

Monterey Bay National Marine Sanctuary

Sand Transport, Erosion, and Coastal Structures

Management Issue

Sand can be transported rapidly within the Sanctuary and is important to consider in relation to the installation or removal of any coastal structures. Hard coastal armoring in the Monterey Bay National Marine Sanctuary (MBNMS or Sanctuary) can potentially damage or alter local coastal habitats, interfere with sediment transport, unintentionally increase erosion, and negatively impact biological resources.

Description

The long-term impacts of coastal armoring projects are poorly understood, yet they have been used extensively along California's coastline to protect infrastructure and other development from wave action, or to avoid coastal erosion. As development increases, and natural erosion of coastal bluffs continues, the pressure to install structures to protect private and public property from erosion will continue to increase. To effectively regulate the installation and removal of coastal structures, managers need information on the current locations and impacts of armoring, erosion and accretion rates for different coastal habitats, alternatives to coastal armoring, and the potential impact of the installation or removal of other coastal structures on sand transport within the Sanctuary.



Examples of coastal armoring structures near the city of Capitola (on the north side of Monterey Bay). Image credit: MBNMS

Questions and Information Needs

- 1) What are the armoring types, approximate ages, and spatial distributions of coastal armoring structures along the Sanctuary coast?
- 2) What are the impacts of each type of armoring on sediment dynamics, marine habitats and public access in different geomorphic and biologic settings along the coast? What are the cumulative effects of multiple structures?
- 3) What are the erosion and/or accretion rates for cliffs, dunes and beaches? How do these rates vary spatially and temporally? How do they relate to regional sediment dynamics within the Sanctuary?
- 4) How prevalent are nearshore sandbars in the Sanctuary? How far and how quickly do they migrate? Will outfall pipes for a desalination plant for example, be inhibited by rapid sand transport if installed in the nearshore?
- 5) Where has beach nourishment taken place within the Sanctuary and what has happened to the added sand?
- 6) What are the alternatives to coastal armoring (e.g., beach nourishment, offshore breakwaters, long-term planning on coastal development)? What are the differences in environmental impacts, aesthetics, public access and engineering for these alternatives?

- 7) The magnitude of sand transport and the resulting erosion or accretion is driven in large part by waves. How often do erosive waves impact Sanctuary shores and what are their characteristics?
- 8) How will the closure of the CEMEX Sand Mining Plant impact the sand budget and coastal erosion in the Sanctuary?

Scientific Approach and Actions

- Characterize individual and cumulative impacts of coastal armoring on sand supply dynamics, marine biological habitats and ecosystems, and public access
- Develop a long term monitoring program that includes intertidal biological community structure, changes in beach morphology, wave characteristics and refraction patterns, and impacts on sand budget
- Develop a regional, integrated database and GIS layers of coastal armoring, land use types, erosion and replenishment rates, biological habitats, wave characteristics, and geology/geomorphology

Potential Key Partners and Information Sources

California Coastal Commission, US Army Corps of Engineers, US Geological Survey Pacific Coastal and Marine Science Center, City of Monterey, City of Santa Cruz, Moss Landing Harbor District, San Mateo County Harbor District, Santa Cruz Harbor District, Caltrans, Central Coast Wetlands Group

Management Support Products

- Integrated map and database of sediment transport dynamics and coastal armoring sites
- A beach sand budget for the Sanctuary

Planned Use of Products and Actions

- Identify planning sub-regions based on biological sensitivity of habitats, physical and geological factors, and development pressures
- Develop and implement guidelines for identifying sensitive sub-regions, heavily armored areas, and intermediate areas that require thorough case-by-case review
- Link information to State of California's *Coastal Sediment Management Master Plan*, implementing interagency coordination of long-term plans for sensitive sub-regions

Program References

MBNMS Management Plan

- Coastal Armoring Action Plan, Strategy CA-1, CA-2

MBNMS Condition Report

- What is the abundance and distribution of major habitat types and how is it changing? (Nearshore Environment – Question 5)
- What are the levels of human activities that may influence habitat quality and how are they changing? (Nearshore Environment – Question 8)

ONMS Performance Measures

- Complete three collaborative coastal erosion response plans for the planning sub-regions of the Sanctuary
- Number of sites in which habitat, based on long term monitoring data, is being maintained or improved



Location of coastal armoring structures in the MBNMS of coastline armored. Map credit: MBNMS