

The following are my comments on the draft of the “City of Carpinteria Coastal Vulnerability and Adaptation Project” document (hereafter, “Draft”). I appreciate the opportunity to review the document and give feedback during this public comment period; I hope this feedback can help the final document be a more effective tool in helping Carpinteria deal with sea level rise (SLR).

Overall I’m very impressed with the quantity, quality, and specificity of the information in the Draft. In terms of the effort that went into it and the expertise that it reflects, I’m grateful to the people who created it.

With that said, I think it can be improved. Three areas in particular that I think could be better are:

- The title
- The discussion of scenario selection and probabilities in Section 4 (“Climate and Sea Level Rise Science”)
- The Executive Summary

My suggestions for improving each of those areas are below. Following that is a list of minor corrections/typos that I noticed.

Thank you.

John Callender
4466 Mesa Lane
Carpinteria, CA 93013

Title

The title of the Draft is “City of Carpinteria / Coastal Vulnerability and Adaptation Project.” I was surprised that the title doesn’t mention sea level rise explicitly. It should. Assessing the community’s vulnerability to sea level rise is

the main point of the document, and the main goal of the Coastal Commission grant that helped fund its creation. It will prevent confusion if the title reflects that.

I suggest a title like “City of Carpinteria / Sea Level Rise Vulnerability and Adaptation Project.”

Scenario Discussion and Probabilities

In Section 4 (“Climate and Sea Level Rise Science”) I found the scenario discussion confusing. As I read through Section 4.4 (“State of Climate Science in California”), and in particular as I read through the part under the subheading “Sea Level Rise” on page 4-6, I thought the explanation was overly condensed. Among the questions I thought it could do a better job of answering were:

- Why was the RCP 8.5 (“business as usual”) scenario chosen as the main focus of the report? (I’m not questioning the decision. But readers would benefit from more information about how and why that scenario was chosen.)
- Table 4.2 (“Probabilistic Projections of Sea Level Rise for Santa Barbara (OPC 2018)”) is a poor choice of table to represent the projections in the OPC 2018 report. By giving projections in millimeters per year, rather than cumulative feet of SLR, it makes it hard to compare the table’s information to the hazard maps and SLR projections discussed in the Draft. (Also, see additional discussion of the tables and scenario data from OPC 2018 below.)
- What are the estimated probabilities associated with the various scenarios discussed? Some of that can be inferred from Table 4-2, but it isn’t clear that the “Low emissions” values in the table correspond to the RCP 2.6 scenario (which isn’t mentioned in the text), nor that “High emissions” refers to the RCP 8.5 scenario (which is mentioned, though only briefly).

In general it felt like this part of the Draft had been rushed in its preparation. That's not surprising, since the OPC 2018 document the section is based on only came out a few months ago. But I think this part of the Draft is crucial, especially for decision makers who may not have had much past exposure to accurate information about sea level rise.

For example, if a reader of the Draft is inclined to think the risk of SLR has been overstated in the past, they may be suspicious when they realize that the selected scenario is based on a 1-in-200 probability. "Aha!" such a reader may think. "The risk is being inflated to drive a particular political agenda. Because of that, I bet I can safely ignore these predictions." If the thinking behind the scenario selection isn't included in the Draft, and if the problematic amount of SLR that is expected even under optimistic scenarios isn't discussed, this hypothetical reader will be less likely to realize their mistake.

It is important that decision makers have access to the the best available science, which includes not over-simplifying things. I don't think it's a problem that the Draft focuses on the 0.5% probability (1-in-200) RCP 8.5 scenario, in terms of labeling the various hazard maps with labels like:

- 2030 (10" / ~1')
- 2060 (27" / ~2')
- 2100 (60" / ~5')

...as long as the Draft also include enough information for an interested reader to understand the thinking behind that choice, and to have an appreciation of the larger range of possible scenarios and their associated probabilities and impacts.

In reading the OPC 2018 document ("State of California / Sea Level Rise Guidance / 2018 Update", http://www.opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf), I found that the explanations it provided did a better job of explaining this

information than the summary of that material in the Draft. I think it would be helpful if section 4 of the Draft were expanded to include more of OPC 2018's explanation. In particular, the Draft should summarize (or simply reproduce in full, if possible) the information in the section of OPC 2018 titled "Best Available Science to Support Planning for Sea Level Rise in California," on pp. 11-16.

