

California King Tides Initiative

Highlights from 2011-2012



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Cover image “Waiting for the King Tides” at Sutro Baths, San Francisco, taken by Ted Schulze, December 24, 2011.

*with support from 

California King Tides is a partnership of state, federal, and non-profit organizations.



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Overview of California King Tides Initiative

The California King Tides Initiative (Initiative) was launched in the winter of 2010-2011 by a partnership of government agencies and non-profit organizations. The Initiative engages citizens in photographing king tides, or extreme high tide events that occur when the sun and moon's gravitational forces reinforce one another, along the entire California coast. The goal of the Initiative is to highlight the flooding and erosion that occurs during king tides and to raise awareness about how sea level rise could affect coastal communities, especially during extreme storm events. In addition, the campaign seeks to create a living library of photographs that can be used to inspire and inform action to reduce coastal hazards and impacts from sea level rise.

The Initiative was inspired by similar projects across the globe, including ones in Washington, Oregon, British Columbia, and Australia, and is part of a growing network of local efforts. California Initiative partners include the California Coastal Commission, the California Coastkeeper Alliance, the Gulf of the Farallones National Marine Sanctuary, San Francisco Bay Development and Conservation Commission, the San Francisco Bay National Estuarine Research Reserve, Thank You Ocean, and the Tijuana River National Estuarine Research Reserve.

Getting involved in the Initiative is easy and fun and anyone with a camera or smartphone can participate. Participants have ranged from students, teachers, professional photographers, scientists, coastal managers, land trust organizations, surfers, and beach-goers.

2011-2012 Highlights

This was an exciting year for the Initiative. We increased participation through social media, established new partnerships, and coordinated with over 10 King Tides Initiatives across the globe. The Initiative promoted the king tides on December 23, 24, 2011; January 20, 21, 22; and February 6, 7, 8, 2012. Over the winter months, participants submitted hundreds of king tides photos from across the state to Flickr and Facebook.

Some of our accomplishments include:

- An increase in Initiative participation, with nearly **500** photos uploaded to the [California Flickr group](#) from 28 cities spanning the entire California Coast; **370** of these photos are from 2011-2012.
- New partnerships and supporters, including [Thank You Ocean](#), [Sierra Club of California](#), [Friends of Five Creeks](#), [Surfrider Foundation](#), and [Surfpulse](#), among others.
- Increased visibility through photos showcased at the Ocean Day California Monterey Bay Aquarium Reception, State of the Estuary Conference, [California Academy of Sciences Night Life](#) and at the [Rickshaw Stop's Nerd Nite](#), and through a [Thank You Ocean podcast](#).

- Extensive media coverage for the California King Tides Initiative throughout the state and nationally, with stories by [Energy & Environment's ClimateWire](#), [NPR's KQED](#), [San Francisco Chronicle](#), [KTVU](#), [San Diego City Beat](#), and [Santa Barbara Independent](#).



Don Edwards SF Bay National Wildlife Refuge. Photo by Flickr user ee.refuge.

Documenting the Entire Coastline

California King Tides Initiative participants have uploaded over 500 photos from 28 cities along the California coast. Help us complete the coastline! Grab your camera or smartphone and take photos during the next king tides.

Sea Level Rise in California

One of the reasons the Initiative is documenting high tides along the coast is to illustrate the coastal hazards associated with high waters and to show the potential impacts of sea level rise in the future. The Initiative also seeks to raise awareness about actions that communities and the public can take to prepare for higher water levels.

In California, mean sea level has risen by an average of 8 inches in the past several decades, and could rise by as much as 3 to 5 ½ feet by 2100 (NRC 2012). The primary coastal hazards associated with rising sea level include flooding and increased coastal erosion, which can lead to property damage, landslides, and bluff collapse. Low-lying areas such as beaches and wetlands could also become permanently inundated if coastal development blocks the natural inland movement of these areas. For more information on how sea level rise could affect our coasts, see the box below.

