

Reply to Flessa and Colleagues

We appreciate Dr. Flessa and his colleagues' acknowledging that the vaquita's decline is not a result of reduction of flow of the Colorado River. The primary intent of our paper was to put to bed that assertion, which continues to be represented as the cause for decline by parties that are against banning gillnets and developing real alternatives for fishermen in the Upper Gulf of California. The authors of Rojas-Bracho and colleagues (2019) recognized that Manjarrez-Bringas and colleagues (2018) was being used to divert attention from the real issue of gillnet entanglement, and that it was important to once again refute the unsubstantiated claims that vaquita is an estuarine species and that the area in which vaquita are known to reside had estuarine conditions prior to the damming of the Colorado River.

There is no doubt that there is more to be learned about the ecological effects on the Upper Gulf from the reduction of flow of the Colorado River. But the Rojas-Bracho and colleagues paper was meant to illuminate two explicit facts: The Manjarrez-Bringas and colleagues claim that vaquita were being driven to extinction by reduction of Colorado River water flow to the Gulf is not supported by any evidence they present, nor any evidence published in the peer-reviewed

literature (i.e., this is the “unsubstantiated claim”), and the area in which the vaquita live (the Upper Gulf of California, south of the mouth of the Colorado River and Isla Montague) has likely never had long-term or widespread brackish-water conditions such that it could be classified as an estuary (i.e., an area where brackish conditions prevail). Our focus was on whether evidence supported dramatic year-round changes in salinity and decreases in productivity that would have resulted in decline in a species that has persisted in the Upper Gulf for over 3 million years (i.e., vaquita). Our intent was not to dismiss ecological changes in the Upper Gulf and particularly in the delta region. The magnitude of those changes is beyond the scope of our vaquita-oriented perspective and a debate that will likely continue.

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References cited

- Manjarrez-Bringas N, Aragón-Noriega EA, Beltrán-Morales LF, Cordoba-Matson MV, Alfredo Ortega-Rubio A. 2018. Lessons for sustainable development: Marine mammal conservation policies and its social and economic effects. *Sustainability* 10: 2185. doi:10.3390/su10072185
- Rojas-Bracho L et al. 2019. Unsubstantiated claims can lead to tragic conservation outcomes. *BioScience* 69: 12–14. doi:10.1093/biosci/biy138

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