

Chapter 5: Shoreline Armoring

OVERVIEW

Ocean Beaches are one of the most valued recreational resources of the state. The cumulative loss of public resources from encroachment of shoreline armoring¹ on sandy beaches is an important coastal management issue. In addition to covering beach area that provides for recreation, shoreline armoring also can exacerbate erosion problems by fixing the back beach and eliminating the influx of sediment from coastal bluffs, and can cause localized scour in front or at the end of the shoreline protective devices. In addition, by allowing shoreline armoring in areas with existing development, the cycle of rebuilding storm damaged or destroyed development in the same hazardous areas is often perpetuated. ReCAP found that from 1978 through 1996, the Commission authorized shoreline protective devices along an estimated 2.8 miles of shoreline in the project area, covering an estimated 3.5 acres of sandy beach.²

The term *shoreline armoring* as used in this project refers to hard protective structures such as vertical seawalls, revetments, riprap, revetments and bulkheads.

The ReCAP project area lies at the junction of a major mountain range and the Pacific Ocean, making development in the region highly vulnerable to a variety of natural hazards, including threats from landslides, fire, flooding, and waves. Generally, the shoreline consists of a series of rocky headlands and narrow crescent shaped beaches, vulnerable to erosion and wave uprush. A large portion of the beachfront property in the project area was subdivided and developed prior to 1976, before the effective date of the Coastal Act, without benefit of mitigation or planning to minimize impacts to coastal resources, and this development faces significant impacts from wave hazards. In spite of this exposure, development along the coastline in the project area continues to occur, placing more property at risk. To reduce the risk to private shorefront development, armoring of the coastline has often occurred. However, this armoring results in impacts to shoreline processes and recreational beaches.

In an analysis of aerial photos from 1978, ReCAP found that most of the densely developed beaches, such as Broad Beach, Carbon Beach, and Amarillo Beach, were already built out and many structures employed some form of engineering or shoreline protective structure

¹ The Commission in its regulatory actions usually does not consider retaining walls as shoreline protective devices because such walls do not permanently trap sand. However, ReCAP included retaining walls built to protect septic systems in our analysis because, as hard structures, they may contribute to localized scour. A lot by lot field check to distinguish retaining walls from bulkheads underneath houses was not possible as part of this project.

² These figures are based on permit actions but not field checked to confirm construction. See Appendix Section IV.

underneath or in front of the home. Between 1976 and the present, most of the shoreline development has been incremental development of a small number of vacant parcels or renovations, expansions or reconstruction of older, existing structures. Newer residential structures on the shore have often been built on caissons and are larger in size and often extend further seaward than older development.

POLICY BACKGROUND

Under the Coastal Act, development is required to be sited and designed to minimize risks, assure stability and structural integrity and neither create nor contribute significantly to erosion or require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs (Section 30253). Section 30235 of the Act allows the construction of shoreline protective devices where existing development is threatened from erosion and when designed to eliminate or mitigate impacts on shoreline sand supply. Further, the Coastal Act provides that development damaged or destroyed by natural disasters can be rebuilt in the same area, exempt from coastal permits, provided they are not expanded by more than 10% and conform to existing zoning requirements. Certain emergency actions are also exempt from permit review.

Because the City of Malibu has no certified LCP, the above Coastal Act policies govern development along the shoreline in the Malibu portion of the project area³. In the Ventura County portion of the project area, the policies of the certified LCP have governed the review of development since certification in 1983. Ventura County's certified LCP contains standards addressing shoreline development that incorporate standards of Section 30253 and 30235 of the Coastal Act. New residential units require special review. In addition, LCP policies require a building permit for construction or maintenance of shoreline structures. All permits for shoreline structures are referred to the Public Works Agency for an evaluation on littoral drift and beach profiles. Shoreline structures are required to avoid interference with public rights of access. (County of Ventura, 1994)

To evaluate the cumulative effects of the implementation of these policies, ReCAP analyzed overall permitting activity from 1978 through 1996, focusing more specifically on the 10 years 1986-1996. Some of the development protected by armoring consists of

³ Both the policies of the L.A. County LUP developed prior to city incorporation and the City of Malibu General Plan policies give insight into how the local governments have addressed this issue in other planning. The L.A. County policies mirror the Coastal Act policies and regional guidelines. Policies P167 and 153 allow seawalls for new development only if no feasible alternatives exist, only to protect existing structures, coastal dependent uses or new structures which constitute infill and if designed to mitigate impacts on shoreline and sand supply. (CCC, 1987) The City of Malibu's General Plan policies (CON Implementation Measures 31 and 32) require structures to be sited "landward of state owned tidelands, and; in addition, for infill lots from a stringline... whichever setback is greater; however, an additional setback may be required where necessary to protect the structure from anticipated beach erosion." Seawalls are prohibited unless it is determined that "there are no other less environmentally damaging alternatives for the protection of onshore development. Revetments and seawalls are permitted only when required to serve coastal dependent uses or to protect existing or new structures which constitute infill development." (City of Malibu, 1995).

coastal dependent uses, existing structures or public beaches for which armoring is permitted by the Coastal Act But, the Santa Monica Mountains/Malibu ReCAP confirmed previous findings of ReCAP in the Monterey Bay Area: as long as development is approved in areas with high shoreline erosion and wave hazards, it will likely be armored (CCC, 1995). As a result, it is important to assure that any cumulative impacts to public shoreline lands and resources are adequately mitigated. To improve the measures addressing cumulative impacts of armoring, ReCAP is recommending a range of measures for implementation by the Commission through its management program or by local governments through their LCP planning.

