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Project Title: Spatially-explicit Conservation in the Alborán Sea – Year 3

Beginning Date: February 1, 2009 **Ending Date:** January 31, 2010

Project Synopsis:

The objective of this proposal is to evaluate the feasibility and effectiveness of spatially-explicit protective measures for highly-mobile marine vertebrates in the dynamic oceanographic seascape of the Alborán Sea, in the Western Mediterranean. We will follow a three-step approach. First, we will further develop and improve predictive habitat models for a complement of marine birds, mammals, and turtles using standardized recent (2002-08) vessel-based surveys and remotely-sensed oceanographic data. From these results, we will undertake a gap analysis to identify those overlap areas and “priority habitats” for conservation, both within and across taxonomic groups. Finally, to assess potential MPA designs, we will quantify the spatial and temporal predictability of those critical oceanographic features identified through wildlife modeling and gap analysis. This project will make two major conservation contributions. Regionally, we will evaluate the effectiveness of existing and proposed MPAs for a complement of marine vertebrates in the Alborán Sea. On a broader scale, our approach will establish a methodological and analytical framework for developing place-based conservation measures in other areas of the Mediterranean Sea. It is our hope that this research will help to refine the conceptual and analytical frameworks needed to design MPA networks, when multiple species are considered simultaneously.

Overall Performance:

During the third year of our project, we took advantage of emerging opportunities, whilst making steady progress towards completing the core project activities. Despite slower progress than we had anticipated, our project continues to move forward. To deal with unexpectedly higher travel costs due to the strong Euro, David Hyrenbach did not travel to Spain to participate in any Alnitak cruises in 2009. Instead, we used some of the travel funds to attend two workshops on novel statistical methods for marine zoning, conducted in Brisbane, Australia. The PI (David Hyrenbach) and project consultant (Ana Cañadas) did not use all of the salary allocated in the original proposal for year three. To offset these savings (\$8,803.50 and \$28,923.00 respectively), Hyrenbach was awarded a no-cost extension through May 30, 2011. This extension will be used to finish the project objectives and to continue nurturing developing collaborations and synergies.

I. Year 3 Objectives:

Goals: Build species-specific models and integrate data using Marxan software.

The third year of the project was devoted to three objectives: (i) acquiring the necessary knowledge and experience to use the Marxan software for the integration of species-specific model results into a comprehensive scheme for marine spatial management in the Alborán Sea; (ii) finishing the collection and processing of the survey data for analysis in this project; (iii) disseminating information about the project objectives and approaches to promote the application of spatial management for marine vertebrates; and (iv) continuing to nurture developing collaborations with potential partners, with the aim of expanding the scope and reach of this project beyond the three years of the Pew fellowship (2007-2010).

More specifically, herein we report on activities undertaken from February – December 2009:

At-sea Surveys (2009): Data collection for this project was completed with the fall 2008 surveys by Alnitak, yielding the multi-year (2002 – 2008) time series required for our analyses. Thus, no additional data collection took place during 2009.

Database Processing: The cleaning of the final data was accomplished during the winter and spring of 2009. All of the required surveys and habitat data have been processed and checked.

Outreach / Networking: We showcased the goals and preliminary results of the “Spatially-explicit conservation in the Alborán Sea” project at two international conferences devoted to Marine Protected Areas and marine mammal conservation during 2009. More specifically, we have been active in three regional / international arenas: (i) Important Bird Areas; (ii) IUCN – WCPA Mediterranean; and (iii) European Union Natura 2000. Additionally, Hyrenbach was recently selected to serve in the U.S. Federal Marine Protected Areas Advisory Council (FAC), starting in the spring of 2010.

II. Year 3 Products:

During this third year of the project, we submitted one peer-reviewed manuscript for publication in a scientific journal, submitted an invited article for outreach and education, organized a special session entitled “Criteria for Marine Mammal Critical Habitat to make MPA Networks more Effective: Pelagic Protected Areas” at the First International Congress for Marine Mammal Protected Areas (ICMMPA), and gave four scientific presentations at two international meetings. We also continued to populate a project web-site, which serves as the clearing-house for disseminating project related materials.

Ana Cañadas, Colleen Corrigan, Sascha Hooker, and David Hyrenbach co-lead a session entitled “Criteria for Marine Mammal Critical Habitat to make MPA Networks more Effective: Pelagic Protected Areas”. This session, which was attended by approximately 50 people, led to a review paper, which has been submitted for publication in the journal *Frontiers in Ecology and the Environment*.

Additionally, Hyrenbach was invited to write an outreach article on pelagic MPAs for a special volume of the journal *Current*, assembled and published by NOAA’s MPA Center.

- **Peer Reviewed Manuscripts:**

Sascha K. Hooker, Ana Cañadas, K. David Hyrenbach, Colleen Corrigan, Jeff J. Polovina, Randall R. Reeves. 2010. How to make marine protected area networks effective for marine top predators. Submitted to *Frontiers in Ecology and the Environment*.