The good news is a growing number of efforts to prepare for sea level rise are occurring throughout the state. California is a leader when it comes to climate change, and many communities have developed plans to prepare for sea level rise, and are taking action to ensure coastal beaches, parks, property, and critical facilities are safe from rising tides. Examples of planning efforts that are occurring throughout the state are included with each set of photos in the next section. The photos from the Initiative have been used in many of these efforts to help communicate the potential impacts of sea level rise.

How will sea level rise affect our coasts?

Flooding: Sea level rise will cause coastal flooding on a temporary or permanent basis. Flooding could damage coastal buildings and critical infrastructure, such as low-lying transportation, port, and wastewater treatment facilities, as well as make parks, public accessways, and other recreation areas inaccessible.

Beaches: Sea level rise will cause landward migration or retreat of beaches over the long term. Beaches with seawalls or other barriers will not be able to migrate landward and the sandy beach areas will gradually become inundated, or permanently flooded.

Wetlands and Coastal Habitats: Wetlands will migrate inland if land is available and the wetland is able to build elevation at a rate that keeps pace with sea level rise. Sea level rise will lead to a loss of wetlands and coastal habitats if there is no room for the habitats to migrate inland.

Saltwater Intrusion: As sea level rises, saltwater can intrude into coastal groundwater supplies, leading to increased saltwater intrusion into drinking water wells or water supplies for coastal agriculture.

Increased Coastal Erosion: Sea level rise could lead to an increase in bluff erosion and bluff retreat as more wave energy is available to erode cliffs and bluffs.

Extreme Storm Events: Sea level rise can intensify the effects of extreme storms, as higher water levels can lead to additional flooding and larger waves.

Photos from the 2011-2012 Campaign

The following section includes photo highlights, participant profiles, and sea level rise planning efforts from each of the major coastal regions of California, including the North Coast, the San Francisco Bay Area, the Central Coast, and the South Coast. We hope the photos convey a compelling message about the need for proactive planning to create resilient coastal communities today and into the future.

North Coast

The North Coast includes the northern most counties along the California coast: Humboldt, Del Norte, and Mendocino Counties. The following photos show Humboldt Bay flooded during king tide events.

Efforts to Adapt to Sea Level Rise

Many coastal communities have started to implement sea level rise strategies.

Examples of a few of these efforts are included for each of the different regions of California.



Humboldt Bay - Eureka Slough

Photo taken on 12/23/11 at 10:03 am, facing west/northwest.

King tide was approx. 8.53 feet, 10:00 am per NOAA data (North Spit, Humboldt Bay tide gauge). Photo by Flickr user sisqknothome.



Humboldt Bay – Arcata Bottoms off Jackson Ranch Road.
Photo taken on 12/23/11 at 10:49 am facing east/northeast.
King tide was 7.94 feet, 11:00 am per NOAA data (North Spit,
Humboldt Bay tide gauge). Photo by Flickr user sisqknothome.



Humboldt Bay - Eureka Slough/ Highway 101 bridge.
Photo taken on 12/23/11 at 9:58 am, facing east.
King tide was approx. 8.53 feet, 10:00 am per NOAA data (North Spit, Humboldt Bay tide gauge). Photo
by Flickr user sisqknothome.

Humboldt Bay Sea Level Rise Study

A study is underway in the Humboldt Bay Area to evaluate how sea level rise will affect the bay. The study, known as the “Humboldt Bay Shoreline Inventory, Mapping and Sea Level Rise Assessment,” is being completed by Aldaron Laird through a California Coastal Conservancy grant. To complete the study, Laird walked or kayaked all 102 miles of Humboldt Bay’s shoreline and its sloughs.

San Francisco Bay Area

The San Francisco Bay Area includes Alameda, Contra Costa, Marin, Napa, San Francisco, Santa Clara, San Mateo, Solano, and Sonoma counties. The following photos show areas throughout the Bay Area, including San Francisco, Albany, Sausalito, and Jenner.



San Francisco – Embarcadero Pier 14 (Raygun Gothic Rocketship).

Photo taken on 1/22/12, facing northwest.

King tide was approx. 7.15 feet, 8:55am per NOAA data (San Francisco tide gauge).

