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NORTH PACIFIC REGIONAL WORKSHOP TO FACILITATE THE DESCRIPTION OF ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS
Moscow, 25 February to 1 March 2013

REPORT OF THE NORTH PACIFIC REGIONAL WORKSHOP TO FACILITATE THE DESCRIPTION OF ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS[1]

INTRODUCTION

1. At its tenth meeting, in decision X/29 (paragraph 36), the Conference of the Parties to the Convention on Biological Diversity requested the Executive Secretary to work with Parties and other Governments as well as competent organizations and regional initiatives, such as the Food and Agriculture Organization of the United Nations (FAO), regional seas conventions and action plans, and, where appropriate, regional fisheries management organizations (RFMOs), with regard to fisheries management, to organize a series of regional workshops, with a primary objective to facilitate the description of ecologically or biologically significant marine areas (EBSAs) through the application of scientific criteria in annex I of decision IX/20 and other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria, as well as the scientific guidance on the identification of marine areas beyond national jurisdiction, which meet the scientific criteria in annex I to decision IX/20.

2. In the same decision (paragraph 41), the Conference of the Parties requested that the Executive Secretary make available the scientific and technical data, information and results collated through the workshops referred to above to participating Parties, other Governments, intergovernmental agencies and the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA) for their use according to their competencies.

3. The Conference of the Parties, at its tenth meeting, also requested the Executive Secretary, in collaboration with Parties and other Governments, the Food and Agriculture Organization of the United Nations (FAO), United Nations Division for Ocean Affairs and the Law of the Sea, the United Nations Educational, Scientific and Cultural Organization–Intergovernmental Oceanographic Commission (UNESCO–IOC), in particular the Ocean Biogeographic Information System (OBIS), and other competent organizations, the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC) and the Global Ocean Biodiversity Initiative (GOBI), to establish a repository for scientific and technical information and experience related to the application of the scientific criteria on the identification of EBSAs in annex I of decision IX/20, as well as other relevant compatible and complementary nationally and intergovernmentally agreed scientific criteria that shares information and

[1] The designations employed and the presentation of material in this note do not imply the expression of any opinion whatsoever on the part of the Secretariat concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

harmonizes with similar initiatives, and to develop an information-sharing mechanism with similar initiatives, such as FAO's work on vulnerable marine ecosystems (VMEs) (paragraph 39, decision X/29).

4. Subsequently, at its eleventh meeting, the Conference of the Parties to the Convention requested the Executive Secretary to include the summary reports on the description of areas that meet the criteria for EBSAs, prepared by the Subsidiary Body on Scientific, Technical and Technological Advice at its sixteenth meeting and contained in the annex to decision XI/17, in the repository, as referred to in decision X/29 and decision XI/17, and, for the purpose set out in decision X/29, to submit them to the United Nations General Assembly and particularly its Ad Hoc Open-ended Informal Working Group to Study Issues Relating to the Conservation and Sustainable Use of Marine Biological Diversity Beyond Areas of National Jurisdiction, as well as to submit them to Parties, other Governments and relevant international organizations. The Conference of the Parties further requested the Executive Secretary to submit them to the Ad Hoc Working Group of the Whole on the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects, as well as to provide them as a source of information to United Nations specialized agencies.

5. The Conference of the Parties, in its decision XI/17, also requested the Executive Secretary to further collaborate with Parties, other Governments, competent organizations, and global and regional initiatives, such as the United Nations General Assembly Ad Hoc Working Group of the Whole on the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects, the International Maritime Organization, the Food and Agriculture Organization of the United Nations, regional seas conventions and action plans, and, where appropriate, regional fisheries management organizations with regard to fisheries management, and also including the participation of indigenous and local communities, to facilitate the description of areas that meet the criteria for EBSAs through the organization of additional regional or subregional workshops for the remaining regions or subregions where Parties wish workshops to be held, and for the further description of the areas already described where new information becomes available, as appropriate, and make the reports available for consideration by future meetings of the Subsidiary Body on Scientific, Technical and Technological Advice. The summary reports from the Subsidiary Body will be made available for future meetings of the Conference of the Parties for consideration with a view to including the reports in the repository in line with the purpose and procedures set out in decision X/29 and decision XI/17.

6. Pursuant to the above requests and with financial support from the Government of Japan (through the Japan Biodiversity Fund), the Executive Secretary convened the North Pacific Regional Workshop to Facilitate the Description of Ecologically or Biologically Significant Marine Areas (EBSAs), in collaboration with the Food and Agriculture Organization of the United Nations (FAO), the Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (NOWPAP), the North Pacific Marine Science Organization (PICES), the IOC Sub-Commission for the Western Pacific (WESTPAC) and the North Pacific Fisheries Commission (NPFC). This workshop was hosted by the Government of the Russian Federation in Moscow, from 25 February to 1 March 2013.

7. With the financial support of the Government of Japan (Japan Biodiversity Fund), the Secretariat of the Convention on Biological Diversity commissioned a technical team to support their scientific and technical preparation for the workshop. The results of this technical preparation were made available in a meeting document providing data to inform the CBD North Pacific Regional Workshop to Facilitate the Description of Ecologically or Biologically Significant Marine Areas (UNEP/CBD/RW/EBSA/NP/1/3).

8. The meeting was attended by experts from Canada, Democratic People's Republic of Korea, Japan, Mexico, Philippines, Republic of Korea, Russian Federation, National Oceanic and Atmospheric Administration of the United States of America, Food and Agriculture Organization of the United Nations (FAO), Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (NOWPAP), North Pacific Marine Science Organization

(PICES), North Pacific Fisheries Commission (NPFC), Global Ocean Biodiversity Initiative, Russian Association of Indigenous Peoples of the North, Siberia and the Far East, and WWF-Russia. Experts from China were nominated and invited to participate but were unable to attend for logistical reasons. A member of the Bureau of the Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA Bureau), as well as local observers nominated by the host government, also attended the workshop. The full list of participants is attached as annex I.

ITEM 1. OPENING OF THE MEETING

9. Mr. Anton Bersenev, Director of the Department of State Policy and Regulation for Hunting and Biodiversity, Ministry of Natural Resources and Environment of the Russian Federation, welcomed participants and opened the meeting. He said that the biological resources of the oceans were not always managed sustainably. He cited as an example whaling in the northwestern Pacific Ocean, which had caused great damage to whale populations, such as the Okhotsk-Korean population of grey whales, which almost disappeared in the early 1980s. He indicated that the Russian Federation had put great effort into preserving this grey whale population, the smallest such population in the world, including restricting oil and gas activities off the coast of Sakhalin Island. He went on to say that the establishment of protected areas was one of the most effective measures for the conservation of species and wildlife populations, and yet most of the protected areas in the Russian Federation were terrestrial, with very few marine areas. Some examples of marine protected areas in the Russian Federation were the Commander Reserve (the largest in the Russian Federation) and the Far Eastern Nature Reserve. Mr. Bersenev said that the open waters of the oceans were poorly protected from overuse, including through overfishing. He concluded by saying that the unique habitats and rare marine species of the North Pacific were very important for the conservation of marine ecosystems.

10. On behalf of the Executive Secretary of the Convention on Biological Diversity, Mr. Braulio Dias, Ms. Jihyun Lee (Environmental Affairs Officer for marine and coastal biodiversity at the CBD Secretariat) delivered the opening statement. In the statement, Mr. Dias welcomed participants and thanked them for participating in this important workshop, the fifth regional EBSA workshop convened by the Secretariat. He thanked the Government of the Russian Federation for hosting the workshop. He acknowledged with appreciation the Japan Biodiversity Fund for providing financial support for the participation of experts from developing countries. He also thanked FAO, NOWPAP, PICES, and WESTPAC for closely collaborating with the Secretariat in convening the workshop. He reminded workshop participants of the key outcome of the Rio+20 Conference, which emphasized the Aichi Biodiversity Target to conserve 10 per cent of coastal and marine areas in protected areas. He also mentioned the guidance of the tenth meeting of the Conference of the Parties that the application of the EBSA criteria was a scientific and technical exercise, and that areas identified as such might require enhanced conservation and management measures selected by States and competent intergovernmental organizations. He informed participants that the results of this workshop would be submitted to forthcoming meetings of the Convention's Subsidiary Body on Science, Technology and Technological Advice (SBSTTA) prior to the twelfth meeting of the Conference of the Parties. He added that the EBSA reports considered by the eleventh meeting of the Conference of the Parties would be transmitted to the United Nations General Assembly (UNGA) and its related processes. He expressed his wish for successful workshop deliberations.

ITEM 2. ELECTION OF THE CO-CHAIRS, ADOPTION OF THE AGENDA AND ORGANIZATION OF WORK

11. After brief self-introductions by all participants, Mr. Alexander Shestakov (SBSTTA Bureau, Russian Federation) and Mr. Jake Rice (Canada) were elected as the workshop co-chairs based on proposals by the participants from Mexico and the Russian Federation.

12. Participants were then invited to consider the provisional agenda (UNEP/CBD/RW/EBSA/NP/1/1) and the proposed organization of work as contained in annex II to the

annotations to the provisional agenda (UNEP/CBD/RW/EBSA/NP/1/1/Add.1) and adopted them without any amendments.

13. The workshop was organized in plenary sessions and break-out group sessions. The co-chairs nominated the following rapporteurs for the plenary sessions, taking into consideration the expertise and experience of the workshop participants and in consultation with the Secretariat of the Convention on Biological Diversity and the collaborating organizations in the region:

- Agenda item 3 (workshop background, scope and output): Mr. Sangjin Lee (NOWPAP);
- Agenda item 4 (review of relevant scientific information): Mr. Pat Halpin (Technical Support Team);
- Agenda item 5 (description of EBSAs): Ms. Autumn-Lynn Harrison (GOBI);
- Agenda item 6 (identification of gaps): Mr. Thomas Therriault (PICES)/Mr. Miguel Fortes (Philippines).

ITEM 3. WORKSHOP BACKGROUND, SCOPE AND OUTPUT

14. Ms. Jihyun Lee (CBD Secretariat) provided an overview on CBD’s EBSA process and highlighted the workshop objectives and expected outputs.

15. The workshop participants noted the following points regarding the guidance of the tenth and eleventh meetings of the Conference of the Parties on the regional workshop process as well as the potential contribution of scientific information produced by workshops:

- Each workshop is tasked with describing areas meeting the scientific criteria for ecologically or biologically significant areas (EBSAs) or other relevant criteria based on best available scientific information. As such, the experts at workshops are not expected to discuss any management issues, including threats to the areas;
- The application of the scientific criteria for ecologically or biologically significant marine areas (EBSAs) is a scientific and technical exercise and the identification of EBSAs and the selection of conservation and management measures is a matter for States and competent intergovernmental organizations, in accordance with international law, including the United Nations Convention on the Law of the Sea (paragraph 26, decision X/29);
- The EBSA description process facilitates scientific collaboration and information-sharing at national, subregional and regional levels;
- The EBSA description process is an open-ended process, and additional regional or subregional workshops will be organized when there is sufficient advancement in the availability of scientific information.

16. Mr. Jake Rice (Canada) provided a presentation on the scientific criteria for EBSAs (annex I to decision IX/20, available at http://www.cbd.int/doc/decisions/cop-09/cop-09-dec-20-en.pdf) and the scientific guidance on the application of EBSA criteria, building upon the results of the Expert Workshop on Scientific and Technical Guidance on the Use of Biogeographic Classification Systems and Identification of Marine Areas beyond National Jurisdiction in Need of Protection, which took place in Ottawa from 29 September to 2 October 2009 (available at http://www.cbd.int/doc/meetings/mar/ebsa-np-01/other/ebsa-np-01-ewbcsima-01-02-en.pdf).

17. Mr. Pat Halpin (Technical Support Team) provided an overview on the results of EBSA regional workshops held in other regions.

18. Mr. Jake Rice (Canada) provided an overview on relevant global processes, including FAO’s work on vulnerable marine ecosystems.

19. The workshop noted that close collaboration between CBD's work on EBSAs and FAO's work on vulnerable marine ecosystems (VMEs) would further enhance our common efforts toward sustainable ocean development goals, as stipulated in the outcome document of Rio+20, as well as achieving Aichi Biodiversity Targets related to marine and coastal biodiversity.

20. Mr. Thomas Therriault (PICES) provided an overview of relevant scientific programmes being implemented within PICES at the regional scale.

21. Mr. Sangjin Lee (NOWPAP) provided an overview of relevant scientific and management programmes being implemented within NOWPAP at the regional scale.

22. Mr. Alexander Shestakov (SBSTTA Bureau) provided a presentation on approaches to the identification of important marine areas for the Arctic Ocean, in particular for the Bering Sea.

23. Mr. Pat Halpin (Technical Support Team) provided a regional overview of biogeographic information on open ocean water and deep-sea habitats and a proposed geographic scope of the workshop, based on biogeographic classification systems, and taking into consideration the scope of the previous regional workshops held for the Western South Pacific and the Eastern Tropical and Temperate Pacific.

24. Summaries of the above presentations are provided in annex II.

25. Building on information provided by thematic and national presentations under this agenda item as well as the subsequent agenda item 4, the workshop co-chairs led a discussion on the geographic scope for the workshop. Experts from Parties and other Governments were first asked if they wished to have this workshop undertake description of EBSAs in their respective marine waters within national jurisdictions. Experts from Mexico and the Russian Federation requested the workshop to consider marine areas within their respective national jurisdictions. For other countries and other areas, the workshop agreed to take note of national processes applying EBSA criteria and/or similar national processes for identifying marine areas of particular importance.

26. Those countries with national processes applying EBSA criteria or with similar national processes were invited to provide brief summaries of the national processes and, when available, their results, to be attached as annexes to this report.

27. As such, the workshop noted:

- Canada's experience in applying the scientific criteria for EBSAs in marine areas within their national jurisdiction on the Pacific coast, as presented by Mr. Ian Perry (Canada) and summarized in annex III; and
- Japan's experience in applying the scientific criteria for EBSAs in marine areas within their national jurisdiction, as presented by Mr. Kenji Sudo (Japan) and summarized in annex III.

28. The workshop also noted:

- Similar experience of the United States of America (USA) in identifying marine areas of particular importance within their national jurisdiction, as presented by Mr. Gary Loh-Lee Low (NOAA) and summarized in annex II;
- Republic of Korea's similar experiences in identifying marine areas of particular importance within their national jurisdictions, as presented by Mr. Dae Yeon Moon (Republic of Korea) and summarized in annex II;
- Philippines' similar experience in identifying marine areas of particular importance within their national jurisdictions, as presented by Ms. Marie Antoinette Juinio-Meñez (Philippines) and summarized in annex II;

- Russia's similar experiences in identifying marine areas of particular importance within their national jurisdiction in the Pacific Ocean, as presented by Mr. Boris V. Preobrazhensky (Russian Federation) and summarized in annex II; and
- Mexico's similar experience in identifying marine areas of particular importance within their national jurisdiction in the Pacific Ocean, as presented by Mr. Luis Bourillon (Mexico) and summarized in annex II.

29. The participants agreed to use the northern limit of the area considered in the Western South Pacific regional workshop on EBSAs (Nadi, Fiji, November 2011) as the southern boundary of the area considered in this workshop. This meant some areas to the north and east of the Philippines, beyond national jurisdiction, were considered. The participants were informed that the Eastern Tropical and Temperate Pacific regional workshop on EBSAs (Galapagos Islands, Ecuador, August 2012) had reported that they had not completed a full evaluation of the northeast corner of their workshop area, due to unavailability of some relevant information. The participants of the present workshop were informed that the previously missing information was now available, and agreed to include that area in the scope of this workshop. The participants also agreed to use the Bering Strait as the northern boundary of the area to be considered at this workshop, including the Russian coastal area and the "Donut Hole" in the Bering Sea, but not the marine areas within the national jurisdiction of the USA.

30. In summary, the workshop participants agreed on the following scope for the workshop, as illustrated in the map in annex VI, in consideration of the following:

- Several biogeographic classification systems;
- Marine areas within the national jurisdictions of Mexico and the Russian Federation;
- Marine areas beyond national jurisdiction in this region;
- Areas to the north and east of the Philippines, beyond national jurisdiction;
- The northern limit of the Western South Pacific regional workshop on EBSAs (Fiji, November 2011);
- The north-eastern tropical Pacific area, as requested by the Eastern Tropical and Temperate Pacific regional workshop on EBSAs (Galapagos, August 2012); and
- The Bering Strait, including the Russian coastal area and the "Donut Hole" in the Bering Sea, but excluding the marine areas within the national jurisdiction of the USA.

ITEM 4. REVIEW OF RELEVANT SCIENTIFIC DATA/INFORMATION/MAPS COMPILED AND SUBMITTED FOR THE WORKSHOP

31. For the consideration of this item, the workshop had before it two notes by the Executive Secretary: UNEP/CBD/RW/EBSA/NP/1/2, containing a compilation of the submissions of scientific information to describe ecologically or biologically significant marine areas in the North Pacific submitted by Parties, other Governments and relevant organizations in response to the Secretariat's notification 2012-152 (Ref. no. SCBD/STTM/JM/JL/JG/81106), dated 18 December 2012, and UNEP/CBD/RW/EBSA/NP/1/3, providing data to inform the CBD North Pacific Regional Workshop to Facilitate the Description of Ecologically or Biologically Significant Marine Areas, prepared in support of the workshop deliberations. The documents/references submitted prior to the workshop were made available for the information of workshop participants on the meeting website (http://www.cbd.int/doc/?meeting=EBSA-NP-01).

32. Mr. Pat Halpin provided a presentation on "Review of relevant scientific data/information/maps compiled to facilitate the description of EBSAs in the North Pacific", based on document UNEP/CBD/RW/EBSA/NP/1/3.

33. Ms. Autumn-Lynn Harrison provided a presentation on “Marine predators in space and time in the North Pacific Ocean”.

34. Summaries of the above presentations are provided in annex II.

35. Ms. Elva Escobar (Mexico) provided presentations on three island areas (Alijos, Coronado and Guadalupe) around Mexico, applying the scientific criteria for EBSAs in these areas.

36. Mr. Vassily A. Spiridonov (Russia) provided a presentation on the application of the EBSA criteria in the northwestern Pacific within Russia’s jurisdiction.

37. Mr. Konstantin Zgurovsky (WWF-Russia) provided a presentation on the Sea of Okhotsk, applying the scientific criteria for EBSAs in this area.

38. The contents of the above three presentations on EBSA description were incorporated into the description of areas meeting the EBSA criteria by break-out groups. Each presentation describing areas meeting EBSAs criteria provided an overview of the areas considered, the assessment of the area against EBSA criteria, scientific data/information available as well as other relevant information.

ITEM 5. DESCRIPTION OF AREAS MEETING EBSA CRITERIA THROUGH APPLICATION OF THE SCIENTIFIC CRITERIA AND OTHER RELEVANT COMPATIBLE AND COMPLEMENTARY NATIONALLY AND INTERGOVERNMENTALLY AGREED SCIENTIFIC CRITERIA

39. Under this agenda item, the workshop co-chairs reminded the participants of the intent of the criterion-based processes for describing areas that might be ecologically or biologically significant. It was stressed that all parts of the ocean supported marine biodiversity, and that uses must be sustainable everywhere. However, there may be some areas of the ocean that were *relatively* more ecologically or biologically significant, and consistent with CBD decisions on marine and coastal biodiversity and UNGA resolutions on oceans and the law of the sea, these areas deserved a higher degree of protection. Hence the criteria were to be applied in a *relative* context in relation to the geographic scope of this workshop, in order to call attention to areas that were particularly rich in the properties associated with one or more criteria.

40. The workshop co-chairs then led the participants through a consideration of the information relative to each criterion. In each case the Technical Support Team first showed maps of some ecological features that, based on past workshops, were thought to be especially relevant to the criterion being discussed. This general discussion did not attempt to refine exact boundaries of each area considered to meet the criterion under discussion. It did, however, attempt to specify the features of each specific area that were considered to meet the criterion; their general location and pattern in space, whether those features were persistent or varied seasonally or inter-annually, and if variable, the general pattern of variation; and any special factors associated with each feature. The discussion also identified ecological features and places where the acquisition of more information and more follow-up work after the meeting were considered priorities.

41. The workshop considered the EBSA criteria in the following order: (i) biological productivity; (ii) biological diversity; (iii) importance for threatened, endangered or declining species and/or habitats; (iv) special importance for life-history stages of species; (v) uniqueness or rarity; (vi) vulnerability, fragility, sensitivity, or slow recovery; and (vii) naturalness. As successive criteria were discussed, in many cases the information relevant to a new criterion reinforced the information on previously discussed criteria. In those cases the new information was used to augment the rationale for areas being described as meeting the EBSA criteria. They were not used to describe a new area with the same boundaries as an area previously described as meeting other criteria.

42. The summary of the plenary discussion on each EBSA criterion is provided in annex IV.

43. From the review of information described in annex IV, four types of areas were identified as possibly meeting one or more criterion. This was not a proposal for different categories of EBSAs. Rather,

the differences among the types of areas matter to some potential uses of the report, where clarity is required on different types of information prepared for the description of areas meeting EBSA criteria.

44. These types were:

- ***Spatially stable features whose positions are known and individually resolved on the maps.*** Examples include individual seamounts and feeding areas for sharks and seabirds. Such areas do not have to be used all year round, nor does all the area have to be used every year. However, the feature(s) is entirely contained in the corresponding map polygons;

- ***Spatially stable features whose individual positions are known but where a number of individual cases are being grouped.*** Examples include a group of coastal areas, seamounts or seabird breeding sites where the location of each is known but a single polygon on the map and corresponding description encompasses all the members of the group. The grouping may be done because there may be insufficient knowledge to evaluate each separately or the information is basically the same for all members of the group, so one description can be applied to all group members;

- ***Spatially stable features whose individual positions are not known.*** Examples include areas where coral or sponge concentrations are likely, based on, for example, modelling of suitable habitats, but information is insufficient to specify the locations of each individual concentration. Each such area may be represented by a single map polygon and description, but the entire area inside the polygon is *not* to be interpreted as filled with the feature(s) meeting the criteria. Narrative about these areas should stress the importance of getting better information on the spatial distribution of these features;

- ***Features that are inherently not spatially fixed.*** An example is the North Pacific frontal transition zone. The position of this front moves seasonally and among years. The map polygon for such a feature should include the full range occupied by the front (or other feature) during a typical year. However, the description and its narrative should describe seasonal movement of the key feature(s). The text for description should also make very clear that at any given time, the ecological importance usually is highest wherever the feature is located at that time and often decreases as distance from the feature increases. It may even be the case that at any given time some parts of the total area contained in the polygon are ecologically little different from areas outside the polygon.

45. Following discussion of the information to be captured in the maps and EBSA description, the workshop participants were then split into several break-out groups, including the following:

- Three major subgroups were formed for (i) the central Pacific transition zone and coastal currents beyond exclusive economic zones (EEZs); (ii) seamounts; and (iii) the ecological features within the Russian EEZ and the “donut hole” in the Sea of Okhotsk;

- Smaller subgroups also were formed for (iv) hydrothermal vents, corals and sponges not associated with seamounts; (v) the Mexican coastal areas and offshore islands; and (vi) the few additional special areas not fitting into the other groups.

46. Participants were assisted by the technical support team, including GIS operators, who made hard/electronic copies of the maps available for the deliberations of the break-out group discussion.

47. During break-out group discussions, participants drew approximate boundaries of areas meeting EBSA criteria on maps provided by the technical support team to keep track of opportunities to extend or merge areas for EBSA description and to identify areas that had yet to be considered.

48. The results from the break-out groups were reported at the plenary for consideration. Workshop participants at the plenary session reviewed the descriptions of areas meeting EBSA criteria proposed by

the break-out group sessions, including the draft descriptions prepared using templates provided by the CBD Secretariat, and considered them for inclusion in the final list of areas meeting EBSA criteria.

49. The workshop participants agreed on descriptions of 20 areas meeting EBSA criteria. They are listed in annex V and described in its appendix. The map of described areas is contained in annex VI. Areas discussed by the workshop but not described against EBSA criteria due to data paucity and lack of analysis are listed in annex VII.

ITEM 6. IDENTIFICATION OF GAPS AND NEEDS FOR FURTHER ELABORATION IN DESCRIBING AREAS MEETING EBSA CRITERIA, INCLUDING THE NEED FOR THE DEVELOPMENT OF SCIENTIFIC CAPACITY AND FUTURE SCIENTIFIC COLLABORATION

50. Building on the workshop deliberations, the workshop participants were invited to identify, through break-out group sessions and open plenary discussion, gaps and needs for further elaboration in describing areas meeting EBSA criteria, including the need to develop scientific capacity and future scientific collaboration.

51. The results of the plenary and subgroup discussions are compiled in annex VIII.

ITEM 7. OTHER MATTERS

52. This workshop noted that the southwest portion of the area considered by this workshop did not receive thorough evaluation against the EBSA criteria and should be given attention at an appropriate future regional workshop. This workshop also noted that there were data sets for the North Pacific that could inform future efforts to evaluate this region using the EBSA criteria, but that were not provided to the Secretariat and were therefore not available to the workshop. The workshop further noted that lessons were being learned at each workshop. Participants agreed that there would be substantial value if a workshop were organized after the first round of regional workshops had been completed to consolidate these lessons and provide further guidance on the application of EBSA criteria.

ITEM 8. ADOPTION OF THE REPORT

53. Participants considered and adopted the workshop report on the basis of a draft report prepared and presented by the co-chairs with some changes.

54. Participants agreed that any additional scientific information and scientific references would be provided to the Secretariat by workshop participants within two weeks of the closing of the workshop in order to further refine the descriptions of areas meeting EBSA criteria contained in annex V and its appendix.

ITEM 9. CLOSURE OF THE MEETING

54. In closing the workshop, the co-chairs thanked the workshop participants for their valuable contributions to the workshop deliberations. The workshop participants thanked the Government of the Russian Federation for hosting the workshop, the Government of Japan for financial support, and the Secretariat for convening the workshop. The participants highly appreciated the workshop co-chairs for their able leadership in steering the workshop deliberations. They thanked the technical support team for their hard work and excellent technical support, and experts from Global Ocean Biodiversity Initiative, the Ocean Biogeographic Information System (OBIS) of IOC/UNESCO, and other scientific groups/organizations, who provided necessary scientific information and data for this workshop.

55. The workshop was closed at 5 p.m. on Friday, 1 March 2013.

Annex I

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Annex II

SUMMARY OF THEME PRESENTATIONS

AGENDA ITEM 3

CBD's EBSA process, workshop objectives and expected outputs/outcome (by Jihyun Lee, CBD Secretariat)

This presentation introduced the process for describing ecologically or biologically significant marine areas (EBSAs), including the call in the tenth meeting of the Conference of the Parties (COP 10) for regional EBSA workshops, as well as the process through which the outcomes of the workshops were submitted to SBSTTA 16 and the eleventh meeting of the Conference of the Parties (COP 11) for their consideration. Ms. Lee also outlined the further guidance by COP 11 related to the submission of the summary report on EBSAs to the United Nations General Assembly (UNGA) and its relevant processes as well as inclusion of the report in the CBD EBSA repository. She then highlighted the potential benefits of the EBSA process in further strengthening the region's efforts toward marine biodiversity conservation goals, by facilitating scientific collaboration, increasing awareness, and encouraging countries and, as appropriate, intergovernmental organizations within their competencies, to apply necessary conservation measures related to EBSAs. She provided some examples of previous regional workshops on EBSAs and explained the scientific preparation undertaken jointly with the experts from Parties and international/regional organizations prior to the EBSA regional workshops.

Scientific guidance on the application of EBSA criteria (by Jake Rice, Canada)

This presentation, entitled "Criteria and Guidance for EBSAs: Protection and Use of Special Marine Places", reviewed the seven criteria adopted by the Conference of the Parties to the Convention at its ninth meeting (decision IX/20) for evaluation of ecologically or biologically significant areas. Mr. Rice first introduced the definition of each criterion and provided an extract of the guidance on its use, as contained in annex 1 to that decision. He then summarized some of the lessons that have been learned about the criteria, based on experience with their use in other CBD workshops and national processes. It was stressed that the criteria were designed to be applied individually, but results of use of the criteria can be "layered" to build the full description of the ecological or biological significance of each area. It is most valuable to users of workshop reports when both the maps of areas meeting the criteria and the narrative associated with maps make clear how strongly each area reflects the properties of each criterion, and how many criteria may be met in what ways by each area.

Results of EBSA regional workshops held in other regions (by Pat Halpin, Jesse Cleary, and Ben Donnelly, Technical Support Team)

This presentation reviewed the coverage and results of previous EBSA regional workshops. Since the tenth meeting of the Conference of the Parties, the CBD Secretariat has organized EBSA workshops in (1) the Western South Pacific region (Nadi, Fiji, November 2011), (2) the Wider Caribbean and Western Mid-Atlantic region (Recife, Brazil, February-March 2012), (3) the Southern Indian Ocean (Flic en Flac, Mauritius, July-August 2012), and (4) the Eastern Tropical and Temperate Pacific (Galapagos Islands, Ecuador, August 2012). There were also two EBSA workshops held jointly with ongoing regional processes: (1) North-East Atlantic OSPAR/NEAFC/CBD workshop (Hyères, France, September 2011); and (2) Mediterranean process. These six previous workshops have covered >50% of the ocean area to date. Mr. Halpin presented the areas described as meeting the EBSA criteria from each of the previous workshops. The areas meeting the EBSA criteria were shown to have been very diverse in terms of the ratings against the criteria, size and spatial distribution. Also, areas described as meeting the EBSA criteria are located in both areas beyond national jurisdiction and within national waters.

Relevant global processes, including FAO's work on vulnerable marine ecosystems (by Jake Rice, Canada)

This presentation, entitled "EBSAs and other Approaches: History, Similarities and Differences", first went through the history of the EBSA criteria and the process for their description, clarifying that the process of *describing* areas that meet the EBSA criteria is exclusively a scientific and technical process. According to UNGA resolutions on oceans and the law of the sea, the steps of *designating or identifying* areas as EBSAs does have general policy and management implications, so those steps are outside the competence of CBD, although States may do so within their EEZs, should they wish to. To this point the United Nations has not established a process for conducting those steps in areas beyond national jurisdiction. Hence, when the CBD workshops have described areas that meet the EBSA criteria, they are made available to the United Nations General Assembly, Parties, other Governments and competent intergovernmental organizations. At their own discretion these governments and competent organizations may choose to use them in planning policy and management actions within their respective competencies.

Mr. Rice explained that some other intergovernmental organizations (IGOs), such as FAO and regional fisheries management organizations (RFMOs), the International Maritime Organization (IMO) and the International Seabed Authority (ISA) have adopted criteria for identifying special areas in the ocean as well. The ecological criteria adopted by these organizations generally resemble the criteria adopted by CBD for EBSAs. However, in each case when these other IGOs apply their own ecological criteria to information about the ocean, areas found to meet the criteria do trigger necessary policy and management responses. However, those responses are solely related to the activities for which the respective IGO has competence. These differences in near-term consequences of application of EBSA and other ecological criteria have often resulted in some differences in the maps and reports produced by the various organizations, even though reviews at the previous CBD expert workshop (Ottawa, 2009) have concluded that there are negligible differences in the ecological criteria themselves.

Overview of relevant scientific programmes at regional scale

North Pacific Marine Science Organization (PICES) (by Thomas Therriault)

This presentation introduced the North Pacific Marine Science Organization (PICES), an intergovernmental science organization that was established in 1992 by six member countries: Canada, Japan, People's Republic of China, Republic of Korea, Russian Federation, and United States of America. Mr. Therriault explained that the mission of the organization is "to promote and coordinate marine scientific research in the North Pacific Ocean in order to advance scientific knowledge of the area concerned and of its living resources" via five central themes: (1) advancing scientific knowledge; (2) applying scientific knowledge; (3) fostering partnerships; (4) ensuring a modern organization in support of PICES activities; and (5) distributing PICES scientific knowledge. As a scientific organization it does not have a management or policy mandate. Currently, the major research programme of PICES is "Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems (FUTURE)", which is intended to fulfil two major objectives. The first objective is "Understanding Critical Processes in the North Pacific," which includes three key questions: (1) What determines an ecosystem's intrinsic resilience and vulnerability to natural and anthropogenic forcing? (2) How do ecosystems respond to natural and anthropogenic forcing, and how might they change in the future? and (3) How do human activities affect coastal ecosystems and how are societies affected by changes in these ecosystems? The second objective is "Status Reports, Outlooks, Forecasts, and Engagement." Although the FUTURE programme is a major undertaking for the organization, it is not the only science being done by PICES. PICES continues to collaborate with many partners on many important scientific topics, such as climate change, ecosystem assessment, biological invasions, ocean acidification, hypoxia, and marine spatial planning, to name just a few. In addition, PICES collaborates on operational areas such as training/capacity-building (by summer schools, workshops) and knowledge exchange/communication. A wide variety of PICES products, including two special publications on marine ecosystems of the North Pacific, annual reports, and scientific and technical reports can be used to inform the EBSA process being considered at this workshop.

Northwest Pacific Action Plan (NOWPAP) (by Sangjin Lee)

This presentation reviewed biodiversity-related activities that the Northwest Pacific Action Plan (NOWPAP) has been implementing, together with a brief introduction about NOWPAP, including its history, goals and mechanisms. NOWPAP was established in 1994, as a part of the UNEP Regional Seas Programme (RSP). Because the region is also one of the most densely populated in the world, the four member states (China, Japan, Republic of Korea and Russian Federation) are committed to wisely managing the marine and coastal environment to secure the region's sustainability for future generations. Mr. Lee stressed the significance of collaboration with relevant organizations pursuing similar approaches to conserve marine ecosystems.

Approaches to the identification of important marine areas in the Arctic Ocean, in particular for the Bering Sea (by Alexander Shestakov, SBSTTA Bureau)

This presentation provided information on existing approaches describing marine important areas in the Arctic Ocean and in particular for the Bering Sea, which is included in the northern part of the workshop area. Existing compilations include (i) marine areas of heightened ecological importance (as officially identified by the Arctic Council based on IMO criteria for Particularly Sensitive Sea Areas) for the entire Arctic Ocean, (ii) ecologically or biologically significant marine areas (as identified by IUCN and NRDC based on CBD criteria) for the entire Arctic Ocean, and (iii) biodiversity priority areas (as identified by WWF and The Nature Conservancy based on compatible criteria) for the Bering Sea. These three examples identified important marine areas in the North Pacific through similar expert processes. Most of the areas described for the Bering Sea through each process are well aligned. Most identified areas but one (part of Bering Sea "donut hole" as identified by WWF/TNC) are within waters under national jurisdiction. The Arctic Council plans to officially adopt its report on Arctic marine areas of heightened ecological importance at its Ministerial meeting in May 2013.

Regional overview of biogeographic information on open ocean water and deep-sea habitats and a proposed geographic scope of the workshop (by Pat Halpin, Jesse Cleary, and Ben Donnelly, Technical Support Team)

This presentation provided biogeographic information that can be used by workshop participants to define the workshop boundary. Such information includes widely used biogeographic classification systems (IHO seas, GOODS, MEOW, and LMEs). The scope of the other two regional workshops organized in the South Pacific was also provided.

Sharing similar national experiences in identifying marine areas of particular importance within national jurisdictions

USA's experience (Loh-Lee Low)

This presentation showed that the National Oceanic and Atmospheric Administration (NOAA) has used marine protected areas (MPAs) in a similar way to possible uses of EBSAs, but in a broader context to conserve vital marine habitats and resources. US MPAs include national marine sanctuaries, national parks and wildlife refuges, many state parks and conservation areas, and a variety of time-area closures. A central website on MPAs in the United States is at: http://marineprotectedareas.noaa.gov/dataanalysis/mpainventory/mpaviewer/. This website is a comprehensive geospatial database designed to catalogue and classify MPAs within US waters. The searchable inventory contains information on over 1,600 MPA sites and is the only such comprehensive data set in the USA.

Mr. Loh-Lee Low explained that there are three major regions on the Pacific side of the US EEZ where there are significant numbers of MPAs: (1) the western Pacific Hawaiian Islands region, (2) the Gulf of Alaska, Aleutians and eastern Bering Sea region and (3) the waters off the Pacific Coast states of Washington, Oregon, and California. The purposes and details of each marine protection action in all three regions can be searched from the website indicated above. They generally serve to protect marine areas for reasons that may extend beyond the CBD scientific criteria for EBSAs.