K. David Hyrenbach. 2010. Pelagic Reserves for Marine Top Predators: How Big and How Many? Submitted to *Current: The Journal of Marine Education*.

- **Oral Presentations and Workshops (Scientific Meetings):**

The project “Spatially- explicit conservation in the Alborán Sea” and its preliminary results were presented at two international conferences during 2009, ensuring the widespread dissemination of the concepts underlying our research to international marine conservation fora.

- Hyrenbach, K.D. 2009. MPA designs: large dynamic features and oceanic species. Workshop 2: Criteria for Marine Mammal Critical Habitat to make MPA Networks more Effective. International Marine Mammal Protected Area Conference, Maui, HI, March 29 – April 3, 2009
- Cañadas, A., 2009. MPA designs: Habitat Modelling Approaches. Workshop 2: Criteria for Marine Mammal Critical Habitat to make MPA Networks more Effective. International Marine Mammal Protected Area Conference, Maui, HI, March 29 - April 3, 2009.

Hyrenbach participated in another ICMMPA symposium devoted to the design and implementation of MPA networks for highly-mobile marine vertebrates:

- Hyrenbach, K.D. 2009. Oceanographic Considerations. Symposium 3: Networking for the future of MMPAs and MMPA Networks. International Marine Mammal Protected Area Conference, Maui, HI, March 29 - April 3, 2009.

Additionally, Hyrenbach was invited to give a plenary talk during the closing symposium of the ICMMPA, devoted to the design and implementation of MPA networks:

- Hyrenbach, K.D. 2009. How to deal with temporally and spatially dynamic critical habitats? Panel 3 - How can MPAs and networks of MPAs ensure threat mitigation to cetaceans? International Marine Mammal Protected Area Conference, Maui, HI, March 29 - April 3, 2009.

Hyrenbach was also invited to give a presentation at the *MPA University* session, during the International Marine Conservation Congress:

- Hyrenbach, K.D. 2009. Oceanographic Considerations. MPA-U: Principles & Practices for Establishing Resilient MPA Networks - Making it Happen. International Marine Conservation Congress, Washington, D.C., May 17, 2009.

- **Outreach Presentations:**

- Outreach presentations given to Earthwatch volunteers participating in Alnitak cruises (January 2009, June 2009, July 2009, August 2009, September 2009) by Ana Cañadas.

- **Project Web-site (Alborán Sea Conservation):** <http://www.alboranseaconservation.org/>

The *Alborán Sea Conservation* web-site has received approximately 3000 visits during the two and a half years of operation (August 2007 – February 2010). During 2009, the web-site received 1265 visits and 5691 hits.

Summary					
Reported period	Year 2007				
	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Viewed traffic *	<= 78 Exact value not available in 'Year' view	107 (1.37 visits/visitor)	444 (4.14 Pages/Visit)	1784 (16.67 Hits/Visit)	71.32 MB (682.55 KB/Visit)
Reported period	Year 2008				
	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Viewed traffic *	<= 1062 Exact value not available in 'Year' view	1314 (1.23 visits/visitor)	3230 (2.45 Pages/Visit)	7600 (5.78 Hits/Visit)	557.68 MB (434.59 KB/Visit)
Reported period	Year 2009				
	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Viewed traffic *	<= 1020 Exact value not available in 'Year' view	1265 (1.24 visits/visitor)	2400 (1.89 Pages/Visit)	5691 (4.49 Hits/Visit)	402.57 MB (325.87 KB/Visit)
Reported period	Year 2010				
	Unique visitors	Number of visits	Pages	Hits	Bandwidth
Viewed traffic *	<= 137 Exact value not available in 'Year' view	207 (1.51 visits/visitor)	316 (1.52 Pages/Visit)	766 (3.7 Hits/Visit)	56.39 MB (278.97 KB/Visit)

III. Other Achievements:

- **Synergies**

We have strengthened our working relationships with two ongoing projects working to establish seabird marine protected areas in the Western Mediterranean (SEO - BirdLife Important Bird Areas project, lead by Jose Manual Arcos) and to formulate a broader framework for MPA networks in the Mediterranean context (IUCN's WCPA task force - Mediterranean pelagic MPAs, lead by Giuseppe Notarbartolo di Sciarra). We are exploring additional ways to expand these collaborations, which have already lead to two manuscripts published in 2009, by seeking additional funding from private foundations and the European Union (EU).

Most notably, we also report on a new policy opportunity, which involves the appointment of David Hyrenbach to the U.S. Federal MPA Advisory Council (FAC) in 2010. This appointment will allow Hyrenbach to engage in the ongoing discussions about MPA networks and marine zoning in the United States, starting with the April 2010 FAC meeting.

- **Press Coverage**

We can highlight one interview with the PI, entitled “The Role of Marine Protected Areas in EBM: Often Necessary, but Rarely Sufficient by Themselves”, posted in the *Marine Ecosystem & Management* (MEAM) newsletter. This piece, originally published in March – May 2009, is available online: <http://depts.washington.edu/meam/MEAM7.pdf>