Photo by Sergio Ruiz.



San Francisco –St. Francis Yacht Club, 'Wall, no beach'
Photo taken on 1/21/12 at approximately 9:15 am, facing north.
King tide was approx. 6.8 feet, 9:24 am, per NOAA data (San Francisco tide gauge).
Photo by Matt J Richardson.



King tide in Sausalito, Marin County. Photo by Flickr user LBlash.

Adapting to Rising Tides

The Adapting to Rising Tides is a collaborative planning effort led by the San Francisco Bay Conservation and Development Commission to help San Francisco Bay Area communities adapt to rising sea levels. The goals of the effort are to understand the ecosystem, infrastructure, and economic impacts from sea level rise and to identify strategies for managing risks. The project has started with a vulnerability assessment for a portion of the Alameda County shoreline. For more information visit www.adaptingtorisingtides.org



Profile #1

Name: Barbara Poole
Occupation: Artist
City/ Town: San Rafael

1. Why did you want to participate in the CA King Tides Initiative?

I was inspired to participate because my daughter has studied sea level rise. As a result I became interested in the documentation of the King Tides.

2. How were you involved in the CA King Tides Initiative?

I took photos in San Rafael at Buck's Landing during the King Tide on January 20th, 2012.

3. Did your experience with the CA King Tides Initiative change your impressions of the California coastline? If so, how?

Yes. I became more aware of the ramifications of a King Tide, what it means, and how the water levels affect the coastline. I wouldn't have gone out to look at the coastline during a King Tide without knowing about the King Tides initiative. I was amazed to see the high water levels.

4. How do you think sea level rise and other climate change impacts will impact you and/or your community?

It is likely we will be losing parts of our community to the sea.

6. How do you think the Initiative should use the photos? Please provide ideas for specific online, printed, or physical spaces for sharing in your community or workplace.

The photos should be a part of the planning commission meetings and discussions on development of the coasts.

7. Why is the California coast and shoreline important to you? (E.g. occupation, recreation, quality of life, community)

I treasure the coast and shoreline for their beauty and diversity of wildlife. I like to walk along the coast and watch the sea, seals, whales and birds. My quality of life is improved by being able to have access to the coast.

High Tide/Low Tide Comparison



King tide in Albany. Taken December 2011. Photo by Flickr user tmikkphot.



Low tide in Albany. Taken December 2011. 6 hours after king tide. Photo by Flickr user tmikkphot.



Profile #2

Name: Tom Mikkelsen
Company: TMIKKPhoto
City/Town: Berkeley

1. Why did you want to participate in the CA King Tides Initiative?

I love the bay and ocean. Change interests me and I thought that this sort of change (gradual but quite dramatic) should be documented.

2. How were you involved in the CA King Tides Initiative?

I heard about it from a friend and decided to take some photographs on the bay shoreline from several easily accessible public areas.

3. How do you think sea level rise and other climate change impacts will impact you and/or your community?

Yes, shoreline parks and trails will become inundated, stormwater outfalls will become submerged resulting in flooding upstream and wetland areas may disappear.

4. Why is the California coast and shoreline important to you? (E.g. occupation, recreation, quality of life, community)

I grew up in the Bay Area and visit the coast often. I am also a volunteer photographer for the California Coastal Commission and the San Francisco Bay Trail Project.



Local Coastal Programs

Local Coastal Programs are long-term planning documents for coastal areas and are a key mechanism for addressing sea level rise impacts. Marin and Sonoma Counties are in the process of updating their Local Coastal Programs and are working with the California Coastal Commission to address sea level rise in these planning documents. For more information on Local Coastal Programs, visit

<http://www.coastal.ca.gov/lcps.html>.

San Francisco - Ocean Beach.

Ocean Beach this morning had a lot of Ocean and not much Beach. Photo taken on 12/24/11, facing south towards the Sloat Blvd parking lot.

King tide was approx. 7.14 feet at 9:24 am, per NOAA data (San Francisco tide gauge).

Photo by Flickr user poe.



Jenner - Goat Rock Beach.