SHORELINE CONDITIONS

The project area lies within the Santa Monica littoral cell. The major sediment source for the Ventura and Malibu portion of the Santa Monica cell are the streams draining the Santa Monica Mountains. The sediment from much of the drainage area has been trapped behind dams and catchment basins, never reaching the coast. The U.S. Army Corps of Engineers (USACOE) has estimated that the average annual sediment yield from streams between Pt. Mugu and Topanga Canyon (approximately matching the ReCAP study area) is about 120,000 cubic yards (USACOE, 1994). Figure 5-1 depicts the major sediment sources and sinks and net sediment transport direction for the project area. Another significant sediment source for the region is the incremental addition of eroded material from the coastal bluffs. However, over 60% of the bluffs are blocked from the erosive forces of the wave action by some form of development, including Pacific Coast Highway, vertical seawalls, and revetments (City of Malibu, 1993).

The sediment that reaches the coast is transported along the shore up or down the coast depending on wave conditions. The USACOE report concludes that the net sediment transport direction is in an easterly direction nearly all year at all locations (see Figure 5-1). The amount of sediment transported along the coast varies significantly from year to year, depending on the precipitation, stream flows and wave conditions. Beaches in the study area recede during periods with low sediment yields and recover temporarily after higher rainfall and streamflow (USACOE, 1994). The highly variable width of the beaches in the project area often places the majority of the dense beachfront development in danger from flooding, wave impacts, and structural failure from beach scour. These short-term winter erosional events dictate the level of exposure for development from wave attack.

MEASURES TO AVOID OR MINIMIZE FUTURE ARMORING

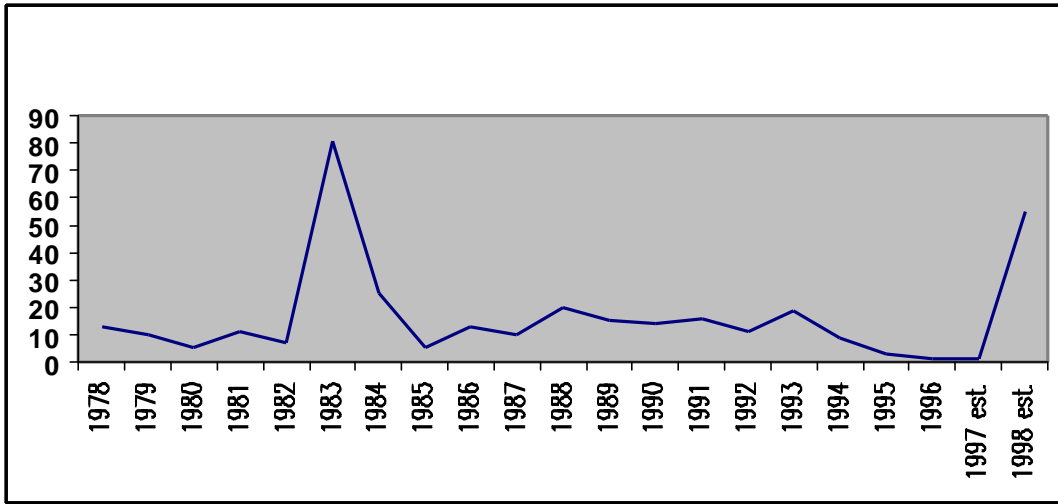
ReCAP staff estimates that currently close to half of the shoreline in the study area is affected by shoreline structures. Steps to maximize protection of the remaining unarmored sections of the shore will help protect regional sand supply.

<p>Recommendation V-1</p>	<p>The City of Malibu, as part of its LCP planning, should prohibit development that would require armoring for those shoreline areas which do not constitute “infill” and should prohibit new subdivisions, including lot splits, which create new lots within high wave hazard areas. The Ventura County LCP should be amended to incorporate similar restrictions.</p>
<p>Recommendation V-2</p>	<p>(a) The Commission should, as a condition of new development or demolition and rebuilding of structures subject to coastal hazards (beach or bluff erosion, inundation, wave uprush, etc.), require that new development on the beach or oceanfront bluff be sited outside areas subject to hazards or elevated above the Base Flood Elevation (as defined by FEMA) and set back as far landward as possible. If siting outside areas subject to coastal hazards is feasible but the applicant elects not to site development there, conditions of allowable developments should provide that the applicant assumes the risk of building in the hazardous areas without assurance that future armoring will be allowed. As part of reconstruction, require investigation of alternatives for waste treatment, including the redesign and/or relocation of sewage disposal systems to avoid the need for bulkheads or retaining walls designed solely to protect such systems.</p> <p>(b) Similar requirements should be incorporated as part of LCPs for the City of Malibu and Ventura County.</p>

Findings:

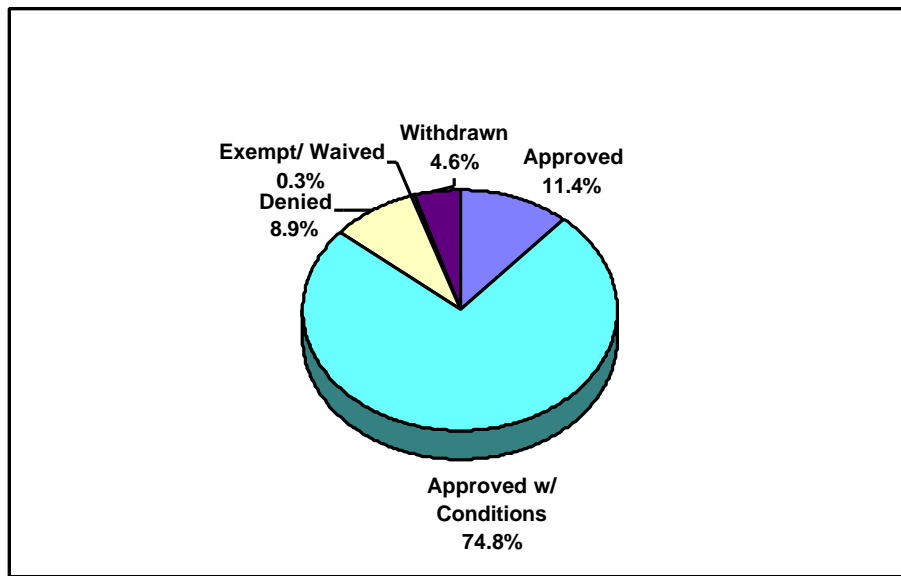
Goals of the coastal policies previously discussed include minimization of risks to new and existing development and avoidance of new shoreline armoring which impacts coastal resources. The ReCAP staff evaluated 19 years of permit actions which implemented the Coastal Act policies regarding protection of shoreline resources and sand supplies in the project area. Analysis of aerial photographs from 1978 and 1993 and analysis of Commission permit actions, indicate that approximately 11.4 miles, or 35% of the project area shoreline was armored with seawalls, revetments or retaining walls to protect septic systems prior to 1978. Shoreline hazards was identified as a key issue in many coastal permits, and, actions on these permits authorized additional armoring. From 1978 through 1996, 330 applications for development involving shoreline protective devices were filed with the Commission and of those 280 (85%) were approved. Figure 5-2 shows the breakdown of applications by year and Figure 5-3 shows

