Response to Kaplan *et al.*: Pelagic MPAs; the devil you know

Edward T Game[1,2], Hedley S Grantham[2], Alistair J Hobday[3], Robert L Pressey[4], Amanda T Lombard[5], Lynnath E Beckley[6], Kristina Gjerde[7], Rodrigo Bustamante[8], Hugh P Possingham[2] and Anthony J Richardson[2,8,9]

[1]*The Nature Conservancy, South Brisbane, Queensland 4101, Australia*

[2]*The Ecology Centre and Centre for Applied Environmental Decision Analysis, University of Queensland, St. Lucia, Queensland 4072, Australia*

[3]*Climate Adaptation Flagship, CSIRO Marine and Atmospheric Research, GPO Box 1538, Hobart, Tasmania 7001, Australia*

[4]*Australian Research Council Centre of Excellence for Coral Reef Studies, James Cook University, Townsville, Queensland 4811, Australia*

[5]*Department of Botany, Nelson Mandela Metropolitan University, PO Box 77000, Port Elizabeth 6031, South Africa*

[6]*School of Environmental Science, Murdoch University, 90 South Street, Murdoch, Western Australia, 6150, Australia*

[7]*IUCN Global Marine Program, Warsaw, Poland*

[8]*Climate Adaptation Flagship, CSIRO Marine and Atmospheric Research, PO Box 120, Cleveland, Queensland 4163, Australia*

[9]*University of Queensland, School of Physical Sciences, St Lucia, Queensland 4072, Australia*

Corresponding author: egame@tnc.org

Kaplan et al. [1] support the need to consider Marine Protected Areas (MPAs) as one tool in management of pelagic threats, though they suggest two challenges, "defining 'targeted' MPAs and enforcement", are more significant than we recognized. Using the example of skipjack tuna, the authors argue that defining 'targeted MPAs' (we assume for a particular species) can be problematic given lack of site fidelity of some pelagic animals. One way to combat the lack of site fidelity in pelagic animals, as we outline in our paper, is to implement temporally variable MPAs [2]. We contend that in fact, while the distribution of pelagic animals might not be static, they are commonly predictable based on an understanding of the environmental drivers, including for skipjack tuna [3, 4]. We agree that for management of single stocks, MPAs might not the best tool. However, the focus of our paper was not the conservation of individual commercial species, but rather pelagic habitats and ecosystems. In this sense, 'targeted' MPAs are better defined based on important pelagic features (e.g., eddies, thermal fronts, upwelling cells, etc.), which often exhibit a high degree of either spatial or temporal predictability [5, 6].

Kaplan et al. [1] also provide two examples to illustrate the potential difficulties of enforcing pelagic MPAs. Although the apparent failure of time-area closures in the Gulf of Guinea might represent enforcement challenges, other than membership of the regional fisheries bodies and an observer program, the authors do not describe the enforcement mechanisms used (which are the responsibility of each vessel's flag country [7]). Did the European fishing industries that proposed the closures also provide money for patrol boats, install Vessel Monitoring Systems, or strengthen the fisheries inspection service of Ghana? Without this information, we cannot judge if this particular

enforcement challenge is one of implementation, rather than failure per se [8]. As in other areas of fishery management, we need to learn more about appropriate enforcement options for pelagic MPAs. Despite some spectacular failures (e.g. cod in the North West Atlantic), fisheries managers are constantly refining and improving management techniques [9]. A few early and poorly resourced attempts at pelagic MPA enforcement should not be used to limit the potential of this conservation strategy – if this logic was applied, fisheries managers would never use a catch quota again.

The second example of enforcement difficulties provided by Kaplan et al. [1] is an interesting one about Somali pirates. This example supports a point we made in the original article [10], that a sophisticated fishery can easily avoid certain areas. Kaplan et al. [1] suggest that failure of the world's navies to stop piracy in waters around Somalia, implies that MPAs could not address illegal, unregulated and unreported (IUU) fishing on the high seas. Equally, however, the example of Somali pirates shows that navies operating in the Red Sea and Gulf of Aden have effectively protected a corridor of ocean that allows hundreds of ships a week safe passage through that area [11] – the equivalent of preventing an IUU activity within a designated area. The effectiveness of this policing means pirates are increasingly forced to operate hundreds of kilometres from the Gulf of Aden [12]. We contend that the failure to eliminate piracy originating from Somalia reflects the failure of the legislative apparatus in Somalia to enforce the laws that exist in that country. Conventional fisheries management would hardly fare any better in such circumstances.

In concluding, Kaplan et al. [1] raise two additional issues: area-based targets and redistribution of fishing effort. In response to these "dangers", the authors suggest that

there needs to be a science-driven analysis of the utility of high seas MPAs. We fully support this. Some issues can be addressed through modeling studies, while others will require monitoring and evaluation of real pelagic MPAs. Substantial biological, technological and legal opportunities do exist to support the implementation of pelagic MPAs [10].

Finally, we feel that the important issues highlighted by Kaplan et al. [1] mean that our paper has satisfied at least one of its original goals, which was to stimulate debate about the effectiveness and strategies for implementing pelagic MPAs.

References

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