The NOAA presentation indicated that the USA has a rigorous process to identify marine areas for protection and conservation within its EEZ, and as such, need not be a part of the CBD process to describe potential EBSAs. NOAA recognizes that some EBSAs described at this CBD workshop in international waters would transition into USA's EEZ. In such situations, Mr. Loh-Lee Low indicated that NOAA would participate to provide CBD scientific data to describe the most appropriate boundaries and assessment for areas meeting the EBSA criteria.

Republic of Korea's experience (by Dae Yeon Moon)

This presentation provided an overview of marine protected areas (MPAs) in the Republic of Korea. The Republic of Korea began to designate MPAs in 2001 in accordance with domestic laws, including the Marine Ecosystem Conservation and Management Act (Article 25) and the Wetland Conservation Act (Article 8). By the end of 2012, a total of 18 MPAs had been designated by the Ministry of Land, Transport and Maritime Affairs (MLTM) and local governments. The MPAs, consisting of 12 coastal tidal flats and six marine ecosystem protected areas, are distributed along the south and west coastal regions. The area covered by the MPAs is estimated to be about 360.3 km^2, accounting for about 0.5% of the territorial waters and 11.6% of tidal flat area. The Republic of Korea is planning to expand MPA coverage to 10% of its territorial waters by 2020. To manage the designated MPAs effectively, the MLTM is collaborating with the MPA Center of the Korea Marine Environment Management Corporation. One of the important activities conducted by the Center is raising public awareness as well as annual assessment of MPA management activities.

Philippines' experience: Marine Key Biodiversity Areas in the Philippines within a regional context (by Marie Antoinette Juinio-Meñez and Miguel D. Fortes)

The number of species increases along East Asia from the high to lower latitudes with the highest diversity reported in the South China Sea. The biogeographic affinity of species (e.g., seagrasses) in the Philippines is generally higher in Southeast Asia (SEA) than the North Pacific (Japan, China and Korea) region. Within SEA, there are various biogeographic regions. The Philippine's initiatives to identify priority marine biodiversity areas were initiated in 2008 using the IUCN Key Biodiversity Areas (KBA) vulnerability and irreplaceability criteria. Ten marine corridors which are crucial for dispersal of larvae and migration of pelagic species were identified to protect influx and exchange of species and genetic pool across the archipelago. The process involved the identification of trigger species based on various sources of information, preparation of distribution maps including physical parameters, key ecosystems and other spatial data; and the delineation of the MKBAs. A total of 98 species out of a total of 156 from ten taxonomic groups, categorized as highly mobile, site-attached and habitat-forming species, were used in the delineation. A total of 123 marine Key Biodiversity Areas were initially identified. Subsequently MPA gap analysis showed 769 existing MPAs overlap with the marine KBAs and 327 MPAs are not within the KBAs. The latter provides guidance on priority areas to be considered for establishment of additional marine protected areas. The EBSA process will further help focus conservation efforts within the territorial seas of the Philippines. However, capability-building and preparation of information is needed. Moreover, the Philippine MKBAs on the Pacific coast are best considered with the SEA region, consistent with its natural biogeography rather than as part of the North Pacific EBSAs. The ASEAN Centre for Biodiversity may be a strategic partner in facilitating an EBSA workshop for the Southeast Asia region. The Philippine territorial seas along the Pacific and the EEZ east and northeast of the country as parts of the domain for the North Pacific workshop can be revisited during a possible future regional workshop on EBSAs.

Russian Federation's experience (by Boris V. Preobrazhensky)

This presentation, entitled "Reference Monitoring System of Polygons for Russian Far-East Seas", explained that the most representative and easily controlled means of monitoring of ecological state of ecosystems is time-attributed and accurately GPS-pinpointed, underwater landscape mapping. Mr. Preobrazhensky indicated that such easily accessible reference data will serve as a reliable base for making conclusions about changes in the state of marine ecosystems and areas in the marine offshore environment. An initial network of reference polygons was proposed.

Mexico's experience (by Luis Bourillon)

This presentation, entitled "Ecoregional Planning Efforts in the Gulf of California and West Coast of the Baja California Peninsula of Mexico", reviewed the results of two marine ecoregional processes carried out in the northwestern portion of Mexico. Mr. Bourillon explained the methodology used, examples of input data, and criteria used to produce a portfolio of conservation priority areas. Mr. Bourillon pointed out that the methodology used was developed by The Nature Conservancy and included Marxan software to analyze existing and new biophysical, biological and ecological data. The process included the use of coarse filters like coastline type, benthic habitats, pelagic processes (i.e., upwelling), biologically significant areas (e.g., breeding, wintering, feeding), as well as fine filters like important species distribution (e.g., threatened, protected, endangered species). It also used human activities as "costs" for conservation actions—in these areas mostly related to commercial and sport fishing, shipping and coastal aquaculture. The results presented in maps show a portfolio of 54 conservation sites inside the Gulf of California and southern portion of the Baja California peninsula, and 13 sites along the remaining western portion of the Baja California peninsula. All these sites were incorporated into the official gap analysis performed by the National Commission of Biodiversity of the Mexican Government. The presentation concluded with a map of the deep-water priority conservation sites recently proposed by the Federal Government for protection within the continental shelf.

AGENDA ITEM 4

Review of relevant scientific data/information/maps compiled to facilitate the description of EBSAs in the North Pacific (by Pat Halpin, Jesse Cleary, and Ben Donnelly)

This presentation reviewed the compilation of scientific data and information prepared for the workshop. The baseline data layers developed for this workshop closely follow the data types prepared for the Western South Pacific EBSA workshop, to provide consistency between regional efforts. More than 65 data layers were prepared for this workshop. The presentation covered three general types of data: (1) biogeographic data, (2) biological data, and (3) physical data. The biogeographic data focused on major biogeographic classification systems (GOODS, MEOW and LMEs). The biological data portion of the presentation covered a variety of data sources to include data and statistical indices compiled by the Ocean Biogeographic Information System (OBIS). The physical data layers included bathymetric and physical substrate data, oceanographic features and remotely sensed data. Specific information on the data layers is provided in detail in the pre-workshop data report (see paragraph 7 of this report).

Marine predators in space and time in the North Pacific Ocean (by Autumn-Lynn Harrison)

The presentation outlined current understanding about the distribution of 12 species of pelagic predators in the North Pacific Ocean based upon synthetic results of the Tagging of Pacific Predators (TOPP), a field project of the Census of Marine Life. The TOPP data set contains location data for pinnipeds, seabirds, sharks, tuna, turtles, and whales, including 257,133 daily locations recorded from 1,679 individuals electronically tracked in the Pacific Ocean during an eight-year period. Ms. Harrison highlighted places that are ecologically important during specific life history stages for each species; discussed how these places shift in space seasonally; and presented probabilities of occurrence in Exclusive Economic Zones of countries, and in areas beyond national jurisdiction. The species considered—including black-footed and Laysan albatrosses, sooty shearwaters, Pacific bluefin tuna, northern elephant seals, and salmon shark—were found to capitalize on the highly productive North Pacific Transition Zone for foraging, migration, and/or breeding.

Annex III

EXAMPLES OF NATIONAL EXPERIENCE IN THE APPLICATION OF EBSA CRITERIA

1. Canada's experience in applying EBSA criteria[2]

Evaluation of proposed ecologically and biologically significant areas in marine waters of British Columbia (presented by Ian Perry, Canada)

Context

Canada's Oceans Act provides the legislative framework for an integrated ecosystem approach to management of Canadian oceans, particularly in areas considered ecologically or biologically significant. The Canadian Department of Fisheries and Oceans (DFO) has developed guidance for the identification of ecologically or biologically significant areas. The criteria for defining such areas include uniqueness, aggregation, fitness consequences, resilience, and naturalness. A formal science advisory process has identified proposed ecologically and biologically significant areas (EBSAs) in Canadian Pacific marine waters, specifically in the Strait of Georgia, along the west coast of Vancouver Island (southern shelf ecoregion), and in the Pacific North Coast Integrated Management Area (PNCIMA, northern shelf ecoregion).

A key Science Advisory Report (2012/075) is from the Pacific Regional Advisory Process of 7-8 February 2012 on "Evaluation of Proposed Ecologically and Biologically Significant Areas in Marine Waters of British Columbia". Additional publications from this process will be posted as they become available on the Fisheries and Oceans Canada Science Advisory Secretariat website, www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm.

Summary

- Using the DFO criteria for defining EBSAs, 18 EBSAs are proposed in the northern shelf ecoregion (Pacific North Coast Integrated Management Area, PNCIMA), seven EBSAs are proposed in the southern shelf ecoregion (west coast of Vancouver Island), and eight EBSAs are proposed in the Strait of Georgia. On the spatial scale of the British Columbia coast, the entire Strait of Georgia is proposed as a single EBSA.

- Identifying areas that are important for species or groups of species based on uniqueness, aggregation, fitness consequences, resilience, and naturalness ("Important Areas") is a key step in the EBSA identification process. The use of physical oceanographic features, geographic bottlenecks, and unique areas that overlap with species-specific Important Areas is an acceptable approach to identifying EBSAs in Canada's Pacific marine waters. Any physical oceanographic features or geographic bottlenecks that are not associated with species' Important Areas are not considered EBSAs.

- Information on species' Important Areas must be retained in an available and accessible form. This information may be important for some management and spatial planning issues. Updates on information related to Important Areas or physiographic features may also lead to future updates in the EBSAs that reflect these Important Areas and physiographic features.

- Guidance is needed for marine resource managers on how best to use EBSAs in management decisions. Such guidance should include how to deal with the uncertainty surrounding the exact location of boundaries of the identified EBSAs.

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[2] Due to the lengthy content of the original report, only the context and the summary of the report are presented here. The original report can be found at http://www.dfo-mpo.gc.ca/csas-sccs/Publications/SAR-AS/2012/2012_075-eng.pdf.

- The process of identifying ecologically significant species (ESSs) should be completed to provide complementary information to spatially explicit EBSAs.

- EBSAs in any one ecoregion should be re-evaluated and updated with new information approximately every five years.

- Significant aspects for improvement in the process for identifying EBSAs in the Pacific Region include expanding the fish species considered beyond those of primarily commercial interest, expanding the range of experts surveyed to identify species' Important Areas (and expanding the use of literature sources when available), and improving the consideration of near-shore areas (e.g., estuaries, river mouths, beaches and other shallow subtidal areas). At present, all estuaries and river mouths supporting anadromous species have been defined as EBSAs, although they are not mapped due to their small spatial scales.

2. Japan's experience in applying EBSA criteria:[3]

Identification of "Marine Areas of Particular Importance" in Japan (presented by Kenji Sudo, Japan Wildlife Research Center)

1. Background

1992 - Convention on Biological Diversity
2008 - Basic Plan on Ocean Policy of Japan
2008 - EBSA Criteria (CBD COP 9)
2011 - Marine Biodiversity Conservation Strategy of Japan
2011-2014 - Identification of "Marine Areas of Particular Importance"

2. Intended application

- Enhancement of marine protected areas and networking thereof
- Adaptation to the predicted effects of climate change
- Appropriate management and environmental consideration in open ocean
- Promotion of public awareness and involvement of various actors

3. Approach and Process

Fiscal year 2011: Establishment of an expert panel
Decision on work plan, principles, scope, criteria, method, etc.
Fiscal year 2012: Collection and analysis of GIS data
Integration of data for multiple criteria
Fiscal year 2013: Collecting opinions from outside experts, academic societies and NGOs/NPOs
Determination and description of areas

4. Establishment of expert panel

Name	Organization	Area of specialization
Dr. Yoshihisa Shirayama （Chair)	JAMSTEC (Japan Agency for Marine-Earth Science and Technology)	Taxonomy and meiobenthos
Prof. Hidetaka Takeoka	Ehime University	Physical oceanography
Prof. Hiroshi Mukai	Kyoto University	Marine ecology
Dr. Kaoru Nakata	Fisheries Research Agency	Fisheries science and planktology
Prof. Yasunori Sakurai	Hokkaido University	Fisheries science and marine ecology

[3] The information has been reproduced in this report in the form and format in which it was submitted by the expert from Japan.

5. Scope

- Horizontal range: From the high tide line to the outer limit of the EEZ
- Vertical range: From the surface to the bottom
- Evaluation unit size: Coastal area 5 km grid, open ocean: 50 km grid

6. Criteria（EBSA + representativeness or typicality）

EBSA criteria (UNEP/CBD/COP/DEC/IX/20)

- Uniqueness or rarity
- Special importance for life history stages of species
- Importance for threatened, endangered or declining species and/or habitats
- Vulnerability, fragility, sensitivity, or slow recovery
- Biological productivity
- Biological diversity
- Naturalness

Additional criterion

- Representativeness or typicality: Area containing representative or typical feature of ecosystem and/or biotic community of Japan

7. GIS data applied in each criterion

- Best available scientific information is used
- Biological data: Distribution data (marine mammals, birds, sea turtles and snakes, fish, Cnidaria, Mollusca, others, deep-sea corals, chemosynthetic community), Red List Species, IBA, marine IBA and national monument, etc.
- Physical data: bathymetry, chlorophyll *a* concentration, distribution of canyons, front and upwelling current, ocean current, sea ice, sand bank, seamount locations, trench, hydrothermal vents and seeps, etc.

8. Sample data

- Special importance for life history of species: Spawning areas of the 52 fish species subject to stock assessment of the Fisheries Research Agency, Japan
- Biological productivity: chlorophyll concentration
- Biological diversity: Hurlbert's index ES(10)

9. How to integrate

MARXAN (complementarity analysis, evaluated "high" in each criterion and expert opinion

10. Result of MARXAN is being prepared.

11. Result of "high" score in each criterion is being prepared.

12. Process in the fiscal year 2013

- Collection of opinions from outside experts, academic societies and non-governmental organizations / non-profit organizations
- Identification of marine areas of particular importance by the expert panel
- Publication of the "marine areas of particular importance"

Annex IV

SUMMARY OF THE WORKSHOP DISCUSSION ON REVIEW OF RELEVANT SCIENTIFIC DATA/INFORMATION/MAPS COMPILED FOR THE WORKSHOP ACCORDING TO EACH EBSA CRITERION

The following summarizes the results of the plenary discussion with regard to each EBSA criterion:

Biological productivity

1. Data layers particularly relevant to this criterion include (1) chlorophyll, (2) benthic biomass, (3) zooplankton biomass, (4) fish catch, or preferably catch per unit effort, CPUE, (5) biogenic habitats, (6) mixed layer depth, (7) minimum oxygen zones as a hindrance to the possibility of having large biomass on the sea floor, (8) occurrence of multiple species that seek highly productive areas, especially higher trophic level species. The group discussed available data layers presented under agenda item 4, and within the document UN/CBD/RW/EBSA/NP/1/3, specifically the Vertically Generalized Production Model (VGPM) primary productivity multi-year climatology and seasonal chlorophyll.

2. After reviewing these data in the document, consensus was reached that many of the highest productivity areas are coastal shelves and are within EEZs not included in the area under consideration. The Russian experts provided important productivity information about Russian offshore areas that were not included in the data layers that had been reviewed, highlighting the ecological importance of the western coast of the Kamchatka peninsula.

3. The participants identified the **North Pacific Transition Zone** as an area for subgroup consideration. A request was made that the narrative description should capture the seasonal north-south migration of the transition zone chlorophyll front (a key feature of the transition zone) and other ecological features that may be associated with that front.

4. Discussion shifted to North Pacific currents, including the Alaska Current, the Kuroshio Current, and the California Current. The Alaska current was not considered by the participants because it is outside the workshop’s geographic scope.

5. The participants concurred that as the **Kuroshio** extension and the western boundary of the **California Current** (beyond the Canadian, USA and Mexican EEZs) are highly productive areas, they should be areas for subgroup consideration. Key currents drive productivity within the North Pacific, and as currents extend into the Pacific, they provide a continuation of the productivity into the open ocean. Those two currents are high productivity zones as well.

6. Participants discussed other potential areas to which the criterion may apply. Seamounts were proposed, but deferred to the discussion of other criteria (diversity, uniqueness). The outer coast of Kamchatka, within Russian national waters, appears to be highly productive on the map layers. Russian participants indicated that it is productive, but benthic data are relatively limited and with regard to fishery productivity, it is not particularly rich compared to other areas. It would be considered average and not of special importance. Based on benthic data, the plenary proposed that perhaps the Sea of Okhotsk, and possibly some additional areas in the Russian coastal zone, might stand out as important. The Russian coastal areas were therefore considered within a Russian subgroup.

7. *Productivity summary:* The workshop co-chairs assigned a break-out group to discuss the following three areas for which the EBSA criterion may apply: North Pacific Transition Zone; Kuroshio Current, and California Current, where the currents extend beyond national jurisdictions. The Russian experts considered potential especially productive marine areas within their national jurisdiction as a whole.

Biological diversity

8. The OBIS data set was discussed, and spatial patterns in the Hulbert ES50 index (threshold within each cell of at least 50 species) were presented. Patterns of diversity are very much influenced by search/data input effort. Areas that have been surveyed many times have higher diversity indices. Considering the caveats presented, the OBIS data set did not particularly reinforce areas already tentatively selected, and the group found no sound basis to argue for potential areas meeting EBSA criteria based upon the OBIS diversity index.

9. The North Pacific Transition Zone was briefly discussed: due to the fact that it is a gradient, it is likely to have higher diversity relative to areas outside the zone. This was an area for further follow-up by the break-out group referred to in paragraph 7.

10. An extensive discussion about seamounts refined the relevant evidence and questions. Participants agreed that seamounts tend to have higher diversity relative to adjacent areas. Of all seamounts in the Pacific, seamounts of volcanic origin tend to have higher diversity and standing stock than guyots. Of volcanic origin, seamounts, with shallower peaks are likely to have higher diversity than seamounts with peaks at deeper depths. Seamounts with peaks in minimum oxygen zone (less than 0.5 ml/L) will have suppressed or limited metazoan diversity. Knowledge of seamount biodiversity is incomplete, and there are many seamounts where few or no data are available.

11. The workshop noted the information on the **Emperor Seamount Chain** presented by Mr. Hitoshi Honda (North Pacific Fisheries Commission).

12. A decision was made to include **seamounts** as an area for further discussion by a subgroup in order to evaluate available data.

13. Additional habitats were discussed, and participants concluded that:

- *Abyssal plains* likely do not qualify under the diversity criterion;
- *Trenches and canyons*: Trenches are all within EEZs and represent a very small proportion of the area of the planet, but very little is known about their diversity. This group will not propose specific trenches as potential EBSAs. Participants encourage countries to give attention to trenches in their national processes;
- *Calderas*: A discussion on calderas would be more appropriate in the context of uniqueness, rarity, and fragility. They may not only be unique, but may also have a high degree of endemism relative to surrounding areas;
- *Seabird rookeries* may be diverse and would be considered further under endangered species and life history criteria.

Importance for threatened, endangered or declining species and/or habitats

14. Participants discussed important areas for endangered seabirds:

- **Black-footed albatross breeding colonies within the Mexican EEZ** (Guadalupe Island) were considered;
- BirdLife International submitted information regarding proposed and existing Important Bird Areas (IBAs) for consideration. These IBAs correspond with foraging areas identified by the Tagging of Pacific Predators project. During breeding, black-footed and Laysan albatrosses restrict their foraging effort to high-use pelagic areas relatively (compared to post-breeding) close to the colony. This "**albatross arc**" was discussed by a subgroup. It was agreed that proposed IBAs that are not yet accepted as such by BirdLife International should not be considered by this group. The workshop therefore considered only those areas already identified as IBAs following standard and widely accepted methodologies;

- Major short-tailed albatross foraging areas. Although they are not distributed basin-wide, it is likely that there are areas of importance within the North Pacific (beyond national jurisdiction), however there are insufficient data to specify where such areas may be located. This was identified as a priority for further research and should be included in a discussion of gaps. The **Kurile island chain** emerged as important for a number of features, as well as the **western coast of Kamchatka and offshore areas northeast of Magadan**. There are nesting areas for endangered species along this Russian zone, which were discussed further within the Russian subgroup.

15. Participants discussed important areas for endangered turtles and mammals:

- There is considerable overlap among areas important to whales, seabirds, and sea lions in Russia, which were considered within the Russian subgroup;
- A subgroup was formed to consider the migration and dispersal areas of loggerhead and leatherback turtles;
- **Coronado Island** in Mexico has been previously mentioned under other criteria but is also relevant to turtles. In the marine waters within Mexican national jurisdiction, areas were proposed that are relevant to the Vaquita, loggerhead turtle, and grey whale, including the **Baja California coast and the Gulf of California**.

16. The participants ended this discussion with threatened fish:

- The narrative description about the North Pacific Transition Zone will include a discussion of the importance of the area as a **migration corridor for bluefin tuna**.

Special importance for life-history stages of species

17. In addition to the North Pacific Transition Zone and the Emperor Seamount Chain, participants discussed areas important to the life histories of many species.

18. Many **Russian locations are important to fur seals and seabirds.** These include the Commander Islands and the Rimsky-Korsakov Islands as well as additional areas provided within the Russian submission. The whole Russian coast is important, but more detailed information on specific areas relevant to this criterion were discussed within the Russian subgroup.

19. The offshore aggregation area of great white sharks (“White Shark Café”) was previously presented at the Eastern Temperate and Tropical Pacific workshop (Galapagos, August 2012). Participants in the present workshop agreed that there was no new information available to warrant adjusting the previous description made by the Galapagos workshop.

Uniqueness or rarity

20. Participants discussed **hydrothermal vents in the eastern North Pacific** Ocean as a potential area for EBSA description. For the features within EEZs outside the geographic scope of the workshop, the narrative description should indicate a need for consideration by relevant countries.

21. Within the Russian EEZ, there are rare biotic communities in **Peter the Great Bay**. The Russian subgroup also considered canyons that would likely meet multiple criteria. A hard copy map of Russian locations outlined with polygons was provided to the technical team for digitization.

22. The Marianas trench was proposed, but is outside the geographic zone of the North Pacific Ocean and was considered by the Western South Pacific Regional Workshop on EBSAs (Fiji, November 2011).

23. **Corals.** The group discussed the potential utility of modelled coral distribution in the North Pacific and recognized its limitations. Participants concluded that:

- An EBSA would not be described on the basis of modelling results alone;

- Modelled predictions could be used as an additional line of evidence to support the rationale of sites already considered for potential EBSA description (e.g., seamounts);
- A map illustrating predictions for corals would be relevant in a gap assessment; and
- There are extensive data gaps in terms of research data and model verification, as well as a need for additional modelling.

24. Further discussion on corals included a question regarding the type of coral being considered (hard skeleton vs. soft corals), and indicated that abyssal plains are likely to have corals, but due to lack of information, it would be difficult to evaluate the area against EBSA criteria.

25. Participants further discussed available information to indicate where corals have in fact been observed in the North Pacific and briefly reviewed some references (Yesson et al. 2012 and Davies and Guinotte 2011). There were some suggestions that corals may be scattered and not occur in high enough concentrations to classify as unique. Corals on seamounts would be considered with seamounts. The participants had difficulty in identifying areas outside of seamounts with unique coral communities.

26. The group briefly discussed unique frontal zones and eddies but concluded that they have already been included in other criteria discussions.

Vulnerability, fragility, sensitivity, or slow recovery

27. The participants continued discussion from the EBSA criterion on uniqueness related to corals and debated whether North Pacific corals should be relevant under the vulnerability/fragility criterion. Currently, there are no active coral fisheries on the high seas (but such fisheries did occur as recently as 30 years ago). However, as corals would be vulnerable, they perhaps should be considered in the vulnerability criterion. This point would be resolved within a coral-focused subgroup.

28. A question arose about the potential vulnerability of the North Pacific "garbage patch". Due to circulation patterns of the gyre, anthropogenic waste is concentrated into a unique feature with an associated fauna, and it was agreed to consider this in a subgroup. The presence of the garbage poses a threat to some species; however, the feature itself (the convergence zone) is not vulnerable. It was suggested that this feature should be included in a gap analysis.

Naturalness

29. Much of the North Pacific, though remote, has consistently been impacted by humans. The participants reviewed results from Halpern 2008 (A Global Map of Human Impact on Marine Ecosystems, *Science* 319 (5865), 948-952) and determined that although the deep-sea benthos could be considered to have a low human impact, this is the case for the deep-sea benthos globally, and no particular area of the North Pacific deep seas stands out as ecologically or biologically important under this criterion.

30. The Mexican experts had proposed the Alijos Islands area for consideration and noted that it also qualifies under this criterion. Russian areas that may qualify would also be considered, and discussion about the relevance of the naturalness criterion to these areas would occur within the Russian subgroup.

Annex V

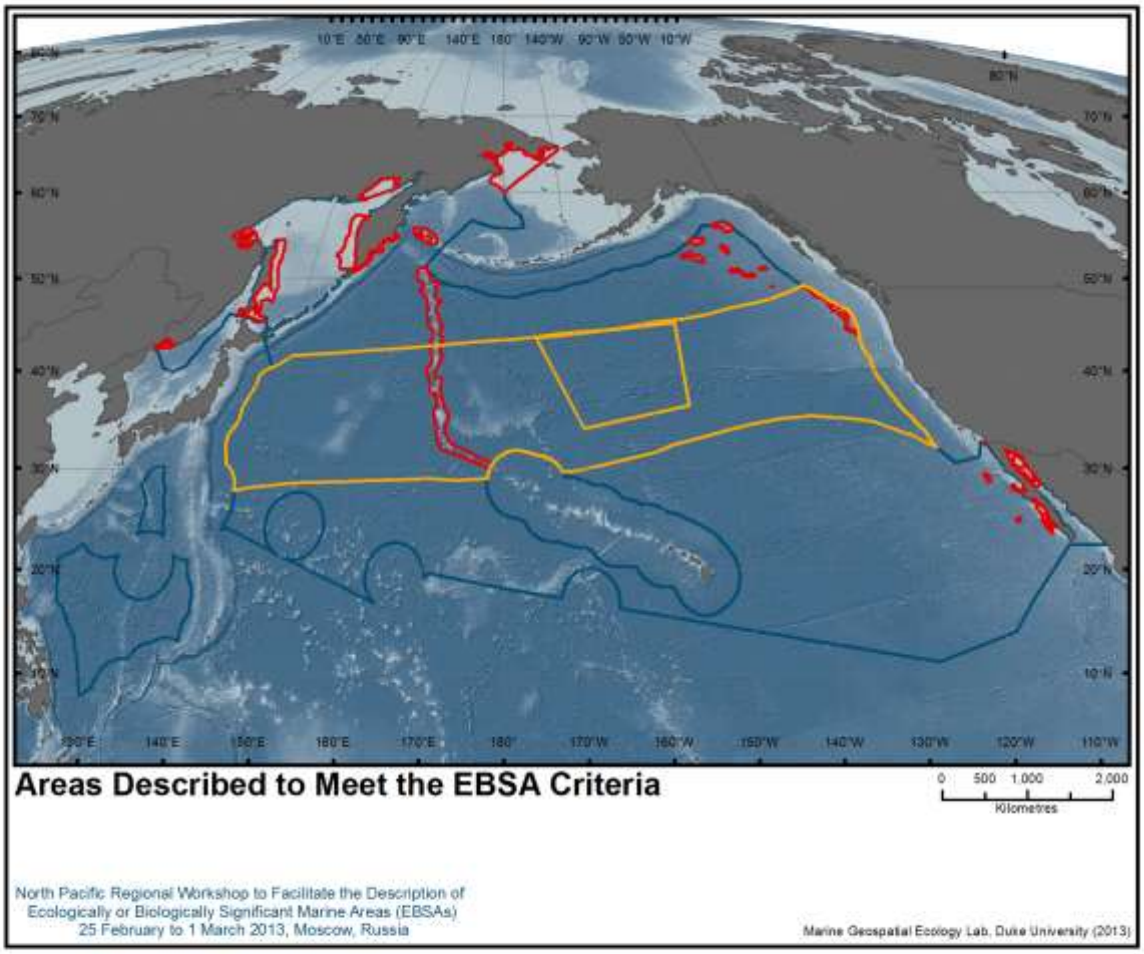
DESCRIPTION OF AREAS MEETING EBSA CRITERIA IN THE NORTH PACIFIC AS AGREED BY THE WORKSHOP PLENARY

Number	Areas meeting EBSA criteria (See the detailed description of compiled EBSAs in appendix to annex V)[4]
1	Peter the Great Bay
2	West Kamchatka shelf
3	Southeast Kamchatka coastal waters
4	Eastern shelf of Sakhalin island
5	Moneron Island shelf
6	Shantary islands shelf, Amur and Tugur bays
7	Commander Islands shelf and slope
8	East and South Chukotka coast
9	Yamskie Islands and western Shelikhov Bay
10	Alijos Islands
11	Coronado Islands
12	Guadalupe Island
13	Upper Gulf of California region
14	Midriff Islands region
15	Coastal waters off Baja California
16	Juan de Fuca Ridge hydrothermal vents
17	Northeast Pacific Ocean seamounts
18	Emperor Seamount Chain and Northern Hawaiian Ridge (outside of the US EEZ)
19	North Pacific Transition Zone
20	Focal foraging areas for Hawaiian albatrosses during egg-laying and incubation

[4] The appendix to annex V appears at the end of this document.

Annex VI

MAP OF WORKSHOP'S GEOGRAPHIC SCOPE AND AREAS MEETING EBSA CRITERIA IN THE NORTH PACIFIC AS AGREED BY THE WORKSHOP PLENARY



Note:

- Blue line indicates the boundary of the area considered by the workshop;
- Polygons in red indicate those areas described against EBSA criteria by the workshop;
- Polygons in yellow indicate features that are inherently not spatially fixed that are described against EBSA criteria by the workshop.

Annex VII

AREAS CONSIDERED DURING THE WORKSHOP BUT NOT DESCRIBED FOR EBSA CRITERIA DUE TO DATA PAUCITY AND LACK OF ANALYSIS

No.	Areas for future consideration[5]
1	The seamount group northeast of Hawaii
2	The Mid-Pacific Mountains
3	Seamounts in the Northwest Pacific rim off the Kuril-Kamchatka Trench

[5] A map (Fig.2) and brief descriptions of these areas are included in annex VIII .

Annex VIII

SUMMARY OF THE WORKSHOP DISCUSSION ON IDENTIFICATION OF GAPS AND NEEDS FOR FURTHER ELABORATION IN DESCRIBING ECOLOGICALLY OR BIOLOGICALLY SIGNIFICANT MARINE AREAS, INCLUDING THE NEED FOR THE DEVELOPMENT OF SCIENTIFIC CAPACITY AS WELL AS FUTURE SCIENTIFIC COLLABORATION

This workshop was the first regional attempt to describe areas meeting EBSA criteria in the North Pacific Ocean. It was recognized that data presented and discussed at this workshop were the best available information provided by participants of the meeting but did not comprise exhaustive treatment of all data from this region. Participants also recognized that there could be additional scientific approaches for describing areas meeting EBSA criteria, for example based on statistical grouping of those with the greatest rarity or most unique features. Further, since the process of describing areas meeting EBSA criteria is an open and ongoing process, participants agreed that a priority list of areas/species for more follow-up work could provide additional structure to the ongoing process. Priorities for further elaboration would include the use of data from fisheries and information about the subarctic North Pacific, including on short-tailed albatross, in future efforts to describe areas meeting EBSA criteria. The Far East North Pacific is an area that requires further elaboration in view of available fishing information.

The workshop participants encountered several operational issues in interpreting and applying the CBD EBSA criteria. The workshop discussed constraints in undertaking the EBSA process, including the need for specific guidance on how to separate, if needed, the seabed from the water column for description of EBSA sites; consistency in using the criteria (e.g., area may not be vulnerable, but the species utilizing it are, e.g., albatross); how to represent features that occur on inherently different scales, such as foraging and migration compared to aggregations of corals or seamounts; uniformity in applying the criteria (e.g., confusion between intent of “naturalness” and “vulnerability”); and identifying the appropriate experts and obtaining and collating necessary data, taking note of CBD’s nomination/selection process as well as the scientific preparation prior to the workshop. Although this document is internally consistent there exists the possibility that it differs from other regions where the EBSA criteria have been applied.

For this region, the gaps identified at this meeting were subdivided into four categories: (1) scientific research; (2) scientific collaboration; (3) data/information exchange; and (4) capacity-building.

Scientific research

Further scientific information on species diversity (benthic and pelagic) is needed in some areas. For example, there was considerable taxonomic uncertainty about invertebrate samples associated with the Alijos Islands area, many of which are believed to be endemic to this area. Similarly, for the Coronado and Guadalupe islands, there was considerable terrestrial information confirming a high level of endemism, but comparable information for the marine environment was lacking. The level of endemism also was identified as an important gap for seamounts and the North Pacific Transition Zone.

In general, models used to predict the potential distribution of specific taxa (e.g., corals and octocorals, seabirds) often are not field validated. In some cases, model results are extrapolated from distributional data collected at global scales and not the regional scales of the North Pacific Ocean. This can result in model over- or underprediction, and caution must be exercised when using this information in applying EBSA criteria.

There was some discussion by workshop participants on the potential importance of the gyre responsible for the formation of the “Pacific garbage patch”. It was noted that the garbage patch poses a threat to specific species and potentially to ecosystem features/function, but there was insufficient information to make specific conclusions at this workshop.

While the North Pacific Transition Zone (NPTZ) is readily monitored by satellite remote sensing of ocean colour, very little *in situ* information has been gathered to advance understanding of the ecosystem dynamics of its chlorophyll front. Many questions remain. For example, how does variability in the position, strength, and behaviour of this front impact the Transition Zone ecosystem? Some evidence suggests that the degree of meandering of the chlorophyll front is a manifestation of enhanced physical convergence and divergence, which facilitates trophic transfer at this specialized habitat. Fieldwork designed to examine the chlorophyll front and its ecosystem dynamics, including community faunal composition, secondary production, etc. are needed (Seki et al., 2003). The following five issues were identified by participants for further study in the NPTZ: (1) distribution of mid-trophic level pelagic species; (2) residency status of species, especially seasonal changes; (3) diversity, including potential endemic species in the NPTZ; (4) ecological significance, including benthic-pelagic coupling; and (5) more data on climate-driven variability in this zone.

Information on species ecology, abundance and seasonality was another area where participants expressed a desire to have additional scientific information. There was considerable discussion about knowledge gaps with respect to seamounts, especially regarding connectivity and endemism. It was noted that seamount productivity tended to be higher than the open ocean but there were potential differences based on geological history (i.e., volcanic vs. non-volcanic) and age. In general, connectivity is poorly understood, especially between areas described as meeting EBSA criteria within the North Pacific, such as loggerhead sea turtles (and other highly migratory species) that migrate between nesting beaches in Mexico and summer feeding areas in the Transition Zone. Since it influences many of the ecosystems discussed, it is important to acquire information about ecological connectivity at different levels (e.g., oceanographic, genetic). This will allow better description of the boundaries of the areas meeting EBSA criteria and may suggest new areas that could be incorporated or defined for description of EBSAs.

Other gaps include hydrodynamics and geomorphological information for some areas, with some areas generally understudied. For example, there were very limited data provided for the deep seabed, notably the abyssal plain. Similarly, trenches, canyons, escarpments and seamounts in the North Pacific remain poorly studied. Participants noted the understanding of deep-water biota is generally poor (e.g., diversity patterns, community structure and distribution of deep fauna) and less comprehensive than that of the overlaying pelagic system and considerably poorer than biological, oceanographic, and geological data contained within EEZs. Increasing sampling effort on the ridge and fracture zone habitats is critical to ensure a better information base for EBSA description.

There was reference to gaps in information related to open-sea areas (“donut holes”) in the southwestern area of this workshop region. A more complete compilation of existing information, augmented by additional research, will be needed for assessment against EBSA criteria.

Participants also mentioned significant gaps in knowledge around many species in the region and especially about endangered species.

The Russian subgroup reported knowledge gaps for Iona Bank and Karaginsky and Olutorsky bays.