**Figure 5-2:
Applications for SPDs filed in the Project Area 1978-1996**



Source: ReCAP Database

**Figure 5-3:
Commission Actions on Applications for SPDs in Project Area, 1978-1996**



Source: ReCAP Database

the breakdown of Commission actions on the 330 applications.⁴ These 330 applications comprised roughly 7.6% of the total applications filed in the project area from 1978-1996; in 1983 alone, a year with significant winter storms, applications for shoreline protective devices comprised about 37.5% of total applications filed in the project area. As shown in the Table 5-1, about 74% of the 280 approvals were for development of new seawalls and approximately 19% were for repair/modification or expansions of existing

⁴ This figure does not include 16 reconsideration requests filed.

devices. Commission records show that Ventura County has approved only one permit for a shoreline protective device since LCP certification in 1983 in the ReCAP study area.

**Table 5-1:
CCC Approved SPD Projects 1978-1996**

SPD Project Type	Number	Percent
new structure	208	74%
repair of existing spd	14	5%
replace	28	10%
expand existing spd	10	4%
unknown (data not available)	20	7%
Total	280	100%

Source: ReCAP Seawall database

Under the current Coastal Act policies, the Commission has approved most of the applications for shoreline armoring that have come before it in the last 19 years. While these actions are not as significant as the impacts of the development existing prior to the Coastal Act, the result is still a contribution to the cumulative armoring of the shoreline with resultant impacts to sandy beaches and shoreline resources.

The cumulative effect of these authorizations is that since 1978, an additional 2.8 miles of shoreline has been approved for armoring. This represents about 9% of the project area's shoreline. Based on staff estimates for an average size of a vertical wall and revetment authorized by the Commission, approximately 3.5 acres of beach have been covered by shoreline armoring. This additional armoring represents beach area lost to recreational use and sand lost to the littoral system. When added to the amount of shoreline armored prior to 1978 and the armoring for which no permit has been identified (about 0.6 miles), the result is that a total of about 14.8 miles, or roughly 45%, of the project area shoreline is affected by shoreline structures built or authorized. Unless future armoring is avoided, ReCAP's projections of future buildout of shoreline lots indicate that up to 5 miles of additional shoreline (or an additional 15% of the project area shoreline) could be armored with hard structures. The remaining unarmored area would consist mostly of public parks or unthreatened bluff areas.

ReCAP's review indicates that the past actions authorizing armoring along much of the project area shoreline occurred as a result of infill situations (CCC, 1997g). As illustrated in Figure A-4 (a-f), in the Appendix, there are some areas of unarmored shoreline, but many of the project area's vacant parcels consist of infill development.⁵ Section 30253 includes provisions to minimize risks from new development and to assure that new development not require construction of protective devices that would substantially alter natural landforms along bluffs or cliffs. Section 30235 allows shoreline

⁵ Infill development as applied in past Commission permit actions referred generally to one or two lots, vacant or made vacant through demolition, between existing developed lots and served with existing infrastructure.

armoring when required to protect existing development and when designed to eliminate or mitigate adverse impacts. The determination of whether armoring is required to protect existing development is usually a case by case determination. With a few exceptions, as long as structures are located in areas subject to wave hazard or bluff erosion, under Section 30235, past permit actions in the project area show that there is a likelihood they will eventually be armored. But, for undeveloped areas, armoring can be avoided: (1) where new proposed subdivisions can be denied or designed to site lots outside of the hazard area; or 2) where there is a undeveloped stretch of existing vacant lots where new development could be designed and sited to avoid exposure to erosion and wave hazards altogether.

Additional armoring is even more likely in the project area given the location of Pacific Coast Highway (PCH). The construction of PCH, between 1924 and 1940, provided a major transportation artery into and out of Los Angeles, and a major public access route to the beaches of the Malibu area. But, it also provided new fill on the shorefront side of the highway upon which single family homes could be constructed. This loose, unconsolidated fill provides poor structural support and often requires one or more retaining walls for adequate stability. This fill is also highly erosive when exposed to wave action. As the shoreline has retreated over time, PCH has been rerouted inland in several locations, including Malibu Road and Malibu Colony Drive. PCH continues to be threatened by erosion, wave uprush and flooding wherever it is located adjacent to the ocean, and given its importance to regional access and transportation, it is possible it will be armored throughout most of its length in the project area.

