Comments: Draft Rocky Intertidal Report

Determination of the extent and type of injury to rocky intertidal algae and animals one year after the initial spill (Cosco Busan): a report prepared for OSPR (California Fish and Game), August 16, 2009 Pete Raimondi, Dan Orr, Christy Bell, Maya George, Sara Worden, Melissa Redfield, Rani Gaddam, Laura Anderson, Dave Lohse; UC Santa Cruz

Submitted September 11, 2009 on behalf of the Responsible Party

As a supplement to comments previously submitted by the responsible party in August 2009 regarding statistical analyses and study design, we offer the following additional observations. The Rocky Intertidal report presents similar graphics and methods as presented in earlier presentations and does not appear to address the Responsible Party's previous comments regarding comparing a single site to a transformed mean of numerous sites, nor does it address the concerns regarding statistical analyses and study design presented to the Trustees in August 2009.

We offer additional comments as follows:

- The main study premise is that the heavily oiled impact site at Alcatraz is more closely related to outer coast reference sites than in-bay sites, which is not supported by the cluster analyses of point intercept data (Figures 2 and 4), where Alcatraz is part of the major group that includes only in-bay sites. Of the in-bay sites, only Pt Blunt clusters with outer coast sites. In fact, the report alludes to this similarity in the In-Bay section in Methods. Alcatraz and Pt. Blunt cluster with the three outer coast sites in the analysis for motile data. The other in-bay sites fall into two distinctly different groups in this analysis.

- Table 2 could have a "date" column for clarification since sampling covered about a month.

- In the methods section on Taxa Richness, the report discusses comparing differences in long-term variability at Alcatraz with other long-term monitoring sites. In the section where these data are presented, the data are pooled for the outer coast long-term sites, a process that obscures the different and contrasting long-term patterns observed at these sites, and compares this pooled value with a single site, Alcatraz, for which there are no confidence limits presented. The analyses we have provided previously showing temporal patterns for each outer coast site with confidence limits, along with the statistical and study design analyses that demonstrated the patterns at Alcatraz fall within the range of the outer coast sites and are not statistically different suggest a different conclusion.

- In the Results section, one of the p-values in the 2nd sentence of the second paragraph of the section, "Across locations - Species Composition", appears to be in error.

- Fucus cover was noted as Common at Pt. Blunt in the mid-intertidal zone on 11/25/07 and was listed as Common to Abundant in the mid to low intertidal zone at the site when resampled on 2/5/09. There does not appear to be strong evidence that abundance/cover declined after the spill, nor does the size structure indicate that a disproportionate number of the plants are in the YOY or 1-year class, considering the physical disruption that occurs at this site. Note that a significant proportion of the plants exceeded 150 mm, which is at least two years old and therefore predate the oil spill.

- In the case of Pt. Isabel, the low number of Fucus plants was near the total number in the entire area, i.e., a couple of hundred meters of shoreline. However, since it is not clear whether Fucus was common at the site before the spill or not, it really should not enter in to the discussion. The clustering of Alcatraz with Golden Gate Field North and other rip-rap sites (rather than outer coast sites) is interesting considering that the report states Alcatraz is more closely allied with outer coast than in-bay sites.

- In the section Assessment within locations (across time), the decline of Fucus at Alcatraz, significant or not, is not outside the range of change seen at the outer coast sites, nor are the changes in the other species highlighted.

- In Figure 11, how does "Other Green" relate to Cladophora?

- The Fucus cover percentages presented in Figure 11 (both less than 20%) appear to differ from those used in the calculations for the 2006, 2007, 2008 comparison to the outer coast sites (52.3, 60.4, and 22.0 cm, respectively). Why??

- Season may be an important factor in this analysis. As indicated above, the spill occurred at the beginning of the disturbance season whereas the 1-yr after surveys occurred toward the end of the disturbance season. This is definitely important for Porphyra and probably a number of other taxa.

- Porphyra was scarce in most places sampled. Moreover, the seasonal difference (November, beginning of disturbance period, to Feb/March, near the end of disturbance period) is important for Porphyra, a genus that is most abundant in California in spring and/or summer on disturbed rocks and then declines in fall. You would expect to see very little in November but more in Feb/March as it approaches the spring maximum. What were the actual % cover numbers at the various sites? The increase observed at Alcatraz could just as likely be the result of normal seasonal variation in Porphyra's abundance as a response to the oil spill.

- Ulva was a major algal taxon at most visited in Nov/Dec 2007.

- Was the Tar/Oil category included in the analyses for Figures 11 and13, i.e., for Alcatraz, Pt Isabel, Marina Green, and Berkeley Marina?

- Do we have the numbers and the analytical pathways for the analyses depicted in Figures 11, 13, and 15-19 before making comments on them? Our experience with the Alcatraz-Outer coast comparisons referred to above suggests this might be helpful in understanding the comparisons provided in those figures.

- Does Figure 15 compare the data in Figure 11 (Nov 2007 and Feb/Mar 2009)? Assuming the "reference" sites are on the outer coast, we are unsure of the purpose of this graphic. What is the rationale behind the assumption that Alcatraz would have a similar range of temporal change compared to the outer coast sites? Do we have these raw data?

- For Figure 16, what were the sampling months for 2005 and 2009? The statement in the text that "all other long-lived species were more abundant in 2005" does not appear accurate according to the figure. Mytilus californianus and Chthamalus are not different between 2005 and 2009. Animals are sparse in general. Figure 16 makes it appear that Ulva increased greatly between 2005 and 2009 but in the comparison between 2007 and 2009 (Figure 11), cover by Ulva was virtually the same. Moreover, as pointed out above, Ulva cover was high at most rocky intertidal sites visited in Nov/Dec 2007.

- Figure 19: Euclidean Distance is typically used on nornalized data for physicochemical variables rather than species count data. If the species count data were normalized, we are concerned that the results might be skewed in the same manner as they were in Figure 20. The results in Figure 20 are misleading, partially due to the normalization/standardization process. In fact, for the variables presented in Figure 20, values for Alcatraz generally fall within the range of values observed at the five outer coast "reference" sites used for this analyses and are not significantly different from them. As a consequence of the normalization and standardization employed for these analyses, the simplified patterns of "change"depicted in these figures mask the fact that the values for the variables at the five "reference" sites varied considerably themselves and exhibited contrasting changes over time. In some cases they changed considerably more than was observed at Alcatraz. The figures should show confidence intervals for Alcatraz.