Photo taken on 12/24/11 at 10:08am, standing on a cliff 187' above sea level facing west: N 38° 26.501' W 123° 07.505'.

King tide was approx. 6.8 feet, 9:27 am, as per NOAA data (Fort Ross tide gauge).

Photo by Nancy Goodenough.



Jenner – North end of Goat Rock Beach: Pacific Ocean (at left) meets the Russian River (at right).
Photo taken on 12/24/11 at 11:04 am, standing on a cliff 187' above sea level facing NNW: N 38° 26.501'
W 123° 07.505'.
King tide was approx. 6.8 feet, 9:27 am, as per NOAA data (Fort Ross tide gauge).
Photo by Nancy Goodenough.

Central Coast

The Central Coast includes Santa Cruz, Monterey, and San Luis Obispo Counties. The photos shown here are from Pacific Grove near Monterey, the town of Pacifica, and Pismo Beach in San Luis Obispo County.



Pacific Grove –Otters Point.

Photo taken on 1/22/12.

King tide was approx. 6.32 feet, 8:58 am, as per NOAA data (Monterey tide gauge). NW swell @ 15 seconds. Top of sea wall is approximately 5 feet below the high tide mark and water level was approximately 3 feet below top of sea wall. Base of sea wall (ground level) to top of wall at low tide is approximately 10 feet. Photo by Bryan Flores.

Santa Cruz Climate Adaptation Plan

An update to the 2007 Hazard Mitigation Plan, the adaptation plan includes strategies and best available science for integrating climate change impacts into City of Santa Cruz operations. For the complete plan, visit:

<http://www.cityofsantacruz.com/Modules/ShowDocument.aspx?documentid=23643>



Pacific Grove - Otters Point.

Photo taken on 1/22/2012.

King tide was approx. 6.32 feet, 8:58 am, as per NOAA data (Monterey tide gauge). 12 foot NW swell @ 15 seconds. Photo by Bryan Flores.



Pacifica - Pacifica Pier.
Photo taken on 1/22/2012. King tide was approx. 6.85 feet, 9:24 am, as per NOAA data (Ocean Beach tide gauge). Photo by Frank Quitarte.



Pacifica. Photo taken on 1/22/12. King tide was approx. 6.85 feet, 9:24 am, as per NOAA data (Ocean Beach tide gauge). Photo by Frank Quitarte.



San Luis Obispo - Pismo Beach.

Photo taken on 12/24/12. King tide was approx. 6.8 feet, 8:40 am, as per NOAA data (Port San Luis tide gauge). Photo by Cassidy Teufel.



Profile #3

King Tides Participant
City/Town: Bolinas, CA

1. Why did you want to participate in the CA King Tides Initiative?

Because I think the pictures are an important real life visual for people to see in order to get a sense of what rising sea levels will look like.

2. How were you involved in the CA King Tides Initiative?

I took a few photos over the winter of 2011 at Bolinas Lagoon.

3. Did your experience with the CA King Tides Initiative change your impressions of the California coastline? If so, how?

Not really...I'm already aware of the reality of the problem but seeing those high tides in front of my eyes definitely brings it home for me.

4. How do you think sea level rise and other climate change impacts will impact you and/or your community?

Living on the coast, practically surrounded by water in San Francisco, I know that much of the city will be impacted. Working on beaches and in Bolinas I know that my job will also be impacted and measures need to be made to help prepare, adapt, and increase resilience to the rising seas.

5. How do you think the Initiative should use the photos? Please provide ideas for specific online, printed, or physical spaces for sharing in your community or workplace.

I definitely think the photos should be shown at local museums, perhaps during high tide events. I also think that billboards of photos - posted at the locations where the photos were shot would be a good idea.

6. Why is the California coast and shoreline important to you? (E.g. occupation, recreation, quality of life, community)

Work, fun, family and friends, recreation, all of it!

Profile photo by Flickruser [waywuwei](#)



Profile #4

Name: Sarah Ferner

Company: SF Bay NERR

City/Town: Tiburon, Marin County

1. Why did you want to participate in the CA King Tides Initiative?

To help educate people about sea level rise.