The principal mechanisms for the Commission and local governments in the project area to prevent future armoring is to avoid authorizing subdivisions which create new lots in hazardous areas or to redesign projects to site development fully outside of hazardous areas. Eliminating development potential on lots in hazardous areas through purchase or TDC retirement is another mechanism to prevent the need for shoreline protective devices. As noted in the buildout scenario discussion in Chapter 3 of this report, there are a few shoreline lots which are large enough to potentially be divided.

In areas currently built out, the greatest opportunity to avoid or minimize additional armoring is in cases where major demolition and redevelopment is likely to occur. In these cases, measures could be instituted through permits and LCPs to resite structures landward or to place structures on pilings to allow sand movement under the houses. Increased setbacks could be also be applied, as discussed in the following section.

ReCAP recommends that the City of Malibu LCP and Ventura County incorporate plan designations and zoning standards applicable to demolition and rebuilding applications which assure more landward siting of development from wave and erosion hazard areas in future LCP planning. The LCPs should identify specific beach and bluff areas where landward siting could minimize exposure to coastal hazards, develop specific requirements for all properties within the area, and apply them through coastal development permits. However, ReCAP recognizes that even with such a comprehensive policy, such planned retreat is not assured, since property owners could choose to renovate structures in place

instead of demolishing them, thus avoiding resiting requirements. If such planned retreat is not deemed to be a feasible option, beach nourishment, as discussed later in this section, may be the most appropriate solution.

MEASURES TO MINIMIZE AND MITIGATE IMPACTS FROM PERMITTED ARMORING

While implementation of current policy and the existing patterns of development make avoidance of future armoring difficult, improving the policies and procedures regulating shoreline armoring can reduce impacts on coastal resources.

Recommendation V-3	<p>(a) Require in the review of coastal development permits for new development and for demolition and reconstruction of existing development, any permitted shoreline structures be set back as far landward as possible from the most landward mean high tideline (MHTL), regardless of the location of protective devices on adjacent lots. The stringline for shoreline protective devices should be applied as a maximum extent of seaward development <i>only if</i> no further landward setback is possible.</p> <p>(b) Similar requirements should be incorporated into the LCP planning for the City of Malibu.</p>
Recommendation V-4	<p>(a) Require the submittal of documentation and maps locating any existing OTD or dedicated easement areas in relation to the proposed development of any shoreline protective device or revetment as part of application filing. If such an OTD or dedicated easement is required as a condition of approval, the mapping should be completed prior to issuance of the permit.</p>
Recommendation V-4, con't.	<p>(b) The City of Malibu and Ventura County should include similar measures in their LCP planning.</p>

Findings:

As noted previously, roughly two thirds of the permits authorizing shoreline structures included conditions of approval. In past permit actions, the Commission has generally relied on two mechanisms to reduce impacts: 1) siting structures to avoid, or minimize, encroachment onto sandy beach areas; and 2) conditioning permits authorizing shoreline protective devices to include an easement for public access. The Ventura County LCP also contains components of these key measures.

Application of Setbacks and Stringlines

By locating shoreline protective devices as far landward as possible, the Commission minimizes the extent that a shoreline structure or bluff protection will physically cover recreational beach area and also minimizes the extent of exposure to wave hazards. The setback also reduces the loss of sand to the littoral system; the location of protective devices in many cases will fix the migration of sand to the littoral system. Even if sited as far landward as possible shoreline structures can contribute to further erosion of the adjacent public lands.

Another factor to consider in reviewing proposals to develop shoreline protective devices is whether the development may encroach on public lands. Typically, the Commission reviews the location of the development relative to the general location of the public trust lands as depicted generally on maps prepared by the State Lands Commission. Since those maps are only a general depiction and do not indicate a definitive or current boundary between public and private lands, the Commission also depends in large part upon a determination by the State Lands Commission (SLC) as to whether the development will be sited landward of the boundary between private and public lands.

This determination is complicated by the fact that the boundary between private and public property is ambulatory. In general, public lands are those that lie seaward of the mean high tide line. This line is formed by the intersection of the plane of the high water at mean high tide with the surface of the land. The plane, or elevation, of mean high tide is determined by calculating the average height of all the twice-daily high tides that occur over a 19- year period for a particular location, as record by the National Ocean Survey. This is an unchanging elevation. The line of mean high tide is where this unchanging elevation meets the shore as it exists at any particular time. On a shoreline composed of rock, the intersection will remain constant. Where the shore is comprised of sandy beach, the beach profile may change as a consequence of wave action that causes accretion or erosion. In these situations, the location where the elevation of the mean high tide line intersects the shore is subject to change. The result is that the mean high tide line, and the boundary between private and public ownership, moves in response to changes in the shore's profile. This makes it difficult for the SLC to reach a definitive position in many instances on whether a development would encroach on public lands. At a minimum, therefore, it is even more important that any new shoreline structures approved by the Commission be set back as far landward as possible to minimize the possibility that they will intrude seaward of the mean high tide line at any time in the future.

Stringline has been described as follows: in a developed area where new construction is generally infilling and is otherwise consistent with the Coastal Act policies, no part of a proposed new structure, including decks and bulkheads, should be built further onto a beach front than a line drawn between the nearest adjacent corners of the adjacent structures. Enclosed living space in the new unit should not extend farther seaward than a second line drawn between the most seaward portions of the nearest corner of the enclosed living space of the adjacent structure.

As noted previously, the Commission has generally applied Coastal Act policies in the project area based on whether the proposed development was an infill situation. As guidance, in 1981 the regional guidelines for the Malibu area generally suggested a 10-ft. setback of new development from the mean high tide line and a prohibition of bulkheads in areas where none existed. Recognizing the existing pattern of development, Commission permit actions generally applied a stringline to development sites which constituted infill vacant lots, allowing retaining walls and other armoring in connection with some new development. However, continuation of the application of a stringline for shoreline structures does not assure that the possibility for encroachment is minimized. If armoring is permitted in an infill situation, the potential for impacts on public lands can be minimized only if it is located as far landward as feasibly possible (CCC, 1997g).

