Our Coast, Our Future
Planning for Sea Level Rise and Storms in the San Francisco Bay Area

Kelley Higgason, Project Coordinator, GFNMS
GFNMS Advisory Council Meeting
November 20, 2013
Goal

Provide science-based, decision support tools to help understand, visualize, and anticipate coastal climate change impacts to Bay Area communities and ecosystems.

www.prbo.org/ocof
Objectives

Model vulnerabilities to SLR & storm hazards
- Seamless DEM (2 m res); 40 SLR and storm scenarios using CoSMoS
- Inputs: water levels, wave heights, flooding + vertical land motion, flood flows, Delta discharge, wind waves for SF Bay

Assess stakeholder information needs
- 3 Scoping Workshops
- 2 Outer Coast Focus Group Meetings
- Quarterly SF Bay Advisory Committee Meetings

Map vulnerabilities at appropriate scale for management action
- Online mapping tool including infrastructure and ecosystem vulnerabilities
Project Scope

- **Outer Coast Nov 2010**
- **SF Bay Nov 2011, expanded:**
  - Geographic scope
  - Model inputs
  - Stakeholder engagement
  - Partners
  - Technical Assistance
Diverse Team

Team Leads

Barnard, USGS
- DEM and scenarios with CoSMoS

Ballard/Fitzgibbon, Point Blue
- Online decision support tools

Higgason, GFNMS
- Project management

Psaros, Coravai LCC
- Collaborative process

Other Partners

- Coastal Services Center
- SF Bay NERR
- National Park Service
- EBM Tools Network

Funders

- NOAA Climate Program Office
- NERRS Science Collaborative
Assess Vulnerabilities with Data and Flood Map

- Species protection plans
- Habitat restoration plans
- Resource management plans
- Municipal plans (General Plans, Climate Action Plans, Local Coastal Plans)
- Infrastructure maintenance plans (levees, roads, etc)
Our Coast Our Future (OCOF) is a collaborative, user-driven project focused on providing San Francisco Bay Area coastal resource and land use managers and planners locally relevant, online maps and tools to help understand, visualize, and anticipate vulnerabilities to sea level rise and storms within the bay and on the outer coast from Half Moon Bay to Bodega Bay.

**Beta Version:** The OCOF web site is now ready for use on the outer coast. We welcome your feedback and want to know what you think of this project and research.

**What's New?**
The Beta version of the Our Coast Our Future (OCOF) website is now available.
Frequently Asked Questions about Our Coast Our Future (OCOF)

Please click on a question to reveal the answer.

GENERAL

What is OCOF?

How can the OCOF scenario models and interactive tools help me?

How is this tool different from other sea level rise mapping efforts?

1. **NOAA Sea Level Rise Viewer**: The NOAA Coastal Services Center’s Sea Level Rise and Coastal Flooding Impacts Viewer provides users the ability to visualize areas potentially impacted by sea level rise side-by-side with other data such as critical infrastructure, roads, ecologically sensitive areas, demographics, and economics. This is a sophisticated screening level tool that models coastal flooding from the combination of a high tide and sea level rise only. The data and maps do not include storm surges nor do they account for erosion, subsidence, or future construction. The tool uses a modified bath-tub approach that accounts for local tidal variability using the NOAA VDATUM model and includes hydraulic connectivity.

2. **FEMA California Coastal Analysis and Mapping Project (CCAMP)**: The CCAMP study area covers the entire California open Pacific coast, including the nine San Francisco Bay Area counties. The new detailed coastal engineering analyses and mapping will revise and update the flood and wave hazard data shown on the coastal Flood Insurance Study reports and Flood Insurance Rate Maps based on existing conditions for each of the twenty coastal counties. Through Risk MAP, CCAMP will develop enhanced products and tools to help communities understand and mitigate existing coastal flood hazards and risks, while OCOF’s online decision support tools project future flood hazards and risks resulting from sea level rise and storms within the San Francisco Bay Area.

What is the difference between PRBO Future San Francisco Bay Tidal Marsh website and OCOF?

If I have questions about sea level rise in San Francisco Bay, should I use OCOF or PRBO’s Sea Level Rise website?

GEOGRAPHIC COVERAGE

What is the current geographic extent and resolution of the Digital Elevation Model and decision support tool?

How did you choose the OCOF project boundary?

