CalConsCom Sea Level Rise TaskForce Draft Resolution
Responding to Sea Level Rise along California's coast and bays.

Resolution: Sierra Club California adopts the Sea Level Rise Positions attached to this Resolution to guide Club activists in their advocacy efforts when taking part in those local and state coastal planning, legislative and permitting actions that address sea level rise (the best available climate science should be used at all times.)

Background Information: The State of California has recently released its Fourth Climate Change Assessment (2018) prepared under the coordination of the California Resources Agency, the Governor's Office of Planning and Research (OPR), and the CA Energy Commission). This Assessment looks at the impacts of climate change on many issues such as transportation, energy, agriculture, forests and, for the purposes of this document Sea Level Rise.

> The Assessment "estimates that, under mid to high sea-level rise scenarios, 31 to 67 percent of Southern California beaches may completely erode by 2100 without large-scale human interventions. Statewide damages could reach nearly $17.9 billion from inundation of residential and commercial buildings under 50 cm (~20 in) of sea-level rise, which is close to the 95th percentile of potential sea-level rise by the middle of this century. A 100-year coastal flood, on top of this level of sea-level rise, would almost double the costs.

More recently, a U.S. Geological Survey study has estimated that under the "high sea level rise" scenario of 2 meters by 2100, a 1 in 100 year coastal flood would impact up to $150 billion in property and 600,000 people, with about two thirds of the socioeconomic impact in the San Francisco Bay Area. (Barnard, P.L. et. al., 2019.)

The State's Ocean Protection Council (OPC) in its Sea Level Rise Guidance 2018 Update concludes that:

> Before 2050, differences in sea-level rise projections under different [GHG] emissions scenarios are minor but they diverge significantly past mid- century. After 2050, sea-level rise projections increasingly depend on the trajectory of greenhouse gas emissions. For example, under the extreme … scenario rapid ice sheet loss on Antarctica could drive rates of sea-level rise in California above 50 mm/year (2 inches/year) by the end of the century, leading to potential sea-level rise exceeding 10 feet. This rate of sea-level rise would be about 30-40 times faster than the sea-level rise experienced over the last century.

A State Coastal Conservancy report concluded that,

> 55 percent of current [coastal] habitat by area is highly vulnerable to five feet of sea level rise, including 60 percent of beaches, 58 percent of rocky intertidal habitat, 58 percent of marshes, and 55 percent of

tidal flats. Furthermore, 41,000 acres of public conservation lands are projected to be inundated by subtidal waters (Heady et al., 2018).

While a 3 foot sea level rise is still considered by the State to be the most likely, according to the 4th National Climate Assessment, "physical feedbacks that until recently were not incorporated into ice sheet models" could add up to 3.6 feet to estimates of likely sea level rise. (U.S. Global Change Research Program, 2017, v. 1.)

Even 3 feet of SLR will cause considerable damage to coastal resources such as sea grasses (seaweed, eelgrass, etc.), mudflats, tidal marshes, freshwater wetlands, seasonal rain-fed ponds, coastal vernal pools, coastal groundwater resources, etc., and the fisheries and human communities they support.

Sierra Club California's Sea Level Rise Positions

Glossary:

Managed (Planned) Retreat
An alternative to holding the line, protecting shorelines with armoring, or adaptive design is a retreat-based approach. Managed retreat refers to varying approaches to respond to coastal hazard risk by relocating