In the past, many shoreline protective devices have been required to protect beach-level septic systems. As the Commission has found in recent permit actions, improvements in the design and technology of septic systems can in some cases allow new walls to be set back further landward or eliminated altogether. Therefore, the stringline should not be applied except as a maximum encroachment line. Given the difficulty in making definitive boundary determination for most new development in the area, refining the use of the stringline and setbacks will better protect public resources and reduce the possibility for encroachment onto public lands, regardless of the presence of other adjacent shoreline protective devices. Over time, if landward setbacks are increased, more sand will be available to the littoral system.

Currently, LCP and LUP policies address primarily development of new shoreline structures. However, an increasing number of shoreline development projects will be for the repair, maintenance, or the demolition and reconstruction of an existing shoreline protective device or single family residence. In the last 10 years, about 19% of approvals for a shoreline protective device were not for new structures but some form of repair or reconstruction of an existing shoreline protective device; this number will only increase in the future, given the extent of existing armoring. Increased setbacks can be applied when protective devices are being replaced or substantially reconstructed. However, where existing structures are only being maintained or repaired, such increased setbacks may not be feasible. The stringline should continue to be applied, however, to such repair and maintenance activities to assure that as older structures are repaired, further seaward encroachment is prohibited.

Access Easements

In addition to resiting shoreline structures landward, ReCAP's analysis of coastal development permits shows that the Commission's response in most cases to the placement of armoring has been to mitigate the impacts of shoreline protective devices by requiring dedication of an access easement or a deed restriction. Of the 280 approvals of shoreline protective devices in the project area, 65 % (181) had requirements for access mitigation, either lateral or vertical. These actions are part of the total of 475 lateral access easements recorded in the Malibu shoreline as noted in Table 4-2 of the report (see Chapter 4). As noted in the Access section of this report, close to 70% of these lateral access easements

have been accepted. As the remainder of these easements are accepted by an agency, available for public use and protected against further encroachment, mitigation for the impacts of shoreline structures on public lands will be more fully achieved. Because of the significant actions of the Commission’s Access Program and the State Lands Commission in accepting many of these easements in Malibu, the cumulative access impacts of development on the sandy beach is being mitigated. Efforts should focus on the remaining OTDs to assure that mitigation is fully realized and not lost.

The problem of the potential loss of access mitigation through the expiration of OTDs is an issue of statewide concern and is the continuing priority of the statewide Access Program. Recent legislation helped address some of the obstacles in getting OTDs accepted and opened by providing a source of funding for operation of accessways and by addressing liability concerns. Another challenge facing the Commission and local governments through their LCP planning is to assure that these areas of dedicated easements and deed restricted areas remain free of encroachments. According to reports of the staff of the statewide Access program, instances have been found where shoreline protective devices have encroached into easement areas, especially as a result of emergency actions. (Locklin, pers. communication). Recommendation IV-9, outlined in the Access section, to document the location of any access easement area will help address the mitigation of the impacts of shoreline armoring on public access.

EMERGENCY ARMORING OF THE SHORELINE

Shoreline protective devices can be engineered and designed to be the minimum necessary to address hazards, to be visually unobtrusive as possible and to be located as far landward as possible to minimize access impacts. Yet, if shoreline protective devices are placed during emergency conditions, the Commission often lacks the opportunity to consider alternative design and siting criteria.

<p>Recommendation V-5</p>	<p>Investigate incentives for relocation of development in hazardous shoreline areas. Consider modification of Section 30610 of the Coastal Act to require a full permit application for the rebuilding of property damaged or destroyed by ocean waves or erosion even if reconstruction occurs in the same location and footprint as the damaged structure.</p>
<p>Recommendation V-6</p>	<p>(a) Pursue modifications of Section 30600 (e) of the Coastal Act to require a follow up coastal development permit for emergency actions undertaken to protect public roads which result in placement of new or expanded shoreline armoring.</p> <p>(b) Develop modified emergency permit procedures to require that where emergency actions by Caltrans are required and are</p>

	not exempt pursuant to PCR 30600(e), permits require Caltrans to use the least environmentally damaging engineering alternative in responding to emergencies to protect Pacific Coast Highway. If the least environmentally damaging engineering alternative can not be installed during the emergency response, all reasonable efforts shall be made to install engineering alternatives that can later be replaced by the least environmentally damaging engineering alternative.
Recommendation V-7	The County of Ventura LCP should be amended to incorporate procedures for emergency permitting and for reconstruction of SPDs, including modifications such as outlined in Recommendations V-2 and V-3.
Recommendation V-8	Establish procedures for Commission and local governments for coordination with property owner and for field inspections before and after storm seasons. Procedures should: provide advance information on location of easement areas to assure emergency structures are not occupying public easements; provide for inspections to identify shoreline protective structures built without permits; and assure emergency structures are removed or regular permit follow-up is completed within the 60 day period.

Findings:

Section 30624 of the Coastal Act allows an emergency permit to be issued when immediate action is required to prevent or mitigate loss or damage to life, health, property or essential public services. Certainly, rapid response is of particular importance in an emergency situation. However, because the regular permitting process is bypassed, an emergency structure can be constructed with minimal engineering review and often no review for alternatives or impacts on coastal resources. Under current Coastal Act provisions, applicants for emergency authorizations are notified and agree with the requirement that the emergency structure be removed or that a regular permit application be submitted within 60 days of the issuance of the emergency permit to retain the structure. The Ventura County LCP does not contain provisions for emergency permitting for SPDs.

