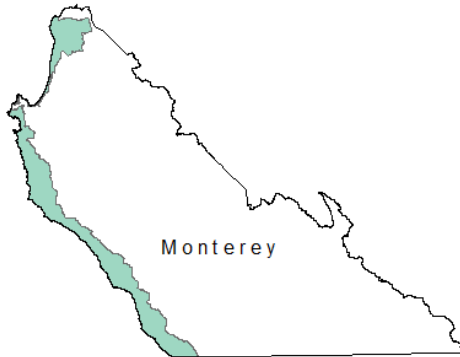




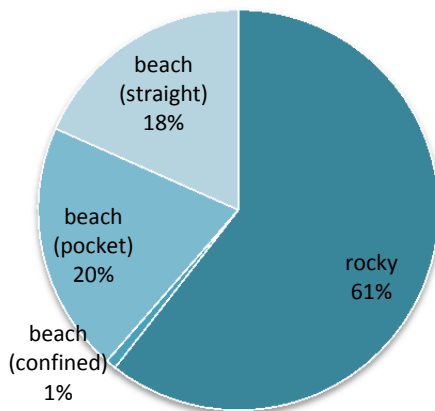
Monterey County

Coastal Zone



Monterey County is located along the Central California Coastline, extending 136 miles from the flat coastal plain south of the Pajaro River to the rugged mountainous shoreline of Big Sur just south of the town Gorda. The 200,960 acres (314 square miles) of terrestrial coastal zone encompasses agricultural resources along Elkhorn Slough and Moss Landing, environmentally sensitive habitat areas (ESHA), important migratory habitats, 15% of all the wetlands in California’s coastal zone, national forests, dunes, numerous access points (3rd highest in the state), and many recreation areas. Monterey County includes several areas of national significance such as the Los Padres National Forest, Salinas River National Wildlife Reserve (NWR), Elkhorn Slough National Estuarine Research Reserve (NERR), and Monterey Bay National Marine Sanctuary. Monterey also includes the world famous Big Sur coast and the many important features of the built and natural environment along the Monterey peninsula.

Outer coast shoreline



Coastal Zone Resources

Ports & Harbors: Moss Landing, Monterey
 Publicly Owned/Accessible: 112,600 acres
 Public Access Coastal Areas: 127 locations
 Coastal Zone Wetlands: 9,800 acres

Ocean Economy

2013 County Ocean Sectors GDP \$931 M

2013 Major Ocean Economic Sectors

Tourism and Recreation GDP	\$777 M
Transportation GDP	\$12 M
Minerals GDP	\$5 M

3%

of State Ocean Sector GDP

Source: National Ocean Economics Program, 2016

The Monterey County area has a diverse, thriving ocean economy. In 2013, Monterey County accounted for 3% of the state’s total ocean sector gross domestic product (GDP). Approximately 84% of the county’s ocean economy relies on tourism and recreation. Some of Monterey’s most visited sites (e.g., the Monterey Bay Aquarium, Cannery Row, Fisherman’s Wharf, the coastal trail, and Big Sur) have been categorized as highly vulnerable to changes in sea level. Damages to these valuable assets could have severe impacts to Monterey’s coastal economy.



Monterey County

Hazards and Vulnerability

Multiple vulnerability assessments have been conducted in Monterey County, highlighting locations of sensitive natural resources, community development, and infrastructure. Due to its geology, Monterey County has one of the highest erosion and sand loss rates in the state. Not only is infrastructure at risk from rising sea levels in Monterey County, but its highly sensitive coastal habitats are at high risk to “coastal squeeze”--the incremental loss of beach area and shoreline habitats in front of armored/developed shorelines. The City of Pacific Grove’s “Climate Change Vulnerability Assessment” and the City of Monterey’s “Final Sea Level Rise and Vulnerability Analysis” both use the National Research Council’s (NRC) west coast projections of 2-12 inches of sea level rise by 2030, 5-24 inches by 2050 and 17-66 inches by 2100 [1,2].



Monastery Beach erosion

In the cities of Seaside, Marina, and Monterey, flooding and dune erosion are larger concerns. Sand mining from the Cemex facility in the City of Marina serves to exacerbate such issues [4]. Studies show that sand mining increases erosion rates and that there would be at least a 60-72% decrease in beach loss if the mining stopped [4].

