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Response: Commentary: State of knowledge of the population of the vaquita (*Phocoena sinus*) from the Upper Gulf of California: a bibliometric analysis

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A Commentary on

Commentary: State of knowledge of the population of the vaquita (*Phocoena sinus*) from the Upper Gulf of California: a bibliometric analysis

By Brusca RC and Vidal O (2025) Front. Conserv. Sci. 6:1564571. doi: 10.3389/fcosc.2025.1564571

The commentary by Brusca and Vidal (2025) on Arreguín-Sánchez et al. (2025) contains inaccuracies, and they reflect a view of the importance of scientific knowledge, particularly regarding the changes and dynamics of the vaquita's habitat, as a necessary and significant element for the conservation of the species. Before addressing these issues, we highlight four key aspects of the Arreguín-Sánchez et al. (2025) article:

1. Rigorous peer-reviewed basis: The review, current up to October 2024, is based on peer-reviewed scientific publications, as required by Frontiers in Conservation Science. This review followed the PRISMA approach, a set of guidelines for reporting systematic reviews in a transparent way; widely recommended by scientific publishers. The approach provides methods to identify, select, appraise, and synthesize articles. Following the guidelines, we set rigorous criteria for selecting bibliographic information (see 2.1 section in Arreguín-Sánchez et al., 2025). Articles not meeting these criteria were excluded, including Vidal et al. (2025), whose year of publication is 2025.

2. Fishing as primary mortality source: The resulting review identifies fishing as the main threat to the vaquita population. There is a section subtitled “Illegal and commercial fishing” underscores this point, indicating that “...mortality from bycatch, primarily from gillnets, is considered to be the most important risk to the vaquita population”. A topic addressed in depth by [del Monte-Luna et al. \(2025\)](#).
3. Knowledge gaps in habitat and ecosystem role: The review highlights significant gaps in knowing the vaquita’s habitat, including climatic, environmental effects, and its trophic relationships in the ecosystem. Ignoring these knowledge gaps can be a critical oversight if we expect efforts to recover the vaquita population to be successful.
4. Misinterpretations on river flow and habitat: Contrary to [Brusca and Vidal \(2025\)](#)’s claims, [Arreguín-Sánchez et al. \(2025\)](#) does not assert that reduced Colorado River flow directly causes vaquita mortality, nor does it classify the vaquita as an estuarine species; or that primary production decreased.

The review identified that the UGC habitat, critical for the vaquita, remains understudied. The literature highlights the importance of the changes in climatic patterns and the Colorado River flow; some examples: [Lavín et al. \(1998\)](#); [Lavín and Sánchez \(1999\)](#) and [Galindo-Bect et al. \(2000\)](#) reports the inversion of the salinity gradient in the surface layer affecting the entire UGC, being more pronounced on the western side, almost reaching San Felipe, 70 km from the river mouth; [Carriquiry and Sánchez \(1999\)](#); [Galindo-Bect et al. \(2000\)](#); [Aragón-Noriega and Calderón-Aguilera \(2000\)](#), and [All \(2006\)](#), identified substantial effects on fishery productivity. [Rodríguez et al. \(2001\)](#) performed a palaeoclimatological reconstruction (based on isotopes) of the freshwater influence zone of the Colorado River affecting areas up to at least 65 km south of the mouth. [Getches \(2003\)](#) and [Morrison et al. \(1996\)](#) recognized that the impact on the ecology was detrimental; while [Rowell and Dettman \(2008\)](#) and [Rowell et al., \(2005\)](#) reported (based on isotopes) the negative effect on Sciaenid fish, vaquita’s primary prey. In the above cases, the documented affected area comprises a large part of the vaquita’s distribution zone ([Vidal, 1995](#)); that is, its habitat.

