Links

- http://www.dbw.ca.gov/CSMW/default.aspx