Corals[6]

With regard to corals, specific model prediction issues aside, participants noted that model outputs predicted potential occurrence of coral that overlaps with ridges and seamounts (major physiographic structures at this scale) and that these predictions have been useful as a robust tool for informing management and decision-making. The discussion recognized that sea pens and other coral aggregations may occur on sandy and even in muddy environments not associated with seamounts specifically, and that cold-water corals and sponges have been reported in other habitats not specifically considered in the predictive models, i.e., canyons, escarpments, drop stones, and polymetallic nodules (Tilot, 2006). In addition, these species may aggregate on marine litter or refuse materials deposited in the deep sea, including clincker (Kidd & Huggett, 1981); solid ballast and coins (Watters et al., 2010); cables/conduits (Benn et al., 2010); oil rigs and shipwrecks (Ballard & Archbold, 1987). The group recognized there is a knowledge gap related to the scale of the maps used to represent various underwater features. In the North Pacific region the cold-coral group recognized that corals are likely to occur on extended areas of the abyssal sea floor, notably where polymetallic nodules may exist, as these provide substrate for sessile fauna to settle, further suggesting these bottom habitats could be considered in future application of the EBSA criteria. These should be explored further to document the potential presence of cold-water coral and sponges. Areas with potential habitats for sponges and corals include the northeast section of the Clarion and Clipperton Fracture Zones (CCZ) at depths of 4000 to 5000 m (Tilot, 2006; Menot & Fifis, 2007) and north from it (Figure 1).

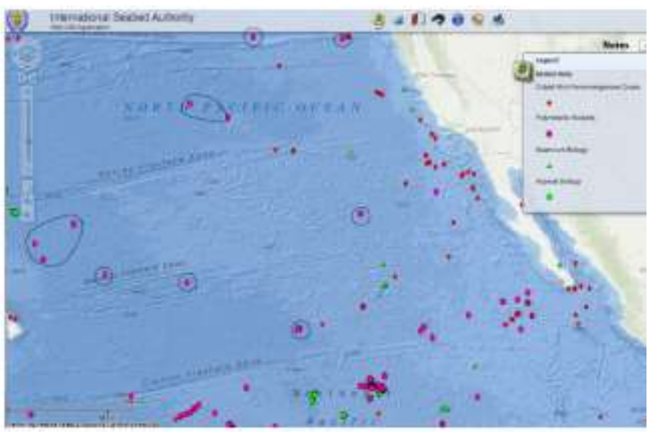


Figure 1. Occurrence of cobalt crusts, polymetallic nodules and sulphides in abyssal ecosystems of the Eastern tropical Pacific.

The presence of cold-water corals and sponges was confirmed for some escarpment/trench walls (e.g., Kurile Kamchatka Trench). In addition, hydrocorals, bryozoans, and octocorals occur in these habitats

[6] References for this section on corals:

Ballard RD, Archbold R. 1987. *The discovery of the Titanic: Exploring the greatest of all ships*. 238 pp. Warner Books, New York.

Benn A, Weaver PP, Billett DSM, van den Hove S, Murdock AP, et al. 2010. Human activities on the deep seafloor in the North East Atlantic: an assessment of spatial extent. *PLoS ONE* 5: e12730.

Kidd RB, Huggett QJ. 1981. Rock debris on abyssal plains in the northeast Atlantic: a comparison of epibenthic sledge hauls and photographic surveys. *Oceanol Acta* 4: 99–104.

Menot L, & Fifis A. 2007. The nodule environment of the NIXO45 site in the Clarion-Clipperton Fracture Zone Report 13 pp. and Annex: Catalogue of megafaunal organisms in the NiXO 45 area, 95 pp.

Ramirez-Llodra E, Ballesteros M, JBC, Dantart L, Sardà F. 2008. Spatio-temporal variations in the diversity, biomass and abundance of bathyal invertebrates in the Catalan Sea (Western Mediterranean). *Mar Biol* 153: 297–309.

Ramirez Llodra E, Brandt A, Danovaro R, De Mol B, Escobar E, et al. 2010. Deep, diverse and definitely different: Unique attributes of the world's largest ecosystem. *Biogeosciences*, 7, 2851-2899.

Tilot, Vi. 2006. Biodiversity and distribution of megafauna. Vol. 1: The polymetallic nodule ecosystem of the Eastern Equatorial Pacific Ocean; *Vol. 2: Annotated photographic atlas of the echinoderms of the Clarion-Clipperton fracture zone*. Paris, UNESCO/IOC, (IOC Technical Series, 69).

Watters DL, Yoklavich MM, Love MS, Schroeder DM. 2010. Assessing marine debris in deep seafloor habitats off California. *Mar Poll Bull* 60: 131–138.

and on the sand of the Koshevarov Bank in the Sea of Okhotsk, which is extremely rich in benthic fauna and is a focal area for fisheries.

A relationship between deep-sea corals and diversity was discussed with support of the OBIS database and the deep-sea octocoral, hexacoral, and alcyonaria databases. Regarding the question of whether deep-sea corals and sponges provide higher diversity than neighbouring locations on the abyssal floor, participants recognized that corals and sponges will aggregate and as a result diversity will increase. However, the scale and pattern of these aggregations are poorly known and need to be documented if this information is to be used in assessments against the EBSA criteria.

From data available, cold-water corals and sponges show medium vulnerability to effects such as sediment transport from shallower waters, sediment suspension, pollution, and other human-mediated activities. Recent biodiversity studies suggest that there are significant differences in community structure of deep-sea fished and non-fished areas on seamounts, with a decrease in sessile and fragile species such as cold-water corals and sponges on the impacted fished sea floor (Ramirez et al., 2008; 2010). Hence, as in shallow water, bottom trawling may have a large impact on areas of deep slope and may be greater still in rocky areas or seamounts where coral is frequently found at depths of about 1000 m. Cold-water corals and sponges in deep-sea ecosystems could be at higher risk from human impacts in the future. Additional observations, a better understanding of the connectivity of corals and sponges between abyssal ecosystems and associations with habitats and substrates will contribute to filling identified knowledge gaps.

Seamounts

Three additional areas of the North Pacific were identified as in need of further investigation in order to be considered for the EBSA description process. These three areas are listed in annex VII, depicted in Figure 2 and described below.

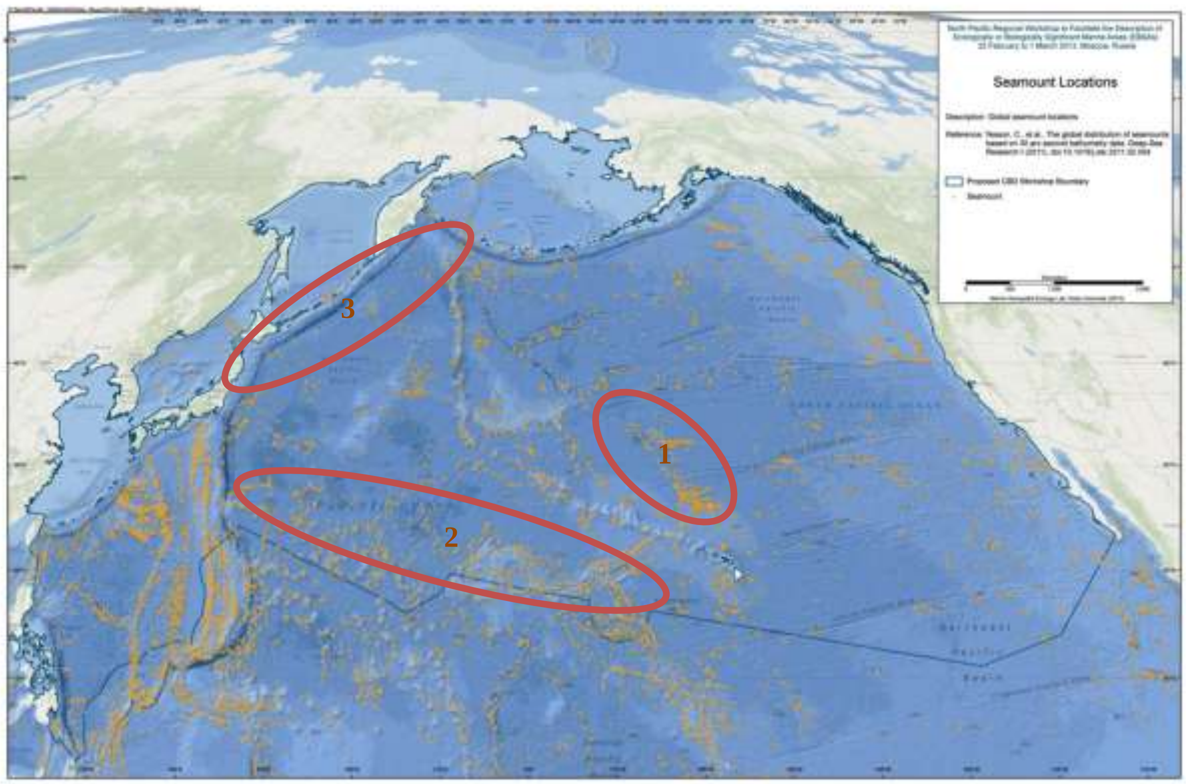


Figure 2. Location of the three seamount areas in need of further investigation.

Area 1: The seamount group northeast of Hawaii

The region is composed of a rather homogeneous group of guyots, a type of seamount that originated from drowned coral reefs during the Cretaceous era. The morphology is made of flat tops, slopes and shallow trenches around the base. Their top surface lays several hundred metres below the sea surface. They are characterized by hard substrate and provide habitats for many species. A preliminary analysis of their geological and morphological characteristics and by the information provided by the Russian scientists (based on samples of associated organisms) suggested that the following EBSA criteria may characterize the area:

Table 1. Preliminary analysis of the EBSA criteria applicable to area 1

Uniqueness and rarity	Importance for life history stages	Importance for threatened or endangered species	Vulnerability	Biological Productivity	Biological diversity	Naturalness
As guyots they are only found in North Pacific	Probably not important	Probably not important	Some studies of corals and sponges based on sampling collections from top of guyots suggest some degree of vulnerability. Presence of living sponges has been observed.	Not known	Not known	Probably too deep for fishing

Area 2: The Mid-Pacific Mountains

This is a very large chain of seamounts of volcanic origin whose chemistry and age differ from the one in the Gulf of Alaska and from those in area 3. The following two bibliographic references were identified as potential good sources of information for this area:

- Menzies, R. J., R. Y. George, and G. T. Rowe. 1973. *Abyssal Environment and Ecology of the World Oceans*, xxiii + 488 pages. New York, and
- Ekman, S. 1953. *Zoogeography of the Sea*. Sidgwick and Jackson, London.

Area 3: Seamounts in the Northwest Pacific rim off the Kuril-Kamchatka Trench

These are also seamounts of volcanic origin but younger than those in the previous region. Their occurrence appears much less dense. For both areas 2 and 3, scientific data and information are known to exist but they were not available at this workshop. Two research institutes in Vladivostok, the Ilichev Pacific Oceanographic Institute and the Far Eastern Geological Institute, should be contacted to provide the required information, as many studies and surveys have been conducted in these areas.

Scientific collaboration

Workshop participants stressed the importance of scientific collaboration in areas beyond national jurisdiction (ABNJ). For the North Pacific this would include the collaboration among intergovernmental organizations like the North Pacific Marine Science Organization (PICES) and the North Pacific Fisheries

Commission (NPFC) and the Northwest Pacific Action Plan (NOWPAP). In addition, the work of FAO on deep-sea fisheries in ABNJ is very relevant, particularly on the identification of vulnerable marine ecosystems (VMEs) and related issues in support of the implementation of the international guidelines for the management of deep-sea fisheries in ABNJ. There is opportunity for sharing scientific information and collaborating on relevant activities with the CBD and its work on EBSAs in ABNJ. The information being gathered for the VME database and the EBSA repository is one of the potential areas for collaboration as well as the identification of gaps and data needs at the regional level and the need for capacity-building.

Monitoring and protection/conservation action plans for many marine groups are well developed in each country of the area but primarily within EEZs. Collaboration is needed among countries in order to better collate some data and harmonize approaches.

Participants identified potential opportunities for collaboration on international and regional research cruise efforts that could contribute robust observations to better understand and characterize the diversity of deep sea corals and sponges and pelagic communities in the open North Pacific (including in conjunction with seamounts or the NPTZ). Specifically, future coral collaborations could be centred on understanding the recovery times required for cold-water corals and sponges to re-establish healthy populations following human-mediated disturbances.

Data/information exchange

In general, countries need to be encouraged to better share scientific information. Beyond scientists, it is necessary to promote the information-sharing to the level of government agencies, policymakers, industry, and local stakeholders. Overall, it is necessary to consolidate a collaborative culture in the context of regional marine science. A regional scientific data-sharing programme, using the Internet as a way to store and show the information, could help bring researchers together on this issue. Further collaboration should be especially encouraged where areas meeting EBSA criteria overlap or cross territorial boundaries (e.g., the hydrothermal vent and seamount areas described as meeting EBSA criteria in the eastern Pacific and the Canada/United States EEZs).

Capacity-building

Many countries around the North Pacific have internal processes underway to describe areas meeting the EBSA criteria. Thus, there exists an opportunity for capacity-building at regional levels, which should be promoted in the areas of deep-sea oceanographic exploration, open sea biology, oceanographic and geographic data analysis methods and tools. Further expertise is required in taxonomy, which has been a particular constraint in deep-water diversity studies. Although advances in genetic tools could help resolve some taxonomic issues, the need for qualified and trained taxonomists remains. Capacity to sample the deep sea (e.g., research vessels, modern sampling equipment) and to apply new technological approaches is needed and could fill some of the data/knowledge gaps identified above. Many international organizations often have training programmes designed to increase capacity, especially for early career scientists. These should be explored as a mechanism to improve our understanding of open marine ecosystems of the North Pacific.

Appendix to Annex V

DESCRIPTION OF AREAS MEETING EBSA CRITERIA IN THE NORTH PACIFIC REGION AS AGREED BY THE WORKSHOP PLENARY

Area No. 1: Peter the Great Bay, Russian Federation

Abstract

The area is characterized by high biodiversity due to a mix of northern and subtropical fauna. A typical representative of subtropic fauna is sea cucumber (Holothurian trepang). Typical representatives of benthic fauna are Pacific oyster (*Crassostrea gigas*) (large oyster banks located in the Expedition bay—a secondary to Posiet bay), *Crenomytilus grayanus, Modiolus difficilis,* sea scallop (*Myzuhopecten yessoensis*), Japanese scallop (*Chlamys nipponensisi*) and Swift's scallop (*Swiftopecten swifti*). The area contains vast growths of Laminaria kelp, eelgrass *(zostera)*, ahnfeltia and gracilaria. Commercial fish stocks are represented in places by Alaska pollock and groupers; large schools of sardine (*Sardinops sagax melanosticta*) periodically occur in the area as well. Commercial stocks of benthic invertebrates, such as Kamchatka craboid, snow crab *(Chionoecetes opilio)*, Spisula and Mactra are also represented, as are grey and black sea urchins and Red Listed gastropods.

Phytoplankton abundance is 2 to 5 g/m^3, 60% of which are diatoms. Red tides occur in spring. Total fish biomass is estimated at 80,000 to 100,000 tonnes. Sharks are regularly observed in this area, which serves as a feeding area. Tiger sharks have been regularly seen. White shark started coming in recent years. Makka shark have also occurred in the area, and a case of spawning was recorded lately. Tropical fish spinagoga occur in the area, as do marine serpents and turtles brought down by the warm current. Fish diversity counts 277 species. The marine area and islands are inhabited by more than 350 species of birds, 200 of which have links to the sea.

Introduction

The area is located on the biogeographical boundary between temperate and subtropical areas, which leads to high biodiversity (mix of northern and southern fauna). Two currents meet here: warm and cold ones, which accounts for the convergence zone. This is the reason for the high density of fish per unit area. The water column is significantly stratified: the dimensal layer remains cold due to winter temperature lowering, while the surface layer warms up to 29˚C, so a "temperature jump" occurs. Nevertheless, the productivity is high.

Tides are weak. Significant monsoon desalination is typical for upper parts of the Amur and Ussuri bays. Salinity is lower than oceanic by 2 to 3‰ and increases towards the high sea.

River currents are weak, which leads to strong mudding of the Amur and Ussuri bays. High eutrophication is regularly observed near Vladivostok.

Location

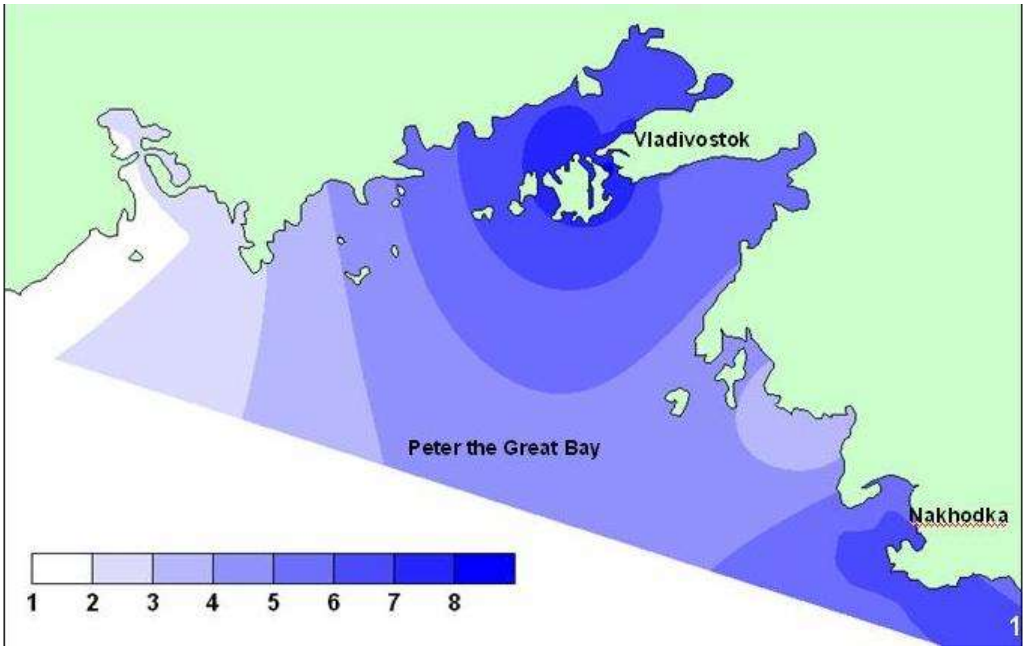
The area is located at the southern most limit of Russian territorial waters. Peter the Great Bay includes three smaller bays: Amur, Ussuri and Posieta (point 13).

Feature description of the proposed area

Unique benthic communities occupy underwater rocks (i.e., Zubr bank) – aggregations of actinias, ascidians and gigantic mussels (*Crenomytilus grayanus*). Peter the Great Bay contains spawning areas of salmon *Oncorhynchus masou*.

Large rookeries of ringed seal (about 2500 individuals) are situated in the area. Aggregations of hydrocorals and colonial Scleractinian corals occur at Rimsky-Korsakov islands.

The area is one of the main stop-over areas on the East Asian-Australasian Flyway. It is the only area in the temperate region where streaked shearwater *(Calonectris leucomelas)* and Swinhoe's storm petrel (*Oceanodroma monorhis)*—normally subtropical species—nest. Huge seagull colonies are observed on Furugelm Island. Nesting areas of Ross's gull are located on Stenin Island.



Feature condition and future outlook of the proposed area

Human activity is represented by fisheries, aquaculture in some areas and ecotourism. Illegal, unreported and unregulated (IUU) fishing is among the main threats. A terminal for storage of oil products has been built recently. Other threats include oil spills and pressure from shipping activities.

The area is vulnerable to climate change. If the climate gets colder, species from warm regions will disappear. If the climate gets warmer, the number of sharks will increase significantly, changing the ecosystem.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X

Explanation for ranking Mix of northern and subtropical fauna caused by encounter of warm and cold currents, which accounts for the convergence zone. Northern limit of tiger, white and makka shark range.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking Spawning areas of salmon *Oncorhynchus masou*. Large rookeries of ringed seal. Stop-over areas on East Asian-Australasian Flyway. Spawning of makka shark on the northern limit of its range.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking A key area for trepang, sea scallop, Japanese scallop, Swift's scallop. Rare species of hydrocorals and colonial corals. Spinagoga habitat.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking Benthic communities are very fragile to potential impacts of IUU fishing, oil spills and transport threat. The area is also vulnerable to climate change because it depends on the convergence of warm and cold currents.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Phytoplankton abundance is 2 –5 g/m^3, 60% of which are diatoms. Red tides are often seen. Total fish biomass is 80,000–100,000 tonnes.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking Fish diversity counts 277 species. The marine area and island are inhabited by more than 350 species of birds, 200 of which are linked to the sea.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Explanation for ranking Ecosystems are locally changed near Vladivostok, but the area in general is much more natural than adjacent ones.					

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Maps and Figures

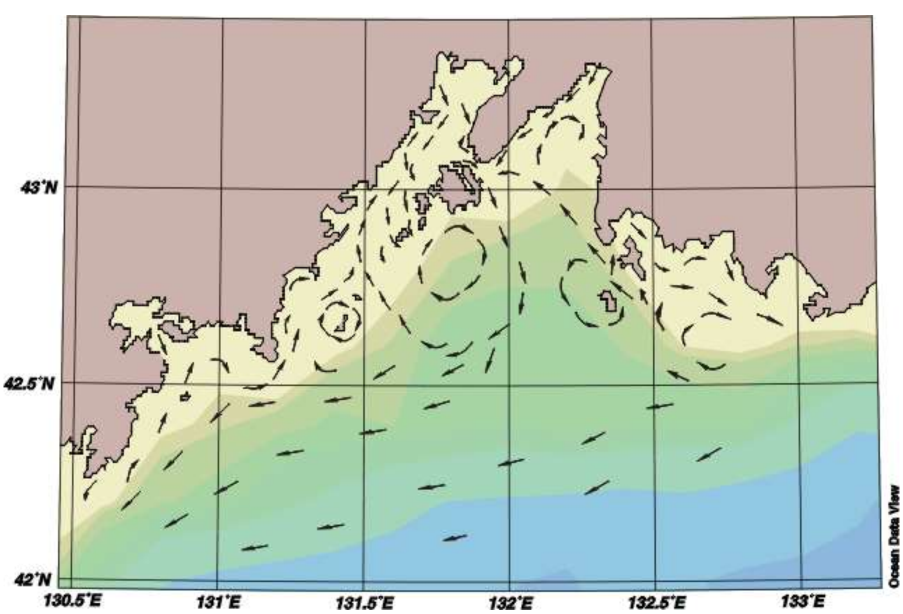

Figure 1. Currents of Peter the Great Bay.

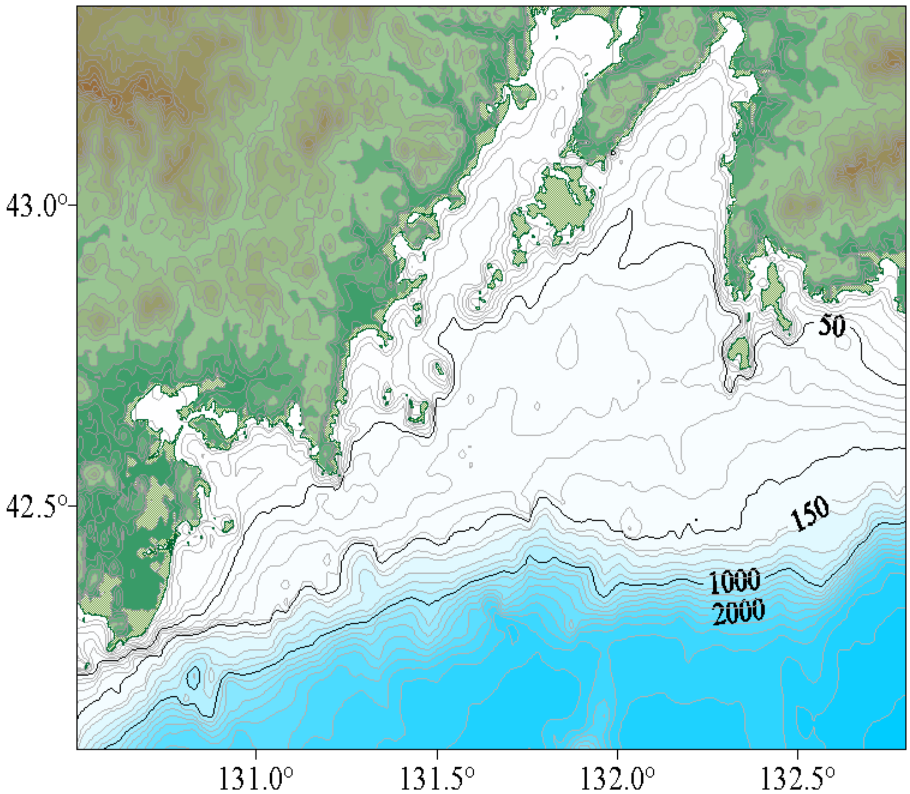

Figure 2. Bathymetry of Peter the Great Bay.

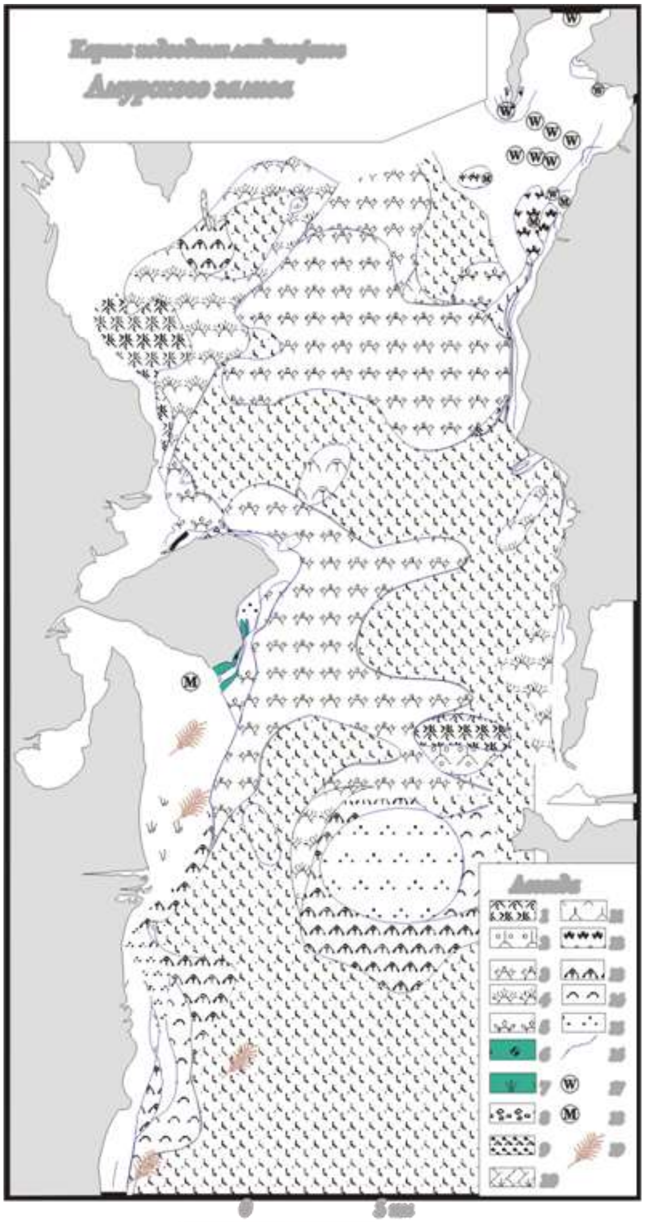

Figure 3. Landscapes of Amur Bay.

Figure 4. Area meeting EBSA criteria.

Area No. 2: West Kamchatka shelf, Russian Federation

Abstract

The West Kamchatka Shelf of the Sea of Okhotsk—located in the Russian Far East—is the biologically richest marine area in Russia and one of the most biologically productive areas of the world ocean. It is a key area for feeding and pre-spawning migrations for various species of Pacific salmon. The West Kamchatka shelf is an important reproduction area for crabs, Alaska pollack, herring, cod and halibut, among others. This region plays a unique role in terms of conserving the productivity and biodiversity of the Sea of Okhotsk in its entirety. This area includes the largest sockeye salmon (*O. nerka*) natural spawning ground in the world.

Introduction

The depth along the coastline slowly increases from the shore. The northern part of the area is deeper than the southern. The distance from the coastline to the 10-metre isobath does not exceed 7 miles. Beyond the 10-metre isobath out at sea there are several distinctive depths and banks\shoals. Overall, the seabed of the Western Kamchatka shelf is flat and at a low angle until the 250-metre isobath.

The oceanographic features of the West Kamchatka shelf are characterized by extremely high tides and strong cyclonic currents. This includes warm West Kamchatka current and cold – Yamskoe and East Sakhalin currents, with a cyclonic circle rotation in between. The area experiences high tides up to 13 metres with tidal waves with a velocity exceeding 5 m/sec. The shelf is covered by ice during the winter season. Severe storms periodically break over the area, with a wind speed exceeding 50 m/sec. Overall, oceanographic features of the West Kamchatka shelf are well studied, documented and modeled by Russian scientific institutes (Pacific Research Institute of Fisheries and Oceanography, Russian Federal Research Institute of Fisheries and Oceanography, Kamchatka Research Institute of Fisheries and Oceanography).

The area is very important for traditional use by indigenous and local communities, in particular for coastal fishing and marine mammal harvesting.

Location

The West Kamchatka Shelf is located in the eastern part of the Sea of Okhotsk along the western coastline of the Kamchatka peninsula in the North Pacific: from 57°15′/ N along the parallel to the 200-metre isobath, then to the south along the 200-metre isobath to 50°51′ N 156°39′ E, then straight to the east until Cape Lopatka, where this parallel crosses the peninsula coastline (50°51′ N 156°39′ E). The total coverage of the area meeting EBSA criteria is about 100 000 km^2.

Feature description of the proposed area

The high productivity of the West Kamchatka shelf is the result of a favourable combination of hydrodynamic and hydro-chemical factors. The high speed of water recirculation in this area provides an additional source for fortification with biogenic elements. These factors favour intensive growth of primary planktonic producers—planktonic microalgae, which provides food supply and provision for zoo- and ichthyoplankton, and benthic fauna. The waters of the West Kamchatka shelf harbour over 150 taxa of phytoplankton, with a high level of biomass per cubic metre.

Biomass of phytoplankton on the West Kamchatka shelf during the spring-summer period is between 500 and 1000 mg/m^3. Average biomass of key groups of zoobenthos is 130,37 g/m^2.

The waters of the West Kamchatka shelf are crucial for the wild salmon population of the North Pacific. Besides the fact that major spawning rivers of the Kamchatka peninsula flow into the waters of the shelf, West Kamchatka is also a key feeding ground for salmon juveniles and also on the migration route of Pacific salmon.

Importance for threatened, endangered and declining species or habitats

Birds and seabirds
- *Gavia adamsii*: use the area during spring-summer migration; listed in the Red Data Book of the Russian Federation
- *Phoebastria albatrus\ Diomedea albatrus* - IUCN 3.1 Vulnerable, Annex 1 Bonn Convention, Annex 1 CITES
- *Branta (bernicla) nigricans*: listed in the Red Data Book of the Russian Federation, Annex 2 Bonn Convention
- *Anser erythropus*: listed in the Red Data Book of the Russian Federation, IUCN 3.1 Vulnerable
- *Anas formosa*: IUCN 3.1 Vulnerable, Red Data Book of the Russian Federation
- *Haliaeetus albicilla*: listed in the Red Data Book of the Russian Federation
- *Haliaeetus pelagicus*: Vulnerable (IUCN 3.1)
- *Sterna camtschatica*: listed in the Red Data Book of the Russian Federation

Marine mammals
- *Eumetopias jubatus* Schreber, 1776 (Steller sea lion)) - Endangered A2a / Version 3.1: IUCN (2001)
- *Callorhinus ursinus* Linnaeus, 1758 (Northern fur seal) - Vulnerable A2b / Version 3.1: IUCN (2001)
- *Phoca largha* Pallas, 1811 (spotted seal) - Data Deficient A2b / Version 3.1: IUCN (2001)
- *Enhydra lutris* Linnaeus, 1758 (sea otter) - Endangered A1a / Version 3.1: IUCN (2001)
- *Delphinapterus leucas* Pallas, 1776 (beluga) - Near Threatened / Version 3.1: IUCN (2001)
- *Eubalaena japonica* Lacépède, 1818 (North Pacific right whale) - Endangered D / Version 3.1: IUCN (2001)
- *Eschrichtius robustus* Lilljeborg, 1861 (gray whale) – listed in the Red Data Book of the Russian Federation, rear
- *Balaena mysticetus* Linnaeus, 1758 (bowhead whale) - Least Concern / Version 3.1: IUCN (2001)
- *Eubalaena japonica* Lacépède, 1818(North Pacific right whale) - Endangered D / Version 3.1: IUCN (2001); listed in the Red Data Book of the Russian Federation
- *Balaenoptera physalus* Linnaeus, 1758 (fin whale) - Endangered A1d / Version 3.1: IUCN (2001)

Salmonids
Parasalmo mykiss (Kamchatka trout); listed in the Red Data Book of the Russian Federation; IUCN VU A4cd

Benthic species (in the rivers of the Western Kamchatka shelf)
Dahurinaia middendorff
Kurilinaia kamchatica

Feature condition and future outlook of the proposed area

The biodiversity of the Western Kamchatka shelf is currently impacted by oil and gas exploration (estimated to have 3.5 billion tonnes of oil and gas).

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No informat ion	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities,			X	

	and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				
Explanation for ranking Unique composition of biological, geomorphological, hydrological and climatic conditions in the entire Northwest Pacific allows for extremely high productivity and diversity; high value of ecosystem services; rare composition of biological resources of national and international importance.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking Feeding ground for six types of wild Pacific salmon; pre-spawning accumulation of Pacific *Mallotus villosus socialis*; huge seabird colonies and migration routes; important feeding cycles of Pacific salmon, main habitats and feeding ground for crabs and economically important white fish (Alaska pollock); Kamchatka trout.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking A number of Russian and regional species listed in the Red Data Book of the Russian Federation (see above description).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
Explanation for ranking Due to temperatures and climate conditions the area is very sensitive to possible impacts of oil and gas development and would take a long time to recover from oil spills; sensitive to onshore activities, such as mining, and the alteration of rivers and river beds.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking The Kamchatka shelf is the “Fish basket” of Russia; it ensures about one quarter of all the national fish and seafood harvest; biomass of zooplankton from 1000 to 2000 mg/m^3. Total annual production of invertebrates within the zone 0-15 metres depth is assessed at about 40 million tonnes.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking High diversity for North Pacific: about 200 species and subspecies of fish; dozens of zooplankton and phytoplankton species, around 100 birds species; over 20 species of marine mammals and whales, over 100 species of macrophytes, over 1000 benthic species. *Parasalmo mykiss* – has unique interspecies					

variability, accounting for over 10 populations, which have six life-history stages.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Explanation for ranking The area is of crucial national and international importance for the fishing industry. It has not been degraded by human activities.					