I also think the Draft should include the following two tables from OPC 2018, both of which would be more useful and easier for decision makers to understand than Table 24 (which the Draft does include, but which, as I mentioned above, is hard to interpret due to its use of mm/year rather than cumulative feet of SLR):

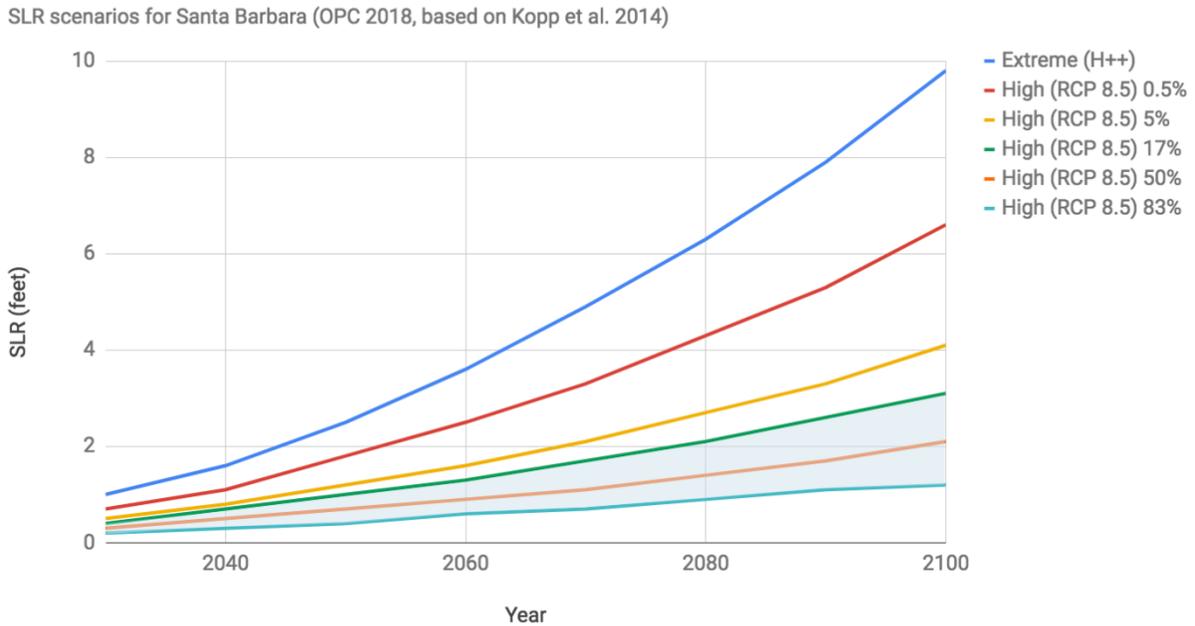
- Table 22: Projected Sea-Level Rise (in feet) for Santa Barbara (OPC 2018, p. 66)
- Table 23: Probability that Sea-Level Rise will meet or exceed a particular height (in feet) in Santa Barbara (OPC 2018, p. 67)

Beyond the inclusion of those two tables, I was surprised that the Draft did not include any line graphs plotting the amount of SLR under different scenarios over time. Such graphs have often been included in government publications on SLR in the past, because they are better than tables for quickly and clearly communicating key features of the data.