DATA

Which LIDAR data do you use?
Our Coast Our Future Web Tool Tutorial

Published on Feb 18, 2013
Watch this tutorial to learn how to use the tools on this website. The tools are aimed at San Francisco Bay Area coastal resource and land use managers and planners.

All Comments (0)
Sign in now to post a comment!
1) Choose a topic.
- Flooding shows the extent of flooding due to SLR, waves, and storm surge.
- Choose topic: Bolinas Lagoon

2) Choose a Sea Level Rise (cm) level.
- Options: 0, 25, 50, 75, 100, 125, 150, 175, 200, 250, 300, 500
- What Sea Level Rise scenario should I use?

3) Choose a storm scenario frequency.
- Options: None, Annual, 20 year, 100 year

4) Choose other layers to view with topic data.
- Placenames
- Land Use
- Detail View
What projections are likely to occur in a given year?

Move the slider control below the graph left and right to see how different climate experts' projections of sea level rise compare to one another. Hold your mouse over each bar for details.

When is a projection likely to occur?

Move the slider control below the graph left and right to see how different climate experts' projections of when sea level rise will occur compare to one another. Hold your mouse over each bar for details.

Citations
Interactive Map

1) Choose a topic.
- **Current** shows the velocity of the ocean waters in a scenario.
  - Flooding
  - Waves

2) Choose a Sea Level Rise (cm) level.
- 0, 25, 50, 75, 100, 125, 150, 175, 200, 500
  - What Sea Level Rise scenario should I use?

3) Choose a storm scenario frequency
- None, Annual, 20 year, 100 year

4) Choose other layers to view with topic data.
- Placenames
- Land Use
- Protected Areas
- Rivers & Streams
- Cliff Retreat
- Coastal Armoring

Current Velocity: 0.00cm SLR + Wave 000 = 0.310 m per sec (27.5267, -122.9460)

Rodeo Beach (Chronicle)
1) Choose a topic.
Flooding shows the extent of flooding due to SLR, waves, and storm surge.

Flooding  |  Waves
Current   |  Uncertainty

What do the Tools represent?

2) Choose a Sea Level Rise (cm) level.

0  |  25  |  50  |  75  |  100  |  125  |  150  |  175  |  200  |  250  |  500  |  750  |
What Sea Level Rise scenario should I use?

3) Choose a storm scenario frequency.

None  |  Annual  |  20 year  |  100 year

4) Choose other layers to view with topic data.

Placenames  |  Land Use  |  Background

OCOF Data Download
15:42:12
The report you requested is available for download by clicking on this link.
This is the sea level rise and storm scenario report for the area you selected. This report was designed to provide information to help you identify vulnerabilities to sea level rise and storm surges.

**Area and Elevation Information**

Area is the size of selected polygon, in square meters, acres and hectares; and Elevation is the average, minimum and maximum elevation from the Digital Elevation Model (DEM) within the polygon.

<table>
<thead>
<tr>
<th>Area</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>576,111.40 m²</td>
<td>Mean: 4.39 m</td>
</tr>
<tr>
<td>14.25 ac</td>
<td>Minimum: 0.29 m</td>
</tr>
<tr>
<td>57.61 ha</td>
<td>Maximum: 5.37 m</td>
</tr>
</tbody>
</table>

**Projected Percent Area Flooded for the Selected Area**

Values indicate the percentage of the selected area flooded for the Storm and Sea Level Rise Scenario combination.

<table>
<thead>
<tr>
<th>Storm Scenario</th>
<th>100-yr Storm</th>
<th>50-yr Storm</th>
<th>Annual Storm</th>
<th>No Storm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0%</td>
<td>10%</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td>4%</td>
<td>5%</td>
<td>15%</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Projected Average Flood Depth for the Selected Area**

Values indicate the average flood depth (in feet and centimeters) over the Mean Higher High Water (MHHW) within the selected area for each Storm and Sea Level Rise Scenario combination. Values include modeling uncertainty bracket of +/- 0.40 ft.