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Maps and Figures

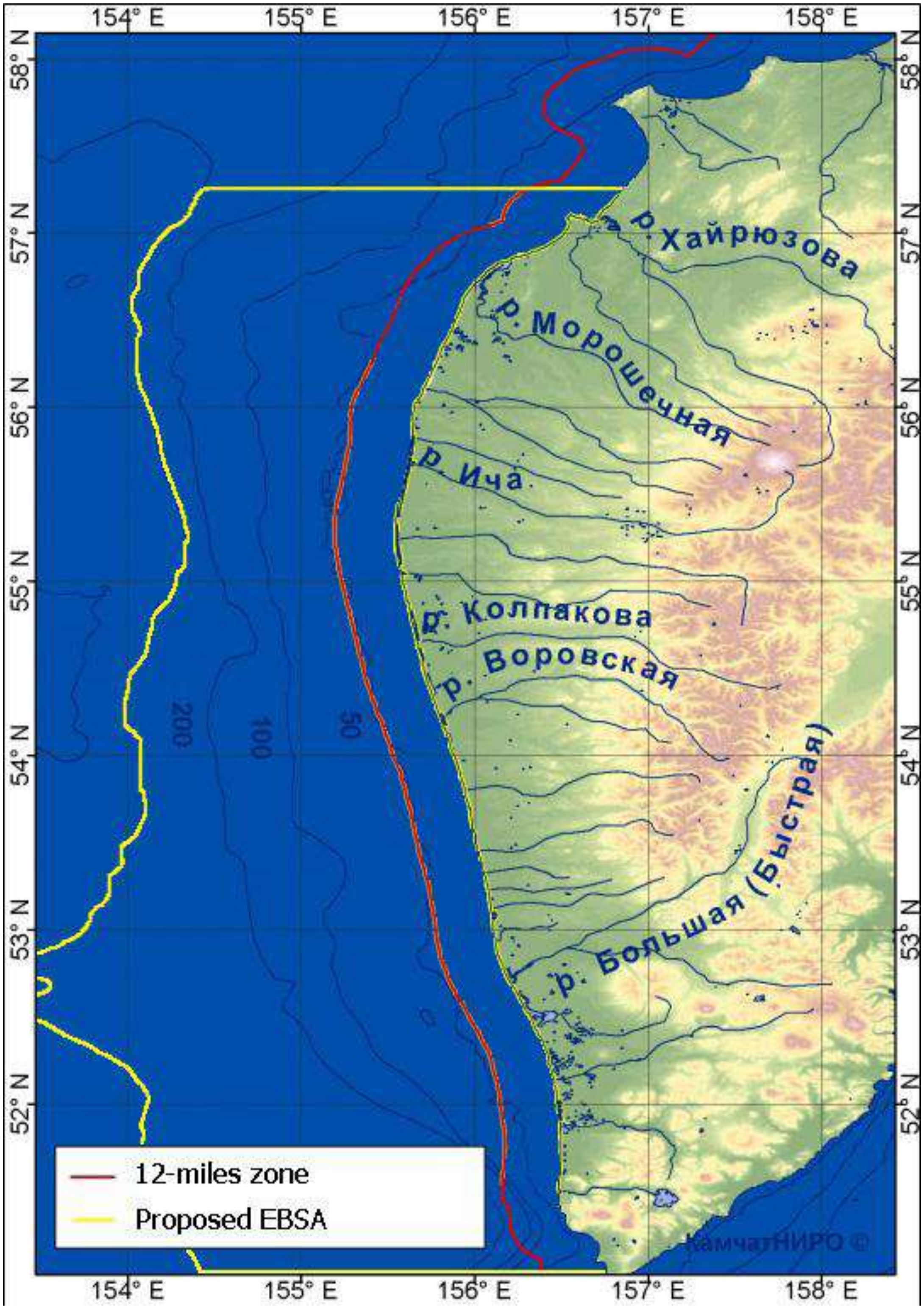


Figure 1. Boundaries of the area.

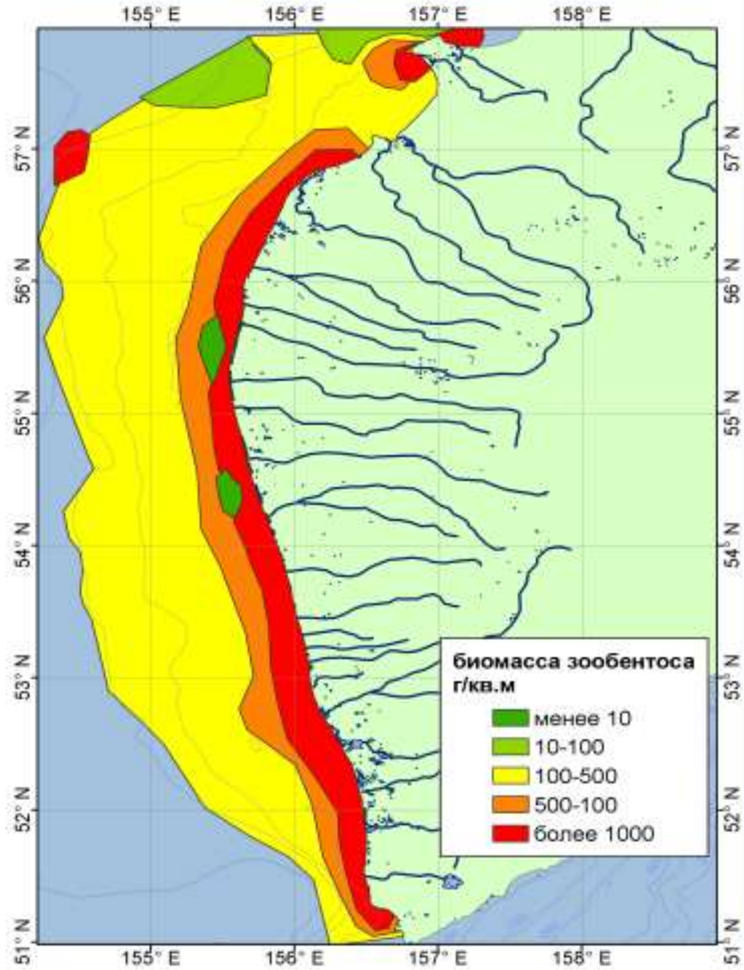


Figure 2. Zoobenthos biomass distribution off west Kamchatka (gr/m^2).

Figure 3. Area meeting EBSA criteria.

Area No. 3: Southeast Kamchatka coastal waters, Russian Federation

Abstract

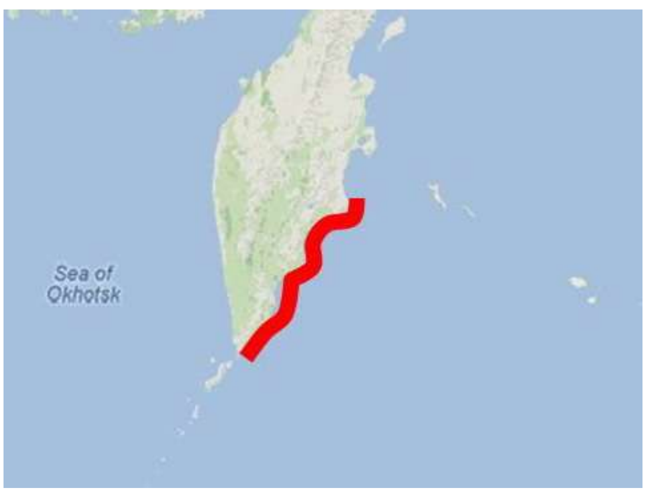
The southeast Kamchatka coastal waters (Northwest Pacific) are critical for several species of marine megafauna and are a rich marine habitat characterized by a high level of biodiversity. The Russian Far East generally has a straighter shoreline, lacking the deep bays and small islands that characterize the fjordic western North American coast from Vancouver to Alaska, which has thousands of islands and inlets. At the same time, the southeastern part of Kamchatka has a curved relief, both along the shoreline and underwater. It provides a high level of biodiversity in a small area. This feature attracts marine megafauna (cetaceans, pinnipeds) as well.

Introduction

The coastal waters of the southeast Kamchatka are located in a temperate zone with its main current directed south along the shore. The shore shelf zone is narrow—several kilometres wide. As a result, this area is inhabited by shallow- and deepwater species. Several bays are located between main capes. Some of them are large and open (Vestnik, Kronotcky Gulf, and Khalaktyrka). Also the southeast part of Kamchatka contains long fjordic bays. Thus the area has a mosaic structure with different hydrological and climatic conditions. Migration routes of different vertebrates (marine birds, cetaceans, pinnipeds, salmons) are located along the shore.

Location

The boundary of the area meeting EBSA critieria begins at cape Lopatka (the southern point of the Kamchatka peninsula, 50° 90ˈ N, 156° 70 E), then to the north along the edge of 12-miles, until Cape Kozlova (in the north, 54° 65ˈ N, 161° 89ˈ E).



Feature description of the proposed area

The main current goes along the shore to the south. Schools of salmon pass to the western side, concentrating along the coastline where they attract plenty of large vertebrates, i.e., Steller's sea eagles, harbor seal, killer whale. The narrow shelf area provides a high diversity of biotopes, which also contributes to increased biodiversity. Grey whales are regularly seen in Kronotsky Bay, Vestnik Bay.

Steller's sea lions are observed at Cape Kozlova. Steller's sea lion is listed as Endangered on the IUCN Red List. Avachinskaya Bay has a high diversity of benthic species (Sanamyan, 2012), and is a feeding ground for killer whales. Starichkov and Utashud islands are important bird areas, harbouring seabird colonies. According to an Arctic Marine Shipping Assessment (AMSA) report, the area contains segments of heightened ecological significance.

Feature condition and future outlook of the proposed area

The Whale and Dolphin Conservation Society (WDCS) has been involved with several relevant projects in the North Pacific: the Far East Russia Orca Project and Russian Cetacean Habitat Project. WDCS and colleagues have been engaged in killer whale and other cetacean studies, mostly in the nearshore waters of Kamchatka over the last decade. In the last few years the research has expanded to include more data on Baird’s beaked whales and humpback whales.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.	X			
Explanation for ranking					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking The area has served as a feeding ground for killer whales over many years. Starichkov (52° 77′ N, 158° 62′ E) and Utashud (51° 52′ N, 157° 69′ E) islands are habitats for 13 species of colonial seabirds. The seabird colonies count about 26,000 pairs on Starichkov island and 22,000 pairs on Utashud.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking Rookery of Steller’s sea lion on Cape Kozlova (N54.61 E161.84), feeding grounds for grey whales located in Vestnik Bay (51° 47′ N, 157° 60′ E) and Olga Harbour (54 °53′ N, 161° 12′ E). Closed bays are inhabited by sea otters.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
Explanation for ranking					

The southeastern part of Kamchatka has a curved relief, both along the shoreline and underwater. It provides a high level of biodiversity in a small area, which explains its vulnerability to increasing human impact.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
Explanation for ranking The area provides 5–7 % of the total Far Eastern salmon catch, but large schools of salmon pass this area to spawn on the West Kamchatka shelf.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking Diversity of underwater biotopes provides relevant conditions for coexistence of many species of invertebrates. Some of them have been described only recently (Cnidaria: Anthozoa; Gastropoda: Opisthobranchia; Tunicata: Ascidiacea).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Explanation for ranking Part of the area is used for commercial fishery and shipping.					

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Maps and Figures

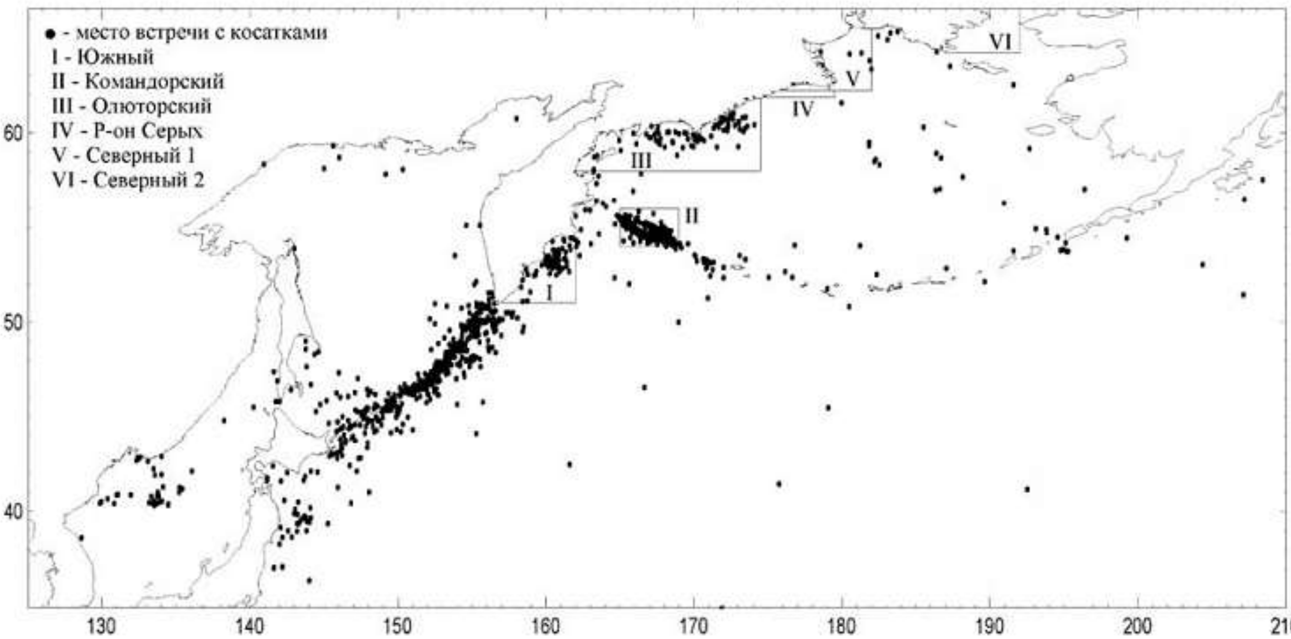

Figure 1. Distribution of killer whales 1935-1988 in harvest regions (Shvetsov, Perlov, 2004).

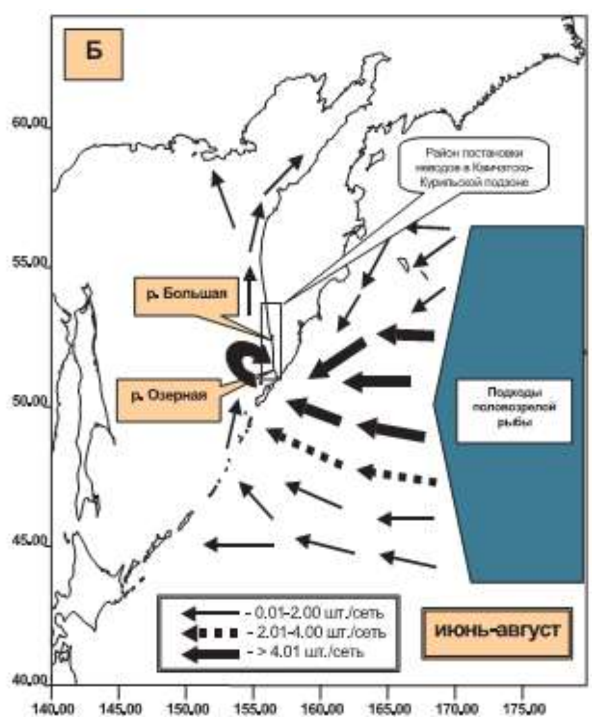

Figure 2. Sockeye salmon migration pattern (Bugaev, 2002).

Figure 5.2-1 Areas of heightened ecological significance in the Bering Sea LME

[Figure 10 from "Identification of Arctic marine areas of heightened ecological significance: A follow-up project to Recommendation IIC of the Arctic Marine Shipping Assessment, 2009"]

Figure 3. Areas of heightened ecological significance in the Bering Sea LME.

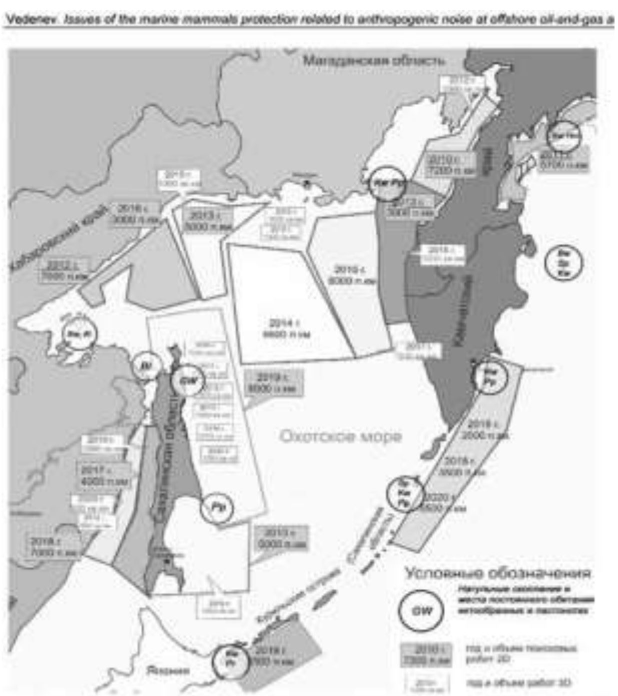

Figure 4. Potential zones of gas and oil exploration (Vedenev, 2008).

Figure 5. Area meeting EBSA criteria.

Area No. 4: Eastern Shelf of Sakhalin Island, Russian Federation

Abstract

Thick benthic aggregations make this area an important feeding ground for grey whales. The smallest population of whales in the world depends on its welfare (Okhotsk-Korean population of the grey whale). Bottom community characterized by high density of shellfish and sea urchins.

Area at the northern part of Sakhalin is a feeding ground for beluga whales due to congregations of salmons passing to spawning grounds in the Amur River. Chum salmon *(Oncorhynchus keta)* is the main target of commercial fishery; total catch is in the thousands of tonnes. Red-listed kaluga (*Huso dauricus*) is regularly seen in the area; single specimens are being caught for scientific purposes. Aggregations of **Dromia personata** are located in the southeast. Red-listed Sakhalin taymen (*Hucho perryi)* inhabits coastal waters at river mouths.

Introduction

The cold East Sakhalin current exerts the biggest impacts on the area. Ice conditions are heavy, with sea ice remaining until June. For this reason, grey whales come to feed at the end of June. The East Sakhalin current throws sea ice out of the Sea of Okhotsk. These factors make the area vulnerable to climate change.

Significant desalination takes place in the Amur estuary. The salinity of water is five to six times less than in the broader Sea of Okhotsk. High removal of solid sediments causes soiling and shallowing of the Strait of Tartary. Its average depth is 4 metres, which seriously hinders shipping.

Location

The area is situated along the eastern coast of Sakhalin island, from the southern point of Sakhalin island to the north along the 200 m isobath and then east to the mouth of the Amur River.

Feature description of the proposed area

The Terpenia peninsula is an important bird area, and the adjacent marine area plays a significant role in maintaining the ecological integrity of the ecosystem. The whole area is located on the East Asian–Australasian Flyway and serves as a stop-over place for migratory birds.

Productivity is high both on the bottom and in the pelagic zone. Benthic biomass sometimes exceeds 1 kg/m^2. Average plankton biomass is 400 to 500 mg/m^3. Biomass of macrozoobenthos on the Eastern Sakhalin shelf is 556 ± 70 g/m^2.

Feature condition and future outlook of the proposed area

Fishery is moderately represented within the area. The main targets for fishing are Alaska pollock and red fish (mostly hunchback salmon – *Oncorhynchus gorbuscha*). Salmon fishing is intensive at river mouths. Total catch is 50,000 – 100,000 tonnes per year. Oil and gas exploration is increasing, which is a threat to these ecosystems. The main issue is not single oil spills, but permanent noise and leaks.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness	Area contains either (i) unique ("the only one				X

or rarity	of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				
Explanation for ranking Unique benthic aggregations support a broad range of features, in particular those significant for the Okhotsk-Korean population of grey whales and fish stocks. Lagoons at the northeastern coast of Sakhalin island are on the list of tentative Ramsar sites.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking Feeding ground for beluga and grey whales. Salmon-spawning grounds. Stop-over sites for migratory birds on the East Asian-Australasian Flyway.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking Feeding grounds for the Okhotsk-Korean population of grey whale.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking The area is vulnerable to climate change because it depends on the cold East Sakhalin current. It is also vulnerable to human activities, especially associated with the developing oil and gas industry. The well-being of the whale population is vulnerable to noise and pollution from shipping activities.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Average plankton biomass is 400 – 500 mg/m^3. Benthic biomass is over 1 kg/m^2. Biomass of macrozoobenthos is 556 ± 70 g/m^2.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has high genetic diversity.				X
Explanation for ranking Area contains high diversity of benthic ecosystems, habitats, communities and species.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low		X		

	level of human-induced disturbance or degradation.				
Explanation for ranking Though the area is in good condition now, human activity is increasing, especially in the extractive industries (shipping, oil and gas drilling).					

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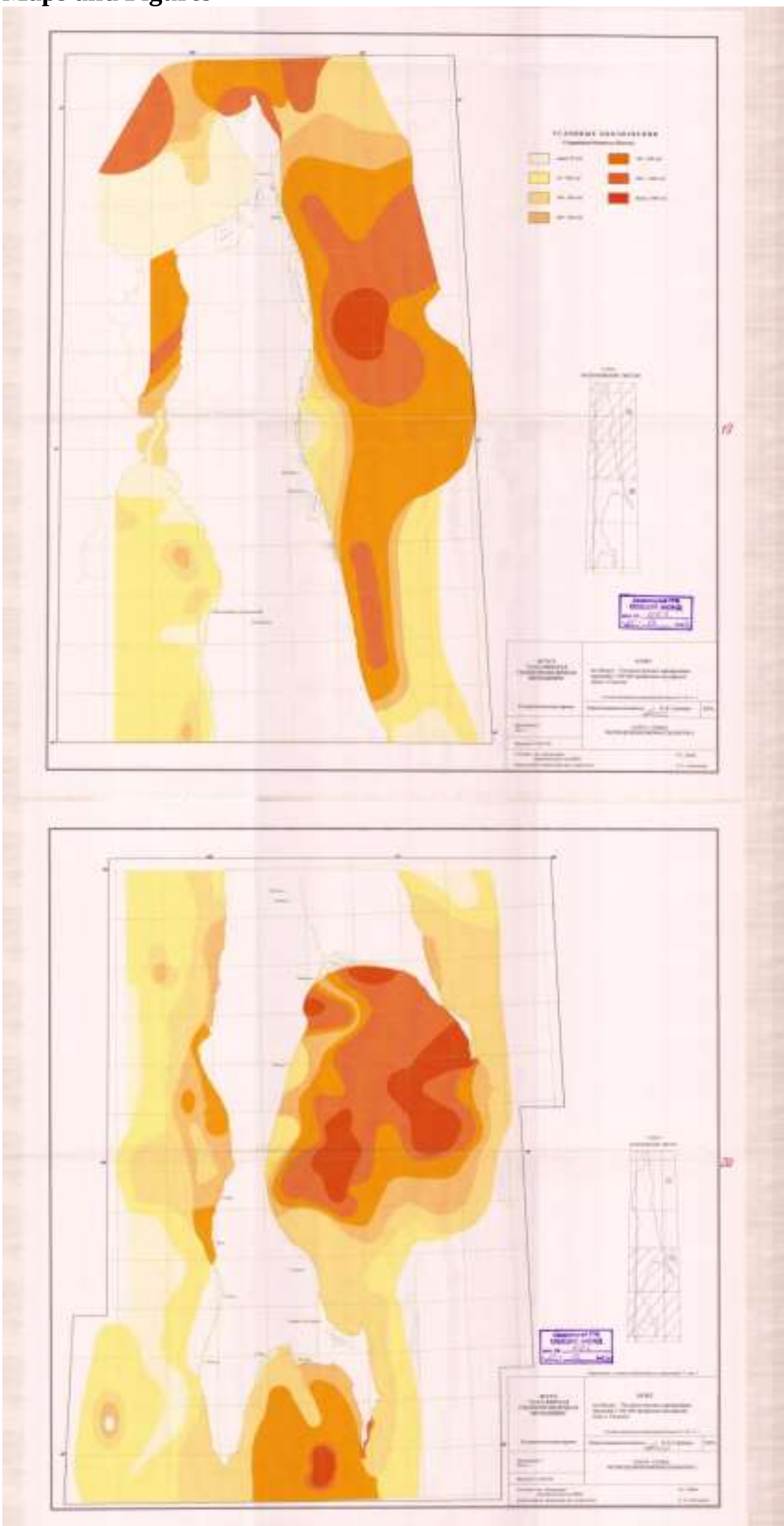
Maps and Figures



Figures 1, 2. Benthic biomass.

Figures 3, 4. Distribution of main benthic communities.

Figures 5, 6. Trophic zoning.

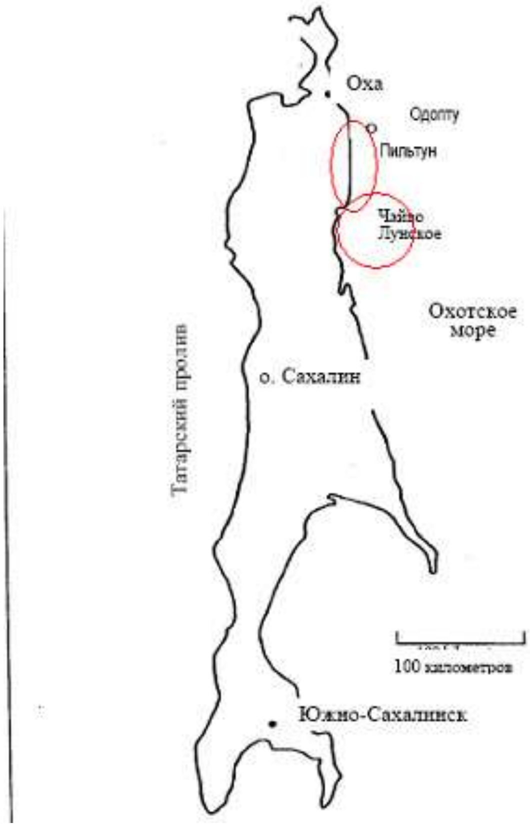


Figure 7. Feeding areas of grey whales.

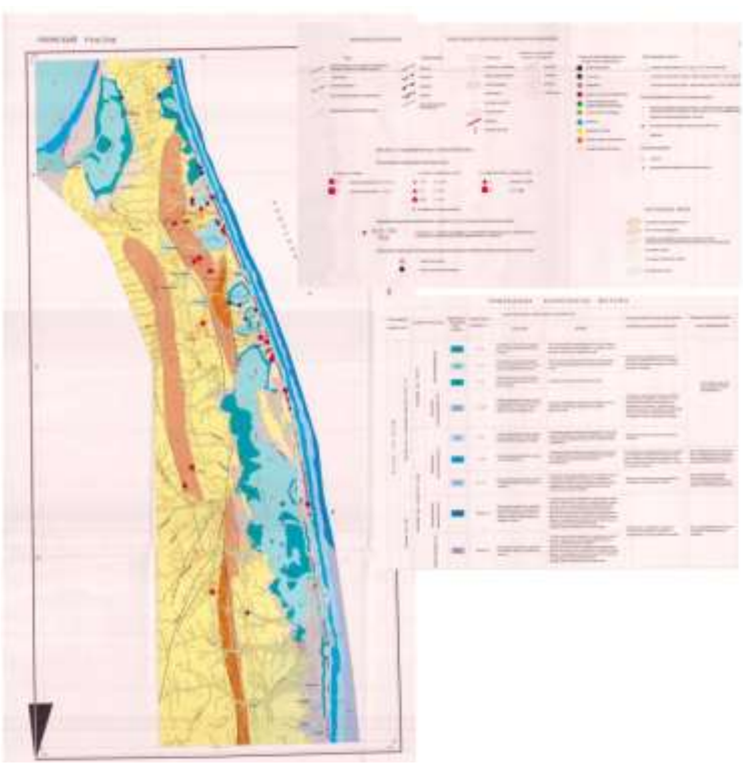


Figure 8. Piltun Bay (main location of feeding grounds of grey whales).

Figure 9. Area meeting EBSA criteria.

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Maps 1 to 6 prepared by V. Labay and L. Streltsova from SakhNIRO.

Area No. 5: Moneron Island Shelf, Russian Federation

Abstract

This is a biodiversity hotspot, with a high diversity of benthic communities and an intact marine ecosystem, including sponge and bryozoan aggregations, and red hydrocorals. It is located at the northern boundary of abalone (*Haliotis*) range. Density of abalone has high internannual variability, which is caused by natural factors. Here too is the only rookery of Steller's sea lion in the southern part of the Sea of Okhotsk and the highest density of zooplankton in the Sea of Okhotsk.

Introduction

A branch of warm Kuroshio current encircles the area and separates it from the cold waters. Local upwelling takes place.

Location

Moneron Island (46°14′00″ N, 141°13′00″ E) is located in the Strait of Tatary, 45 km southwest of Sakhalin island, Russian Federation. The boundary of its shelf lies along the 150 m isobath.

Feature description of the proposed area

A branch of the Kuroshio current is responsible for the area's high biodiversity. Its high density of marine flora and zooplankton is a result of local upwelling. There is also a high diversity of fish species and benthic organismsm and dense thickets of laminaria. The area is currently protected under Russian national law for its biodiversity values.

Moneron Island and smaller islands contain large seabird colonies. It is a nesting area for many seabirds and includes rookeries of bearded seal and Steller's sea lion. High transparency of water and warm current impact justify existence of rare species of underwater fauna: *Haliotis sakhalinensis*, *Plazaster borealis*, giant Tugalia, gigantic "sea boot chiton".

Feature condition and future outlook of the proposed area

There is no human activity in the area at present, except for occasional tourism. If this situation remains unchanged, the Moneron shelf will not degrade. The area is resilient to climate change, thanks to the warm current coming from the Japanese archipelago.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.			X	
Explanation for ranking One of the most intact marine ecosystems in the region. Red hydrocorals and abalone *Haliotis pseudo*					

population represented.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.			X	
Explanation for ranking Large seabird colonies. Nesting area for many species of birds. Rookeries of bearded seal and Steller's sea lion.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.	X			
Explanation for ranking Red hydrocorals. Rookeries of Steller's sea lion. Rare species of underwater fauna: *Haliotis sakhalinensis*, *Plazaster borealis*, giant Tugalia, gigantic "sea boot chiton".					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.		X		
Explanation for ranking There is no human activity in the area at present, except for occasional ecotourism. If this situation remains unchanged, the Moneron shelf will not degrade. The area is resilient to climate change, thanks to the warm current coming from the Japanese archipelago.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking The highest density of zooplankton in the Sea of Okhotsk; exceptionally dense kelp growth covers about 80% of steep rocky substrate					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.		X		
Explanation for ranking High diversity of fish species and benthic organisms.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking Virtually intact marine ecosystem.					

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Maps and Figures

Figure 1. Area meeting EBSA criteria.

Area No. 6: Shantary islands shelf, Amur and Tugur bays, Russian Federation

Abstract

The flora and fauna of the area, as well as its abiotic landscape components, have many particular features. Large rookeries of pinnipeds are located on the islands, and the number of whales steadily increases within adjacent waters.

Bird diversity is very high. More than 240 species have been registered both nesting and on migrations. The following IUCN Red-listed species of birds nest in the area: the biggest population of *Haliaeetus pelagicus, Pandion haliaetus, Ciconia nigra, Grus monacha, Tringa guttifer, Sterna camtschatica, Gallinago solitaria, Brachyramphus marmoratus, Bubo blakistoni*. Many species are protected under multilateral agreements between Russia and Japan, USA, India and Korea.

The biomass of Tugur Bay is about 100,000 tonnes. These are sponges, actinias, ascidians, sea barnacles and bivalves. This diversity exists within a current speed of 13 km/h.

Introduction

The main oceanographic feature is a general cyclonic circulation of the water mass along the boundaries of the basin of the Sea of Okhotsk. Local areas of cyclonic and anticyclonic circulation exist within the general circulation. The north Okhotsk current is a relatively stable component of water circulation during the warm period of the year.

The general scheme of water circulation within the active layer of the sea changes seasonally. Current speed increases in autumn. In winter, the current flows predominantly in a southerly and southwesterly direction in the ice-free area. Surface current speed is highest in coastal areas.

Tides cause significant changes in sea level as well as the speed and direction of currents. The highest tides are observed in Tugur Bay (up to 10.1 m), while the lowest ones are at the Shantary Islands (5–7 m). Current speed is slow offshore (5–10 cm/sec) and extremely high in coastal areas and in bays (433 cm/sec in Tugur Bay). Such speeds are rarely observed in other parts of the ocean.

Location

The area is located in the southern-eastern part of the Sea of Okhotsk and encompasses Shantary archipelago. The boundary is 30 nautical miles around the Shantary Islands.

Feature description of the proposed area

Salmon-spawning grounds are located within rivers of the Shantary archipelago, and the shelf also contains spawning grounds of herring, plaice, and saffron cod. Healthy stocks of crab, especially spiny king crab, are located within the area. It is the only place along the coast of the Sea of Okhotsk where the endemic, Red-listed mikizha (*Parasalmo mykiss)* spawns.

The thickest aggregations of Shantary shelf sublittoral comprise *Laminaria gurjanovae* and *Alaria marginata*, characterized by relatively high biomass (2 kg/m^2 on average). These aggregations are partly due to significant desalination in some areas, which develops conditions for development of estuary fauna.

Biomass is as high as 2200 g/m^2. Whirling currents and removal of biogenic elements from Amur Bay explain the high productivity. Species diversity increases with deepening, but biomass sharply decreases at 10 m depth, where the rocky surface changes to gravel and pebble. The high biomass of the surface layer is caused by significant development of the euphotic area.

The following marine mammals are regularly observed within the area:

Cetaceans:
Balaena mysticetus
Eubalaena glacialis
Eschrichtius robustus
Balaenoptera physalus
Balaenoptera acutorosnrata
Megaptera novaengliae
Berardius bairdii
Delphinapterus leucas
Orcinus orca
Delphinus delphis
Phocoena phocoena
Phocoenoides dalli

Pinnipeds:
Eumetopias jubatus
Erignathus barbatus
Phoca fasciata
Phoca largha
Pusa hispida

Feature condition and future outlook of the proposed area

The natural complex exists in extreme climate conditions and is very vulnerable even to minor human intervention. A small oil spill in 1991 killed off a large number of birds and also influenced fish and marine mammals. Development of the oil and gas industry on the Sakhalin shelf will influence this area if relevant conservation measures are not applied.

The area is vulnerable to climate change because its particular features are produced by ice conditions and low temperatures. This causes gatherings of plankton species on the ice edge, which attract bowhead and other whales. The Sea of Okhotsk contains the smallest population of the bowhead whale (about 500 individuals).

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking The exceptionally high velocity of tides supports specific benthic sponge, balanoid, hydroid and ascidian communities in high density. A key feeding ground for whales, especially for bowhead whale – their number highest within the area. A key area for seabirds, both migrating and nesting.					

Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.			X	
Explanation for ranking Spawning areas for endemic mikizha (*Parasalmo mykiss*) and other salmonids, herring, plaice and cod. Feeding ground for whales.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking IUCN Red-listed species of birds nest and thrive in the area: the biggest population of *Haliaeetus pelagicus*, *Pandion haliaetus*, *Ciconia nigra*, *Grus monacha*, *Tringa guttifer*, *Sterna camtschatica*, *Gallinago solitaria*, *Brachyramphus marmoratus*, *Bubo blakistoni*. Bowhead whale.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking The natural complex exists in extreme climatic conditions and is very vulnerable to even minor human intervention. The area is vulnerable to climate change as well because its particular features are caused by ice conditions and low temperatures.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Biomass is as high as 2200 g/m^2, and the total biomass has been estimated to be over 100,000 tonnes.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking Over 240 species of birds. Whales, including blue whale.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking The area is remote and characterized by heavy ice, which restricts its use by humans. Fishing takes place, but it is relatively small-scale, for the needs of local people and small fishery associations.					

