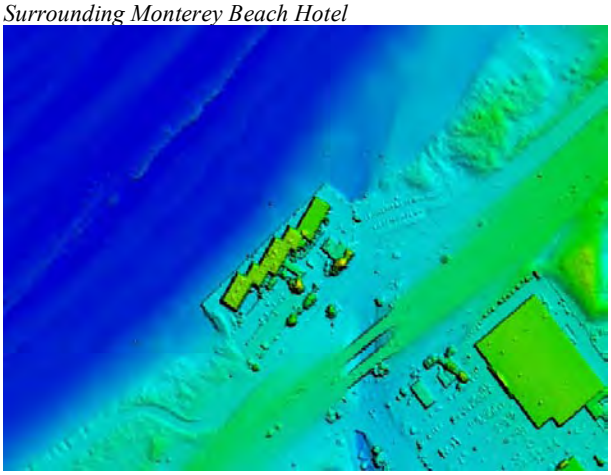
Coastal Armoring Action Plan

Goal

Reduce expansion of hard coastal armoring in the coastal areas near the MBNMS through proactive regional planning, project tracking, and comprehensive permit analysis and compliance.

Figure CA-1: NOAA LIDAR Image of Armored Coastline Surrounding Monterey Beach Hotel



Introduction

Shoreline protective structures have been used extensively along California's coastline to protect infrastructure and other development from wave action, or to retain soil to avoid erosion. Private landowners and local, state, or federal governments have typically installed structures in an attempt to protect development threatened by coastal erosion. Structures have also been installed to protect public infrastructure such as Highway 1, which in some stretches is vulnerable to erosion related to bluff retreat. This practice is commonly known as coastal armoring, and seawalls, bulkheads and revetments are some of the structures that are used. Seawalls are barriers, usually vertical walls, between the land and water that protect from wave erosion. A bulkhead is used as a retainer, providing protection and stabilizing the land that it supports. Revetments are protective structures placed along slopes and are constructed of a sturdy material such as stone.

Increases in development and continued, natural erosion of coastal bluffs will cause additional pressure to install structures to protect private and public property from erosion. Development is continuing to occur in vulnerable areas along California's coast, followed by a desire to protect both private and public property. The situation presents a serious predicament to both resource managers and property owners. However, it is clear that current policies need strengthening, and there is a need to develop collaborative approaches to address the issues of erosion and the demand for coastal armoring, including improved guidance to enable better decision making.

Sanctuary regulations prohibit alteration of the seabed, and all armoring structures placed below the mean high tide line require approval from the MBNMS. The Sanctuary regulates coastal armoring by authorizing California Coastal Commission permits, and placing specific conditions on those permits. Many seawalls have been constructed with no notification to or authorization from the MBNMS. Since 1992, MBNMS review of seawalls primarily focused on minimizing impacts from the construction process rather than long-term impacts from the armoring itself. Since its designation, MBNMS has reviewed and authorized California Coastal Commission permits for seawalls, riprap or other coastal armoring projects at fifteen sites. Only a portion of the total coastal armoring projects underway in the region came to the Sanctuary for review, clearly indicating a need for improved inter-agency coordination.

As with any activity that alters natural processes, there can be significant long-term impacts related to coastal armoring. Environmental impacts of coastal armoring vary significantly depending on the type of structure constructed, the magnitude of the project, and the specific geological, biological, and oceanographic conditions in the vicinity of the structure. Coastal armoring can potentially damage or alter local coastal habitats, deprive beaches of sand, lead to accelerated erosion of adjacent beaches, hinder access, and present problems with public safety. Coastal armoring projects may impede and eventually cut off access to significant stretches of public beaches.

Currents, waves, and wind normally transport sediment throughout the littoral system. Armoring of the coast can interfere with littoral transport, which in a natural state may reach a dynamic equilibrium. When the availability of sediment is reduced due to the existence of a structure, erosion can increase in other nearby locations. Vertical structures in particular can deflect wave energy causing increased erosion and altering natural habitat in front of the structure. Reflected wave energy may make it difficult for organisms to inhabit the area because of high turbidity.

Coastal armoring can negatively impact certain biological resources by causing changes in abundance and distribution of species. Coastal armoring structures can influence the structure of benthic communities, due to potential differences in settlement patterns for natural substrates and armoring structures. Armoring structures can encroach into the intertidal zone or disturb important buffer areas such as marsh habitat between the marine and terrestrial environments, which naturally mitigate erosion, and play an important role in flushing certain contaminants.[2] Certain structures can also provide habitat for predatory species not normally associated with the beach and intertidal zone such as rats and squirrels, which can feed on intertidal organisms, compete for food with native species, and transmit disease. Additionally, coastal armoring can act as a barrier to wildlife, by blocking access of certain species to the beach.