Similar to the findings in the Monterey ReCAP, significant cumulative impacts to shoreline beach resources have occurred as a result of the application of the policies and procedures for emergency permitting. There are three aspects of the problems of emergency permitting of SPDs: (1) applicants often fail to submit follow-up permits; (2) once constructed, few if any emergency structures are removed; and (3) the emergency permit process leads to incremental, haphazard armoring of the coast without mitigation for the impacts to sand supply. For all practical purposes, if armoring is installed in emergencies, it remains in place, often with sub-standard engineering review and without mitigation for impacts to coastal resources.

In Malibu, the emergency permitting problem is especially severe because of the dense development on narrow beaches that often are stripped of all sand during harsh winter

storm conditions. The project area has been subject to significant damages from large storms in 1978, 1982-83, 1988, and 1998. About one third of all applications for shoreline structures between 1978 and 1996 were approved in 1983, a major storm event year. It is very likely that many of these were permits for emergency placement of shoreline protection⁶ In the project area, in response to the most recent El Niño storms of 1997-8, a total of 54 emergency permits were issued, including 27 for riprap and 15 for vertical seawalls. As discussed further below, many other emergency placements of armoring occurred as exempt actions under 1996 Coastal Act amendments. Assuring that the emergency armoring is removed or a follow up permit is obtained, which addresses alternatives and mitigation of impacts, remains a significant problem. Of these 54 emergency authorizations approved in 1997-98, as of the date of this report, none have filed regular follow-up permits. The enforcement of follow up permit requirements continues to be a top priority of the Commission's Enforcement program. The Enforcement Program staff is working with the staff of the Access Program and the Technical Services Division to respond to emergency permitting cases

The low number of follow-up permits was also a problem identified in the Monterey ReCAP, and, in response, ReCAP staff developed and implemented a statewide permit tracking system. Installed in all district offices in 1995, the permit tracking system established a reliable procedure for recording emergency permits issued, tracking whether the emergency structure has been removed or whether permits have been filed within the 60-day period.

Given the current Coastal Act language, the emergency authorization of armoring can be expected to continue. The Commission's principal recourse to the lack of follow up permit actions is to initiate enforcement investigations. Between 1978-1996, about 43 of the 330 applications for shoreline armoring (13%) were noted as after-the-fact permits (ATFs) to resolve enforcement actions. Review of these ATF actions also show that the armoring placed in an emergency usually remains, although in most cases mitigation is required.

El Niño conditions are expected to occur every 2-7 years (Cayan, 1997); with the erosive nature of most of the project area's shoreline, the demand for emergency permits is likely to increase. As more of the shoreline is armored, the demand will increase for maintaining or expanding existing armoring. While developing guidance for emergency permitting to reinforce the temporary nature of the development is possible, in most cases even placement of riprap and rock intended to be temporary is rarely removed.

Permit Exemptions

In addition to impacts from armoring occurring as a result of the emergency permitting process, impacts are occurring as well from the implementation of permit exemptions. Prior to 1983, if a structure was damaged or destroyed by storms or other hazards, the

⁶ Commission staff is unable to provide a complete analysis of the number of emergency permits granted in the past 20 years because of the manner in which permit numbers were previously assigned, making tracking difficult. The current permit tracking system corrected the problem so that future assessments will be more complete.

Commission did not always allow the rebuilding of structures in place. The Commission often reviewed the follow up project for whether resiting with a further setback was feasible and whether mitigation in the form of a public access easement dedication was needed to mitigate the impacts of the rebuilding. However, it was the application of this policy in Malibu following the large winter storms of 1978 and 1982-83 that resulted in the amendment of the Coastal Act Section 30610(g) to exempt from any permit requirements, and thus from any access mitigation, certain rebuilding following natural disasters.

Coastal Act exemption 30610(g) to rebuild existing structures in place and in kind contributes to perpetuating impacts of encroachment on sandy beach and public lands. With this policy, in many cases the Commission or local government is precluded from a permit review which may consider alternatives such as resiting a structure further landward to avoid impacts on public lands and requiring the imposition of conditions to mitigate hazards and impacts to access. As a result, many of the shoreline structures built prior to the Coastal Act and which may have significant impacts on public lands, if destroyed or damaged in a storm, can continue to be rebuilt exempt from any coastal permit review if they meet certain criteria.

When structures are destroyed by wave impacts, mitigating future hazards and impacts to access may only be minimized by relocating structures further back from the mean high tide line. However, the Coastal Act creates an incentive to rebuild houses and armoring in the same location by waiving any review for impacts to coastal resources if certain criteria are met. Siting structures further back or increasing the size of the structure, on the other hand, would be subject to permit review. The Monterey ReCAP also identified this problem. ReCAP staff is recommending that the Commission pursue modifications of Section 30610 of the Coastal Act to eliminate the exemption and to require full permit review if the rebuilding of property damaged or destroyed by ocean waves or erosion occurs in the same location and footprint. In coordination with local government and the Federal Emergency Management Agency other incentives, perhaps financial, for property owners to relocate structures damaged by wave hazards and to reduce the continuing use of shoreline protective devices could be investigated.

Amendments to the Coastal Act in 1996 (AB 2963 Firestone) also resulted in impacts from shoreline armoring. Significant shoreline armoring has occurred to protect PCH. Section 30600 (e) of the Coastal Act allows continued armoring of the shoreline under emergency conditions by exempting from permit requirements, including even emergency authorizations, activities to maintain, repair or restore and existing highway except for a designated state scenic highway. Since PCH in this ReCAP project area is not a designated scenic highway, as a result, no mitigation or alternatives consideration is factored into the large amount of emergency armoring placed to protect PCH.

While it is important to streamline actions during an emergency, these recent changes to the Coastal Act are implemented at a cost to public shoreline resources that are not mitigated. Given the long-term impact of shoreline armoring, ReCAP staff believes that the current emergency permit procedures provide sufficient streamlining for such projects and recommends that this section of the Coastal Act be amended to require follow up permits

for shoreline armoring so that development needed during an emergency can later be removed or mitigated. The Commission should develop procedures and conditions to assure that emergency actions are temporary and that consideration of engineering alternatives are undertaken as part of a follow-up permit.