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Maps and Figures

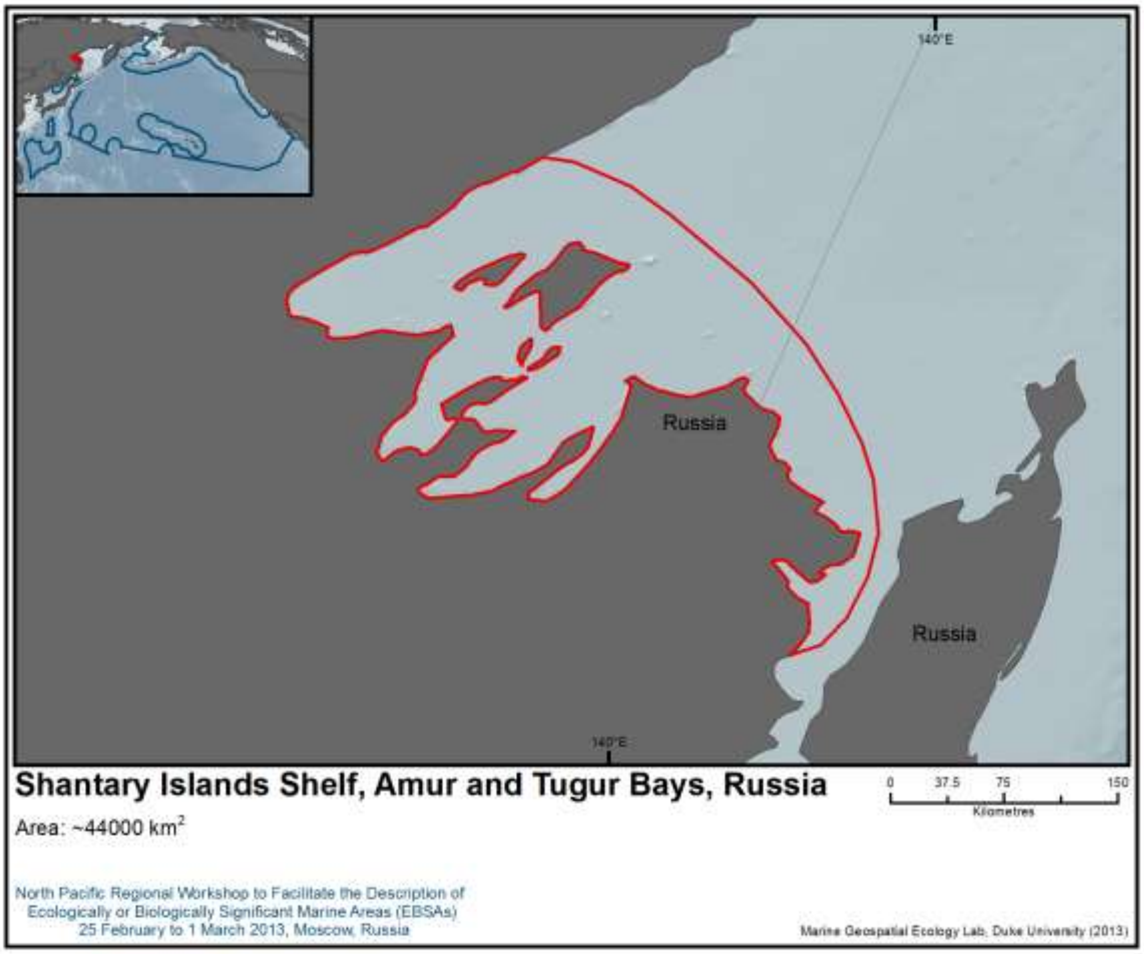

Figure 1. Area meeting EBSA criteria.

Table 1. Littoral species of the Shantary islands shelf

Species
Amphipoda
Anisogammarus makarovi
Anisogammarus ochotensis
Anisogammarus schmidti
Anisogammarus tiuschovi
Anisogamrnarus kygi
An'sogammarus tiuschovi
Caprella cristibrachium
Corophium crassicorne
Dogielinotus cimbaluki
Ischyrocerus leonovi
Melita dentata
Melita mikulitchi

Species
Parhyale ochotensis
Pontogeneia ivanovi
Pontoporeia affinis
Decapoda
Pagurus middendorffii
Pandalidae
Telmessus cheiragonus
Crangon septemspinbsa
Isopoda
Idotea ochotensis
Saduria entomon
Mysidacea
Archaeomysis grebnitzkii
Cirripedia
Balanus balanoides
Chthamalus dalli
Bivalvla
Clinocardium californiensis
Hiatella arctica
Liocyma fiuctuosa
Lyonsia sp. nov.
Macoma baltica
Musculus laevigatus
Mya priapus
Mysella sp.
Mytiius edulis
Turtonia minuta
Mya priapus
Gastropoda
Collisella patina
Collisella sp.
Faisic.ngula sp.
Falsicingula kurilensis

Area No. 7: Commander Islands shelf and slope, Russian Federation

Abstract

The Komandorsky (Commander) Islands shelf and slope is an area of high priority that shows remarkable uniqueness and a high level of not yet fully documented marine biodiversity, plays an extremely important role in maintaining populations of a number of key marine species, and is crucial with regard to protection of endangered and threatened species. It maintains a high level of naturalness, particularly in offshore areas. It is very sensitive but a protection regime has a long history, and this gives some guarantee for persistence of the naturalness of this area. However, further documenting of marine biodiversity and monitoring of all important levels of the marine ecosystem are critical for management of the protected area and overseeing conservation in the entire North Pacific.

Introduction

The Komandorsky (Commander) Islands shelf and slope is a high priority area that meets EBSA criteria as a result of several assessment projects, including the WWF Bering Sea Biodiversity assessment, physiographical regionalization of the Far Eastern Seas of Russia, initiated by WWF Russia (Ivanov, 2003), and the gap analysis for MPA planning within the GEF/UNDP project "Strengthening of Marine and Coastal Protected Areas in Russia" (Mokievsky et al., 2102). Respective bibliographies can be found in these publications and in the monographs by Oshurkov (2000) and Shuntov (2001). The area includes the coastal waters of Bering and Mednyi islands, as well as the insular shelf and slope areas, with corresponding pelagic zones. It is a well isolated and highly important area. Although geologically the islands are the westernmost part of the Aleutian Arc, they are equally isolated from the Aleutian insular margins and Kamchatka Peninsula. The islands and their biota (including marine mammals and seabirds) have been studied for many years by various specialists but relatively little is known about their marine communities and ecosystems in general. The results of the most comprehensive survey of the sublittoral, undertaken from 1986 to 1992 under the leadership of V.V. Oshurkov, remain mostly unpublished.

The Commander Islands were also identified as a marine area of heightened ecological significance in the "AMSA IIC final report", prepared by the Protection of the Arctic Marine Environment (PAME) working group of the Arctic Council, with support from Conservation of Arctic Flora and Fauna (CAFF), the Arctic Monitoring and Assessment Programme (AMAP) and the Sustainable Development Working Group (SDWG).

Location

The Commander Islands are located on the geographical boundary of the western Bering Sea and the Pacific Ocean and include two large islands (Bering and Mednyi), two smaller islands (Toporkov and Ariy Kamen') and several rocks that are a continuation of the Aleutian Islands. The area covers the insular shelf and slope down to a depth of 4000 m, with the respective water column, and is entirely within the jurisdiction of the Russian Federation.

Feature description of the proposed area

The insular shelf is a platform extending from 2 to 34 km from the shore. From the north and the south the insular shelf steeply falls to the abyssal depth (4000 m). An extremely steep, nearly vertical slope facilitates upwelling of the deep Pacific water. Relatively warm waters rise up to about 150 m depth and heat the surface water mass year round. In summer the surface water temperature ranges between 9 and 11°C, which is generally higher than elsewhere in the Bering Sea, the respective and even more southern latitudes of the Northwestern Pacific and over most of the Okhotsk Sea. These oceanographical features may be considered unique for the Northwestern Pacific although some similarity may be found in the Aleutian Islands.

In the past the uniqueness of the area with regard to species, populations and communities was extremely high because the coastal zone of the islands was inhabited until 1768 by the last relic population of Steller's sea cow (*Hydrodamalis gigas*), a phytophagous sirenian whose bones are still found in coastal deposits. Owing to the isolatation effect as a result of distance from the land, depth and oceanographical regime, a significant level of endemism in marine benthic biota can be expected. The inventory is far from complete but several species, which for the time being are considered endemic to the area, have been described. The number of these species will apparently increase when lower sublittoral and bathyal zones are adequately sampled. The other feature that is highly peculiar is the shift of vertical life zones, with the deep water fauna rising nearly up to the shelf, and the sublittoral kelp shifted to the intertidal zone (Mokievsky et al., 2012).

The area is home to populations of benthic species and demersal fishes. A probable separate substock of Alaska pollack (*Theragra chalcogramma*), the fish species of greatest importance for the Bering Sea ecosystem, is reproducing on the insular shelf. The pelagic waters around the islands are known as important feeding grounds for all salmon species, particularly sockeye salmon (*Oncorhynchus nerca*). The islands host a local population of orcas (*Orcinus orca*), one of the largest rookeries of fur seals (*Callorhinus ursinus*) in the Bering Sea (on Bering and Mednyi islands) and numerous seabird colonies. The area is also of great importance for maintaining populations of endangered and declining species. There is the largest Steller sea lion (*Eumetopias jubatus*) rookery in the Bering Sea on Mednyi Island, the largest population of sea otter (*Enhydra lutris*) in Russian waters, and red-legged kittiwake (*Rissa brevirostris*) colonies on the islands of Ariy Kamen' and Toporkov. The coastal waters are used by humpback whales (*Megaptera novaeangliae*) as a summer feeding ground, while several species of rare cetaceans are relatively frequently recorded in the insular waters.

A species diversity inventory is not yet complete but probably alpha, beta and gamma diversity of the area are the highest in the subarctic waters of the Northwestern Pacific. A more or less complete species list (about 150 species) is currently available only for macroalgae, and this value is one of the highest for the Russian Far East.

Owing to upwelling and relatively mild conditions, the pelagic ecosystem is thought to be highly productive, but there are few estimates or models of productivity at different trophic levels. Extensive upper sublittoral areas are occupied by a kelp community with substantial biomass where a classic example of the dynamics of the food chain "kelp – sea urchin – sea otter" has been studied (Kussakin, Ivanova, 1995; Oshurkov, 2000).

Most of the population of northern fur seals breeds on the Commander Islands. The colonies are occupied for about the same period of time each year, from spring to late autumn, and the females feed in a wide zone around the islands while they nurse the pups in the colonies.

The islands harbour large breeding colonies of seabirds, including red-legged kittiwake and ancient murrelet, with subspecies microrhychos restricted to these islands. Rock sandpiper of subspecies quarta breeds on the Commander Islands and also in southern Kamchatka and on the Kuril islands. These birds are probably sedentary on the Commander Islands, where there are an estimated 5000 breeding pairs.

Feature condition and future outlook of the proposed area

The Commander Islands area cannot be considered a pristine natural area. The coastal ecosystem has undergone considerable changes since the mid-eighteenth century, when Steller's sea cow was exterminated. These animals consumed enormous amount of kelp, so their extinction apparently impacted the entire coastal ecosystem but again no reconstruction nor models have been applied. The ban on sea otter hunting in the USSR since 1926 led to an increased sea otter population and respective changes in the trophic chain "kelp – sea urchin – sea otter" so that reconstruction of the initial natural condition of the coastal ecosystem became problematic (Oshurkov, 2000). On the other hand, early protection (since the 1930s) of the shelf from the commercial fishery for the purpose of protecting pinniped populations and the establishment of a strictly protected reserve (*zapovednik*) in 1994 make the marine ecosystem of the shelf nearly unique in the Northwestern Pacific: this is one of the few marine areas with significant stocks of commercial fishes that have never been affected by commercial fishery.

Currently the 30-mile zone around the islands is protected as part of the Komandorsky State Nature Biosphere Reserve. Subsistence fishery is allowed in the six-mile zone to the north of Bering Island. Without the protection regime the ecosystem would be extremely fragile to massive renewable resource exploitation. This has been proven by the extinction of Steller's sea cow and the drastic decline of fur seals and sea otters following intensive hunting from the eighteenth to early twentieth century. As an ecosystem influenced by open ocean, the insular marine ecosystem is thought to be relatively physically resilient to climate change, but this speculation has not been tested. The research and monitoring programme in the biosphere reserve currently covers only warm-blooded top predators, while other components remain poorly observed.

Assessment of the area against CBD EBSA criteria

<table>
<tr><td rowspan="2">CBD EBSA criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
Due to the isolation effect, depth and oceanographical regime, there is a significant level of endemism in the marine benthic biota. The inventory is far from complete but several species currently considered endemic to the area have been described. The number of these species could increase when lower sublittoral and bathyal zones are adequately sampled. Unique vertical zonation with the shift of bathyal biota to lower sublittoral and upper sublittoral communities to the littoral zone. Unique oceanographical regime: an extremely steep, nearly vertical slope facilitates upwelling of the deep Pacific water.</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
The area is home to populations of benthic species and demersal fishes. A probable separate substock of Alaska pollack (Theragra chalcogramma), the fish species of greatest importance for the Bering Sea ecosystem, is reproducing on the insular shelf. The pelagic waters around the islands are known as important feeding grounds for all salmon species, particularly sockey salmon. The islands harbour, for example, local and transient population of orcas, one of the largest rookeries of fur seals in the Bering Sea on the Bering and Mednyi islands, and numerous seabird colonies.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
</table>

Explanation for ranking Sea otter, Steller sea lion, bowhead whale, red-legged kittiwake and others.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking Currently the 30-mile zone around the islands is protected as part of the the Komandorsky State Nature Biosphere Reserve. Subsistence fishing is allowed in the 6-mile zone to the north of Bering Island. Without the protection regime the ecosystem would be extremely fragile to massive renewable resource exploitation. This is proven by the extinction of Steller's sea cow and the drastic decline of fur seals and sea otters following intensive hunting from the eighteenth to early twentieth century.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Owing to upwelling and relatively mild conditions, the pelagic ecosystem is thought to be highly productive but there are few estimates or models of productivity at different trophic levels. Extensive upper sublittoral areas are occupied by kelp communities with substantial biomass where a classic example of the dynamic of food chain "kelp – sea urchin – sea otter" has been studied (Kussakin, Ivanova, 1995; Oshurkov, 1999).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking A species diversity inventory has not yet been completed but probably alpha, beta and gamma diversity of the area are the highest in the subarctic waters of the Northwestern Pacific. A more or less complete species list (over 180 species) is currently available only for macroalgae, and this value is one of the highest for the Russian Far East.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Explanation for ranking In spite of significant changes in the coastal zone ecosystem, the marine area in general still holds significant naturalness.					

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Mokievsky V.O., Chikina M.V., Makarov A.N., Kolyuchkina G.A., Simakova U.V., Udalov A.A. 2012. *Gap-analysis: identifications of gaps in biogeographical and ecosystem coverage of marine protected areas network and protection of key marine species*. Technical report to the GEF/UNDP Project "Strengthening of marine and coastal protected areas in Russia" (in Russian) http://www.mpa-russia.ru/report/.

Oshurkov V.V. 2000. *Succesion and dynamic of epibenthic communities from the boreal upper subtidal zone*. Vladivostok: Dalnauka. — 201 p. (in Russian).

Shuntov V.P. 2001. *Biology of Far-Eastern seas of Russia*. Vladivostok: TINRO-Centre. — 580 p. (in Russian).

Maps and Figures

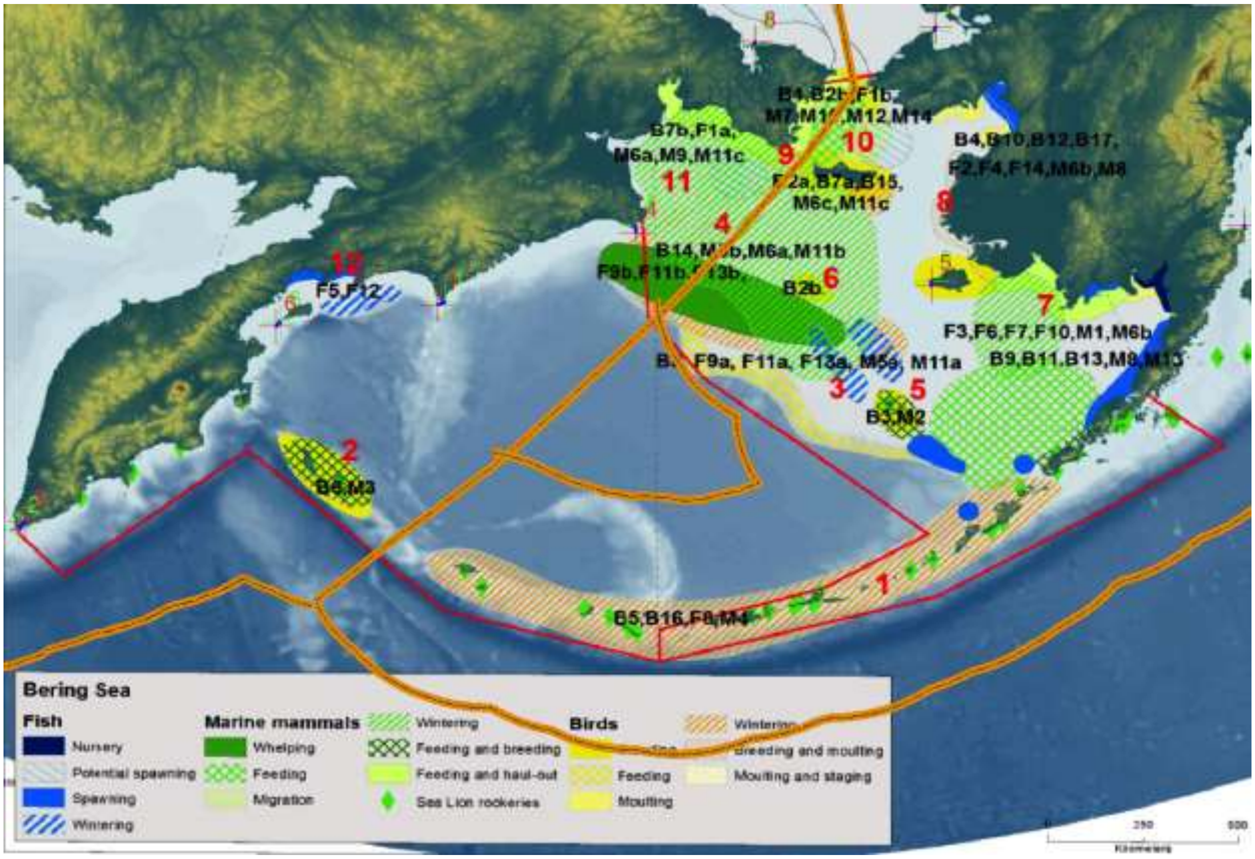

Figure 1. Location of the area. See area marked as 2.B6, M3.

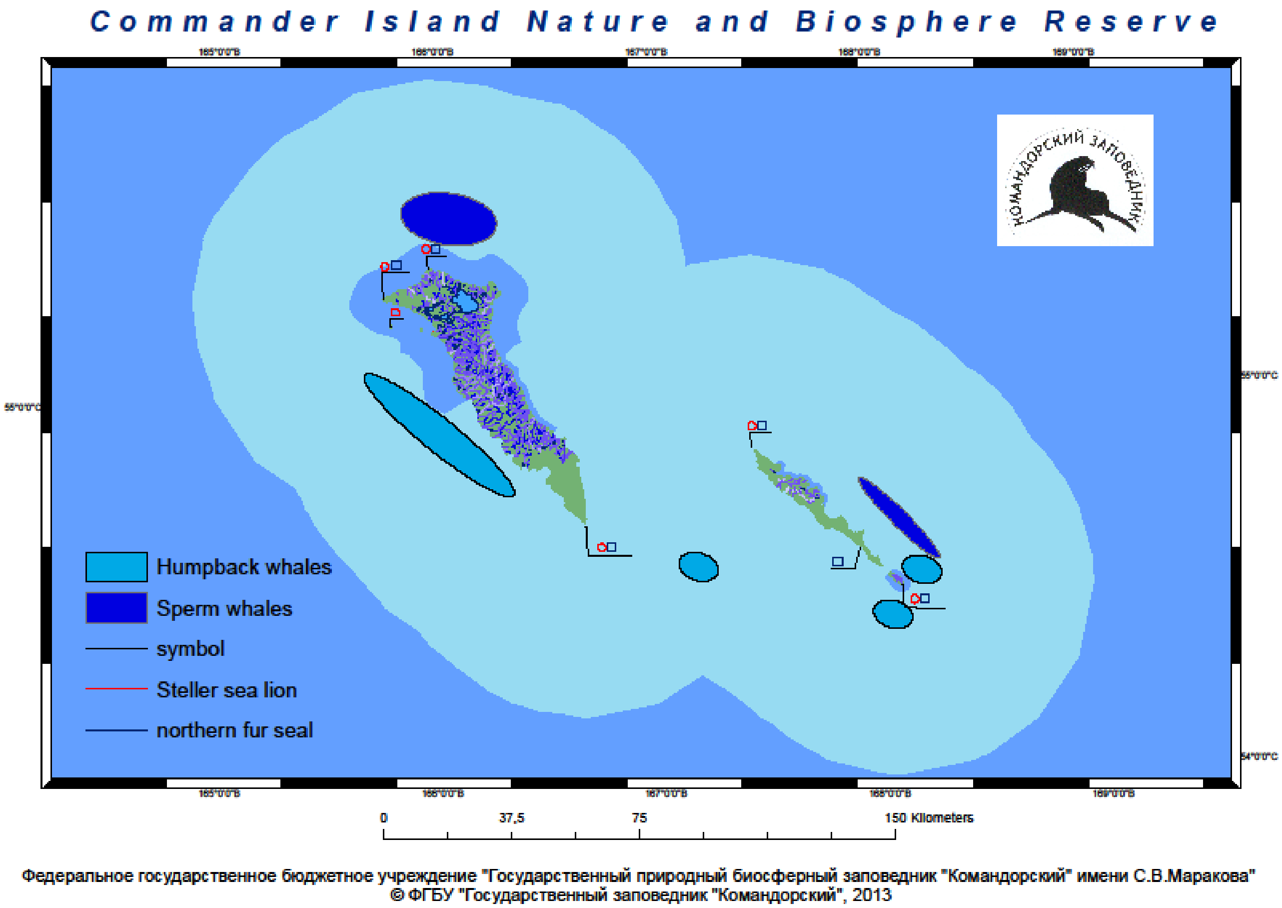

Figure 2. Biological features of the area.

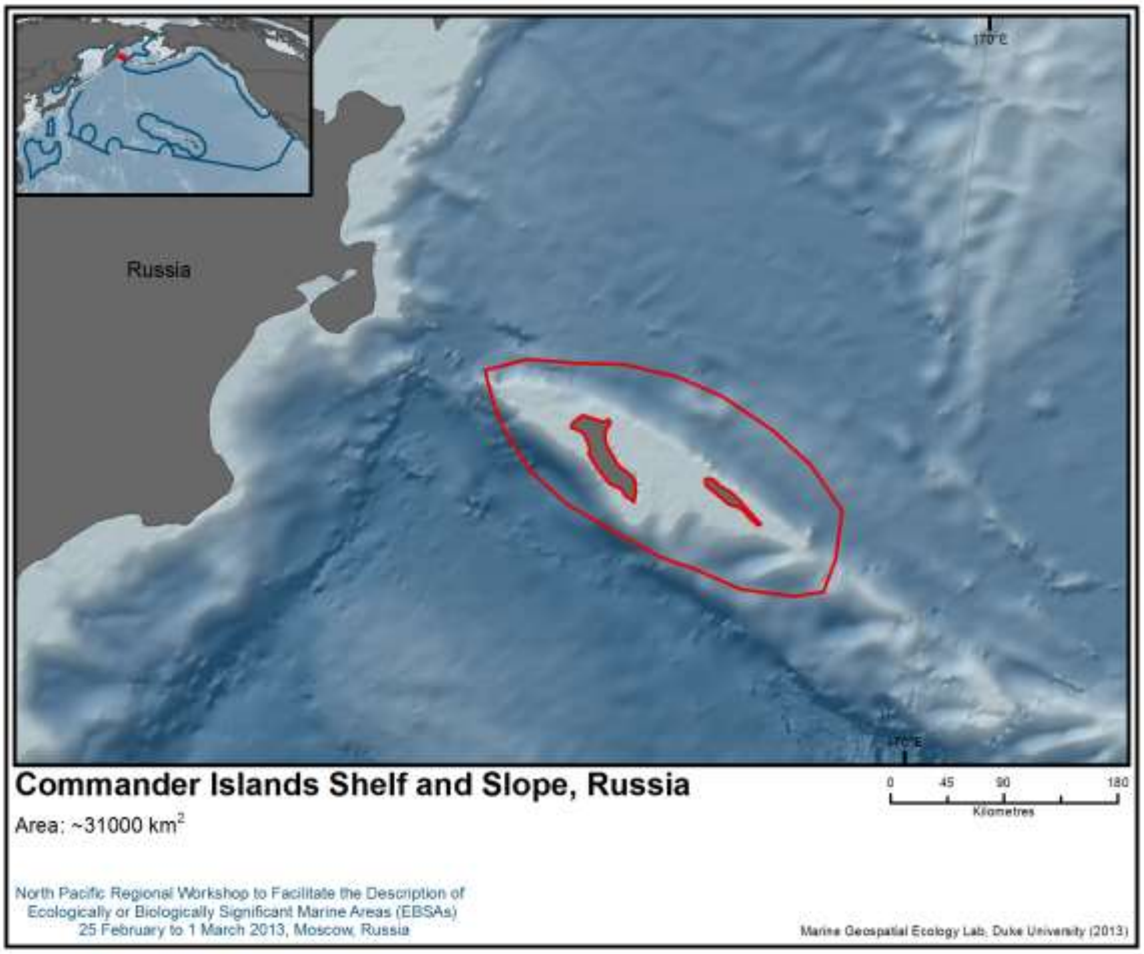

Figure 3. Commander Islands shelf and slope.

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Figure 2 was kindly provided by the the Komandorsky State Nature Biosphere Reserve.

Area No. 8: East and South Chukotka coast

Abstract

The uniqueness of the coastal waters of the western Bering Strait and the southern Chukotka Peninsula is associated with the largest and best-known polynya system in the North Pacific and the Chuckchi Sea. This is a wintering ground for bowhead whales, beluga whales, Pacific walruses and numerous seabirds. In spring, polynyas are used as migration routes. In summer, the southern and southwestern coast of the Chukotka Peninsula harbours the largest breeding colonies of seabirds in Chukotka, which are supported by significant productivity of the water column ecosystem in the northwestern Bering Sea and the Bering Strait. With regard to biological diversity, this area, with its complex coastline and diverse sea ice regime, has a high diversity of littoral and sublittoral habitats and a relatively high diversity of marine species for an Arctic area. The system rates "high" in terms of naturalness but is very sensitive to climate change and offshore industrial activity.

Introduction

The coastal area off the eastern and southern Chukotka Peninsula (northwestern Bering Sea and the Bering Strait) is described as an area meeting EBSA criteria as a result of several assessment projects, including the WWF Bering Sea Biodiversity assessment, physiographical regionalization of the Far Eastern Seas of Russia, initiated by WWF Russia (Ivanov, 2003), preparation of the Atlas of Marine and Coastal Biodiversity of the Russian Arctic (Spiridonov et al., 2011) and the gap analysis for marine protected area planning within the GEF/UNDP project "Strengthening of Marine and Coastal Protected areas in Russia" (Mokievsky et al., 2102). It includes the coastal waters of Chukotka Peninsula from Krest Bay to Dezhnev Cape. It is a relatively restricted but highly important area representing part of a gateway from the North Pacific to the Arctic and a crossroad of faunal migration routes between the Bering and Chukchi seas. It is a relatively well-studied area, although most of the data refer to higher trophic levels of the ecosystem, i.e., seabirds and marine mammals, while the structure and dynamics of benthic and pelagic ecosystems is relatively less studied.

This area was also identified through the Arctic Council process as a marine area of heightened ecological importance ("AMSA IIC final report") (see map below).

The area is very important for traditional use by indigenous local communities, in particular for coastal fishing and harvesting of marine mammals (walrus, seals, whales).

Location

The area extends from Krest Bay (Zaliv Kresta), the northwestern part of the Bay of Anadyr, along the complex coastline of the Chukotka Peninsula to Dezhnev Cape (Figure 1). The offshore boundary coincides with the border of Russia's EEZ in the Bering Sea and the maritime border of Russia in the Bering Strait and is thus entirely within Russia's jurisdiction. It merges with similar areas in the US part of the northern Bering Sea and the Bering Strait, which could also be considered ecologically significant, but the conditions in the Russian part are in several respects peculiar and even unique.

Feature description of the proposed area

The shelf of the eastern and southern Chukotka Peninsula is a relatively shallow (mostly within 35 m depth) underwater plain, with a topography that was strongly influenced by glaciation events and sea level changes in the Quarternary. Numerous fjords along the Chukotka coast continue underwater as glacial troughs, with depths up to 100 m. This is the area of strong tidal currents impacting seabed geomorphology and sediments that are predominately sandy and rocky substrates. Water transport through the Bering Strait is generally northward, facilitating penetration of Pacific biota to the Arctic with the transformed surface water mass of the Bering Sea.

The uniqueness of the coastal zone of the western Bering Strait (off the eastern coast of the Chukotka Peninsula) and southern Chukotka Peninsula is based on the existence of the largest and best-known polynya in the North Pacific and the Chuckchi Sea: the Anadyr'–Sireniki polynya system (Gavrilo, Popov, 2011). This polynya system develops in winter and is particularly pronounced in late winter (February – April), when an extensive belt of open water or water covered by nilas develops between landfast ice and drifting ice floes. These polynyas are broader off the southern coast of Chukotka Peninsula and narrower in the Bering Strait. Multi-year statistics for polynya areas similar to the ones derived for polynyas of the Siberian shelf (Gavrilo et al., 2011) are unfortunately not available. The stability of polynya locations over more than a thousand years is indicated by archaeological records of ancient Inuit culture exploiting highly productive marine ecosystems associated with polynyas (Arutyunov et al., 1982; Dinesman et al., 1996).

Like other polynyas, the Anadyr–Sireniki polynya system is extremely important for life-history stages of numerous species, including threatened, endangered and declining ones. This is a wintering ground for bowhead whales (*Balaena mysticetus*), beluga whales (*Delphinapterus leucas*), and Pacific walruses (Bogoslovskaya et al., 1982, 2007); the latter breed on the the ice floes of Anadyr Bay to the south of developing polynyas (Melentyev, Chernook, 2010). Several species of seabird also spend winters there, including long-tailed ducks, eiders and alcids (Konyukhov et al., 1998). The system of polynyas and leads along the Chukotka coast serves as a spring migration path for seabirds, including eiders, long-tailed ducks (*Clangula hyemalis*) and alcids. All these areas, along with the sea-ice edge in the Bering Sea, are important wintering grounds for seabirds, in particular ivory (*Pagophila eburnea*) and Ross gulls (*Rhodostethia rosaea*), and alcids.

The coastal waters of the southern and eastern Chukotka Peninsula are particularly rich in nutrients that may be partly associated with river discharge to the Gulf of Anadyr' (Ivanenkov, 1964; Sapozhnikov, 1995; Cooper et al., 1997). This, along with a favourable light regime in the polynya areas, is a precondition for high biological productivity. The data on primary productivity and production of zooplankton and zoobenthos are not particularly detailed nor is there much information on the abundance and production of micronekton (euphausids and small pelagic fish) and nektobenthic fish such as sand eel (for available information see Shuntov, 2001). However, in summer the southern and south-western coast of the Chukotka Peninsula harbours the biggest breeding colonies in Chukotka of mostly fulmar (*Fulmarus glacialis*), black-legged kittiwake (*Rissa tridactyla*), guillemots and others, totaling over 4 million breeding pairs (Konyukhov et al., 1998; Gavrilo, Popov, 2011), which are apparently supported by significant productivity of the water column ecosystem in the northwestern Bering Sea and the Bering Strait.

With its complex coastline and diverse sea ice regime, the area has a high level of biological diversity in its littoral and sublittoral habitats (Mokievsky et al., 2012). Species diversity shows a gradient from Krest Bay to Lawrence Bay that is remarkable in the littoral (Kussakin, Ivanova, 1978), but probably less remarkable in the sublittoral. The number of benthic macrophytes exceeds 70, which is relatively high for the low Arctic zone. Therefore, in terms of diversity this area should also be regarded as significant.

Feature condition and future outlook of the proposed area

The Sireniki polynya has been critically important for the development and subsistence of the indigenous culture of the marine hunters of Chukotka for more than a thousand years (Arutyunov et al., 1982; Dinesman et al., 1996).The only marine hunting and fishing that take place are traditional marine resource exploitation by indigenous people. Coastal pollution is restricted to small areas of coastal settlements and the area still has a high level of naturalness. Polynya systems are sensitive to climate change although no specific models and scenarios have been developed for this system. In the last two decades, in the adjacent northern Bering Sea area off St. Lawrence Island, geographic displacement of marine mammal population distributions has coincided with a reduction of benthic prey populations, an increase in pelagic fish, a reduction in sea ice, and an increase in air and ocean temperature (Grebmeyer et al., 2006). Since polynyas are used as shipping lanes they are highly vulnerable to the anthropogenic impact associated with shipping and offshore oil and gas development (risk of accidents, spills and noise pollution).

Part of the coastal zone will be included in the Beringia National Park (expected to be established in 2014 according to the National Conception of Specially Protected Areas development up to 2020) but no areas will be under the park's jurisdiction on the eastern and southern Chukotka side. It is highly important to extend the buffer zone of the park to the polynya zone and to organize a marine ecological research and monitoring programme in order to understand better the organization of this highly important ecosystem and its possible changes.

Assessment of the area against CBD EBSA criteria

<table>
<tr><th rowspan="2">CBD EBSA criteria
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<tr><td colspan="6">Explanation for ranking
The area contains the largest and best-known Anadyr'-Sireniki polynya system in the North Pacific and the Chuckchi Sea. Also, it is an area of remarkable diversity of littoral (and to a lesser extent sublittoral) biota.</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
The Anadyr'-Sireniki polynya system is extremely important for life-history stages of numerous species, includingthose that are threatened, endangered and declining. This is a wintering ground for bowhead whales, beluga whales, and Pacific walruses (Bogoslovskaya et al., 1982, 2007; Melentyev, Chernook, 2010). Several species of seabird also spend winters here, including long-tailed ducks, eiders and alcids (Konyukhov et al., 1998). The system of polynyas and leads along the Chukotka coast serves as a spring migration path for seabirds, including eiders, long-tailed ducks and alcids. All these areas, along with the sea ice edge in the Bering Sea, are important wintering grounds for seabirds, in particular ivory and Ross gulls, and alcids. In summer the southern and south-western coast of the Chukotka Peninsula harbours Chukotka's biggest breeding colonies of mostly fulmar, black-legged kittiwake and guillemots (Konyukhov eta l., 1998; Gavrilo, Popov, 2011), which are apparently supported by significant productivity of the water column ecosystem in the northwestern Bering Sea and the Bering Strait.</td></tr>
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<tr><td colspan="6">Explanation for ranking</td></tr>
</table>

The area is critically important as a wintering ground and migration pathway for bowhead whales, and a migration pathway and feeding ground for grey whales (Chukchi–Californian population); it may also be exploited by other endangered great whales, i.e., finwhales. The northern part of the area is also an important foraging area for polar bears. Several endangered aquatic birds are associated with adjacent wetlands (Sergienko, Gavrilo, 2011).					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking Polynya systems are sensitive to climate change, although no scenarios exist for this particular system. Since polynyas are used as shipping lanes they are highly vulnerable to the anthropogenic impact associated with shipping and offshore oil and gas development (risk of accidents, spills and noise pollution). With the current intensity of shipping and other industrial activity offshore, the risk is relatively low but it increases considerably with the intensification of operations along the Northern Sea Route and the North-West Passage. The area has a complex coastline with persistent landfast ice, meaning that recovery after a significant oil or chemical spill could take decades, while several vertebrate species will be seriously threatened either directly or due to shortage of food.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
Explanation for ranking Overwintering populations of marine birds and mammals as well as the breeding colonies of seabirds are apparently supported by the area's above-average biological productivity.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking This area, with its complex coastline and diverse sea ice regime, offers a high diversity of littoral and sublittoral habitats (Mokievsky et al., 2012). Species diversity is remarkable in the littoral from Krest Bay to Lawrence Bay (but probably less remarkable in the sublittoral). The number of benthic macrophytes species exceeds 70, which is relatively high for the low Arctic zone (Kussakin, Ivanova, 1978).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking The Sireniki polynya has been critically important for the development and subsistence of the indigenous culture of the marine hunters of Chukotka for more than a thousand years (Arutyunov et al., 1982; Dinesman et al., 1996) but no marine hunting and fishing occurs, beyond that conducted traditionally by indigenous and local people. Coastal pollution is restricted to small areas of coastal settlements and the area still holds a high level of naturalness.					