Public transportation in the City of Monterey is vulnerable to flooding, and in particular, the coastal recreational trail and Del Monte Avenue bus routes [2].

In the City of Monterey, flooding was identified as the largest risk associated with climate change [2]. The City of Pacific Grove vulnerability analysis highlighted major threats to Lovers Point, the Hopkins Marine Station, and the Monterey Bay Aquarium[2].

Further south, Carmel-by-the-Sea, renowned for its mile-long stretch of white sand beach and forest of Monterey pine and oak trees, is vulnerable. The city’s scenic roads, public access pathways to its sandy beaches, and the Carmel River Lagoon are all threatened by flooding, which will intensify with sea level rise and increased storm surge [5].

The southernmost portion of Monterey County includes Big Sur, which offers views of the Santa Lucia Mountains, coastal bluffs, rocky coastline, beaches, and the ocean from Highway 1. Much of Highway 1 is already susceptible to damage from erosion and flooding during storm events

Population at risk to 100yr Flood
 11,000 = current risk | 14,000 = future
 w/1.4m SLR
 Source: Heberger et al., 2009

Potential Bluff/Dune Erosion Risk w/ 1.4m SLR 1600 properties | 820 people
 Source: Heberger et al., 2009

In the northernmost part of Monterey County, Elkhorn Slough and north Monterey County generally have begun to experience saltwater intrusion, affecting both agricultural and residential wells. Monterey County supports one of the highest wetland acreages in the California coastal zone, and could lose significant statewide wetland area to sea level rise according to a Pacific Institute Study [3]. According to this study, migration is viable for many of the wetlands in Monterey County under a 55 inch sea level rise scenario. Sea level rise-related flood risks for this county are highest near Monterey Bay and Elkhorn Slough.



Monterey County

and major high tides, which is expected to increase with sea level rise. Likewise, the risks of

losing beaches and public access ways are projected to increase.

LCP and Sea Level Rise Planning

Local Coastal Programs (LCPs) are planning tools used by local governments to guide development in the coastal zone, in partnership with the Coastal Commission. LCPs specify the appropriate location, type, and scale of new or changed uses of land and water and include a land use plan and measures to implement the plan (such as zoning ordinances). The Coastal Commission has awarded three rounds of the Local Assistance Grant Program since January 2014 to support certification and updates of LCPs, with an emphasis on addressing the impacts of climate change. Within this county, the City of Monterey (Round 2) and the City of Pacific Grove (Round 1) have been awarded grants from the Coastal Commission to address the impacts of sea level rise within their LCP jurisdictions. Table 1 below shows whether jurisdictions have LCPs that address sea level rise. "In part" means an LCP segment has some explicit policy language addressing sea level rise; "Acknowledges SLR" means there are no explicit policies addressing sea level rise, but the hazard is recognized in the certified LCP; and "In progress" refers to jurisdictions with LCP grants for addressing sea level rise. A case study for the City of Pacific Grove is available to highlight the Commission's LCP planning work on sea level rise [6].

Table 1. LCP Planning in Monterey County (as of Dec. 2016)

Jurisdiction/Segment	Certified LCP?	Grant?	Vulnerability Assessments	Updated for SLR?	Shoreline by Jurisdiction
Monterey County					
North Segment	Yes (1988)	OPC, SCC	Yes[7]	In Progress	67%
Del Monte Forest Segment	Yes (1988)	OPC	No	Acknowledges SLR	
Carmel Area Segment	Yes (1988)	OPC	No	In Progress	
Big Sur Segment	Yes (1988)	OPC	No	In Progress	
City of Marina	Yes (1982)	No	Yes[4]	No	2%
City of Sand City	Yes (1984)	No	Yes[4]	No	1%
City of Seaside	Yes (2013)	No	Yes[4]	In Part	<1%
City of Monterey					
Laguna Grande Segment	No	CCC, OPC	Yes[2,4]	In progress	2%
Del Monte Beach Segment			Yes [4,7]	In progress	
Harbor Segment			Yes[4,7]	In progress	
Cannery Row Segment			Yes [7]	In progress	
Skyline Segment			Yes [7]	In progress	
City of Pacific Grove	No	CCC	Yes [1]	In Progress	4%
City of Carmel	Yes (2004)	No	No	Acknowledges SLR	1%
Federal Lands and Ports					23%

Coastal Act Management Priorities

The Monterey County area faces significant sea level rise vulnerabilities to natural habitat, coastal development, and public access. The county must address likely long-term impacts to its extremely valuable beach and wetland resources. It also must deal with storm flooding, shoreline erosion, and urban coastal squeeze. Some top priorities by Coastal Act themes are presented below.