The construction phase of coastal armoring projects generally causes short-term impacts, lasting only a few days to a few weeks. Problems include increased turbidity caused by suspended solids in the immediate vicinity of the construction site, and the risk of chemicals or other materials entering the ocean from construction activities. Structures constructed in the intertidal zone generally have more impact than those constructed above the high tide line. Many short-term construction impacts can be minimized through appropriate mitigation measures, including scheduling of the construction phase to reduce impacts by considering animal migration patterns and spawning patterns or specific actions such as the use of silt curtains. However, the long-term impacts of coastal armoring projects are more difficult to address or prevent, and they are a key focus of this action plan.

Strategy CA-1: Conduct Issue Characterization and Needs Assessment

Implementation of this strategy will identify existing information and data gaps, and compile and produce the necessary scientific data and evaluation tools. This will also involve an in-depth analysis of a subregion of the MBNMS and then development of a long-term monitoring program based on its success.

Activity 1.1: Produce MBNMS-wide Maps and Database for use as Planning and Permit Review Tools

The MBNMS will coordinate with partners to map existing coastal armoring sites and potential future site requests based on evaluation of coastal erosion rates and development patterns. The MBNMS will also coordinate with partners to develop a regional integrated database and Geographic Information System (GIS) layers showing land use types, parcels, coastal armoring locations, beach and bluff erosion and replenishment rates, bottom types, biological habitats, and geology/geomorphology. This database system should become integrated with Sanctuary Integrated Monitoring Network (SIMoN) to facilitate use by other agencies and the public.

Activity 1.2: Compile and Analyze Ecological and Socioeconomic Data

This activity is a long-term characterization that will begin as a pilot project with an in-depth analysis on a critical subregion. The MBNMS will first coordinate with partners to identify methods and to assess individual and cumulative impacts of coastal armoring on sand supply dynamics, marine biological habitats and ecosystems, and public access. Compilation of this data should include studies to estimate coastal bluff erosion rates, and shoreline change rates and a regional evaluation of sand transport dynamics and beach nourishment.

Activity 1.3: Incorporate Data and link with State Programs

Incorporate data into maps and database from Activity 1.1, and link to State of California's COASTAL SEDIMENT MANAGEMENT MASTER PLAN.

Activity 1.4: Develop and Implement a Long-term Monitoring Program

Quantify and compare the impacts of different types of coastal armoring structures in various habitat types and conditions. Considerations for monitoring program include intertidal biological community structure, changes in beaches, wave refraction patterns, and impacts on sand budget.

Strategy CA-2: Develop and Implement Regional Approach to Coastal Armoring

MBNMS will collaborate with partners to develop and implement a more proactive and comprehensive regional approach that minimizes the negative impacts of coastal armoring. This approach will consider impacts throughout the life of the structure from construction and maintenance to the long-term cumulative impacts.

Activity 2.1: Apply Hierarchy of Preferred Responses to Erosion

The MBNMS will use the following hierarchy of responses as preferred approaches to addressing coastal erosion that may threaten structures.

A. *Use of preventative measures*
   Identify and evaluate preventative measures aimed at reducing the need for coastal armoring. Considerations may include increased setback requirements, incorporation of a "no hard armoring" policy (possibly in covenants, codes, and restrictions) for new subdivisions or situations when coastal agricultural land is converted to development, re-alignment of coastal roads and highways, and new setback requirements to be established for demolition/rebuild projects in urbanized areas.

B. *Alternatives to coastal armoring*
Identify and evaluate alternatives to coastal armoring, including but not limited to: (a) alternatives conforming to MBNMS regulations such as relocation of vulnerable structures, re-alignment of coastal infrastructure such as roads, bridges, and highways, and control of surficial erosion; and (b) alternatives not conforming to MBNMS regulations, including some sand supply strategies and artificial reef structures.

C. *Preferred types of coastal armoring*
In cases where armoring is deemed necessary, identify and evaluate the least environmentally damaging types of coastal armoring, including more natural alternatives for specific conditions and geographic locations, taking into account engineering, environmental, aesthetic and public access concerns.

Activity 2.2: Develop and Implement Guidelines for Identifying Sub-regions

Guidelines will be developed with partners to identify pristine or particularly sensitive areas where coastal armoring should be strongly discouraged or not allowed; urban zones that are already heavily armored and where efforts should focus on restoration and improved armoring techniques; and areas in-between where thorough case-by-case review and additional research is needed.