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Maps and Figures

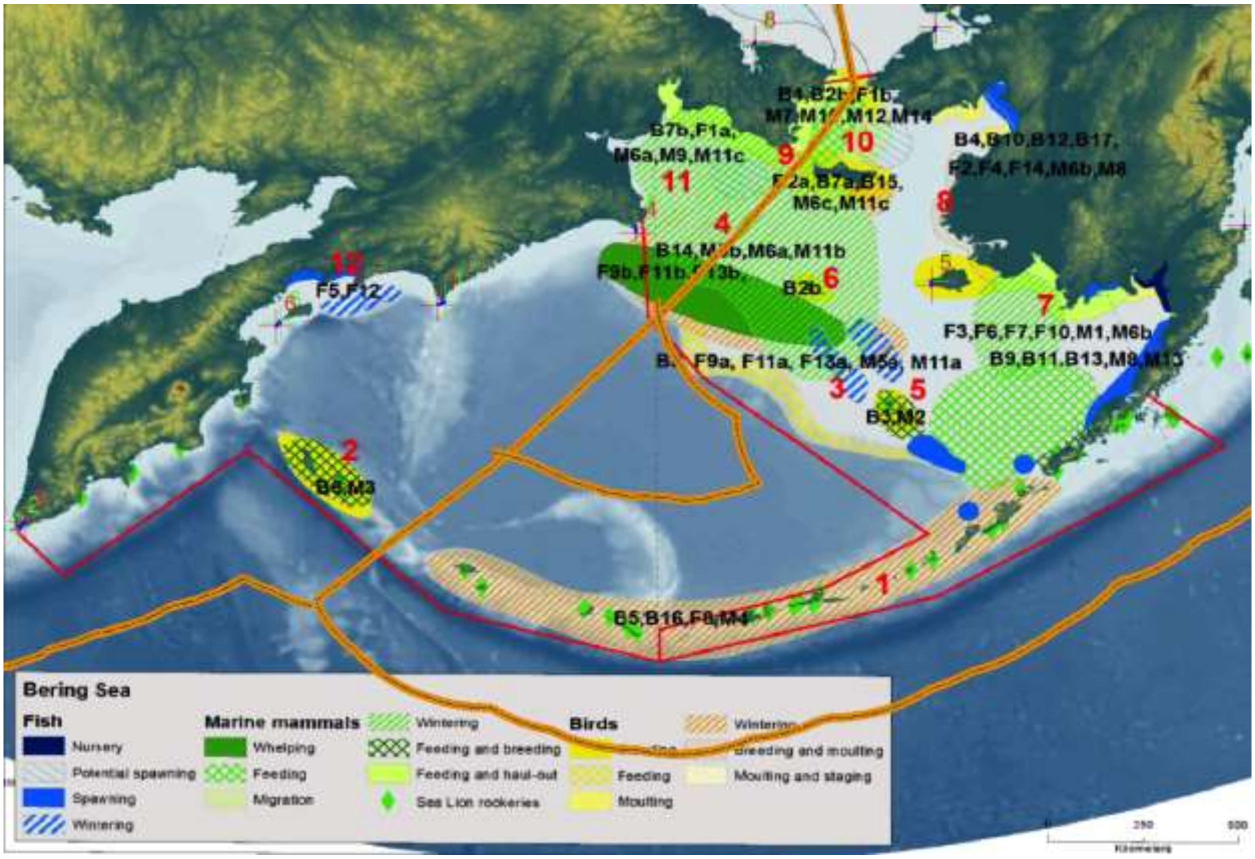

Figure 1. Location of the area.

Figure 2. Area meeting EBSA criteria.

Area No. 9: Yamskie Islands and Western Shelikhov Bay, Russian Federation

Abstract

Shelikhov Bay is located in the northwestern Sea of Okhotsk and characterized by upwelling, strong tidal currents and particular ice conditions. High productivity attracts many species to the area, including endangered ones. The Yamskie Islands shelf serves as important area for cetaceans, while the island shores themselves are occupied by seabirds. The area is fragile to human impact, but it has not been significant so far.

Introduction

Shelikhov Bay is divided into Gizhiginskaya and Penzhinskaya bays by the Taygonos Peninsula. The Gizhiga, Penzhina, Yama and Malkachan rivers flow into the bay, which is ice-covered from December to May. Tides are among the highest in the Pacific Ocean. Within the bay are numerous fisheries resources, especially herring, plaice, halibut and navaga.

Location

The area starts east of the latititude of Zavialov Island in the northwestern Sea of Okhotsk at the 200 m isobath and follows the isobaths surrounding Piagin and Koni peninsulas and Yamskie Islands up to the point of Gizhiga Peninsula, including the western part of Shelikhov Bay. It is located entirely within Russia's territorial sea and EEZ.

Feature description of the proposed area

The oceanographical regime of the area is dominated by upwelling southeast of the peninsulas and Yamskie Islands, which considerably enriches surface water with nutrients, thus increasing primary productivity (Arzhanova et al., 1997; Shuntov, 2001; Dulepova, 2002). The other important features are strong tidal currents and tidal fronts (not particularly well studied) and the sea ice regime extending five to six months of the year. Both the tidal fronts and marginal ice zone effects likely contribute to local increasing of pelagic production and accumulation of plankton biomass, but these processes are not studied in detail. Nectonic communities are studied by Sukhanov and Ivanov (2012) on the basis of the data of the Sea Museum-Aquarium of the Pacific Research Fisheries Center (TINRO Center) trawl surveys are shown to be particularly diverse and seasonally variable for the Sea of Okhotsk as a whole and comparatively mosaic on the regional spatial scale. For benthic communities only aggregate data are available in the literature; however, the biomass tends to be highest for the Sea of Okhotsk, averaging more than 500 g/m^2 and dominated by epifauna (Dulepova, 2008). The area is most probably important for maintaining populations of krill (owing to high productivity and circulation) (Shuntov, 2001), and is particularly known as an important area for maintaining one of the key Pacific herring stocks – the Gizhigin herring (Gorbatenko et al., 2004). It is furthermore important as a feeding area for Alaska Pollack and Pacific salmon. The Yamskie Islands host the largest seabird colonies in the Western Pacific, i.e., over 11 million breeding pairs of fulmars and black-legged kittiwakes (Mokievsky et al., 2012), and are important as feeding areas for seabirds and cetaceans (Shuntov, 2003). Shelikhov Bay is one of the main beluga whale breeding areas in the Sea of Okhotsk (Burdin et al., 2009). The area is important for particular endangered species, including Steller sea lion, which breed on the Yamskie Islands and feed in the surrounding areas (Mokievsky et al., 2012). The data on historical catch of bowhead whales confirm the hypothesis of Russian scientists that the area is also an important feeding area for the bowhead whale population of the Sea of Okhotsk.

Feature condition and future outlook of the proposed area

The area is vulnerable to oil and gas development, owing to the absence of means to combat oil spills in waters covered by sea ice. It may be also impacted by overfishing, yet the present intensity of fishing is moderate and is lower than on the West Kamchatka shelf. It is unlikely that the fishing effort will increase considerably because harsh environmental conditions preclude the use of some gears. Therefore the area may be characterized as having a high level of naturalness.

Assessment of the area against CBD EBSA criteria

<table>
<tr><td rowspan="2">CBD EBSA criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.
Rare combination of oceanographic conditions, i.e. high tidal magnitude, tidal fronts and upwelling; largest in the Russian Far East seabird colonies; there little information on endemism of species.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Yamskie islands host the largest seabird colonies in the Western Pacific, i.e. over 11 million breeding pairs of fulmars and black-legged kittiwakes.
Important features of the area are also strong tidal currents and tidal fronts (not particularly well studied) and the sea ice regime, which extends to 5-6 months of the year. Both the tidal fronts and marginal ice zone effects likely contribute to increasing of local pelagic production and accumulation of plankton biomass, but these processes have not been studied in detail.</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.
Breeding, feeding and wintering area of PH, breeding and feeding area of beluga whales,feeding area of AP and cetaceans, largest seabird colonies and respective feeding areas in NW Pacific.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
Important area for maintaining one of the key Pacific herring stocks – the Gizhigin herring. Important feeding area for Alaska pollack and Pacific salmon. Seabird feeding areas as well as a feeding area for cetaceans. Shelikhov Bay is one of the main breeding areas of beluga whales in the Sea of Okhotsk.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.
Rookeries and feeding area of Steller sea lion, feeding area of bowhead whales.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
The area is important for particular endangered species, including Steller sea lion, which breeds on the Yamskie Islands and feeds in the surrounding areas. The data on historical catch of bowhead whales confirms the hypothesis of Russian scientists that the area is also an important feeding area for the Sea of Okhotsk bowhead whale population.</td></tr>
<tr><td>Vulnerability,</td><td>Areas that contain a relatively high proportion</td><td>Unclear</td><td></td><td></td><td>X</td></tr>
</table>

fragility, sensitivity, or slow recovery	of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery. The area is vulnerable to the oil and gas development owing to the absence of means to combat oil spills in the sea ice covered waters.	for climate change			(for oil spill)
Explanation for ranking The area is vulnerable to oil and gas development owing to the absence of means to combat oil spills in the sea-ice-covered waters. Seabirds and cetaceans are most sensitive to such impacts.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity. Upwelling system; high production of phyto and zooplankton, concentrations of macrozooplankton.				X
Explanation for ranking The biomass tends to be the highest in the Sea of Okhotsk, averaging more than 500 g m^{-2} and dominated by epifauna.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity. Mosaics of nekton and benthic communities.				X
Explanation for ranking Upwelling zone; large seabirds colonies, cetaceans.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking The area is remote and poorly populated. Human activity is restricted to that of indigenous and local people. Threats can come from outside, but they do not originate within the area so far. Present intensity of fishing is moderate and is less than on the West Kamchatka shelf. It is unlikely that the fishing effort will increase considerably because harsh environmental conditions preclude the use of some gears. Therefore the area may be characterized as having a high level of naturalness.					

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Shuntov V.P. 2001. *Biology of Far-Eastern seas of Russia*. Vladivostok: TINRO-Centre. — 580 p. (in Russian).

Maps and Figures

Figure 1. Area meeting EBSA criteria.

Area No. 10: Alijos Islands, Mexico

Abstract

The Alijos Islands, located at 24° 57' 03" latitude N and 115° 44' 55" longitude W, are a group of small volcanic islands in columnar form rising from depths between 2400 and 4500 m. Their flanks are escarpments, part of the rest of an underwater volcano elevated from the surface of the ocean floor, far from the continental margin. The exposed part rising from the sea surface has a total area of 1,000 m². This island group has been known since colonial times in Mexico and has been represented on maps since 1598. Alijos Islands belong to the Pacific coastal biome and are located in the southern section of the California Current Province (CALC), northwest of the convergence front, which lies southwest of the tip of Baja California. Fronts are less well defined in this region although the presence of upwelling fronts and fronts associated with meanders of the coastal jet and their associated cyclonic eddies occur. Upwelling generates a highly productive area that supports high densities of fish and other vertebrates. The Alijos Islands are characterized by major aggregations of birds. The rocky outcrops are major nesting sites for seabirds feeding on the highly productive waters, providing a major draw for ecotourists drawn to seabirds, marine mammals and high fish densities. The islands are considered among Mexico's Marine Prioritary Areas. Due to its remoteness and the small area exposed, it has preserved its naturalness, although current knowledge and available biological, environmental and oceanographic studies are limited.

Introduction

The Alijos Islands are a group of small volcanic islands in columnar form. Their flanks are escarpments that are part of an underwater volcano elevated from the surface of the ocean floor, distant from the continental margin. The exposed part rising from the sea surface has a total area of 1,000 m². Three main larger rock mounds and numerous smaller rocks characterize the island complex. Roca Sur is the largest of the group. It is 34 m high, 14 m in diameter, and located at 24° 57' 03" latitude N and 115° 44' 55" longitude W, rising from depths between 2400 and 4500 m. This island group has been known since colonial times in Mexico and represented on maps since 1598. The rocky outcrops are major seabird nesting sites. The remoteness of this island group and the small dimensions exposed have limited current knowledge and available biological, environmental and oceanographic studies. The most recent knowledge dates from the early 1990s and was reported by Schmieder (1996).

The Alijos Islands seem to have emerged from a dome of molten rock that rises from the mantle as a consequence of an extension of a fracture zone or a transform fault. It belongs to the chain of seamounts along the continental margin of California that have transitional and alkaline lavas formed from a mantle plume with short geological duration.

Location

The Alijos Islands are located in the eastern Pacific Ocean at 24° 57.5' latitude N, and 115° 45.0' longitude W, 300 km west of the Baja California Peninsula. These islands are located within the ecoregion of the South Californian Pacific. The geological and physiographic features are those of the Pacífic plate (Ulloa et al. 2006), and the topography is composed of igneous rocks (Ulloa et al. 2006) and a narrow continental shelf (Schmieder 1996).

Oceanographic features

The Alijos Islands belong to the Pacific coastal biome described by Longhurst (1998), and are located in the southern section of the California Current Province (CALC), northwest of the convergence front, which lies southwest of the tip of Baja California. The front is less defined in this region although upwelling fronts and fronts associated with meanders of the coastal jet and their associated cyclonic eddies occur.

Feature description of the proposed area

The coastal wind regime is weaker at this latitude in comparison to the northern portion of the California Current but has been recognized to be favourable for upwelling year round, though some seasonality in upwelling is evident in the chlorophyll field. Upwelling cells south of prominent capes are persistent: Cape Colonet, Punta Baja, Cape San Quintin, Punta Eugenia, Punta Abreojos and Cape Falso all may generate such cells from late summer (August) through early winter (November). South of Cape San Lazaro even coastal upwelling ceases in autumn and winter (September-January).

Because of the large number of published studies of the California Current, in reviewing this province it is easier to concentrate on the individual process rather than to see the whole (Longhurst 1998). For instance, it is easy to lose sight of the fact that there is a seasonal cycle in the depth of the pycnocline that occurs over the whole area of the province (summer, 20-25 m; winter approx. 75 m). During all seasons if one ignores the effects of mesoscale features, the thermocline slopes downwards to the west, offshore, as it must in upwelling cells, the density profile may be relatively featureless but wherever a significant mixed layer exists, a DCM occurs on the density gradient, usually with the depth of primary production a few metres shallower. The offshore region has a seasonal cycle typical of subtropical oceans: primary production rate and chlorophyll accumulation begin as soon as the mixed layer begins to deepen in the autumn. As noted previously, in the offshore areas chlorophyll values peak in midwinter and primary production rate slows again with the shoaling of the thermocline in spring. Analysis of chlorophyll fields, integrated for the whole province, shows that this process, rather than summer upwelling at the coast, dominates the seasonal cycle. This observation recalls earlier suggestions that between-year variability in biological properties was forced primarily by changes in the advection of nutrients from the source of the California Current rather by variation in the nutrients brought to the surface by coastal upwelling (Chelton, 1982).

Feature condition and future outlook of the proposed area

The islands are currently considered a Marine Priority Area by CONABIO (http://www.conabio.gob.mx/conocimiento/regionalizacion/doctos/marinas.html). Ongoing conservation programmes and activities are being carried out by the Universidad Nacional Autónoma de México (UNAM), Universidad Autónoma de Baja California (UABC) and Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE).

The establishment of an MPA in this area will extend its protection to 10 miles offshore of the islands. All the islands in this province are highly important in this region for the understanding of vertebrate and invertebrate fauna connectivity and their relation to the local oceanography and productivity.

Assessment of the area against CBD EBSA criteria

<table>
<tr><td rowspan="2">CBD EBSA criteria
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<tr><td>No information</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td>x</td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Typical of the area.</td></tr>
</table>

<table>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td>x</td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Typical of the area. The great relevance of Alijos Islands is that seabirds, mammals, large vertebrates and many invertebrates use these islands for reproduction, breeding, refuge and shelter, and they are all connected to the other California islands and borderland regions. This makes the islands very important; however, they have not been studied enough to support a higher ranking.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td>x</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Not sufficiently recorded and evaluated to rank. Should be considered for future activities.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td>x</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
Some of the current activities that could be considered of high impact to the island fauna include the yellowfin tuna fishery, Thunnus albacares. In general, however, the area can be considered of ecological importance and integrity with some degradation produced by human activities—if they continue, the functional characteristics will be lost (Arriaga et al., 2000). Ciguatoxins were recorded in the area in 1993, with 7 people dying (UNESCO, 2011).

The introduction of rats and other pests to these islands is a potential risk to which the populations are increasingly exposed as fishing activities intensify. In the history of the Eastern Tropical Pacific islands, as in Isabela, Rasa, and others, this has been a major problem, and this knowledge should be considered to avoid future degradation by human activity related to the islands.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td></td><td>x</td></tr>
<tr><td colspan="6">Explanation for ranking
Coastal upwelling is a special case that merits special attention. The upwelling cells generate diatom-copepod assemblages of remarkably low diversity: In repeated net tows in one assemblage a few kilometres off Baja California (25^{o}N), no more than 29 species of zooplankton (and no more than 20 in any one haul) were found, or about one-quarter the number taken 25 km farther offshore and examined with equivalent attention. Large, filter-feeding, copepod, especially C. pacificus at 115 ind m^{-3} comprised 77% of zooplankton dry weight at the coast. The seasonal ontogenetic migration of this species cause the deep basin on the continental shelf to trap large concentrations of overwintering stage 5 copepodites; early in the winter these aggregate near the bottom, but the layers progressively shoal as oxygen concentration in the bottom water progressively declines, eventually forcing them over the sill depth as have been recorded in Santa Barbara Basin by Osgood and Checkly (1997a, b). Compare this situation with that of C. finmarchicus in the deep basin of the Scotia Shelf in the Northwest Atlantic Shelves Province.</td></tr>
</table>

A few large species of diatoms (*Coscinodiscus, Nitzschia and Tripodonesis*) formed 81% of algal cell volume. However, these rich diatom crops are also utilized by a very unusual organism- a bright red swimming galatheid crab, *Pleuroncodes planipes*. The pelagic phase crowd into the surface layer off Baja California where they tail-flip up to the surface and then parachute down again filtering actively with their maxillipeds, this is remarkable sight against the rich olive-green upwelled water. These crabs (one per 3 m^3), each capable of clearing diatoms from 3 or 4 L^{-1} hr^{-1}, may comprise 90% of the total zooplankton/nekton biomass in upwelling cells and contribute 85% of all zooplankton/nekton grazing pressure. *Pleuroncodes* is directly preyed on, and preferred food of yellowfin tuna in the same region, so this is a remarkably direct link from diatoms to resource.

The islands aggregate fish, and the offshore fishery is one of the most important ecosystem services offered by these islands. It is an important feeding ground for birds, its slopes provide refuge to invertebrates and juvenile larval stages, and the islands provide nesting grounds for the development and growth of birds that feed on the abundant fish. Marine mammals feed on the high abundance of resources (Arriana-Cabrera et al., 1998).

Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				x

Explanation for ranking
The islands host a large diversity of taxa, including molluscs, polychaetes, echinoderms, crustacea, fish, turtles, seabirds and marine mammals (Arriaga-Cabrera et al, 1998). The key species for supporting its conservation are the seabirds that nest in these islands. Losing these would imply structural changes in the ecosystem, with a subsequent loss of local diversity. There is a high aggregation of seabirds that are considered flagship species, which are charismatic for the islands and highly attractive to ecotourism, which can promote conservation. Nationwide these islands have been considered special sites due to their large aggregations of species.

Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				x

Explanation for ranking
The area is located between two biological provinces in a latitude influenced by the Pacific current moving to the west and forming the Pacific Transocean current. In spite of its evident biogeographical importance, the number of scientific studies is limited due to its isolation and remoteness, which have led to the islands' high degree of naturalness and limited human impact. Much still remains to be recorded on its biota, endemicity and oceanographic variability (Schmieder, 1996). To date 500 species have been recorded, many of which are unique to their genus (60 species in 57 genera), and many others are not yet described.

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Maps and Figures

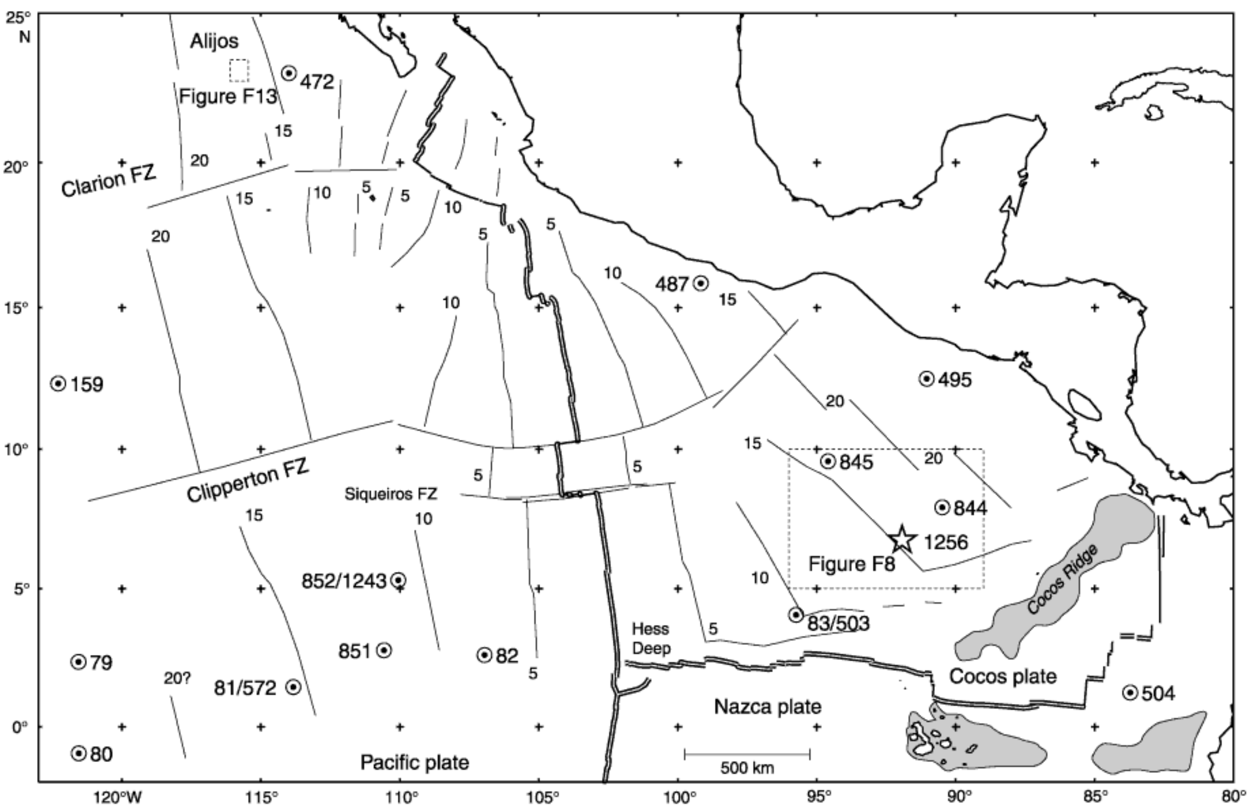

Figure 1. Map of the ages of the ocean floor in the Pacific and Cocos plates. The isocrones are defined by lines at 5 my intervals. Locations in circles with numbers refer to Deep Sea Drilling Project (DSDP) and Ocean Drilling Program (ODP) coring efforts on the ocean floor. Numbers next to the lines are ages of the cortex. FZ= Fracture Zones.

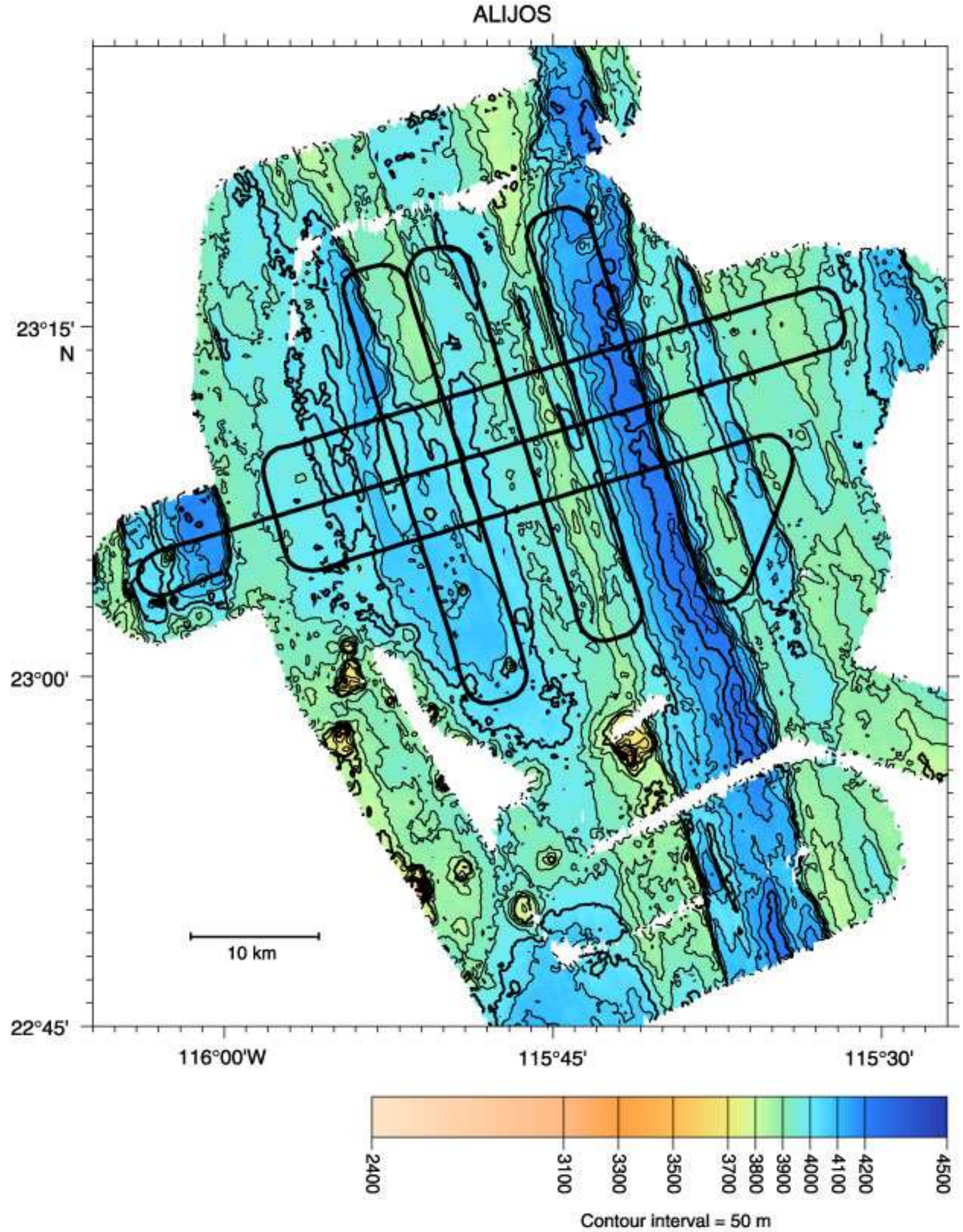

Figure 2. Sea floor bathymetry in the ODP area to the east of the Alijos Islands.

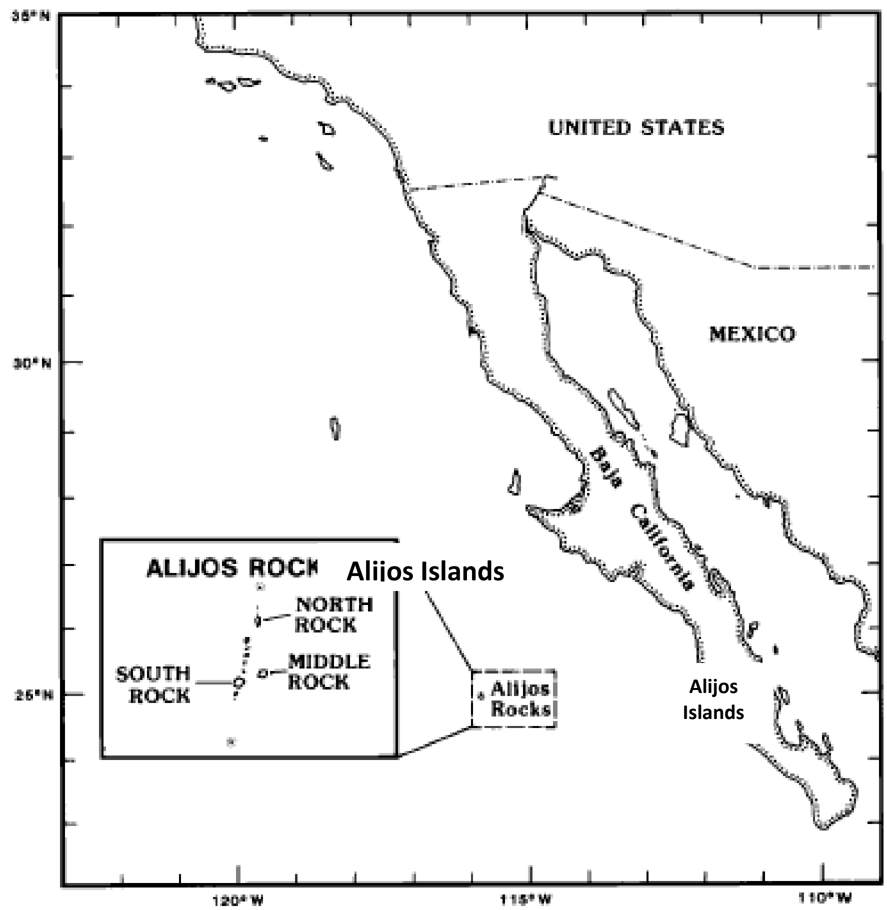

Figure 3. Location of the Alijos Islands.

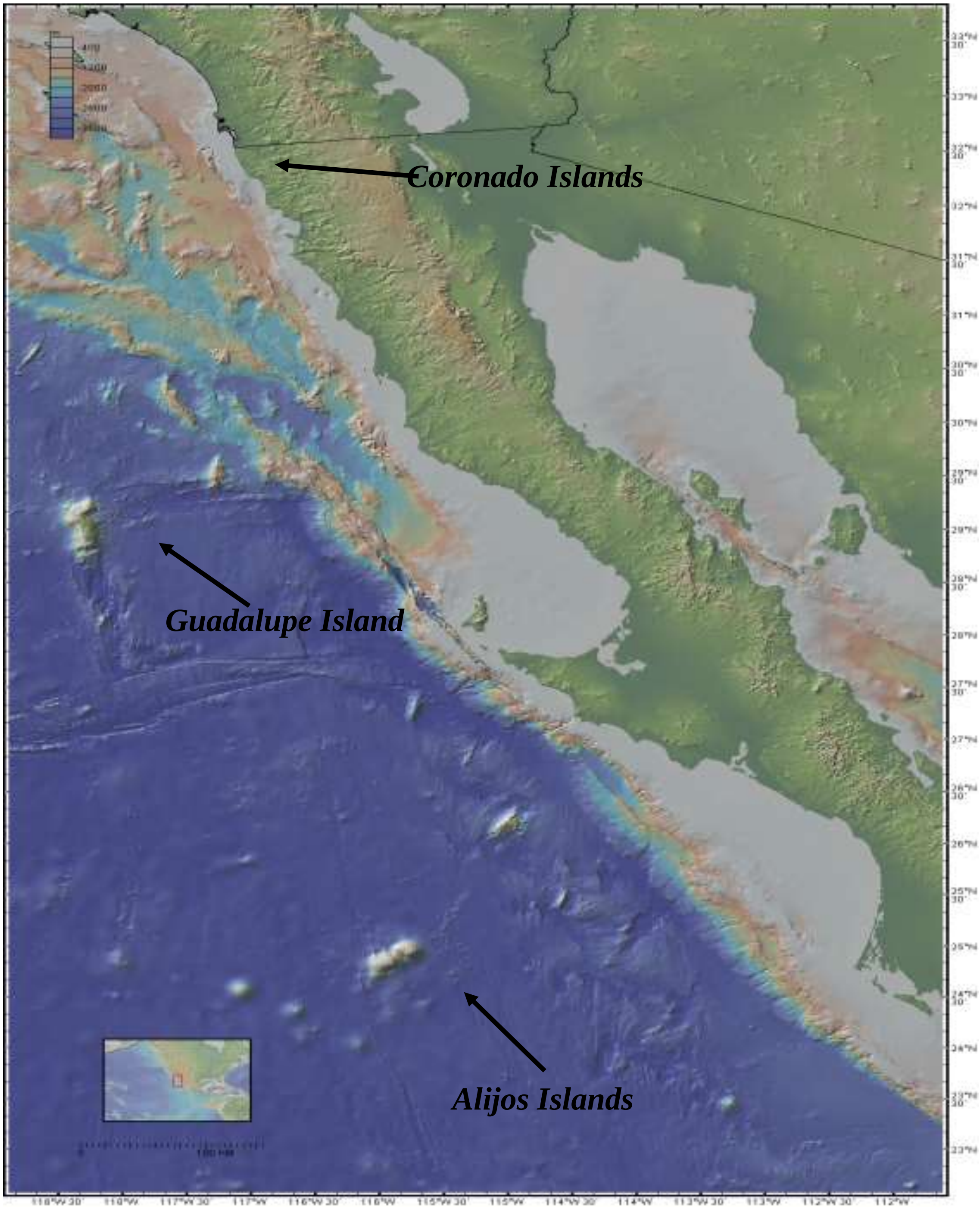

Figure 4. Location of Alijos Islands off the western Baja California peninsula and the bathymetry of the sea floor.

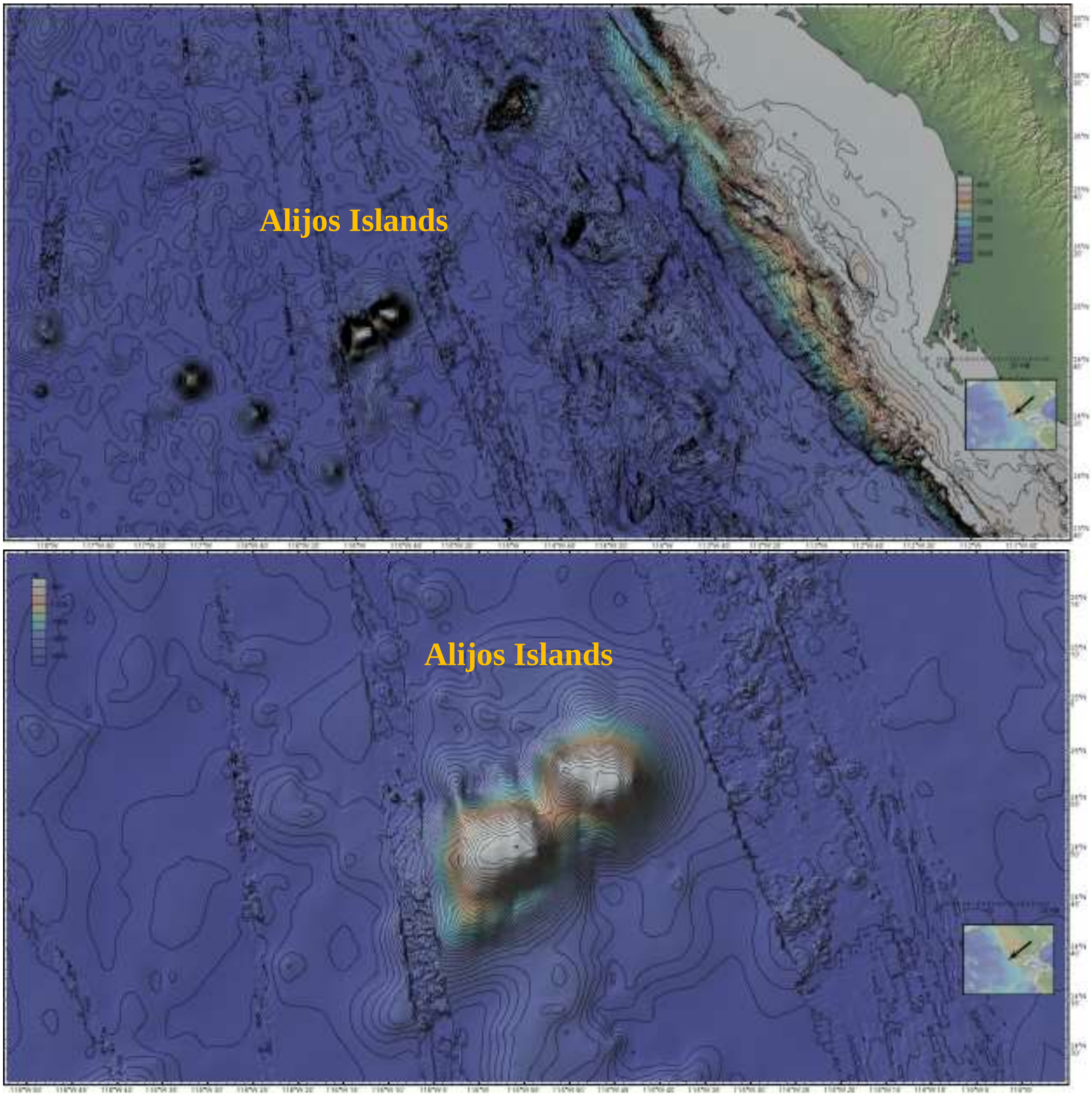

Figure 5. Bathymetry in the area near the Alijos Islands. Upper panel: regional bathymetry to the west of Bahía de Magdalena in the western margin of the Baja California Peninsula. Lower Panel: local bathymetry surrounding the Alijos Islands. The softness of the relief of the flanks is a product of the limited bathymetric records in this location.