Considering historical changes in Colorado River flow, from an average of 1,200 m³/s (1920–1935) to less than 50 m³/s (1960–1980), the obvious question is: *does anyone think that such a drastic reduction in flow does not affect the habitat and ecosystem of the UGC?* with the immediate implication being: *is the vaquita isolated or unaffected by such changes?* We think it is, there is an effect that we need to study; and we emphasize, it would be a grave error not to address this knowledge gap. In fact, [Morrison et al. \(2006\)](#), in their report for the United Nations Environment Programme and the Turner Foundation, conclude, textually, that “Without further action, it is almost certain that a number of fish species in the Colorado River system will become extinct. Without further action, the ecological and human communities of the Colorado River delta will be destroyed. Global climatic changes may have a significant impact on the future...”.

[Lluch-Cota et al. \(2007\)](#) concluded, textually, “the reconstruction of past environments seems particularly important for the northern area (referring to the UGC), where habitat and carrying capacity changed dramatically after the construction of dams on the Colorado River. This unidirectional change must be considered for any attempt at ecosystem restoration or management”. [Brusca](#) is a co-author of this study, and he explicitly endorsed this argument. Consequently, his current critique, as expressed in [Brusca and Vidal \(2025\)](#), is inconsistent and contradicts his own previous position, undermining the coherence of his current stance.

There are two aspects that [Brusca and Vidal \(2025\)](#) expresses in a vague manner, without arguments or knowledge, and therefore fallacious, but that are important to clarify. Firstly, they claim that [Arreguín-Sánchez et al. \(2017a\)](#) has been frequently criticized, generalizing this to the author’s other scientific publications. This is misleading. Only one critique ([Johnson et al., 2017](#)) exists, which was responded ([Arreguín-Sánchez et al., 2017b](#)). Likewise, a review of citations (e.g., Google Scholar) reveals 43 references to this paper (excluding self-citations), with no further critiques. The same applies to the author’s other publications.

Secondly, [Brusca and Vidal \(2025\)](#) insinuate, without evidence, that our conclusions are influenced by the funding source. This is a serious accusation that violates basic principles of academic integrity, as it implies biased science without providing factual support. Like any other institution that wishes to resolve priority issues, the Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT) requested this research from the Instituto Politécnico Nacional. The authors received no compensation, meaning there is no conflict of interest. Questioning the findings of our study, which is based on well-established methods, under this argument reflects a lack of academic critique and diverts the discussion away from the scientific issue of insufficient information about the current and suitable habitat of the vaquita. It is more constructive and useful to openly discuss contrasting hypotheses with scientific arguments. In this sense, a valid and a essential scientific question is: if there were no fishing, would the current habitat allow for the recovery of the vaquita? The information presented clearly shows that the habitat in the late 1980s—if not the early 20th century—when the population was abundant, is different from the current one. Currently there is no evidence as to how critical this difference is for the vaquita’s recovery. There is simply no information about habitat quality. This is recently highlighted in the work by [Arreguín-Sánchez et al. \(2025\)](#).

[Brusca and Vidal \(2025\)](#) suggests that the idea that changes in the Colorado River’s flow rate affect vaquita habitat is a myth. However, evidence is beginning to emerge regarding the vaquita’s response to changes in water masses related to salinity through trophic relationships, as shown by [Rodríguez-Pérez et al. \(2024\)](#), which supports this hypothesis, and more similar results will be published soon.

We reiterate, knowledge about the habitat of the UGC can provide useful arguments for the management of vaquita conservation. Efforts to reduce fishing mortality must continue (with which we agree); but we insist, these efforts could gain

effectiveness, and potentially benefit, from understanding the vaquita-habitat relationship.

In conclusion, the critique by Brusca and Vidal (2025) misrepresents key aspects of Arreguín-Sánchez et al. (2025) and overlooks critical evidence on habitat changes in the UGC. Addressing these knowledge gaps is essential for informed conservation strategies.

Author contributions

FA-S: Writing – original draft, Writing – review & editing. MZ-R: Writing – review & editing. FV-S: Writing – review & editing. PM-L: Writing – review & editing. MR-F: Writing – review & editing. GA-R: Writing – review & editing. DM-C: Writing – review & editing. LS-V: Writing – review & editing.

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