<table>
<thead>
<tr>
<th>Storm Scenario</th>
<th>100-yr Storm</th>
<th>50-yr Storm</th>
<th>Annual Storm</th>
<th>No Storm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30-110 cm</td>
<td>50-130 cm</td>
<td>45-175 cm</td>
<td>35-210 cm</td>
</tr>
<tr>
<td></td>
<td>1.0-3.5 ft</td>
<td>1.6-4.3 ft</td>
<td>1.5-5.9 ft</td>
<td>3.5-6.9 ft</td>
</tr>
<tr>
<td></td>
<td>15-75 cm</td>
<td>25-105 cm</td>
<td>20-150 cm</td>
<td>25-210 cm</td>
</tr>
<tr>
<td></td>
<td>0.5-3.1 ft</td>
<td>1.0-3.8 ft</td>
<td>0.7-5.1 ft</td>
<td>1.0-6.9 ft</td>
</tr>
<tr>
<td></td>
<td>0-50 cm</td>
<td>25-75 cm</td>
<td>25-125 cm</td>
<td>30-185 cm</td>
</tr>
<tr>
<td></td>
<td>0-2.6 ft</td>
<td>0.3-5.4 ft</td>
<td>0.8-4.3 ft</td>
<td>1.5-6.6 ft</td>
</tr>
</tbody>
</table>

**Map of Area**

The map shows the area selected with the flood scenarios and flood depth.
1) Choose a topic.
Flooding shows the extent of flooding with lift and storm surge.

Flooding: Waves
Current: Uncertainty

What do the Topics represent?

2) Choose a Sea Level Rise (cm) level.
Rise (cm) level:
0, 25, 50, 75, 100, 125, 150, 175, 200, 500

What Sea Level Rise should I use?

3) Choose a storm scenario frequency
None: Annual: 20 year: 100 year

4) Choose other layers to view with topic data.
- Placenames
- Land Use
- Protected Areas
- Rivers & Streams
- Cliff Retreat
- Coastal Armoring
- Roads and Transportation
- Buildings
- Utilities & Services

Load a GIS file
You can select and upload a KML, KMZ, or zipped SHP file with polygons and select one. All uploaded files are expected to be in Latitude/Longitude WGS-84.

Areas in your GIS file Marin Coastal Parking

- Rodeo Beach Parking Lot
- Rodeo Beach Street Parking
- Muir Beach Parking
1) Choose a topic.

Flooding shows the extent of flooding with SLR and storm surge.

- Flooding
- Waves

Current: Uncertainty

What do the topics represent?

2) Choose a Sea Level Rise (cm) level.

- 0
- 25
- 50
- 75
- 100
- 125
- 150
- 175
- 200
- 250
- 300
- 500

What Sea Level Rise scenario should I use?

3) Choose a storm scenario frequency.

- None
- Annual
- 20 year
- 100 year

4) Choose other layers to view with topic data.

- Placenames
- Land Use
- Protected Areas
- Rivers & Streams
- Cliff Retreat
- Coastal Armoring

Max Wave Runup during Flood
000cm SLR + Wave 000

Flood-prone Low-lying Areas
000cm SLR + Wave 000

Flood Hazard 000cm SLR + Wave 000

Flood Depth 000cm SLR + Wave 000

- Stream
- Intermittent Stream

0 cm
250 cm
500 cm
750 cm
Rivers and Streams
Citation Information:

Originator: U.S. Geological Survey
Originator: Patrick Barnard
Originator: Amy Foxgrover
Originator: Li Erikson

Title: MAXIMUM FLOOD DEPTH

Online Linkage: http://data.prbo.org/apps/ocof

Description:

Abstract:

Model projections of MAXIMUM FLOOD DEPTH using the Coastal Storm Modeling System (CoSMoS). Models cover the entire outer coast of the Our Coast Our Future (OCOF) California study area from Bodega Head south to Half Moon Bay including the entire San Francisco Bay shoreline and baylands. Projections include a suite of scenarios for both sea-level rise and storm scenarios. Sea-level rise scenarios span 0-2 meters in 50 cm increments.

Dataset: CoSMoS Model Results Product Suite

More information or discussion on these modeling results.

Layer: flddeep - Flood Depth

More information

Units: cm

Description: Maximum Depth of Flooding Surface above base elevation of Mean High High Water.

Files included in this download (within zip file):

<table>
<thead>
<tr>
<th>Content</th>
<th>Format</th>
<th>File name</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>The</td>
<td>GeoTIFF</td>
<td>SLR0000Wave000_flddeep.tif</td>
<td>Data in 4 byte floating point</td>
</tr>
</tbody>
</table>
Thank You!

www.prbo.org/ocof