2. How were you involved in the CA King Tides Initiative?

I organize workshops for science teachers and during a workshop about sea level rise, I introduced the teachers to the Initiative. We also discussed ways they could use the Initiative or similar independent projects with their students. The teachers were very interested.

3. How do you think sea level rise and other climate change impacts will impact you and/or your community?

Flooding of housing and roads - we already see this in some neighborhoods in Southern Marin.

4. How do you think the Initiative should use the photos?

Interpretive exhibits!

5. Why is the California coast and shoreline important to you? (E.g. occupation, recreation, quality of life, community)

Occupation, recreation, quality of life, all of the above!

South Coast

The South Coast includes Santa Barbara, Ventura, Los Angeles, Orange, and San Diego counties. The following photos show Santa Barbara, Malibu, and San Diego.



Santa Barbara - Breakwater.

Photo taken on 2/7/12 at 9:16 am, facing east. King tide was approx. 5.75 feet at 8:42 am (Santa Barbara tide gauge). Photo by Claire Fackler.



Profile #5

Name: Claire Fackler

Company: NOAA Office of National Marine Sanctuaries

City/Town: Santa Barbara

1. Why did you want to participate in the CA King Tides Initiative?

I was intrigued by the idea of how storm events during king tides can show us the future impacts of sea level rise along our coasts.

2. How were you involved in the CA King Tides Initiative?

I took photos at several coastal locations in the Santa Barbara area, and uploaded my photos to Flickr and the CA King Tides group. I also support the Thank You Ocean campaign, which is how I heard about the King Tides Initiative.

3. Did your experience with the CA King Tides Initiative change your impressions of the California coastline? If so, how?

You can certainly see the infrastructure (i.e. piers, sea walls, beach stairs, watersheds) being impacted by king tides.

4. How do you think sea-level rise and other climate change impacts will impact you and/or your community?

The Santa Barbara community will need to address several sea walls, beach stairs and other infrastructure along the coast as we begin to feel the impacts of climate change more readily. Cliff erosion will also be a really big deal in our community.

5. How have you used your King Tides photos? (e.g. Who have you shared them with? Have you used them in any reports or presentations?)

All of my king tide photos are on Flickr linked to the CA King Tides Initiative. I have seen my photos used online and I believe one was used in a recent publication.

6. How do you think the Initiative should use the photos? Please provide ideas for specific online, printed, or physical spaces for sharing in your community or workplace.

Facebook and other social media is a great way to use the photos to visually communicate with broad audiences the impacts of what sea level rise will look like. Climate Interpreter is a website that focuses on climate change communication, so that may be a good place to highlight photos to demonstrate sea level rise. Using these photos in news media outlets to convey concerns about climate change are a great way to show impacts now and in the future. Some people don't believe scientists' predictions, yet they believe their own eyes and personal experiences and these king tides photos tell a compelling cautionary tale.

7. Why is the California coast and shoreline important to you? (E.g. occupation, recreation, quality of life, community)

The California coastline is important to me since my family and I spend a lot of our free time around, on and in the ocean. My occupation revolves around the ocean as well.



Flooded beach in Santa Barbara. The image shows the large ocean tidal flow and the near disappearance of the local beach due to the high tides. Photo taken on 1/22/12, facing east towards the Santa Barbara Marina.

King tide was approx. 5.75 feet at 8:42 am as per NOAA data (Santa Barbara tide gauge).

Photo by Russell Lombardo.



Malibu- Broad Beach.

Photo taken on 12/24/11 at 9:45 am, facing west.

King tide was approx. 6.96 feet, 8:07 am, per NOAA data (Santa Monica tide gauge).

Photo by Laurel Bartels.



Malibu - Broad Beach Road.

Photo taken on 12/23/11 at 7:15 am, facing south.

King tide was approx. 6.94 feet, 7:22 am, per NOAA data (Santa Monica tide gauge).

Photo by Laurel Bartels.



Malibu Road.

Photo taken on 12/24/11 at 9:20am, facing south.