Activity 2.3: Identify Planning Sub-regions

MBNMS staff will work with partners to identify boundaries for sub-regions and consider measures developed in Activity 2.1 to determine planning approaches for each sub-region. Sub-region and size will be based on complexity and continuity of similar habitats or land uses. This may include continual habitats of rocky shores, sandy beaches, littoral cells, estuarine environments, and land use such as existing armoring, urban areas, rural coastlines, or beaches with heavy visitation. These areas will be identified based on ecological and land use criteria for identifying planning sub-regions for coastal armoring policies and strategies. Identifying sub-regions should be based on: (a) biological sensitivity of habitats; (b) physical considerations, including geological factors such as sediment sources and sinks, beach nourishment needs, shoreline orientation and erosion rates; and (c) development pressures, including the extent of existing armoring, potential for new armoring requests, types of structures to be protected, and level of development and infrastructure.

Activity 2.4: Develop Specific Planning Guidelines for each Sub-region

MBNMS staff will work with partners to develop specific planning guidelines for each sub-region identified in Activity 2.3, based on application of the hierarchical approach as stated in Activity 2.1. All policy development and application of guidelines to sub-regions should involve significant outreach to affected parties and agencies. Sub-regions will be addressed sequentially beginning with an initial pilot region in Southern Monterey Bay.

Activity 2.5: Develop Maintenance and Restoration Program

MBNMS staff will work with partners to develop a program for maintenance and restoration of existing armoring, including "clean-up" of poorly maintained sites, for both authorized and illegal structures. If or when maintenance is requested, MBNMS and partners will re-evaluate the need for protection. All maintenance and restoration programs should incorporate improvements in beach access and public safety. In heavily armored areas where maintenance is

necessary and appropriate, MBNMS and partners will consider the potential for installation of a comprehensive, uniform structure to replace multiple individual structures.

Activity 2.6: Reduce Need for Emergency Permits

The MBNMS will coordinate with partners to reduce the use of and need for emergency coastal development permits through better predictive erosion analyses, potential alteration of current guidelines regarding initiation of work, and more proactive regional planning. Staff will consider areas where it is appropriate to either initiate the work or develop alternative solutions, before the site becomes an emergency.

Activity 2.7: Broaden the Multi-Agency Enforcement Program

MBNMS will work with partners to develop cooperative enforcement mechanisms for inspection of permitted coastal armoring structures, tracking/notification and corrective action regarding illegal structures, assessment of fines, and removal of emergency structures that are not permitted to remain in place permanently.

Activity 2.8: Pursue Pilot Program for Alternatives to Coastal Armoring

Based on the scientific and needs assessment, MBNMS will pursue a pilot program to investigate environmentally sound alternatives to coastal armoring, and develop and implement monitoring protocols for the program. Alternatives will include but not be limited to: preventative measures, planned retreats, beach nourishment, and structural responses such as groins or breakwaters.

MBNMS will convene interagency working groups to identify and help design sub-region specific design alternatives for the coastal erosion responses identified in Activity 2.1. Considerations will include:

A. Identifying the suite of preventative measures such as restricting activities that contribute to erosion, predevelopment conditioning of projects and the necessary legal measures or relocation of structures such as road realignment or development demolition, or enhanced vegetation of exposed, erosion prone areas.
B. Identifying hard structures that may preempt erosion or help retain sand on beaches. Types of structures may include groins (narrow wooden or concrete constructions that extend from a shore into the sea to protect a beach from erosion), offshore seawalls, breakwater, or submerged structures such as artificial reefs that dissipate wave energy prior to reaching the shoreline. All hard structures would alter the seabed and therefore trigger review by MBNMS as a prohibited activity.
C. Identifying appropriate sources of beach quality material and one or more locations for one or more pilot demonstration projects that might receive an MBNMS scientific research permit (and other necessary agency permits) to test and develop appropriate sand supply and beach nourishment program options. MBNMS will develop a coordinating mechanism with the California Coastal Sediment Management Workgroup to promote the exchange of information and ideas. If appropriate sources of sand and potentially beneficial nourishment sites can be identified, the pilot study or studies would develop specific research objectives and study methodologies. Criteria for "success" will also be developed. The criteria could include minimal environmental impacts, recreational access, shoreline protection and habitat benefits, the potential for using maintained

nourishment to avoid or mitigate for shoreline armoring, and other identifiable overall benefits to MBNMS resources.

At the conclusion of this/these demonstration pilot project(s), the agency working group will evaluate the desirability of, and necessary steps for, continuing such a program involving beach nourishment within MBNMS boundaries. If the sand supply project is to continue, this evaluation will also examine whether revision of MBNMS regulations may be warranted, if a beneficial program might continue via MBNMS permit or authorization in concert with other regulatory agencies.

Strategy CA-3: Improve Permit Program

MBNMS will improve the current case-by-case permit system and strengthen coordination with other agencies regarding coastal armoring permit processing.

Activity 3.1: Integrate State and Federal Planning Programs

Where possible, MBNMS will link and integrate aspects of the MBNMS coastal armoring plan with California state erosion policy and Coastal Sediment Management Master Plan.