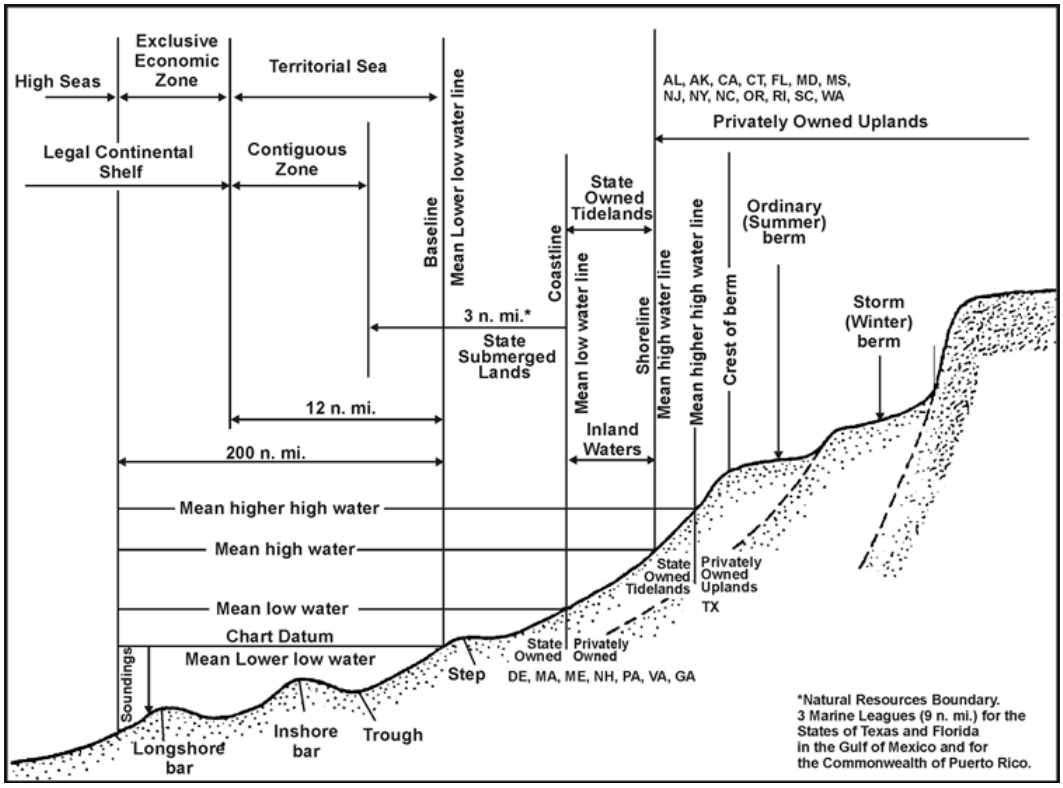
structures and/or abandonment of development. These strategies can result in a landward redevelopment pattern and a managed realignment of development along the coast so that natural erosion and other coastal processes, including beach formation/creation and habitat migration, can continue. (California Coastal Commission Draft Residential Adaptation Policy Guidance, Revised March 2018)

Public Trust Lands: The State Lands Commission manages 4 million acres of tide and submerged lands and the beds of navigable rivers, streams, lakes, bays, estuaries, inlets, and straits. These lands, often referred to as sovereign or Public Trust lands, stretch from the Klamath River and Goose Lake in the north to the Tijuana Estuary in the south, and the Colorado River in the east, and from the Pacific Coast 3 miles offshore in the west to world-famous Lake Tahoe in the east, and includes California's two longest rivers, the Sacramento and San Joaquin.

Tidelands:
Lands between "mean high water" and "mean low water". These are "public trust lands" owned by the state of California.

Submerged lands

Lands between mean low water and mean lower low water. Public trust lands owned by the State of California



(Ikehara 2005)

Inundation zone:
Those coastal lands that are likely to eventually become permanently inundated (i.e., are below mean high water, thus becoming tidelands or submerged lands) and thus waters of the state at some time in the future based on sea level rise projections.

Dynamic Amplifiers

Dynamic water levels can increase from wind waves, storm surge, nearby river discharge, and other events. Underwater profiles, beach and shore profiles, projected shoreline erosion, and other shoreline characteristics affect both the deepwater and nearshore wave forms. The combination of an increase in dynamic water levels with the local shoreline characteristics can be applied to SLR projections, allow modeling of projected **Total Water Level** for SLR conditions (TWL_{SLR}). These models can, for example, illustrate a possible over-topping of a dune, bluff, coastal structure or other controlling topographic feature. A pilot study conducted for the San Francisco coast showed that modeled TWL_{SLR} ranged from 1 (sandy beach) to as high as 4 (steep bluff or armored shore) times the projected SLR (i.e. TWL_{SLR} = SLR x 1 to 4). The pilot

study also confirmed that simply adding the projected SLR to currently known TWL significantly underestimated TWL_{SLR}, especially where bluffs, coastal structures, or armoring were present. Such modeling provides the most accurate estimate of future total water level.
References: Sea Level Rise Pilot Study, Future Conditions Analysis and Mapping San Francisco County, California and Coastal Storm Modeling System