BEACH NOURISHMENT OPPORTUNITIES

As much of the ReCAP project area is already developed and armored, beach nourishment may provide the best long-term solution to protecting beaches.

<p>Recommendation V-9</p>	<p>LCP Planning for the City of Malibu and Los Angeles County should include policies to establish periodic nourishment of key beaches vulnerable to wave damage. Policies should be developed in consultation with L.A. County Beaches and Harbor and the State Lands Commission. Policies and programs developed for beach nourishment should include measures to minimize adverse resource impacts from deposition of material, including measures such as timing or seasonal restrictions or identification of preferred locations for deposits.</p>
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Findings:

Southeast of the project area, Southern Santa Monica Bay has received over 30 million cubic yards of sand since 1939, mostly as a result of major harbor and construction projects completed during World War II. Beach widths in the nourished areas were increased by much as 150 to 500 feet (Leidersdorf, Hollar and Woodell, 1994). In contrast, the Malibu coastline has not received much beach nourishment. Some of the sand placed along southern Santa Monica Bay may have been transported north and west to the Malibu area, but given the predominant longshore transport direction, it likely has had little effect on Ventura and Malibu beaches. There has been limited beach nourishment at Zuma County Beach and Las Tunas State Beach.

Beach nourishment is most effective if it is undertaken as a large-scale effort for an entire beach with definable endpoints. Any sand added to a beach will be distributed alongshore as the wave energy works to return the beach to its natural, unnourished width; therefore, any nourishment project should not be considered a one time, quick fix for a beach, but should be a longer term program that incorporates monitoring and maintenance. Most likely sand will need to be periodically added to the beach to maintain the desired width (CCC, 1998c). The National Research Council has shown that a carefully planned,

designed and maintained beach nourishment program can provide protection for properties fronted by the nourished beach (NRC, 1995).

Authorities and funding need to be addressed in implementing a beach nourishment program. A number of mechanisms can be used to generate funds for a beach nourishment program, including an in-lieu fee program, assessment districts and pursuit of federal or state funds. Because most effective beach nourishment projects involve a long stretch of coast, they are usually undertaken by a group of property owners or by a local government. According to the Commission's Ventura District office staff, Los Angeles County has initiated a regional task force to inventory the condition of beaches, identify funding sources to accomplish beach restoration, and formulate a long-term maintenance plan. The City of Malibu has already had the benefit of a detailed study by the USACOE, which analyzed the Malibu coastline, identifying the areas prone to damage from erosion and wave hazards and proposing plans to minimize the economic impacts of exposure to shoreline hazards. The USACOE report concluded that beach nourishment would be effective from a cost benefit perspective along four stretches of Malibu's coast which include the following beaches: Escondido, Puerco, Amarillo, Carbon, La Costa, Las Flores, Big Rock, Las Tunas, and Topanga (USACOE, 1994). The City of Malibu LCP should incorporate policies into its LCP to help implement nourishment at these beaches. In addition, the task force should be assisted in seeking funds to initiate a beach nourishment program either through mechanisms such as assessment districts or a cost sharing arrangement between beachfront homeowners and local, state or federal governments. The Task Force should also pursue state and federal funds which may be appropriate for a regional nourishment program. Because of their role in placing armoring to protect PCH, Caltrans can play an important role in this Task Force as discussed below. Because of its important role in managing beaches in Los Angeles County, the Los Angeles County Department of Beaches and Harbors should be involved in the development of a beach nourishment strategy.

MITIGATING THE IMPACTS OF ARMORING PACIFIC COAST HIGHWAY

Maintaining and protecting the road network in the project area is an important objective, but often this results in effects to regional sand and shoreline resources.

<p>Recommendation V-10</p>	<p>The state Department of Transportation (Caltrans) should assist the L.A. County Beach Nourishment Task Force in investigating measures to fund regional beach nourishment and to address the use of clean material for placement on the beach. Beach sand nourishment proposals should also be coordinated with the L.A. County Beaches and Harbors Department and State Lands Commission. Policies and</p>
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	<p>programs developed for beach nourishment should include measures to minimize adverse resource impacts from deposition of material, including measures such as timing or seasonal restrictions or identification of preferred locations for deposits.</p>
<p>Recommendation V-11</p>	<p>The City of Malibu and Los Angeles County should include policies in their LCP planning to require that sediment removed from catchment basins be tested for suitability, and, if appropriate, used for disposal in the littoral system. In consultation with L.A. County Department of Beaches and Harbors, the LCP for Malibu should designate appropriate beaches or offshore feeder sites in the littoral system for placement of suitable materials from the catchment basins, consistent with Coastal Act Sections 30233 (b) and (d). The Ventura County LCP should be amended to include similar policies. Policies and programs developed for beach nourishment should include measures to minimize adverse resource impacts from deposition of material, including measures such as timing or seasonal restrictions or identification of preferred locations for deposits.</p>

Findings:

The Pacific Coast Highway winds along the majority of the Ventura and Malibu coastline. Skirting inland on the Malibu terrace and in a few locations where rerouting was necessary due to landslide and erosion hazards, it provides spectacular ocean views and access to public beaches. However, the maintenance of this important piece of public infrastructure has not been without cost to coastal resources. Nearly 5 miles (or about 15%) of the project area’s shoreline has been armored with massive rock revetments to protect PCH. Because much of this armoring is rock riprap or revetment, ReCAP estimates that this 5 miles represents 31% of the total armoring in the project area and about two thirds of the beach area affected by existing armoring.