Figure 6. Area meeting EBSA criteria.

Table 1. Protected species of the Alijos Islands

Group	**Family**	*Genus*	**Species**	**NOM-059-SEMARNAT-**	**IUCN Red List category**
Marine Birds	Laridae	*Sterna*	*antillarum*	Subject to special protection.	
Marine mammals	Delphinidae	*Lagenorhynchus*	*obliquidens*	Subject to special protection	
	Otariidae	*Arctocephalus*	*townsendi*	In danger of extinction. Endemic	VU D2 ver 2.3 (1994)
	Ziphiidae	*Berardius*	*bairdii*	Subject to special protection	LR/cd ver 2.3 (1994)
	Ziphiidae	*Mesoplodon*	*densirostris*	Subject to special protection	
	Ziphiidae	*Mesoplodon*	*europaeus*	Subject to special protection	
	Ziphiidae	*Mesoplodon*	*ginkgodens*	Subject to special protection	DD ver 2.3 (1994)
	Ziphiidae	*Mesoplodon*	*peruvianus*	Subject to special protection	DD ver 2.3 (1994)

Table 2. List of species in the National Fisheries Chart

Group	Target species
Bivalves	*Anadara tuberculosa*
	Argopecten irradians concentricus
	Atrina maura
	Atrina tuberculosa
	Chione californiensis
	Chione undatella
	Lyropecten subnodosus
	Megapitaria squalida
	Pecten vogdesi
	Pinna rugosa
	Spondylus calcifer
	Tivela stultorum
Tuna fish	*Auxis thazard*
	Katsuwonus pelamis
	Thunnus albacares
	Thunnus obesus
	Thunnus thynnus
Bluecrabs	*Callinectes arcuatus*
	Callinectes bellicosus
	Callinectes toxotes
Lobsters	*Panulirus gracilis*
	Panulirus inflatus
	Panulirus interruptus
Fish	*Bodianus diplotaenia*
	Brotula clarkae
	Caulolatilus affinis
	Caulolatilus princeps
	Hippoglossina stomata
	Hippoglossina tetrophthalmus
	Merluccius productus
	Paralabrax auroguttatus
	Paralabrax clathratus
	Paralabrax loro
	Paralabrax maculatofasciatus
	Paralabrax nebulifer
	Paralichthys aestuarius
	Paralichthys californicus
	Paralichthys woolmani
	Pleuronichthys guttulatus
	Scomberomorus concolor
	Scomberomorus sierra
	Scorpaena guttata
	Scorpaena plumieri
	Sebastes atrovirens
	Sebastes paucispinis
	Semicossyphus pulcher

	Xystreurys liolepis
Smaller pelagics	*Cetengraulis mysticetus*
	Engraulis mordax
	Etrumeus teres
	Oligoplites refulgens
	Opisthonema bulleri
	Opisthonema libertate
	Opisthonema medirastre
	Sarda chiliensis
	Sardinops sagax
	Scomber japonicus
	Trachurus symmetricus
Swordfish	*Xiphias gladius*
Coastal sharks	*Carcharhinus falciformis*
	Carcharhinus leucas
	Galeocerdo cuvier
	Ginglymostoma cirratum
	Isurus oxyrinchus
	Sphyrna corona
	Squatina californica
	Alopias pelagicus
	Alopias superciliosus
	Alopias vulpinus

Area No. 11: Coronado Islands, Mexico

Abstract

The Coronado islands are located on the continental margin, 13.6 km off the northwest coast of Baja California within Mexico's EEZ. Coronado Norte, Centro, Sur and Pilón de Azúcar are the four islands of this complex, which support abundant bird population. The islands are exposed continental blocks, which are products of the shear zone in the borders of the Pacific and North American plates. The underwater cliffs border to the west a deep channel over 1100 m in depth. To the south and east the sea floor depth does not exceed 50 m. A narrow continental shelf surrounds the islands. The sediment nearby is mainly sand and mud. The coastal zone of the islands comprises beaches, cliffs, dunes, coastal lagoons and bays, which continue into deep-sea habitats; this large-scale diversity explains the islands' high biological diversity. Upwelling occurs by wind associated with the California Current, which elevates primary productivity seasonally and supports the high biomass of invertebrates, both in the water column and the benthos, and the large aggregations of fish, marine birds and mammals.

Introduction

The Coronado Islands are located 13.6 km off the northwest coast of Baja California within Mexico's EEZ on the continental margin, sloping down to 200 m depth. The southern island, 3.2 km long and 800 m wide, is inhabited. The islands harbour a diverse and abundant bird population. These islands were initially called "deserted islands", until 1602, when Sebastian Vizcaino named them "Cuatro Coronados". The named changed throughout the centuries to "Los Obispos" (The Bishop islands), "Las Coronadas" (the Crowned islands), and many others, including "Los Centinelas de la Bahía de San Diego" (the sentinels of San Diego bay).

Location

Coronado Islands are an archipelago comprising four small islands:

- Coronado Norte (32°28'N, 117°18'O), with a surface area of 48 ha;
- Pilón de Azúcar (32° 25'N, 117°16'O) covering 7 ha;
- Coronado Centro (32°25'N, 117°16'O) covering 14 ha;
- Coronado Sur (32°25'N, 117°15'O) covering 183 ha.

These islands are under the jurisdiction of Mexico and the municipality of Tijuana in the state of Baja California. They are within the South Californian ecoregion in the Eastern Pacific.

The Coronado islands are located on the continental shelf within the California Current Province (CALC) in its mid extent south from the bifurcation of the eastward flow of the North Pacific Current and north to the convergence front, which lies southwest off the tip of Baja California at the root of the North Equatorial Current (NEC). Its seaward limit is the California Front.

Feature description of the proposed area

Oceanography: The main currents affecting the islands are the California Current and the California Countercurrent. Upwelling occurs from March through July, tide is semidiurnal, winds prevail from the northwest with high waves splashing the coast, ocean temperature varies seasonally from 13 to 22°C, salinity varies between 33 ‰ and 37 ‰, with the occasional input of fresh water from groundwater and creeks in the rainy season (Arriaga-Cabrera et al. 1998). Extreme ENSO phenomena have been recorded occasionally (INEGI, 2005). In recent decades red-tide events have become increasingly frequent, as have cold fronts (Arriaga-Cabrera et al., 1998). Turbulent processes, concentration, retention and nutrient enrichment are characteristic due to the closeness to the mainland. The Ekman process is responsible for the upwellings. The euphotic zone spans from the surface down to 40 m, and primary productivity is high and associated with nutrient enrichment—both natural and due to eutrophication.

The continental shelf surrounding the Coronado islands is wider than to the northern extent of the CCA region extending wider than the 10 km from shore, within the topography the continental borderland with deep (ca. 200 m) basins, shallow banks is not as pronounced as further north. Tidal fronts have not been described, but the entire coastal boundary province is populated by upwelling fronts and fronts associated with meanders of the coastal jet and their associated cyclonic eddies as described above. Off the Coronado islands the California current has been intensively investigated as exemplified by the results from long time series (1950-present) of the California Cooperative Fisheries Investigations (CalCOFI) managed jointly by the US and Mexico federal, state, and university research groups. A separate and narrower maximum flow occurs within 100-150 km of the coast as an inshore California current, which partially reverses with the seasons. The southward flow of the offshore current includes mesoscale eddies, and meanders 120-150 km in area.These are anticyclonic on the seaward side and cyclonic on the landward side of the flow. Among the mesoscale features of the offshore current are intense jets and plumes originating at the coast, which entrain upwelled water and advect it far offshore (Burkov and Pavlova, 1980; Mooers and Robinson, 1984).

Upwelling at the coast is forced by coastal winds modified by their response to blocking of the zonal westerlies by the coastal mountain chain. Thus the coastal wind regime is not uniform: a local maximum of cyclonic curl is associated with the S California Bight, and a lobe of anticyclonic curl frequently reaches the coast at Punta Baja, where longshore equatorward wind stress is maximal. Equatorward transport in the separate coastal velocity core may be interrupted by discontinuous northward flow beginning seasonally in August-October. In early winter (November-January) continuous poleward flows occurs from the Mexican border almost to Cape Mendocino, with this continuity breaking down in February and March with the development of frequent cyclonic eddies between Point Conception and Cape Mendocino. In March or April the summer pattern of eddying southward flow becomes fully established (Wyllie, 1966). When reversal of coastal flow is most strongly developed (early spring), the poleward current lies closest to the coast.

Geology: The islands are the portions of inclined continental blocks exposed above the sea surface in an échelon physiography. The orientation of the blocks on the Californian continental margin is NNW. The underwater cliffs of the islands border to the north the Coronado Canyon, to the west the Coronado Escarpment and the San Diego deep channel with over 1100 m depth; to the south and east the sea floor depth does not exceed 50 m among the islands and the coast of the Baja California Peninsula.

Geologically, the islands are inclined blocks, products of the shear zone in the borders of the Pacific and North American plates along the continental margin. The massif is located in a transition zone that makes up the margin, highly deformed geologically by the shear with the more stable crustal blocks on the continental margin. Initially these blocks are formed in the acretionary prism of the continental margin of the overriding plate in the subduction zone between the oceanic plate Farallon and the continental North American plate.

After the subduction off the California coast stopped in the late Miocene and the plate borders reorganized into shear structures (such as the system of faults of San Andrés) underwater blocks in the prism were elevated over the sea surface, forming the islands, including Catalina Island and others to the north. The limited geology that is known of the islands is the result of studies which were carried out by the universities of California between 1951 and 1979. The sedimentary formations exposed in the islands are composed mainly of sandstones and shale. Geological charts are available from a descriptive guide to the facies and sources of deposits from the Miocene in southern California and in the northwest of Baja California (SEPM, 1979).

The islands are in the Pacific plate. The rocks are in general igneous, metamorphic and sedimentary, and the sea floor sediment is mainly sand, silt and clay. The coastal zone of the islands comprises beaches, cliffs, dunes, coastal lagoons and bays. A narrow continental shelf surrounds the islands (Arriaga-Cabrera et al, 1998).

Feature condition and future outlook of the proposed area

The Coronado islands have been proposed as a Marine Priority Area in Mexico (Arriaga-Cabrera et al. 1989). Traditional sustainable economic activities include pelagic fisheries and extraction of seaweed, sargassum and invertebrates (including abalone, lobster, and marine culture of urchin and bivalves). The area serves as a link to coastal protected areas in the region (i.e., Punta Banda Estuary near Ensenada). In addition, this is a natural corridor for migratory bird and mammal species. Dunes, among other coastal ecosystems, are at risk due to their closeness to the mainland. This is an area important for national ecotourism. Macroalgae such as kelp sustain a great diversity of species, including some that are important for the fisheries of both Mexico and USA (Arriaga-Cabrera, 1998). The area was affected by the local fishery in recent decades, including those of the larger pelagic species (e.g., mackerel, tuna and marlin) (Morgan et al. 2005). Introduced species are being successfully eradicated (Case et al., 2002), due to successful conservation activities and programmes, and sustainable management, carried out conservation organizations, such as Greenpeace, Universidad Autónoma de Baja California (UABC), Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), Instituto Nacional de la Pesca (INP) Centros Regionales de Investigación Pesquera (CRIP - La Paz), Biopesca, Proesteros, Pronatura, Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP) and Federation of Fishery Cooperatives programmes (Benitez et al., 1999).

These islands overlap the Ensenadense marine prioritary region of CONABIO in 98% of its coverage, the "Bahía Todos Santos" AICA in 13% of its coverage; 40% of the area overlaps the "Lower Bight of the Californias/Islas Coronados" priority conservation area of the Baja California to Bering Sea Marine Conservation Initiative (Commission for Environmental Cooperation) and is part of the Western Hemisphere Shorebird Reserve Network.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.		X		
Explanation for ranking The Coronado Islands are typical coastal islands of the California Current System.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.			X	
Explanation for ranking The Coronado Islands are important for connectivity within the island region as one of several stepping stones for invertebrates and vertebrates that breed and find refuge within the submerged vegetation. Many of these species are economically sustainable, such as marine algae *Macrocystis* spp., *Gelidium robustum*, *Chondracantus canaliculatus*, and associated invertebrates, including the red and purple *Strongylocentrotus* spp., oysters, abalone (*Haliotis* spp.), mussels, lobster (*Panulirus* spp.), sardine (*Sardinops* sp.), mackerel (*Scomber japonicus*) and other fish. Almost all the fishery extractions have					

been regulated in recent years. *C. canaliculatus* provides an important activity for marginalized groups. The Coronado Islands contribute much to marine mammals and marine birds, likely due to the connectivity of diverse species along their migratory routes, providing them food and shelter.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.		X		
Explanation for ranking The Coronado Islands provide habitats for recovery of species, none of which are endangered or threatened. It provides services typical of coastal islands along the California Current System.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
Explanation for ranking Current and potential activities of highest impact in the Coronado Islands include the fishery at the artisanal, illegal, semi-industrial and industrial levels, including the tuna fleets for *Thunnus thynnus* and the culture of bivalves. In addition, ecotourism could have a lesser impact on the environment than urban development due to the proximity of the islands to the mainland and the need to develop infrastructure for ecotourism and attend fishery basic needs. The islands undergo a reduction of fresh water through deforestation, opening of agricultural areas and construction of roads. The channeling of the River Tijuana and its input to the islands' coastal zone is evident. The exploitation of geothermal resources, oil and minerals (phosphate) has been foreseen. Major impacts on the marine environment in the Coronado Islands include pollution by urban waste water from irregular human settlements in Tijuana and Ensenada, garbage, and introduced species. Abalone, sea urchins *(Strongylocentrotus franciscanus* and *S. purpuratus)*, sea cucumber and the *Sebastes sp*. fish are also over-exploited. Other species are moderately extracted, and some are being cultured.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Seasonal upwelling at the coast is forced by winds. Primary production rate and chlorophyll accumulation begin as soon as the mixed layer begins to deepen in the autumn. As noted previously, in the offshore areas chlorophyll values peak in midwinter and primary productivity rate slows again with the shoaling of the thermocline in spring. The upwelling cells generate diatom-copepod assemblages of remarkably low diversity. These upwelling events are associated with the location of the large, filter-feeding copepod that characterize the zooplankton biomass maximum. Early in the winter these aggregate near the bottom, but the layers progressively shoal as oxygen concentration in the bottom water progressively declines, as in the case of the Santa Barbara Basin (Osgood and Checkly, 1997a, b). This is an area of importance for feeding, refuge, reproduction and nesting of diverse species of marine birds, invertebrates, marine turtle (*Chelonia mydas)* and marine mammals, including sea elephants and seals.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking Many of the taxa occurring in the Coronado Islands hold a large species diversity. These groups include					

phytoplankton, zooplankton, echinoderms, polychaetes, molluscs, crustaceans, other invertebrates, fish, sea turtles, marine birds, marine mammals, macroalgae and seagrass.

Among the key species, the following have been recognized: the extended banks of kelp and Sargassum and the dune vegetation *Carpobrotus aequilateris*.

As flag species the following have been recognized: The grey whale *Eschrichtius robustus*, diverse species of abalone, lobsters and kelp.

The following species are abundant in the Coronado Islands: *Synthliboramphus hypoleucus;* diverse larvae of invertebrates related to the convergent currents.

The following endemic plants occurr on the islands: *Agave shawii, Aesculus spp., Sarcostemma arenaria, Adenothamnus validus, Ambrosia chenopodiifolia, Coreopsis maritima, Haplopappus arenarius, H. berberidis, H. palmeri, H. venetus, Hazardia berberidis, H. orwtti, Hemizonia greeneana, Bergerocactus emoryi, Echinocereus maritimus, Ferocactus viridescens, Lemairocereus thurberi, Atriplex julaceae, Dudleya ingens, Phacelia spp., Salvia munzii, Lathyrus latifolius, Lotus distidus, L. watsonii, Fraxinus trifoliata, Stipa diegoensis, Eriogonum fasciculatum, E. grande, Ceanothus verrucosus, Rhamnus insula, Cneoridium dumosum, Ptelea aptera, Ribes tortuosum, R. viburnifolium* and *Galvezia juncea.*

The reptiles include the rattlesnake *Crotalus viridus caliginis*, the Coronado lizard *Anniella pulchra pulcra* and among the mammals the Coronado rat *Neotoma bunkeri*.

The degree of environmental heterogeneity is related to the large scale and landscape diversity of oceanic conditions, coastal hydrography, topography and marine habitats, including seagrass beds, coastal lagoons, kelp beds and Sargassum. This diversity, including that on land, has been recognized among the valuable ecosystem services that these island provide as fisheries, aquaculture, tourism and environmental education.

Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		

Explanation for ranking
The Coronado Islands do not have a high degree of naturalness. Their proximity to the coast and the uses to which they have been subjected have modified the islands, which show a certain degree of human disturbance.

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Maps and Figures

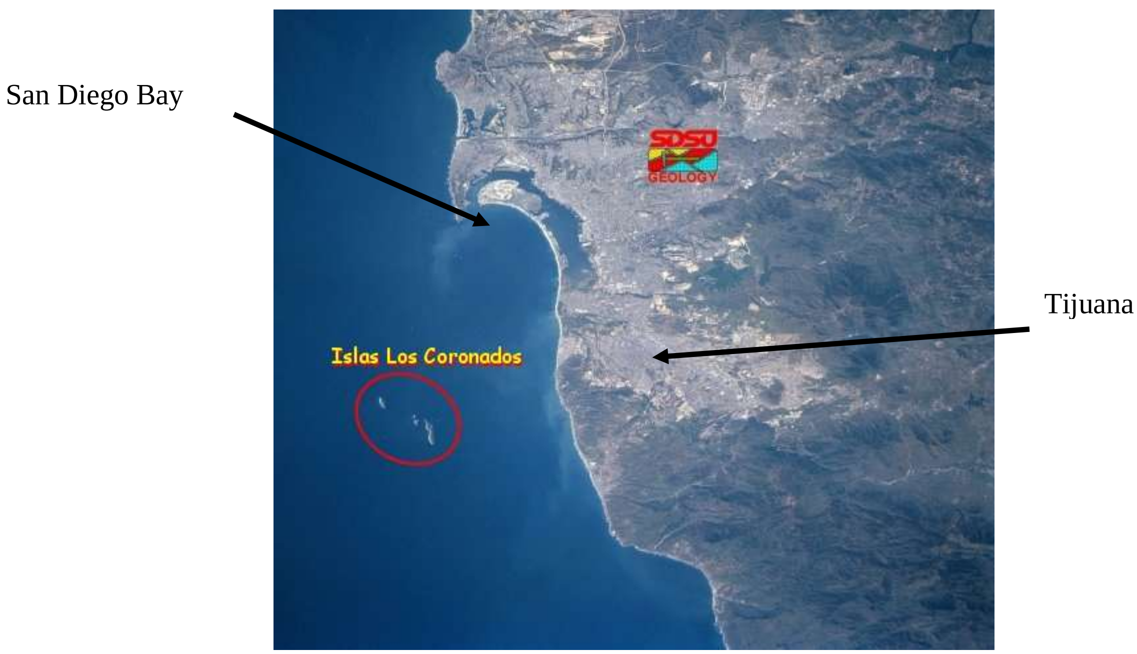

Figure 1. Location of Coronado islands to the west of the Baja California coast and to the south of California.

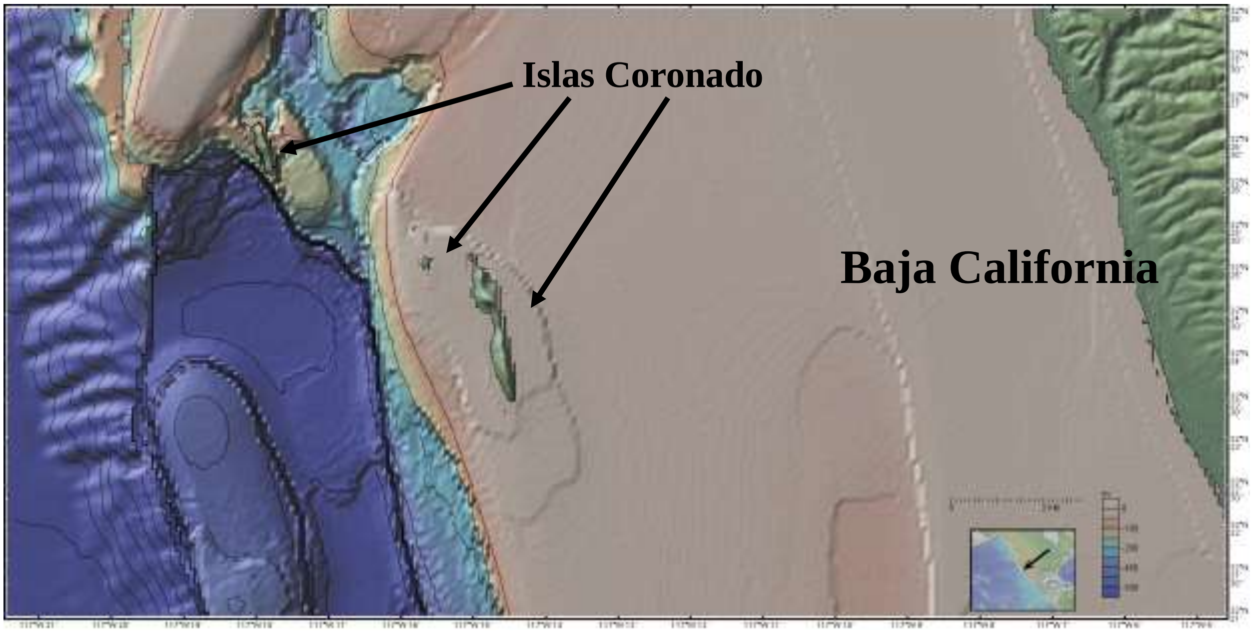

Figure 2. Bathymetry in the Coronado Islands and area displaying the softness and evenness of the shallow margin.

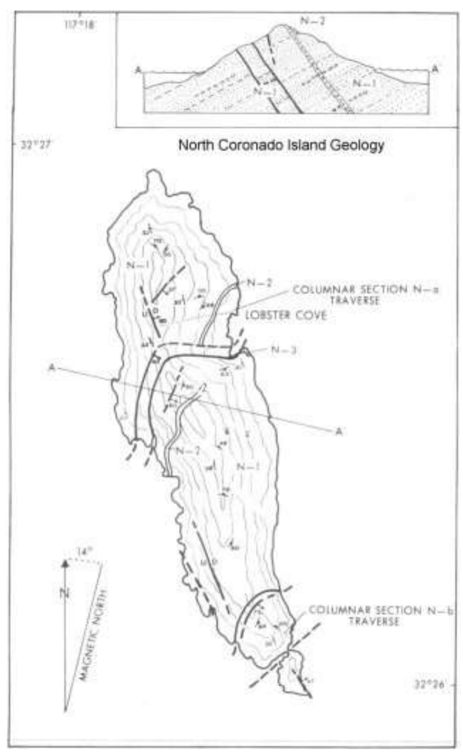

Figure 3. Geology of Isla Coronado Norte.

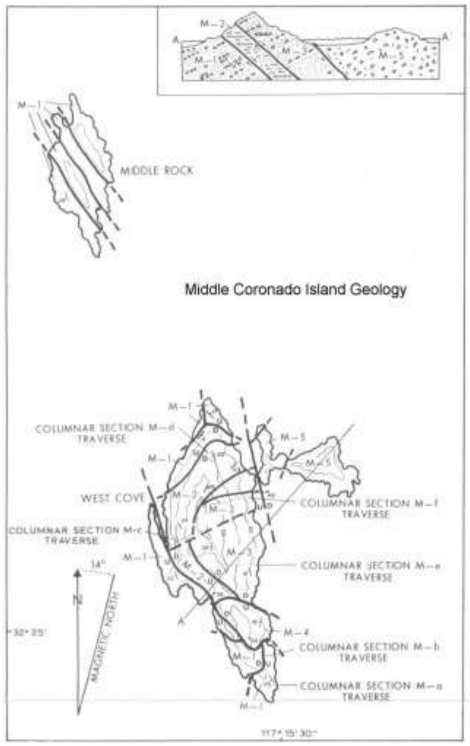

Figure 4. Geology of middle Coronado.

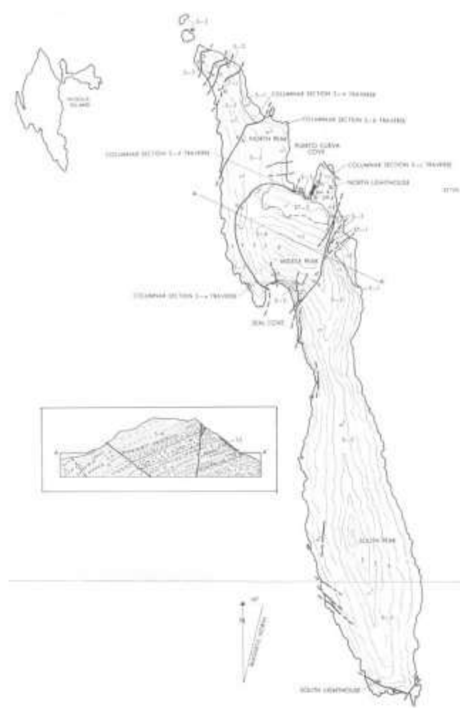

Figure 5. Geology of Isla Coronado Sur.

Figure 6. Geology of the northern tip of Isla Coronado Sur.

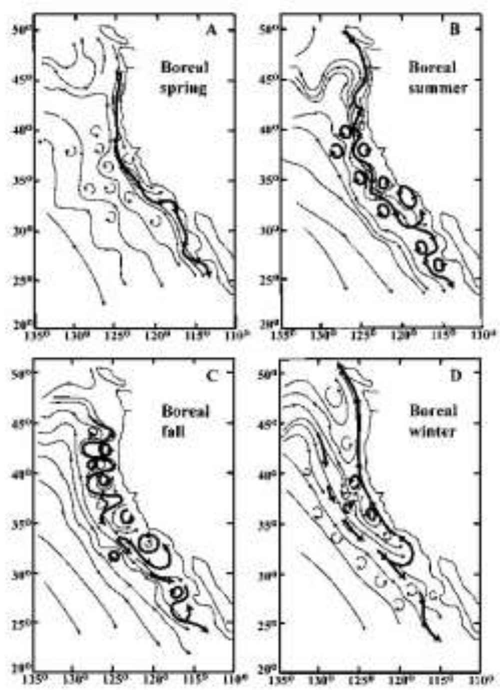

Figure 7. Seasonal variability of the California Current, meander and gyre formation in the region.

Figure 8. Area meeting EBSA criteria.

Table 1. Protected species recorded on this site

Group	Family	Species		NOM-059-SEMARNAT	IUCN Red List Category
Plants	Cactaceae	*Ferocactus*	*viridescens*	Endangered. Endemic	
	Juncaginaceae	*Triglochin*	*concinnum*	Endangered	
Reptiles	Anniellidae	*Anniella*	*pulchra*	Subject to special protection	
	Anguidae	*Elgaria*	*multicarinata*	Subject to special protection	
	Cheloniidae	*Chelonia*	*mydas*	In danger of extinction	EN A1bd ver 2.3 (1994)
Birds	Accipitridae	*Haliaeetus*	*leucocephalus*	In danger of extinction	
	Alcidae	*Ptychoramphus*	*aleuticus aleuticus*	Endangered	
	Alcidae	*Ptychoramphus*	*aleuticus aleuticus*	Endangered	
	Alcidae	*Synthliboramphus*	*craveri*	Endangered	VU B1+2e, C1 ver 2.3 (1994)
	Alcidae	*Synthliboramphus*	*hypoleucus*	In danger of extinction	VU B1+2de, C1 ver 2.3 (1994)

	Emberizidae	*Passerculus*	*sandwichensis beldingi*	Endangered	
	Emberizidae	*Melospiza*	*melodia coronatorum*	In danger of extinction. Endemic	
	Falconidae	*Falco*	*peregrinus*	Subject to special protection	
	Fringillidae	*Carpodacus*	*mexicanus clementis*	In danger of extinction. Endemic	
	Hydrobatidae	*Oceanodroma*	*homochroa*	Endangered	LR/nt ver 2.3 (1994)
	Hydrobatidae	*Oceanodroma*	*leucorhoa willetti*	In danger of extinction	
	Hydrobatidae	*Oceanodroma*	*melania*	Endangered	
	Hydrobatidae	*Oceanodroma*	*microsoma*	Endangered	
	Laridae	*Larus*	*heermanni*	Subject to special protection	LR/nt ver 2.3 (1994)
	Laridae	*Larus*	*livens*	Subject to special protection	
	Laridae	*Sterna*	*antillarum*	Subject to special protection	
	Laridae	*Sterna*	*antillarum browni*	In danger of extinction. Endemic	
	Laridae	*Sterna*	*elegans*	Subject to special protection	LR/nt ver 2.3 (1994)
Mammals	Eschrichtidae	*Eschrichtius*	*robustus*	Subject to special protection	LR/cd ver 2.3 (1994)
	Muridae	*Neotoma*	*bunkeri*	Probably extinct in the wild. Endemic	EN B1+2c ver 2.3 (1994)
	Otariidae	*Zalophus*	*californianus*	Subject to special protection	
	Phocidae	*Mirounga*	*angustirostris*	Endangered	
	Phocidae	*Phoca*	*vitulina*	Subject to special protection	
	Ziphiidae	*Ziphius*	*cavirostris*	Subject to special protection	DD ver 2.3 (1994)

Table 2. Species listed in the National Fisheries Chart

Group	Target species
Abalone	*Haliotis corrugada*
	Haliotis cracherodii
	Haliotis fulgens
	Haliotis rufescens
	Haliotis sorenseni
Algae	*Gelidium robustum*
	Gracilariopsis lemaneiformis
Clams	*Anadara tuberculosa*

	Argopecten irradians concentricus
	Atrina maura
	Atrina tuberculosa
	Chione californiensis
	Chione undatella
	Lyropecten subnodosus
	Megapitaria squalida
	Pecten vogdesi
	Pinna rugosa
	Spondylus calcifer
	Tivela stultorum
Tuna	*Auxis thazard*
	Katsuwonus pelamis
	Thunnus albacares
	Thunnus obesus
	Thunnus thynnus
Crabs	*Cancer antennarius*
	Cancer anthonyi
	Cancer gracilis
	Cancer magister
	Cancer productus
Snail	*Megastraea turbanica*
	Megastraea undosa
Sea urchin	*Strongylocentrotus franciscanus*
	Strongylocentrotus purpuratus
Bluecrab	*Callinectes arcuatus*
	Callinectes bellicosus
	Callinectes toxotes
Lobster	*Panulirus gracilis*
	Panulirus inflatus
	Panulirus interruptus
Mussel	*Modiolus capax*
	Mytilus californianus
Fish	*Brotula clarkae*
	Caranx caballus
	Caulolatilus affinis
	Citharichthys xanthostigma
	Cynoscion parvipinnis
	Cynoscion xanthulus
	Diplectrum pacificum
	Epinephelus acanthistius
	Epinephelus analogus
	Epinephelus itajara
	Epinephelus niphobles
	Euthynnus lineatus
	Hippoglossina stomata
	Hippoglossina tetrophthalmus
	Merluccius productus

	Microstomus pacificus
	Mugil cephalus
	Mugil curema
	Mugil hospes
	Mustelus lunulatus
	Mycteroperca xenarcha
	Paralabrax auroguttatus
	Paralabrax clathratus
	Paralabrax loro
	Paralabrax maculatofasciatus
	Paralabrax nebulifer
	Paralichthys aestuarius
	Paralichthys californicus
	Paralichthys woolmani
	Pleuronichthys guttulatus
	Scomberomorus concolor
	Scomberomorus sierra
	Scorpaena guttata
	Sebastes atrovirens
	Sebastes paucispinis
	Selar crumenophthalmus
	Semicossyphus pulcher
	Seriola lalandi
	Seriola peruana
	Seriola rivoliana
	Sphyraena ensis
	Stereolepis gigas
	Xystreurys liolepis
Smaller pelagic	*Engraulis mordax*
	Sarda chiliensis
	Sardinops sagax
	Scomber japonicus
	Trachurus symmetricus
Kelp	*Macrocystis pyrifera*
Coastal shark	*Carcharhinus falciformis*
	Carcharhinus leucas
	Mustelus henlei
	Sphyrna zygaena
Offshore shark	*Alopias pelagicus*
	Sphyrna lewini

Area No. 12: Guadalupe Island, Mexico

Abstract

Guadalupe Island is an oceanic island of volcanic origin in the Mexican EEZ, 241 km to the west of the Baja California Peninsula. It occurs on the Pacific tectonic plate and hosts two shield volcanoes. The rock composition is seven-million-year-old metamorphic basalts. The continental shelf is narrow. The immediate oceanic system is highly productive due to upwelling and supports large populations of endemic marine birds, invertebrates, fish and marine mammals. This is one of the few places in the world where certain marine birds reproduce and where marine mammals and birds raise their young. Its relevance in addition to endemic species and large aggregations of marine birds, mammals and large pelagics is its connectivity to other populations along the California current system. It hosts many terrestrial and marine endemics that are at risk due to the introduction of carnivores and pests; the use of the island's resources for development and settlements is also a threat. Ongoing measures for conservation and rehabilitation are insufficient.

Introduction

Guadalupe Island belongs to the ecoregion of the South Californian Pacific. It is an oceanic island of volcanic origin occuring on the Pacific tectonic plate located in the Mexican EEZ, 241 km to the west of the Baja California Peninsula. The rock composition is seven million-year-old metamorphic basalts, and there are two shield volcanoes located on the island. The continental shelf is narrow. The coastal, neritic and oceanic neighbouring systems are highly productive, attributed on the one hand to the California current upwelling system and on the other to localized eutrophication by runoff. This upwelling system supports large populations of marine birds, invertebrates, fish and marine mammals, some of which are endemic. The island is one of the few places in the world where some of the marine bird species reproduce and where many marine mammals and birds raise their young. In addition to the degree of endemicity of marine species are the large aggregations of marine birds, mammals and larger pelagics on their migratory paths along the California current system. Risks to its biodiversity include introduced carnivores and pests, as well as the growth of fisheries and the use of coastal habitats. Ongoing measures for conservation and rehabilitation are insufficient.

Location

Guadalupe Island is elongated in shape, measuring 33 km long and 10 km wide, and located at 29°2'N and 118°16.6'W. The island is a massif formed on an ocean cortex of the same origin as the Revillagigedo Archipelago and the Alijos Islands.

Feature description of the proposed area

Physiography and geology. Guadalupe Island is of tectonic origin and is located on the Pacific tectonic plate (Figures 2, 3). A currently inactive crest is the base of the island (Lonsdale, 1991; González-Gracia et al., 2003). The origin was a hot plume extending from the Fieberling Guyot (Batiza and Vanko, 1984). Two shield volcanoes grew seven million years ago; the youngest of the two volcanoes is located to the north (Batiza, 1977). The metamorphic rock composition is alkaline, mainly olivine and trachyte basalts. Part of the Guadalupe Rift dispersion centre occurs between the Pacific and Farallon plates (Michaud et al., 2006). The sea floor topography is rugged and covered by non-tectonically perturbed sediments (Krause 1961). The continental shelf is narrow, sloping down to 3000 m.

Oceanographic aspects. The California Current surface water mass is characterized by upwelling. Strong waves and surf have an important role in the generation of narrow beaches. The water temperature ranges between 18 and 22°C. The coastal ecosystems are affected by ENSO, by seasonal hurricanes and cold fronts. Processes like the Ekman transport and convection cells concentrate nutrients at the surface in the form of nitrates, nitrites, phosphates and silicates. The resulting primary productivity is high. The coastal wind regime is weaker at this latitude in comparison to the northern portion of the California current but has been recognized as being favourable for generating upwelling year-round, showing some seasonality in the chlorophyll field. The major monitoring programme IMECOCAL has recognized the seasonal deepening of the pycnocline and the dynamic generation of mesoscale features characterized by high primary production rates and chlorophyll accumulation.