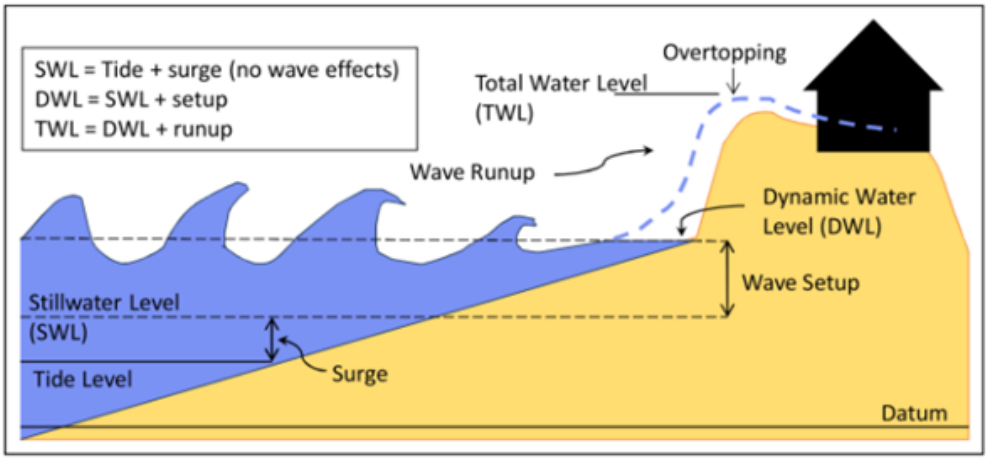


Figure 5. Definition Sketch of SWL, DWL, and TWL

Note: SWL = Stillwater Level; DWL = Dynamic Water Level; and TWL = Total Water Level

Sea level Rise projections and "Waters of the State"

"Prior to 2050, differences in sea-level rise projections under different emissions scenarios
are minor. This is because near-term sea-level
rise has been locked in by past greenhouse gas emissions and the slow response times of the ocean and land ice to warming. (State of California Sea-Level Rise Guidance, 2018 Update, Ocean Protection Council, pg. 234, Step 2, Evaluate Project Lifespan).
Therefore, potential inundation within the next 30 years is relatively predictable. Current uplands that will be inundated at the projected new "mean high water line" will become "Tidelands", "Submerged Lands," or "Waters of the State." All are state owned under current law and precedent, irrespective of prior grants (State Lands Commission, 2017.)

Flooding:
Sea level rise's impact will be more than permanent inundation to coastal properties. Extensive flooding can also be anticipated as additional factors will result in coastal and tidally influenced riverine uplands facing new or more frequent flooding than previously

experienced (see dynamic amplifiers below).

Living Shoreline: Living shorelines use "plants or other natural elements, sometimes in combination with harder shoreline structures, to stabilize estuarine coasts, bays, and tributaries." https:// oceanservice.noaa.gov/facts/living-shoreline.html.)

Sierra Club California Positions on Sea Level Rise

California's coastal shallow waters are among the most biologically and economically productive in the nation. It's tidal marshes, mudflats, sea grass and kelp beds support over 70% (some estimate as high as 90%) of our commercial fish and shell fish species, providing both feeding and nursery habitats. It's beaches and mudflats provide essential habitat to millions of shorebirds and other waterbirds as well as important recreational opportunities for human communities. Tidal marshes and sea grass and kelp beds are some of the most effective habitats for sequestering carbon, thus helping address climate change.

Sea level rise threatens all of these habitats with drowning, since they all exist only in shallow waters and 3 -10 feet of sea level rise will turn these habitats into deeper water, less biologically productive habitats. The loss of these habitats poses as real a threat to future community existence as does inundation.

The State Ocean Protection Council states, in its Update on Sea-Level Rise Science (April 2017):

> Hundreds of miles of roads and railways, harbors and airports, power plants and wastewater treatment facilities, in addition to thousands of businesses and homes, are at risk from future flooding, inundation, and coastal retreat. But the total potential impact of such coastal risks is significantly larger still: not only are economic assets and households in flood zones increasingly exposed, but also people's safety, lives, daily movement patterns, and sense of community and security could be disrupted.

Hard edge responses to sea level rise, for example sea walls or levees can be very destructive to shallow water habitats. Wave energy reflected off sea walls and levees can erode contiguous tidal marshes and beaches. Seawalls can reflect wave energy to adjacent parcels causing similar erosion. Sea walls also prevent beaches and tidal marshes from migrating upland and thus can result in the complete destruction of beaches and marshes. Finally, seawalls themselves provide only temporary solutions to sea level rise.