Over four miles of this armoring occurred prior to the establishment of the Coastal Act. It appears that only a few permits have been issued to Caltrans for the protection of PCH in the project area. The majority of PCH armoring has been exempt from permit requirements or has been constructed without permits; therefore, there has been little consideration of alternative protection strategies or mitigation. ReCAP staff identified one case of mitigation for a Caltrans project that involved the removal of slide material from PCH, shifting the highway seaward and construction of a rock revetment. As conditioned, the

permit required as mitigation options, either the construction of a series of groins, a beach nourishment program, or construction of a beach parking lot. The loss of sand resources was ultimately mitigated through the construction of beach parking. (CCC, 1982b)

Evidence from this past winter shows that Caltrans undertook about 200 significant emergency storm repair projects statewide. While the protection of PCH in an emergency is an important objective, impacts to shoreline resources also need to be addressed. Frequently, this armoring is not temporary and usually not removed. Given the location of the road, erosion will undoubtedly threaten PCH again in the future. ReCAP estimates an additional 3 miles of PCH could be armored and up to 8 additional acres of beach impacted. An issue raised by this projected armoring is whether there will be consideration of alternatives or mitigation for impacts to sand supply and public access as a result of these projects. Under current law, Caltrans may armor to protect PCH with no permit required and no requirement that the emergency armoring be temporary and removed after the emergency.

The protection of PCH is certainly a high priority due to its critical role in regional transportation and in providing public access. However, as long as such protection is exempt from review, the Commission has little assurance that different alternatives to protect PCH will be considered or encroachment minimized. Caltrans has been identified by the County as a suggested participant in the County Task Force on beach nourishment. Given the extent of coastline armored and beach lost to recreational use directly from the protection of PCH, Caltrans participation is important and ReCAP recommends that Caltrans assist the Task Force in investigating any available funding mechanisms for ongoing beach nourishment. Because of its important role in managing beaches in Los Angeles County, Caltrans should coordinate beach nourishment efforts with the Los Angeles County Department of Beaches and Harbors.

As noted previously, the streams in the project are a source of sediment to the littoral cell. Catchment basins in the project area inland of PCH, constructed by L.A. County and Caltrans, trap a significant amount of sediment from these streams. If determined to be suitable material, this sediment could be placed in the littoral system. Since the beaches are located within the City of Malibu but the County and Caltrans are responsible for maintaining these catchment basins, the L.A. County Regional Task Force on beach Nourishment may be the appropriate forum to address this issue. However, the LCP planning for the project area should develop policies to assure that as part of the maintenance of these catchment basins, the sediment is tested for suitability and if found suitable, placed in the littoral system.

ADDRESSING SEA LEVEL RISE

To fully manage shoreline resources and reduce future shoreline armoring, the Commission should develop a strategy to address sea level rise in development proposals.

<p>Recommendation V-12</p>	<p>The Commission should develop a long-term strategy to address the issue of sea level rise. The strategy should define the criteria for estimated sea level rise (i.e., projections of sea level rise from EPA) and should develop measures to avoid or to minimize the effects of sea level rise in permit actions and in Local Coastal Programs. Such measures could include modifying Commission permit requirements to: 1) require that the potential for sea level rise is considered in the design of all development proposals and habitat restoration projects along the ocean shoreline and the shoreline immediately adjacent to or within a harbor, river, bay, or estuary; and 2) require that buffer areas adequate to address sea level rise are included in wetland restoration projects.</p>
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Findings:

The potential for sea level rise can lead to significant impacts on both natural resources and development in the coastal zone. The response to sea level rise requires a detailed analysis but the Commission lacks sufficient resources at this time to undertake this project. However, a revised recommendation is incorporated into Part 3 of the Action Plan. The potential for sea level rise is another hazard for development along the coast of California. Although estimates of the likelihood and the extent of sea level rise vary, many scientists believe the threat is real. EPA estimates that global warming could raise sea levels 15 cm by the year 2050 and 34 cm by the year 2100 (Titus, 1996).⁷

A rising sea level will affect both existing and future development along the coast, harbors, and rivers of California.⁸ Higher water level will mean that higher waves will hit the coast; as wave energy is proportional to the square of the wave height, so cliffs, coastal

⁷<http://www.epa.gov/oppeoeel/globalwarming/impacts/coastal/summary.html>. (Titus, James and Vijay Narayanan. EPA. "The Probability of Sea Level Rise".

⁸ Information taken from Ewing, Lesley, Jaime Michaels and Richard McCarthy. *Draft Report: Planning for an Accelerated Sea Level Rise Along the California Coast*. 1989.

structures etc., will be exposed to much higher wave energy. Accelerated cliff retreat could also occur from increased exposure to wave attack. Sea level rise would reduce beach size, making summer beaches narrower and entirely submerging some winter beaches. Sea level rise can also affect harbors and coastal structures: increased water levels could damage jetties and lead to increased forces on pier supports. Existing shoreline protective devices may not be as effective in protecting inland development with an increase in sea level. These impacts could have a significant economic impact in California.

In addition, sea level rise could lead to a loss of wetland and other habitat, and losses to recreational opportunities. A loss of habitat areas, particularly wetlands, could lead to significant economic and social impacts.

Although some projects reviewed by the Commission have addressed the potential for sea level rise in their designs, the Commission does not currently have a policy or direction to address the issue. While a full analysis of the potential of sea level rise and the effects of sea level rise was beyond the resources available to ReCAP, the issue is one that the Commission should address. Therefore, ReCAP staff recommends that additional resources be sought to undertake a more detailed analysis of the issue, and develop an appropriate strategy. In the interim, the Commission should require that proposed development be planned to address the possibility of sea level rise, assuring the integrity of the development for the lifetime of the structure. To accomplish this goal, the Commission will need to adopt specific criteria or estimates of sea level rise against which to assess a project.