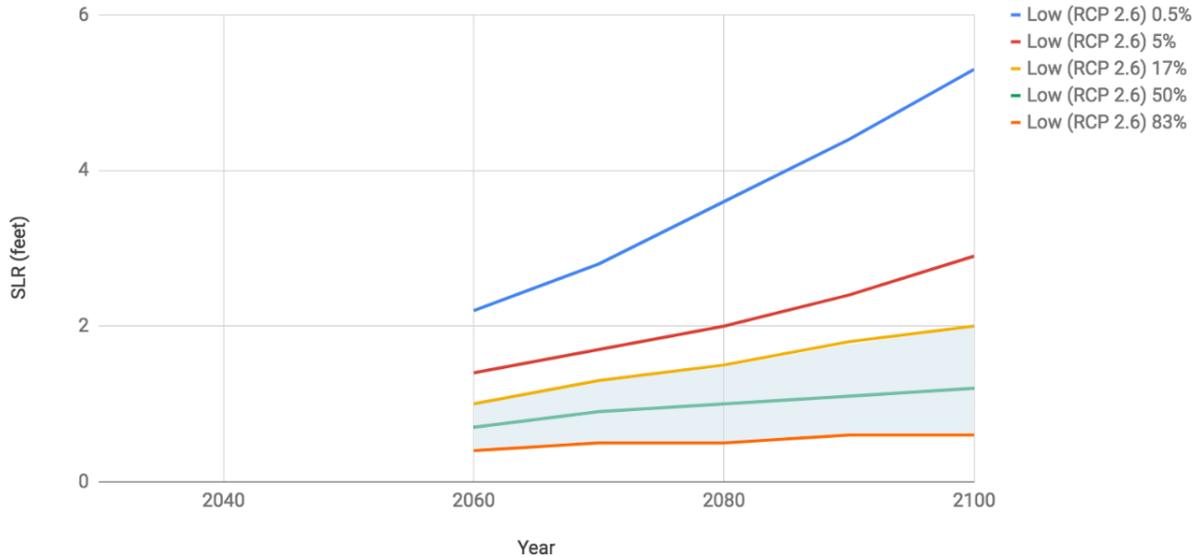
I realize that OPC 2018 doesn't include any such graphs itself. I suspect it omitted them because of the large number of tables the report includes in order to cover the 12 different tidal gauges along the California coast. Generating graphs for all those tables may have been deemed too much effort.

Regardless, I think it is important that such graphs be included in the city's Draft. It would not be difficult to create the small number of graphs we would need based on the OPC 2018 data for Santa Barbara. Below are a few example graphs I created by entering the data from Table 22 in OPC 2018 into a Google Docs

spreadsheet (https://docs.google.com/spreadsheets/d/1QzIL9T6Pvgob6kOP48wiyzHfsZ02g_VLiKhH-Gqeslw/), then adding overlay shading for the central 66% probability to a few of the generated graphs in a Google Docs presentation (<https://docs.google.com/presentation/d/18p0U0sqXxxj71q0d-D-Lac7JxxfiCfVvk1fimNfKg968/>):



SLR scenarios for Santa Barbara (OPC 2018, based on Kopp et al. 2014)



The Draft should include at least a graph such as that first one (for the RCP 8.5 and H++ scenarios), and possibly the second one as well (for the RCP 2.6 scenario) as part of an expanded discussion of SLR scenarios and scenario probabilities.

Executive Summary

The Executive Summary at the beginning of the Draft gives a condensed picture of the document as a whole, including its various sections and the information found there. Unfortunately, it does so at the expense of what is arguably the more important function of an executive summary: Highlighting the *most important* information for decision makers.

To be effective an Executive Summary cannot simply be a shorter version of the document as a whole. It must work as a document in its own right, one that effectively informs decision makers who may not take the time to read beyond it.

In its current form, the Draft's Executive Summary is roughly 10 pages long. The

first three and a half of those pages, though, consist of a fairly lengthy account of the full document's purpose, history, and structure. That information is of secondary importance.

By way of contrast, this is the first paragraph of the OPC 2018 report's Executive Summary:

THE CLIMATE ACROSS CALIFORNIA is changing, and the effects, such as rising average temperatures, shrinking mountain snowpack, more intense storms, and higher sea levels are expected to continue and worsen in the coming decades. Sea-level rise is caused by the thermal expansion of warming ocean water and melting of land ice as the Earth warms. It is one of the most obvious manifestations of the trend of climate change and is an immediate and real threat to lives, livelihoods, transportation, economies, and the environment in California.

This is a much more effective opening. It establishes the importance of the issue and conveys important information decision makers need to know. The Draft would be improved greatly if its Executive Summary began in similar fashion.

The Executive Summary in the city's Draft does better on page 4, once it gets to the section headed "ES.3 Key Findings of this Report," but even here it sometimes gets bogged down in summarizing the full range of information contained in the report, rather than focusing on key findings and explaining what makes them significant. There should be more "forest", fewer "trees".

