Watershed-Scale Impacts of Climate Change on Carmel River and Lagoon

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December 12, 2018

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Potential Climate Change Impacts

- Sea Level Rise
- Wildfires
- Floods
Sea Level Rise and Lagoon Breach Dynamics

Projected Sea Level Rise in Monterey Bay

<table>
<thead>
<tr>
<th>Year</th>
<th>Low SLR</th>
<th>Medium SLR</th>
<th>High SLR*</th>
</tr>
</thead>
<tbody>
<tr>
<td>2030</td>
<td>1.1 inches</td>
<td>4.0 inches</td>
<td>8.8 inches</td>
</tr>
<tr>
<td>2060</td>
<td>6.3 inches</td>
<td>12.8 inches</td>
<td>28.3 inches</td>
</tr>
<tr>
<td>2100</td>
<td>16.1 inches</td>
<td>34.5 inches</td>
<td>62.6 inches</td>
</tr>
</tbody>
</table>

Revell Coastal, 2016

- Barrier already actively managed for flood risk/inundation
- Barrier beach elevation may shift with changing sea level

Krause et al., 2008

Watershed-scale changes in climate are likely to have largest impact on Lagoon
Carmel River Watershed Flooding

February 3, 1998
Peak flow 14,600 cfs

Photos courtesy of Larry Hampson
Impacts of Wildfires

- Increased sedimentation (when burned downstream of reservoirs)
- Increased runoff and peak flows

Wildfire contributing factors:
- Summer air temperature
- Seasonal PSDI
- Winter precipitation

(Keely, 2017, Potter, 2017)
Climate Change Projections
PRISM\textsuperscript{1} vs BCSD\textsuperscript{2}

1. http://prism.oregonstate.edu/
2. https://gdo-dcp.ucllnl.org
Climate Change Projections
PRISM$^1$ vs BCSD$^2$

1. http://prism.oregonstate.edu/
Increase in total annual precipitation, mostly in winter months
BCSD Projected Precipitation

Observed historical (PRISM) greater than projected?
Very few projected years with precipitation greater than 1983 and 1998
BCSD Projected Temperature

Similar trends in comparing observed historical and projected temperature.
So why is observed historical so different from projected values?
Differences in observed vs projected
What can we do about it?

• Grid cell sizes
• Extreme precipitation gradient
• Climate models include ARs, wind direction/storm trajectory?