The Sierra Club believes that when planning adaptation responses to sea level rise, local governments and regional and state agencies should, as described below, first consider natural adaptation tools (such as living shorelines and tidal marsh restoration), followed by Managed/Planned Retreat and only if both these prove infeasible consider the application of hard-edged structures such as sea wall and levees. In all cases, the best available climate science should be used at all times.

Ensuring Social Equity and Environmental Justice:

1. Responses to sea level rise must ensure that adaptation tools that are possible for advantaged communities should not result in negative impacts to neighboring disadvantaged communities for whom those solutions are not available.

2. Federal, State and local funding sources must be developed in order to make possible the relocation of disadvantaged communities in response to sea level rise.

3. Disadvantaged communities must be part of the discussion when facing the need for SLR adaptation strategies and resources must be provided to allow them to participate in those discussions.

4. Laws, policies, rules, regulations, and evaluation criteria should be applied in a nondiscriminatory manner, including measures for adapting to sea level rise. Measures that result in disproportionate impact, such as inequitable loss of housing or access to beaches, are discriminatory, whether or not such a result was intended, and should be corrected. We support measures that redress environmental inequities.

Preserving Coastal Resources

1. Require local jurisdictions to develop planning 30-year maps of future mean higher high water line based on high sea level rise predictions. These maps should be updated every ten years at a minimum.

2. Ensure ecosystem function and landscape resiliency in all proposed solutions to sea level rise.

3. Utilize natural infrastructure wherever possible to address Sea Level Rise. The first adaptive strategy to be considered when planning for sea level rise and flooding should be preservation and restoration of natural habitats -- tidal marshes, beaches, sub-tidal living shorelines, freshwater wetlands, seasonal rain-fed ponds, coastal vernal pools, coastal groundwater resources, and riparian areas.

4. Consider managed/planned retreat as the second adaptive strategy when planning for sea level rise and flooding.

5. To facilitate managed retreat, anticipate provision for wetland and beach upland migration by the preservation, where possible, of adequate adjacent uplands for that purpose.

6. Where freshwater wetlands, seasonal rain-fed ponds, coastal vernal pools and coastal groundwater resources currently exist but are threatened by Sea Level Rise, managed retreat should include efforts to replicate those resources.

7. Provide equivalent opportunities for coastline public access for all adaptations to sea level rise.

8. Avoid the installation of hard infrastructure, such as sea walls or levees, whenever possible.

9. Use improved ecological connectivity between habitats to guide the development of any proposed adaptive strategies.

10. Avoid the destruction of existing habitats whenever possible when planning and implementing near-term solutions.

11. Mechanisms to provide adequate sediment to sustain beaches, mudflats, salt pannes and tidal marshes into the future should be identified.

When considering planning and permitting issues along the coast and bay shorelines for projects that will fall within the estimated "mean high water line" by 2050, all agencies and local governments should implement the following policies:

1. For undeveloped and developed **non-urban** shorelines no new development or structures should be permitted.

2. For **urban** shorelines no new development or structures should be permitted unless there is full protection for future coastal flooding for the lifetime of the structure. The developer/owner must fully provide for all costs associated with sea level rise. This accounting must include financial instruments that would assure that there is the capability for managed retreat, structure removal and the removal and remediation of hazardous material. The developer/owner must also provide assurance that such structure will not impact adjacent habitats and will continue to be ecologically compatible with existing conditions.

3. For all shoreline locations no reconstruction or rehabilitation of existing structures that extends the ability of those features to withstand increased sea level rise (for example sea walls) should be permitted except on urban or other developed shorelines for which the developer/owner must fully provide for all costs associated with sea level rise (see #2 above).

4. No replacement, rebuilding or major repairs to existing structures or infrastructure should be permitted except on developed shorelines for which the developer owner must fully account for all costs associated with sea level rise (see #2 above).

5. All coastal structures with life spans of less than 30 years should be considered temporary.

6. When considering California Coastal Commission (CCC) Local Coastal Programs (LCPs), the CCC and local governments should:

A. Develop a set of alternative responses to the SLR predictions including financial analysis.

B. Begin educating all residents (homeowners, renters and businesses) to the impending inundation.

C. Encourage all residents to consider moving out from areas that will be inundated.

D. Develop federal, state and local funding sources in order to provide government assistance in planning and implementing that process.

E. Require that all property owners of structures inform the occupants and prospective buyers or tenants that their building will face inundation by 2050 and explain the issues associated with that location.