One example of how this could be done would be to highlight in the Executive Summary some of the key "Thresholds" identified in the "Sector Profiles" fold-out pages in Section 1. For example:

- p. 1-3 (Land Use Parcels and Structures): "With 2' of SLR, substantial damages are projected."
- p. 1-5 (Roads and Parking): "With 2' of SLR, tidal inundation impacts to roads and erosion impacts to parking lots escalate."
- p. 1-7 (Public Transportation): "With ~1' of SLR, the railroad faces an

expanded risk of cliff erosion. With ~2' of SLR, damage becomes widespread to rail."

- (etc.)

Also, the Executive Summary would benefit greatly if it included key charts and maps from the document. I would especially recommend including each of the following figures in the Executive Summary:

- The line chart showing different SLR scenarios and their probabilities over time (RCP 8.5 and H++ version) that I recommended be added to Section 4 of the document in my earlier comments.
- Figure 5-4, "Combined Coastal Hazards considered in the Vulnerability Assessment", from page 5-10 of the Draft.
- Figure 6-9, "Estimated Value of Infrastructure Vulnerable to Coastal Erosion from a 1% Annual Chance Storm", from page 6-15 of the Draft (bar chart only, not the accompanying table).
- Figure 6-10, "Estimated Value of Property Vulnerable to Coastal Flooding from a 1% Annual Chance Storm", from page 6-16 of the Draft (bar chart only).
- Figure 6-11, "Estimated Value of Property Vulnerable to Tidal Inundation", from page 6-17 of the Draft (bar chart only).

With a rewritten introduction, the elimination (or at least extreme condensing) of the material in the first three and a half pages, inclusion of information about thresholds from the Sector Profiles, and inclusion of the above five figures with explanatory text, I think the Executive Summary would do a much better job of holding decision makers' attention while conveying the key information they need to know.

Minor Corrections/Typos

- p. 1-13, under Overview, Legacy Oil and Gas Wells: "There are at least 53 known in active legacy wells..." Should be "inactive" (one word). Later,

- under Adaptive Strategies, Range of Strategies: "...of business with CUPAs..." CUPAs? Is that meant to be CUPs (Conditional Use Permits)?
- p. 1-23, under Environmentally Sensitive Habitat Area (ESHA), Overview, under the table: "Peporting acreages..." Should be "Reporting"? Later in the same line, "Quantitatively predicting of future habitats..." Remove "of"? Later, under Creek and Riparian Habitats: In the middle of the paragraph, "opening and closing should be maintained, it the beach is allowed..." Should be "if the beach is allowed...". Later, in the same paragraph: "The extent of riparian habitat transition to esruarine..." Should be "estuarian". Later, under Adaptation Strategies, Range of Strategies, Protect: "terrestrial habitat vulerabilioty..." Should be "vulnerability". Later, under Potential Next Steps, Policy, first bullet point: "maintaining hydraulic connectivity..." Should be "maintain"? "... upstream and and coordinate..." Should just be one "and".
 - p. 3-9, under 3.7 Coastal Processes, Tides, last paragraph on the page toward the end: "was 10.79 feet mean lower low water..." Should that be "10.79 feet above mean lower low water..."?
 - p. 3-10, first paragraph: "The elevation of this tide level is 6.5 feet MLLW..." Should it be "6.5 feet above MLLW..."?
 - p. 3-16, under Existing Shoreline Protection: "...constructed in 1977 is location along Carpinteria Shores..." Should be "located".
 - p. 3-18, under 3.9 Existing Coastal Hazards: "...elevations across the landscape. adopted Please note..." It looks like "adopted" should be deleted.
 - p. 6-27, under 6.5 Hazardous Materials Sites, and Oil and Gas Wells, second paragraph: "...8 are located on the beach,, 5 are..." The comma (,) is doubled.
 - p. 6-40, under Monarch Butterfly Habitat, second paragraph, second sentence reads: "For example, a large Monarch butterfly population in the eucalyptus grove along the Ellwood Mesa in the nearby City of Goleta." Not a complete sentence?
 - p. 6-46, under 2100, second paragraph: "Figure 6-18 shows..." Should that

actually be “Figure 6-16”?

- p. 6-49, under Opportunistic Sediment Management Plan, the second sentence begins, “Carpinteria Creeks have several...” The C in Creeks should be lowercase.