

Interactive comment on “Deepwater Horizon oil spill impacts on Alabama beaches” by J. S. Hayworth et al.

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GENERAL COMMENTS

This manuscript presents a review of the impact of the BP oil spill on the beaches of Alabama focusing on the knowledge gaps and the requirements for better evaluating the impact of oil spills on beaches and improving immediate and long-term monitoring and response actions. I enjoyed reading this discussion manuscript and it would be a valuable contribution for both the scientific and general communities. The ideas, concepts and results are clearly described and presented and the manuscript well

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structured.

General comments for improving the manuscript/discussion are:

(1) Include additional information on preventative and remediation actions and techniques applied to limit contamination of the beach system (both on Alabama beaches and for previous spills) and the effectiveness of these strategies. What is the recommended state-of-the-art for responding to oil spills on beaches? Was this applied on the beaches of Alabama?

Author response. We appreciate the comments and suggestions provided by the referee. We agree that the manuscript will be improved by including additional information on preventative and remedial actions and techniques, and their effectiveness, for oil-contaminated beach systems. However, we do not want to include specific information on remediation methods and their effectiveness, which is beyond the focus of this manuscript. We have, however, discussed a few. On page 5 we discuss how commonly used floating oil containment barriers failed to prevent shoreline contamination in most cases. In addition, we also comment on the “deep cleaning” method employed by BP for cleaning beaches.

(2) Include information on the weather and average oceanic forcing conditions (tides, waves) for Alabama coastline.

Author response. On page 5 we have now included information on tidal forcing conditions.

(3) Can the reported PAH concentrations be compared with EPA standards for aquatic health/human health? This would put into perspective the magnitude of the contamination.

Author response. There are no established benchmark criteria for PAH's related to Deepwater Horizon oil; rather, the EPA has developed a complex methodology for assessing risk to aquatic organisms which takes into account assumed bioavail-

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ability (based on organic carbon content), individual PAH concentrations, and modification factors for alkylated PAH's when these compounds are not explicitly determined (<http://www.epa.gov/bpspill/sediment-benchmarks.html>). Discussing these benchmarks would warrant risk analysis and would require a considerable amount of space and in our opinion detracts from the main points we are making in this section, which are: (1) available data specifically addressing PAH concentrations and distribution in the beach system are limited; and (2) PAH distribution in the beach system cannot be determined with any degree of certainty from the existing dataset.

(4) Additional discussion on how the preventative/remediation efforts and level of contamination on Alabama beaches compare with other shorelines impacted by BP oil spill would be beneficial.

Author response. We have included some sentences on page 5 about how floating barriers were used to prevent shoreline contamination but it failed in most cases. In addition, we also comment on BP's "deep cleaning" method used for cleaning beaches.

(5) What were the lessons learnt with respect to protecting/remediating beaches from previous oil spills such as Exxon Valdez and where these taken into account for the BP oil spill?

Author response. There are other review articles available that summarized Exxon experience; we have cited these works on page 14 of our revised manuscript.

SPECIFIC COMMENTS

Specific comments include:

(1) P. 6727, Line 1: It is stated that the reported total PAH concentration at location 18 is two orders of magnitude greater than at other locations and therefore this concentration is not shown in the figure. It would be good however to mention in the text what the value is.

Author response. The total PAH value has been reported in our revised manuscript on

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page 7.

(2) P. 6733, Lines 20-25: I agree that increase in organic carbon in beach sediment will impact fate of other anthropogenic contaminants, but for some cases, if a compound degraded under reducing conditions, the increase in organic C may actually reduce concentrations of the contaminant. It is misleading only mention the potential increase in contaminant concentrations due to higher organic C.

Author response. We agree that there exists the possibility that the increase in carbon content could produce the unintended outcomes noted by the reviewer. We modified the last sentence in that portion of the revised manuscript to reflect this: “Whether such increases are sufficient to produce concomitant changes that eventually lead to human and/or ecological health issues, or if such changes produce other unforeseen (and potentially beneficial outcomes), is unknown.”

(3) P. 6733, Lines 11-13: Have these long-term studies been carried out for previous oil spill locations?

Author response. As we note on P. 6732, (beginning on line 14), very few studies considering ecosystem impacts and recovery, focusing on sandy beach environments, have been documented in the literature. We reference several of these studies on P. 6732 and discuss results relevant to the Deepwater Horizon event.

(4) Fig. 6 caption: typo. Should refer to Fig. 5.

Author response. This has been corrected in our revised manuscript.

(5) Fig. 5: Is it possible to use a dotted line to denote average location of the shoreline in this figure (and what is the average horizontal tidal excursion)? It difficult to understand where the samples were collected relative to the mean shoreline/intertidal zone.

Author response. We modified Figure 5 in our revised manuscript to denote the average shoreline and average horizontal tidal excursion.

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Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/8/C4628/2011/hessd-8-C4628-2011-supplement.pdf>

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