Activity 3.2: Develop Consistent Permitting Conditions

Following the initiation of regional analysis from Strategy 2, identify permit conditions and authorization criteria of the agencies involved in the regulation of coastal armoring. Staff will subsequently compare typical multi-agency seawall permit conditions, identify and discuss selected discrepancies, and where possible seek to rectify discrepancies.

Activity 3.3: Incorporate MBNMS Standard Conditions into Other Agency Permits

The MBNMS will coordinate with the California Coastal Commission to incorporate current MBNMS standard conditions regarding construction processes into Coastal Commission permits

Activity 3.4: Clarify Level of MBNMS Involvement in Projects and Develop Review Thresholds

MBNMS staff will develop and identify a threshold for full MBNMS review of selected projects based on overall footprint, location, and potential impacts, and ensure early communication on these projects.

Activity 3.5: Share Information with Other Agencies

MBNMS staff will continue to improve early sharing of information on projects and permits among all relevant agencies.

Activity 3.6: Conduct Permit Enforcement Inspections and Actions

The MBNMS will conduct enforcement inspections of permitted coastal armoring activities and follow up to ensure compliance with conditions of permits and authorizations. The MBNMS will conduct general surveillance patrols to detect coastal armoring activities being conducted without required permits.

Strategy CA-4: Implement Programs and Increase Training

MBNMS will provide outreach and training to local, state and federal agencies and the general public about the sanctuary's sub-regional approach to addressing the issue of coastal erosion.

Activity 4.1: Conduct Needs Assessment

MBNMS staff will conduct a needs assessment to determine best strategies for reaching target groups including: decision makers, agencies, coastal landowners, and coastal developers.

Activity 4.2: Conduct Outreach to Agencies and Property Owners

MBNMS will coordinate with partners to increase outreach to agencies not involved in the planning process, developers, and private property owners about regional approaches to coastal erosion, existing guidelines, and the impacts of coastal armoring.

Activity 4.3: Review and Comment on Local Land Use Decisions

MBNMS staff will track and evaluate local and regional land use decisions where coastal development may impact MBNMS resources. Where appropriate, produce verbal or written comments on specific projects.

Activity 4.4: Review and Comment on Local Coastal Program Updates

MBNMS will coordinate with the California Coastal Commission and local agencies during Local Coastal Program updates to improve existing policies and incorporate coastal armoring guidelines where possible.

Action Plan Partners: California Coastal Commission, United States Geological Survey, California Department of Transportation, California Department of Boating and Waterways, Local Municipalities, Research Institutions, California Department of Fish and Game, Local Jurisdictions, Local Experts, Elkhorn Slough NERR, Property Owners

Table CA.1: Measuring Performance of the Coastal Armoring Action Plan

Desired Outcome(s) For This Action Plan:	
Reduce expansion of hard coastal armoring in the coastal areas near MBNMS through proactive regional planning, project tracking, and comprehensive permit analysis and compliance.	
Performance Measure	**Explanation**
By 2012, complete three collaborative coastal erosion response plans for the planning sub-regions of the MBNMS.	MBNMS will track performance annually through the development of three detailed plans for three sub-regions that will include: an analysis of coastal erosion and management response including an analysis of local and regional alternatives to manage coastal erosion.

Table CA.2: Estimated Timelines for the Coastal Armoring Action Plan

Coastal Armoring Action Plan	YR 1	YR 2	YR 3	YR 4	YR 5
Strategy CA-1: Conduct Issue Characterization and Needs Assessment	●	———	———	———	——▶
Strategy CA-2: Develop and Implement Regional Approach to Coastal Armoring		●	———	——●	
Strategy CA-3: Improve Permit Program	●	——●			
Strategy CA-4: Implement Programs and Increase Training				●	——▶

Legend

Year Beginning/Ending : ●—●	Major Level of Implementation: ———
Ongoing Strategy : ●——▶	Minor Level of Implementation: .....

Table CA.3: Estimated Costs for the Coastal Armoring Action Plan

Strategy	Estimated Annual Cost (in thousands)*				
	YR 1	YR 2	YR 3	YR 4	YR 5
Strategy CA-1: Conduct Issue Characterization and Needs Assessment	$198	$98	$106	$64	$80.4
Strategy CA-2: Develop and Implement Regional Approach to Coastal Armoring	$17	$53	$61	$33	$24
Strategy CA-3: Improve Permit Program	$8	$8	$8	$8	$4
Strategy CA-4: Implement Programs and Increase Training	$4	$14.5	$19.5	$15.5	$11.5
Total Estimated Annual Cost	*$227*	*$173.5*	*$194.5*	*$120.5*	*$119.9*

* Cost estimates are for both "programmatic" and "base" (salaries and overhead) expenses.