King tide was approx. 6.96 feet, 8:07 am, per NOAA data (Santa Monica tide gauge). Photo by Laurel Bartels.

AdaptLA:

Los Angeles County is in the process of developing an adaptation plan, known as AdaptLA, and is working with UCLA to develop new regional projections of climate change over the next 30 years, including impacts from sea level rise. For more information, visit: <http://c-change.la/>.



Malibu - Beachfront Homes on Malibu Road.

Photo taken at high tide, approx. 8:00 a.m. facing east. Photo by LA Waterkeeper.



Malibu - Broad Beach Road.

Photo taken on 12/23/11 at 7:15AM, facing west.

King tide was approx. 6.94 feet, 7:22 am, per NOAA data (Santa Monica tide gauge).

Photo by Laurel Bartels.



Malibu - Broad Beach Road

Photo taken on 12/23/11 at 3:00 pm, facing West at Low Tide. Low Tide was -1.59, 2:40 pm, per NOAA data (Santa Monica tide gauge). Photo by Laurel Bartels.

San Diego



San Diego - Near Windansea Beach. Photo by San Diego Coastkeeper.

San Diego Bay Sea Level Rise Adaptation Strategy:

The strategy provides measures to evaluate and manage risks from sea level rise and other climate change impacts, and includes a vulnerability assessment of community assets at risk, and broad recommendations to increase resilience of these assets. For more information visit:

http://www.icleiusa.org/climate_and_energy/Climate_Adaptation_Guidance/san-diego-bay-sea-level-rise-adaptation-strategy-1/san-diego-bay-sea-level-rise-adaptation-strategy

Looking Forward

During the 2011 and 2012 King Tide season, the California King Tides Initiative organizers used social media to publicize the king tide events for the first time, and worked closely to encourage photos from throughout the entire state. As the Initiative moves forward into the 2012-2013 season, it is:

- Encouraging members of the public to take photos of the king tides using their smartphones as well as cameras.
- Obtaining aerial photos of both mean tide and king tide conditions along the coast of California to provide a new way of seeing the king tides.
- Enhancing the Initiative website to be more user-friendly and organized so images are easily accessible to the public and resource managers.

Dates for the King Tides in the 2012/2013 season are:

- November 13th, 14th, and 15th
- December 12th, 13th, and 14th
- January 9th, 10th, and 11th
- February 7th, 8th, and 9th

Get Involved:

- Go to the California King Tides Initiative Website (<http://californiakingtides.org/>) to:
 - Find out when the high tides occur in your area
 - See photos from past years
 - Read suggestions about where to take photos (although you can take them in any coastal location that appeals to you).
- Get out there and take some photos!
 - Tell your friends about the king tides and invite them to take pictures with you.
 - Share your photos on the California King Tides Initiative Flickr page and make sure to share the date, location, and time the photo was taken.
 - Check back to see your photo as part of our collection!

Question: How are my photos used as part of the California King Tides Initiative collection?

Your photos are used by coastal resource managers and planners to see how the coast changes over time, especially as sea level is increasing. Coastal managers and planners also use your photos to communicate with others about the dynamic nature of the coast and sea level rise.

Occasionally, the California King Tides Initiative is invited to display photos from our collection at various events such as Nightlife at the Academy in San Francisco. We use photos submitted to our collection according to the [“Attribution-NonCommercial-ShareAlike License.”](#) We attribute images to their photographers, usually by using the name given on Flickr when you submitted the photos.

References

National Research Council, Committee on Sea Level Rise in California, Oregon, and Washington (Prepublication Version, 2012) Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, National Academies Press, Washington, D.C. pp.250; ISBN 978-309-24494-3



Morro Bay - Morro Strand State Beach with Morro Rock
Morro Rock Reflection in a Lagoon.

Photo taken on 1/23/11 at sunset, facing south.

This was taken during a 0.5 foot low tide on a wide flat sand beach, still wet from the 5 foot high tide that had flooded this beach earlier that day. Ultra high tide, or "King Tide," reaches sand dune's edge.

Photo © 2011 "Mike" Michael L. Baird, flickr.bairdphotos.com.