Monterey County

Coastal Habitats, ESHA, and Wetlands (Coastal Act Sections 30230, 30231, 30233, 30240)

Inundation and increased erosion from sea level rise could convert coastal habitats from one type to another (e.g., salt marsh to mud flat) and generally reduce the amount of nearshore habitat, such as sandy beaches and rocky intertidal areas. There is a need for more studies of wetland migration opportunities and saltwater intrusion threats facing the Elkhorn Slough/Moss Landing area.

Coastal Development and Hazards (Coastal Act Sections 30235, 30236, 30250, 30253)

Many developed areas in Monterey County already experience hazards related to dune and bluff erosion and flooding. To address the expectation that these hazards will intensify with sea level rise, local governments should consider a comprehensive set of policies and standards for redevelopment, reevaluation of existing seawalls, and strong policies and direction for ensuring that private shoreline development on public lands fully mitigates the impacts to public access and recreation, and other coastal shoreline resources. Long term planning with Caltrans, State Lands Commission, and other stakeholders should be a priority in order to protect both coastal development and beach access.

Public Access and Recreation (Coastal Act Sections 30210, 30211, 30213, 30220, 30221)

One of the highest priorities in the Coastal Act is to protect and maximize public access to the coast. Sea level rise in Monterey County could lead to a loss of public access and recreational opportunities due to permanent inundation or episodic flooding or erosion of beaches, recreational areas, and trails. In addition, sea level rise is expected to cause flooding along public transit routes to the coast, including bus stops, raising environmental justice concerns for those dependent on public transportation.

Agriculture (Coastal Act Sections 30241, 30241.5, 30242, 30243)

The Coastal Act places a high priority on agriculture, and north Monterey County includes the Pajaro Valley agricultural regions spreading into the Salinas Valley agricultural region. These areas are significant and important agricultural assets to the State and the Nation, and are threatened currently by sea level intrusion, particularly in the Seaside Groundwater Basin. Sea level rise can exacerbate all of these concerns.

Additional Considerations

- In planning for sea level rise along Monterey Bay, zoning overlays could be used in LCPs to ensure that modification to existing buildings or construction of new buildings in vulnerable areas include designs to avoid or minimize risks from flooding, erosion or tsunamis.
- Quantitative assessment of impacts to beaches from development of seawalls can help inform selection of mitigation options for areas at risk from flooding and erosion from sea level rise.
- Phased implementation of different adaptation strategies, such as a combination of armoring and relocation of development over time, could be considered for pockets of development along erosion-prone areas of Big Sur that are constrained by critical infrastructure, such as Highway 1.
- Since Elkhorn Slough is surrounded by farmland, habitat migration from sea level rise could present conflicts between ESHA and agricultural uses. Additional studies and stakeholder engagement could seek to identify solutions to balance these potential conflicting uses and find opportunities for phased or multi-benefit adaptation approaches.
- A long-term planning strategy for the Highway 1 segment from Carmel to San Luis Obispo County (and beyond) is needed, including potential realignment inland, multi agency coordination, and California Coastal Trail planning.

References

[1] [EMC Planning Group Inc. 2015. "City of Pacific Grove Climate Change Vulnerability Assessment."](#)



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- [2] [Revell Coastal, LLC. 2016. "2016 City of Monterey Final Sea Level Rise and Vulnerability Analyses, Existing Conditions and Issues Report"](#)
- [3] [Heberger M, H Cooley, P Herrera, PH Gleick, E Moore. 2009. "The Impacts of Sea-Level Rise on the California Coast. Prepared by the Pacific Institute for the California Climate Change Center. "](#)
- [4] [ESA PWA. 2012. "Evaluation of Erosion Mitigation Alternatives for Southern Monterey Bay."](#)
- [5] California Coastal Commission Central Coast District Staff Interview. May 4, 2016.
- [6] California Coastal Commission. December 2016. City of Pacific Grove Case Study.
- [7] [ESA PWA, 2014. "Monterey Bay Sea Level Rise Vulnerability Assessment, Technical Methods Report."](#)