Feature condition and future outlook of the proposed area

Guadalupe Island urgently needs a conservation and restoration programme to control terrestrial and marine invasive species. To improve the vulnerable conditions to which the marine coastal ecosystems are exposed, a programme for vegetation recovery and for eradication of exotic species was created decades ago. In addition, an expansion of the programme 10 nautical mile from the coast will monitor oceanic conditions, which will help to understand the connectivity of the marine fauna with the other islands along the California Current System.

The island is characterized by terrestrial and marine endemics, whose populations are declining with the increasing ecotourism activities, development and deforestation. Regarding terrestrial vegetation, 56% are endemic, 30 of which are under threat or extinct. Twenty three percent of the bird species recorded here are resident, 44% overwinter, 23% are occasional and 10% migratory. Fifty-three terrestrial bird species and subspecies occur on the island, nine of which are endemics that depend on the *Cupressus guadalupensis* forest, which is being cut down for housing and for goat fodder. Its 90 insect species include 11 spiders and three endemics: *Garypus guadalupensis*, *Herpyllus giganteus* and *Sergiolus guadalupensis.* The island's 193 mollusk species include 10 endemics, 211 algal species, 14 snail species or subspecies and 11 endemics. All of the island's endemics are being affected by mice, rats, cats and dogs, all of which have been introduced. Relict species are being reintroduced to the region, providing an opportunity to recover native species diversity.

Planned conservation and management projects: These include a reserved zone for hunting and fishing of animals and plants (1928), a Special Biosphere Reserve "Isla de Guadalupe" (1982), priority sites for conservation (CONABIO, 1996); Guadalupe island and smaller nearby Isla Toro and Isla Zapato, Orly are decreed as national protected areas. Ongoing and future research programmes rely on scientific institutions (UNAM, UABC, CICESE). Other plans include the placement of 14 isolation areas for vegetation and the control of feral species with the support of local cooperatives.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.		X		
Explanation for ranking The area is a typical oceanic island of the California Current System; the major impacts are related to development and fishery settlements.					
Special importance	Areas that are required for a population to survive and thrive.				X

for life-history stages of species					
Explanation for ranking Guadalupe Island is highly important for its connectivity with the islands and borderlands within the California Current system. It serves as a stepping stone in the region for algae, invertebrates and vertebrates. Visiting and resident populations of vertebrates feed, reproduce, breed and find shelter here. Many species are economically important: marine algae *Macrocystis* spp., *Gelidium robustum* and *Chondracanthus canaliculatus*, red and purple sea urchins *Strongylocentrotus* spp., oysters, abalone *Haliotis* spp., mussels, lobster (*Panulirus* spp.), sardine (*Sardinops* sp.) and mackarel (*Scomber japonicus*). The populations of many of these species are connected through Guadalupe Island to the other islands along the California Current System, upon which these marine mammals and birds depend.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.			X	
Explanation for ranking Guadalupe Island provides rocky habitat for both coastal and open-ocean species. Some of the species are resources being exploited or species being indirectly or directly affected by human activities. The large diversity of habitats provides options to recruit and colonize, maintaining stable populations. Some mammals, including blue and bearded whales, visit the island for shelter and food supply. Marine birds nest and reproduce on the island. Diverse invertebrates find shelter in the extended algal prairies, which have been inadequately studied.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
Explanation for ranking Activities with the highest impact include ecotourism, whereby bait is set to attract white sharks, affecting the areas where seals reproduce and raise their pups; there is some litter and pollution from settlements, which has local impact on water quality and eutrophication; and there is medium effect by the sports fishery and industrial fishery involving large pelagic and finfish—the artisanal fishery is ranked low impact, extracting mostly algae (*Macrocystis* spp.) and reducing habitat of some of the key invertebrate species. There is a problem with deforestation affecting input of soil to the coastal waters and eutrophication affecting coastal species. Urban development is affecting natural coastal habitats through the extraction of coastal resources for food and materials to build temporary and long-term settlements. Invasive species, such as rats, cats and dogs associated with fishers and new settlements on the island are affecting the resting sites and lives of marine mammals and the nesting sites of marine birds. Endemic terrestrial fauna and flora are declining. Some of the life stages of some marine species are being negatively affected, and the survival of some of these species could thus be at risk in a few years. Unsustainable extraction of natural resources, including overexploitation of white sharks (*Carcharodon carcharias),* requires monitoring.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking Coastal upwelling is important supporting diatom-copepod assemblages of remarkably low diversity. The					

copepod *C. pacificus* comprises 77% of the dry weight of the zooplankton on the coast.

Large species of diatoms support 80% of algal biomass. The copepods and the galatheid crab *Pleuroncodes* are food sources for yellowfin tuna and for birds and marine invertebrates on the island and visiting marine mammals.

Benthic and fish diversity is high. Invertebrate and fish species contribute to the economy through the following coastal fisheries: sardina (*Sardinops saga*), salmoneta (*Pseudupeneus dentatus*), abalone (Haliotis sp.), lobster (*Panilurus sp.),* jurel (*Seriola* sp.), tuna (*Thunnus germo*) and albacore *(Thunnus alalunga).*

Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X

Explanation for ranking
Biodiversity on Guadalupe Island is high and is represented by coastal invertebrates, fish and large vertebrates that visit or use the area. The most diverse taxa include phytoplankton, algae, mollusks, polychaetes, echinoderms, crustacea, fish, turtles, birds and marine mammals.

Flag species are the albatross *(Diomedea inmutabilis)*, the butterfly fish *Chaetodon falcifer,* and the marine mammals *Mirounga angustirostris* and *Arctocephalus townsendi.*

Endemicity is recorded in marine mammals, including the Guadalupe fur seal *(Arctocephalus townsendi)*, birds (*Junco insularis*, *Carpodacus mexicanus amplus*, *Salpinctes obsoletus guadalupensis*, *Pipilo erythrophthalmus consobrinus, Regulus calendula obscurus, Polyborus lutosus, Oceanodroma macrodactyla, Thryomanes bewickii brevicauda*), fish (*Chaetodon falcifer)* and some terrestrial plants. Another important endemic group is the macroalgae, abalone and several invertebrates.

Marine habitat heterogeneity is high in the island, represented by open-ocean habitats, benthic escarpments, canyons, slopes, bays, beaches and algal habitat.

Ecological integrity is high in open-ocean water, less so in coastal waters, lower in terrestrial habitats along the coast.

Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	

Explanation for ranking
Guadalupe Island is the only place where the Guadalupe fur seal *(Arctocephalus townsendi)* breeds and nurses and one of the important sites in the eastern Pacific for the marine elephant to breed (*Mirounga angustirostris).* It is considered among the few locations where an important population of albatross *(Diomedea inmutabilis)* occurs in the eastern subtropical Pacific.

The isolation and natural conditions of the Pacific oceanic islands have allowed a large number of endemics to occur and provided a special site for reproduction, feeding and shelter for diverse birds, reptiles, mammals. Data is lacking regarding the variability of many of the populations, and this represents an opportunity for international collaboration.

This is the westernmost island in the Mexican EEZ, and its extreme isolation has led to one of the most distinctive ecosystem in North America, harbouring endemic terrestrial plants and animals.

This island is important because it is used by different species to feed, reproduce and nest, develop and grow, i.e., abalone and lobsters (feeding and reproduction), white shark (*Carcharodon carcharias)* (feeding), pinnipeds (raising, feeding), marine birds (reproduction, raising), and the marine mammals Guadalupe fur seal *(Arctocephalus townsendi)*, California seal (*Zalophus californianus)*, marine elephant (*Mirounga angustirostris)*, orca (*Orcinus orca*), Baird whale (*Berardius bairdii*), white-sided dolphin

(*Lagenorhynchus obliquidens)*, and salmon shark (*Lamna ditropis*) use it as part of their migratory route. The marine mammals Guadalupe fur seal *(Arctocephalus townsendi)*, marine elephant (*Mirounga angustirostris)*, gray whale (*Eschrichtius robustus)* and California seal (*Zalophus californianus)* reproduce on the island.

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Maps and Figures

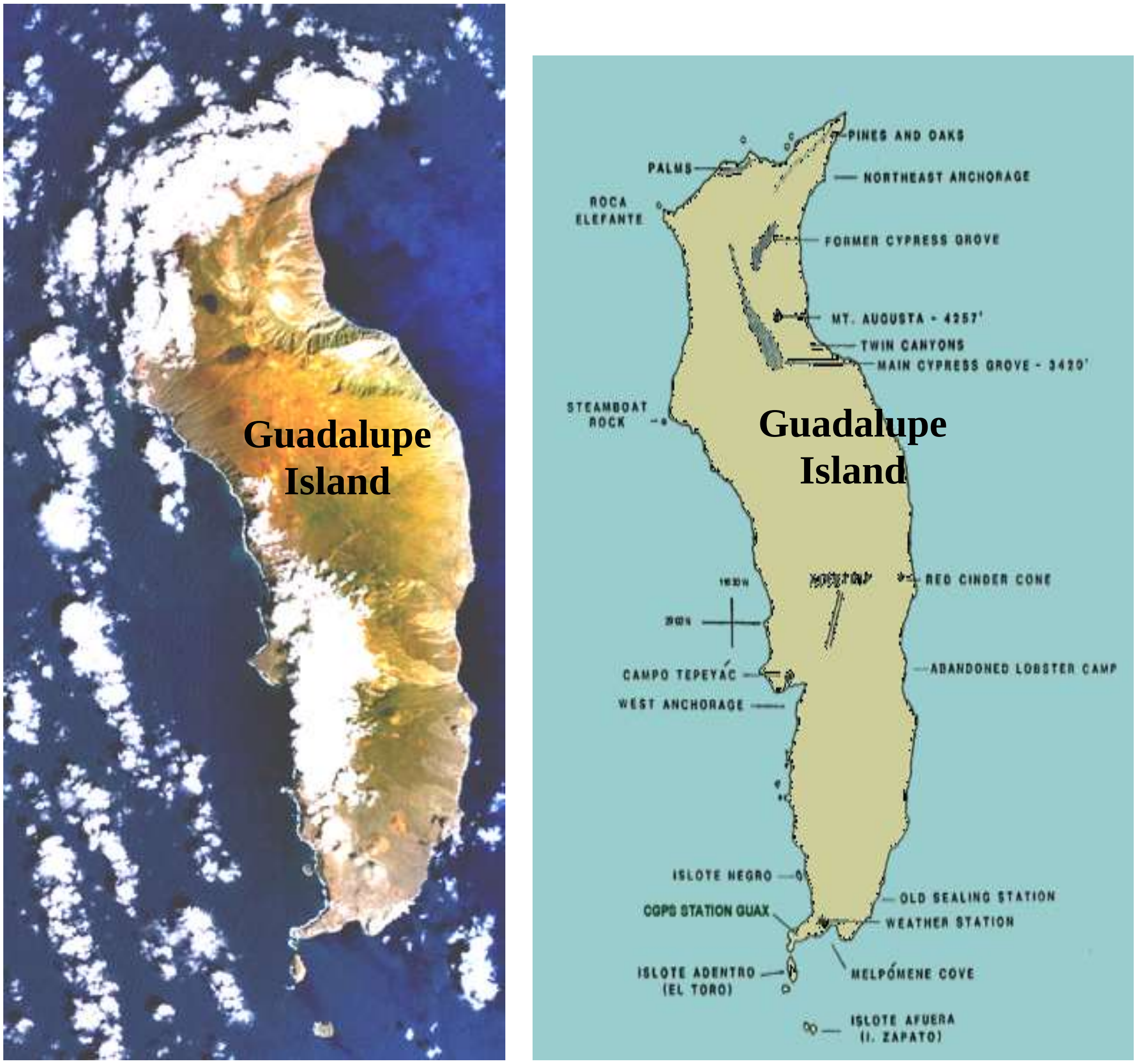

Figure 1. Guadalupe Island view and locations.

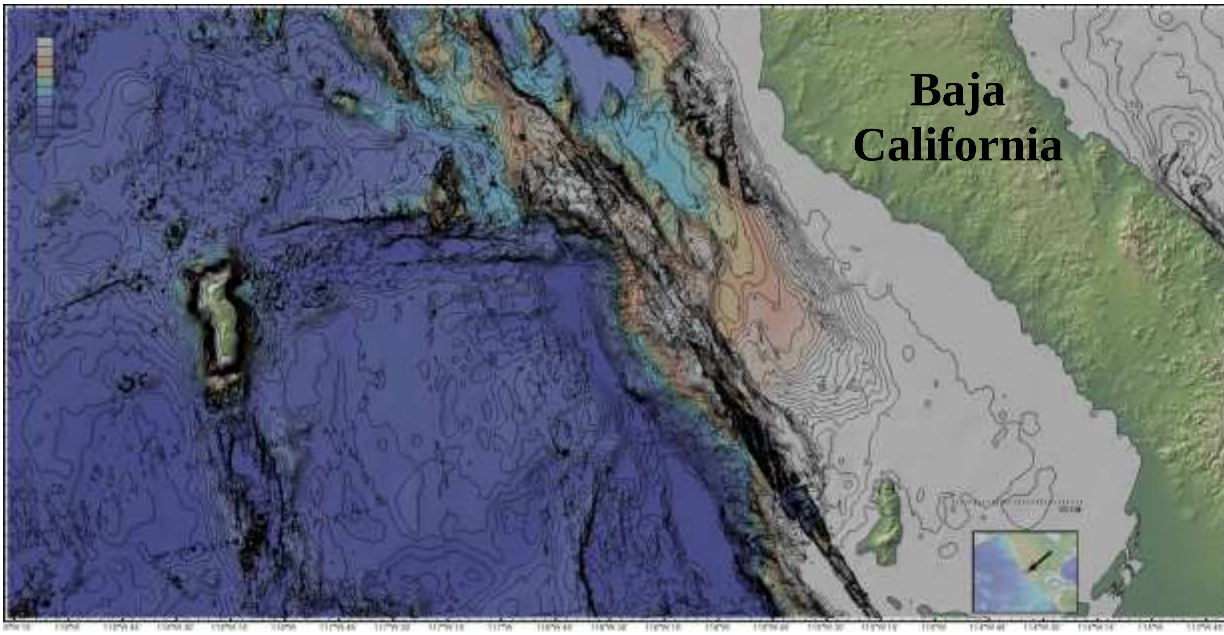

Figure 2. Bathymetry of Guadalupe Island to the west of the Baja California Peninsula.

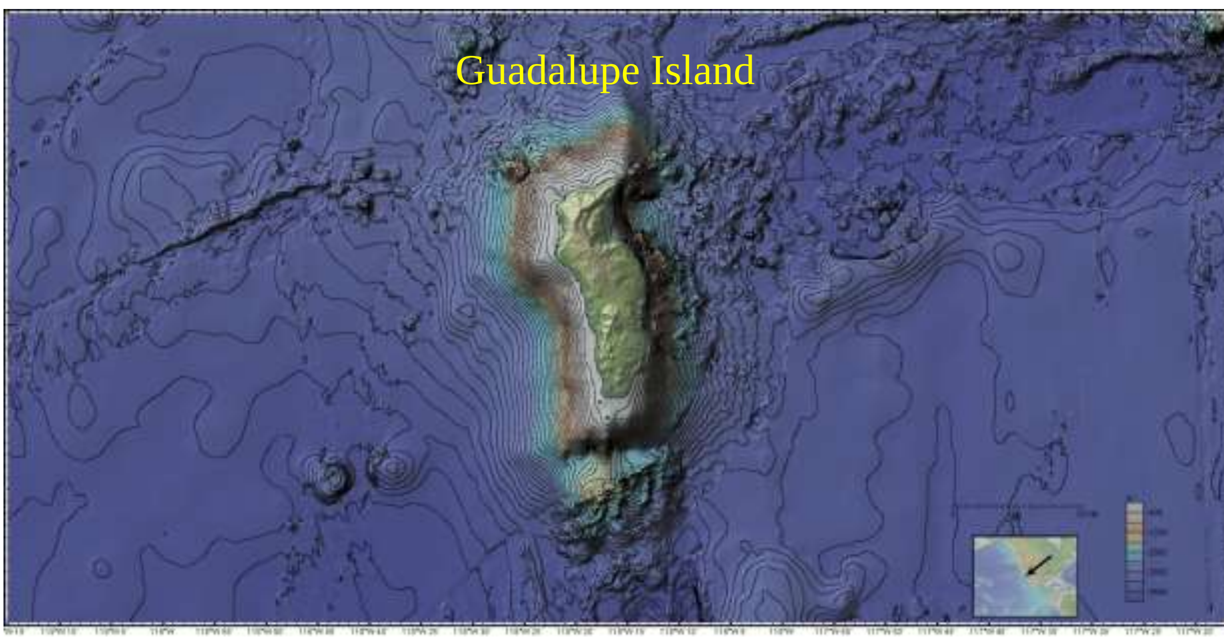

Figure 3. Swath bathymetry of the sea floor surrounding Guadalupe Island.

Figure 4. Area meeting EBSA criteria.

Table 1. Protected species of Guadalupe Island

Group	Family	Species		NOM-059-SEMARNAT-2001 Category	IUCN Red List Category
Plants	Cactaceae	*Ferocactus*	*johnstonianus*	Subject to special protection. Endemic	
	Cactaceae	*Mammillaria*	*blossfeldiana*	Subject to special protection . Endemic	
	Cupressaceae	*Cupressus*	*guadalupensis guadalupensis*		CR B1+2c ver 2.3 (1994)
	Cupressaceae	*Juniperus*	*californica*	Subject to special protection	
	Palmae	*Brahea*	*edulis*	Subject to special protection. Endemic	EN C1 ver 2.3 (1994)
	Pinaceae	*Pinus*	*muricata*	In danger of extinction	LR/nt ver 2.3 (1994)
Fish	Lamnidae	*Carcharodon*	*carcharias*	Threatened	VU A1cd+2cd ver 2.3 (1994)
	Pomacanthidae	*Chaetodon*	*falcifer*	Subject to special protection. Endemic	
Reptiles	Cheloniidae	*Caretta*	*caretta*	In danger of extinction	EN A1abd ver 2.3 (1994)
	Cheloniidae	*Chelonia*	*mydas*	In danger of extinction	EN A1bd ver 2.3 (1994)
	Cheloniidae	*Eretmochelys*	*imbricata*	In danger of extinction	CR A1bd ver 2.3 (1994)
	Dermochelyidae	*Dermochelys*	*coriacea*	In danger of extinction	CR A1abd ver 2.3 (1994)
Birds	Alcidae	*Synthliboramphus*	*craveri*	Threatened	VU B1+2e, C1 ver 2.3 (1994)
	Alcidae	*Synthliboramphus*	*hypoleucus*	In danger of extinction	VU B1+2de, C1 ver 2.3 (1994)
	Diomedeidae	*Phoebastria*	*immutabilis*	Threatened	VU A4bd ver 3.1 (2001)
	Diomedeidae	*Phoebastria*	*nigripes*	Threatened	
	Emberizidae	*Junco*	*hyemalis insularis*	In danger of extinction. Endemic	CR B1+2abce, C2b ver 2.3 (1994)
	Emberizidae	*Pipilo*	*erythrophthalmus consobrinus*	Most probably extinct in natural wildlife. Endemic	
	Falconidae	*Falco*	*peregrinus*	Subject to special protection	

	Fringillidae	*Carpodacus*	*mexicanus amplus*	In danger of extinction. Endemic	
	Hydrobatidae	*Oceanodroma*	*macrodactyla*	Most probably extinct in the wild. Endemic.	CR D ver 2.3 (1994)
	Hydrobatidae	*Oceanodroma*	*melania*	Threatened	
	Laridae	*Larus*	*heermanni*	Subject to special protection	LR/nt ver 2.3 (1994)
	Picidae	*Colaptes*	*auratus rufipileus*	Most probably extinct in the wild. Endemic	
	Procellariidae	*Puffinus*	*opisthomelas*	In danger of extinction	VU A1ce, B1+2abce ver 2.3 (1994)
	Regulidae	*Regulus*	*calendula obscurus*	In danger of extinction. Endemic	
	Sittidae	*Sitta*	*canadensis*	Most probably extinct in the wild	
	Troglodytidae	*Salpinctes*	*obsoletus guadeloupensis*	In danger of extinction. Endemic	
	Troglodytidae	*Thryomanes*	*bewickii brevicauda*	Most probably extinct in the wild. Endemic	
Mammals	Delphinidae	*Lagenorhynchus*	*obliquidens*	Subject to special protection	
	Delphinidae	*Orcinus*	*orca*	Subject to special protection	LR/cd ver 2.3 (1994)
	Eschrichtidae	*Eschrichtius*	*robustus*	Subject to special protection	LR/cd ver 2.3 (1994)
	Mustelidae	*Enhydra*	*lutris*	In danger of extinction	EN A1ace ver 2.3 (1994)
	Otariidae	*Arctocephalus*	*townsendi*	In danger of extinction. Endemic	VU D2 ver 2.3 (1994)
	Otariidae	*Zalophus*	*californianus*	Subject to special protection	
	Phocidae	*Mirounga*	*angustirostris*	Threatened	
	Ziphiidae	*Berardius*	*bairdii*	Subject to special protection	LR/cd ver 2.3 (1994)

Table 2. Species lists from the National Fisheries Chart

Group	Target species
Clam	*Anadara tuberculosa*
	Argopecten irradians concentricus
	Atrina maura
	Atrina tuberculosa
	Chione californiensis
	Chione undatella
	Lyropecten subnodosus
	Megapitaria squalida
	Pecten vogdesi
	Pinna rugosa
	Spondylus calcifer
	Tivela stultorum
Tuna	*Auxis thazard*
	Katsuwonus pelamis
	Thunnus albacares
	Thunnus obesus
	Thunnus thynnus
Bluecrabs	*Callinectes arcuatus*
	Callinectes bellicosus
	Callinectes toxotes
Lobster	*Panulirus gracilis*
	Panulirus inflatus
	Panulirus interruptus
Fish	*Balistes polylepis*
	Bodianus diplotaenia
	Caulolatilus affinis
	Cynoscion othonopterus
	Cynoscion parvipinnis
	Cynoscion xanthulus
	Epinephelus acanthistius
	Epinephelus analogus
	Epinephelus niphobles
	Euthynnus lineatus
	Hippoglossina stomata
	Hippoglossina tetrophthalmus
	Merluccius productus
	Microstomus pacificus
	Paralabrax auroguttatus
	Paralabrax clathratus
	Paralabrax loro
	Paralabrax maculatofasciatus
	Paralabrax nebulifer
	Paralichthys aestuarius
	Paralichthys californicus
	Paralichthys woolmani

	Pleuronichthys guttulatus
	Scomberomorus concolor
	Scomberomorus sierra
	Scorpaena guttata
	Scorpaena plumieri
	Sebastes atrovirens
	Sebastes paucispinis
	Semicossyphus pulcher
	Trachinotus rhodopus
	Xystreurys liolepis
Smaller Pelagics	*Cetengraulis mysticetus*
	Engraulis mordax
	Etrumeus teres
	Oligoplites refulgens
	Opisthonema bulleri
	Opisthonema libertate
	Opisthonema medirastre
	Sarda chiliensis
	Sardinops sagax
	Scomber japonicus
	Trachurus symmetricus
Coastal Sharks	*Carcharhinus falciformis*
	Carcharhinus leucas
	Carcharhinus limbatus
	Carcharhinus obscurus
	Carcharhinus porosus
	Galeocerdo cuvier
	Ginglymostoma cirratum
	Isurus oxyrinchus
	Mustelus californicus
	Nasolamia velox
	Sphyrna corona
	Sphyrna zygaena
	Squatina californica

Area No. 13: Upper Gulf of California region, Mexico

Abstract

The Colorado River Delta and the upper portion of the Gulf of California have biophysical features, endemic biota and oceanographic characteristics that are unique to this region. Among them are strong tidal mixing due to tidal movements and the influx of fresh water in the delta area, which depends on the release of water from the Colorado River, currently severely reduced due to damming and irrigation use. Extensive sediment beds deposited here over a long period concentrate the nutrients that make this area extremely productive. The presence of endemic species is another feature, including the Gulf of California porpoise or *vaquita*, in danger of extinction, and the totoaba, a marine fish that is also endangered. The area is also important for fin whales, common dolphins, sea lions and a multitude of seabird species. The commercial fisheries in the area, both industrial and small-scale, make the marine biota highly vulnerable to human impacts.

Introduction

The Upper Gulf of California spans from the mouth of the Colorado River and includes the delta of this very large river, the tidal flats and primarily shallow areas, products of millions of years of sediments deposited by the river, and deeper areas in basins that extend south and connect into the Midriff Island region. Along both coasts, several islands are used as nesting sites for seabird colonies of gulls, terns, and pelicans. The depth ranges in this area span from shoreline to Wagner Basin, 200 metres deep. The southern limit of this area is an imaginary line from San Felipe, in Baja California, to Puerto Peñasco, in Sonora. It includes the Encantadas Islands. The sea bottom is made of sedimentary rocks covered with lime, mud and silt, with mostly sandy beaches on both sides. The currents move in anti-cyclonic direction, with water circulation dominated by strong tidal forces (tidal energy dissipation of >0.5 W/m^2 reported by Alvarez-Borrego 2002). Temperature ranges from 13 to 31° centigrade, and tidal ranges can be among the largest in the world (>7 m during sping tides reported by Alvarez-Borrego 2002). The area is subject to ENSO events, with occasional influence from summer tropical storms and even hurricanes; red tide events have been reported. The area has high primary productivity values (chlorophyll a values of >10 mg/m^3 reported by Alvarez-Borrego 2002), low eutrophication values, and medium to high levels of nutrients (nitrates, phosphates and silicates). Winter upwelling areas have some of the highest surface nutrient concentrations in any of the oceans of the world (Alvarez-Borrego 2002).

Location

The area is located within Mexico's national jurisdiction and is depicted in Figure 1.

Feature description of the proposed area

The upper Gulf of California has been referred to as a large delta, dominated by the influx of the Colorado River, which shaped its oceanography and productivity, even though the influx of freshwater is greatly reduced from historical amounts and in some years is virtually zero. Important key invertebrate benthic communities inhabit and reproduce in the area, including crustaceans like the target shrimp (*Sicyonia penicillata)* and *Squilla bigelovii*, and other shrimp species (brown and blue). Habitats include tidal flats, salt marshes, hypersaline estuaries, rocky shores, sandy shores and dwarf mangrove forests. The whole area is used for reproduction by both invertebrates and vertebrates. Ecosystem models of the area (Ecosim, Ecopath and Atlantis) show complex food webs, which depend on the high levels of primary productivity, mainly supported by the accumulation of nutrients in the sediments deposited by the river over time. National and international researchers have studied the area extensively. A unique feature of the upper Gulf of California is the presence of disjunct megafauna, in fish like the *totoaba* (*Totoaba mcdonaldi*) and the curvina golfina (*Cynoscion othonopterus*), and in cetaceans such as the *vaquita* porpoise (*Phocoena sinus*). This last species is end emic to this area, and was not observed alive until very recently. The vaquita is critically endangered and threatened with extinction—population numbers were estimated at 241 animals in 2008 (Gerrodette et al. 2011). Other cetaceans, including fin, Bryde, sei whales, common and bottlenose dolphins, also extensively use the area. The rocky islands in the area (Isla San Jorge, Encantadas, San Luis Gonzaga, Montague, Rocas Consag) are used by California sea lions and seabirds (brown pelican, Herman's, yellow-footed gulls) to establish breeding colonies; some seabird species are resident year round, and others migrate north during the summer.

Feature condition and future outlook of the proposed area

The condition of the Colorado River delta is improving due to restoration efforts on the riparian vegetation and agreements with the Mexico/USA border commission to ensure that fresh water reaches the Gulf of California. Intensive research and conservation programmes for *vaquita* recovery are in place; however, the situation apparently is not improving, due to interaction with commercial fisheries (Gerrodete and Rojas-Bracho 2011). The ocean bottom is being disturbed by bottom trawling of shrimp boats, which apparently has a negative effect on the demersal biota. Several research institutions have projects and programmes that continue to produce data, as well as education and outreach opportunities for marine conservation.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No informat ion	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking The *vaquita* porpoise, the *totoaba* and the clapper rail (*Rallus longirostris yumanensis*) are endemic to this area. There are also 22 species of endemic fish, as well as endemic macroalgae (*Chondracantus squarrulosus).* Also found here are the only endemic grasses in the Sonoran Desert region: salt grass or Palmer's grass (*Distichlis palmeri)* (see Glen et al. 1998) and pickleweed (*Suaeda puertopenascoa).*					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking This area is critical to the survival of several endemic species. The area is a critical breeding ground for *curvina golfina* and several species of fish, sharks, rays, and crustaceans.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X

Explanation for ranking Same rationale explained above for *vaquita* porpoise and other endemics and threatened species (listed below), all of them endangered: Macroalgae (*Chondracantus squarrulosus, Eucheuma uncinatum)* regionally endemic Salt grass (*Distichlis palmeri)* Pickleweed (*Suaeda puertopenascoa)* Vaquita marina (*Phocoena sinus)* Colorado River delta grunt (*Colpichthys hubbsi),* Desert pupfish (*Cyprinodon macularius),* Totoaba *(Totoaba macdonaldi),* Curvina golfina *(Cynoscion othonopterus),* plus 22 species of endemic marine fish. Shorebird Yuma clapper rail (*Rallus longirostris yumanensis)* and bald eagle (*Haliaeetus leucocephalus).*					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
Explanation for ranking The Colorado River delta has been severely degraded over many years by the reduced influx of freshwater. In addition, the slow recovery rate of the *vaquita* porpoise population does not allow the population to cope with mortality as a result of fishing gear in addition to natural mortality rates.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking According to the scientific literatures, the area is among the most biologically productive marine areas in the region, due to strong tidal mixing and rich nutrient deposits that maintain primary and secondary productivity high year round.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
Explanation for ranking High levels of endemics bring high genetic diversity to this area. This is important for marine mammals, fish, macroalgae, plants, and some shorebirds.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		
Explanation for ranking The area is impacted by commercial fishing, both industrial and small-scale, coastal aquaculture, and the damming of rivers.					

Maps and Figures

Figure 1. Area meeting EBSA criteria.

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Area No. 14: Midriff Islands region, Mexico

Abstract

The central portion of the Gulf of California is characterized by the presence of two large islands and several small ones, divided by narrow, deep channels that increase current speed, create wind-driven upwelling fronts and eddies, and even further increase primary productivity in this already rich marine area. This area is also where the distance between the coast of Sonora and Baja California is shorter, creating a midriff that is easily visible on maps. The biota of the midriff islands region is rich and diverse. Marine mammal diversity includes almost all large baleen whales, sperm whales, large schools of dolphins and numerous sea lion rookeries. Along the shorelines of the rugged, mountainous and arid islands are several seabird colonies, where important populations nest. Tiny Rasa Island stands out because it is here that a large percentage of the global population of elegant and royal terns and Herman's gulls nest.

Introduction

The Midriff Islands region is perhaps the most diverse and rich marine area in the coastal waters of Mexico. It is referred to in some books as a complete catalogue of oceanographic features in a very small area. The area extends from the north of Angel de la Guarda Island and Tiburón Island, to the south of San Pedro Mártir Island, its southernmost limit. A total of nine islands of volcanic and faulting origin, some very large (Tiburón island is the largest island of México, with over 1,200 hectares) and some very small (Rasa Island is less than 100 hectares), are located in a chain that extends from the Sonoran coast to the Baja California shoreline. Five marine basins with depths ranging from deep and narrow underwater channels, such as the Ballenas Channel, over 1,500 m deep, between Angel de la Guarda island and the Baja California coast, contrasting with Infiernillo channel with an average depth of 5 m, that separate Tiburón Island from the coast of Sonora and with important mangrove estuaries and seagrass beds. In general terms the continental platform can be described as very narrow, with steep rocky slopes that plunge into the deep waters very close to the shoreline. Water in the upper Gulf of California is forced to go through the narrow and mostly deep channels, creating strong currents that create seasonal upwelling areas that are also favoured by prevailing northwest winds in the winter, and southeast winds in the summer. The oceanographic features of this area are well studied and understood (Alvarez-Borrego 2002). The complex mixing of cold, oxygen-rich water, coupled with nutrient-rich waters reaching the surface, produces high primary and secondary productivity almost year round. As a matter of fact, this area is almost isolated from the ENSO effect, maintaining high productivity even in years when the southern Gulf of California waters are affected by warm, less productive water (Tershy et al. 1991). Water temperatures range from 17 to 29°C.

The marine biota in the Midriff Islands region highlights large marine mammals that feed in the zooplankton blooms and large schools of small pelagic fish (Pacific sardine, anchovies, thread herring, mackerel), together with dolphins, seabirds and other filter-feeding marine animals in large feeding concentrations. The studies of large whales show the presence and areas of residence of blue whales (*Balaenoptera musculus*), fin whales (*Balaenoptera physalus*), Bryde's whales (*Balaenoptera edeni*) and minke whales (*Balaenoptera accutorostrata*), (concentrated in the Ballenas Channel and south of Isla Tiburon), and large schools of common dolphins (*Delphinus capenis*), killer whales (*Orcinus orca*) and sperm whales (*Physeter catodon*) (resident around San Pedro Mártir island). Sea lion rookeries are located in Angel de la Guarda, San Esteban, San Lorenzo, and San Pedro Mártir islands.

The seabird colonies are concentrated in Rasa, Salsipuedes, San Lorenzo, Granito, Partida, San Pedro Mártir, Patos and Dátil. The most important species that nest on these isolated and pristine islands are the brown pelican (*Pelecanus occidentalis*), Heermann's gull (*Larus heermanni*), yellow-footed gull (*Larus livens*), elegant tern (*Sterna elegans*), least tern (*Sterna antillarum*), blue-footed boobies (*Sula nebouxii*), brown boobie (*Sula leucogaster*), least petrel (*Oceanodroma microsoma*), storm petrel (*Oceanodroma *melania*) and Craveri's murrelet (*Synthliboramphus craveri*). The role of Rasa Island in the reproduction of terns and Heermann's gulls must be highlighted, as virtually the entire global population nests on this small island.

The seagrass beds of *Halodule wrightii* and *Zostera marina* in the Infiernillo channel area are important feeding areas for black and green sea turtles (*Chelonia mydas*). Tiburon Island and the mainland coast of the Infiernillo channel are the territory of the Comca'ac (seri) indigenous group, which has inhabited this area for at least 2,000 years.

Location

The Midriff Islands region is located within Mexico's national jurisdiction.

Feature description of the proposed area

The Midriff Islands region proposed here includes both the water column and benthic features. The marine ecosystem is mostly pelagic species feeding on zooplankton and small pelagic fish in large concentrations, with some exceptions in the sperm whales feeding on the giant squid stocks. The physical description was presented in the introduction section.

Feature condition and future outlook of the proposed area

The current condition of this area is static, with the drivers of biological productivity (tidal currents, upwellings) active and unaffected by human activities. Among the threats to seabird colonies were introduced species (mostly rats, mice and cats), which have been eradicated. Overfishing has an effect on some fish and invertebrate species. Of particular interest is the commercial fishery of sardines and other species, due to its potential effect on a multitude of species that use these forage species. The constant navigation of oil tankers in this area is a cause of concern due to the danger of an oil spill.

Research in the area is concentrated on marine biodiversity studies, fisheries management, and marine conservation plans and programmes. Trophic modeling studies are underway. Studies of the population dynamics of whales and seabirds on Rasa Island are also ongoing.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking The high ranking is due to a combination of diverse oceanographic features in the water column, rich marine biota, and extremely productive waters year round, even in low productivity years (ENSO years).					
Special importance for life-history stages	Areas that are required for a population to survive and thrive.				X

of species					
Explanation for ranking Rasa Island is a key nesting spot that is vital to the global populations of Heermann's gull, as well as elegant and royal terns. Free of predators, it is having a positive effect on these populations. The island provides feeding sites for several species of marine mammals, many of which are protected and/or endangered.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking The area is very important to protected and/or threatened species of marine mammals and to many seabird species that are declining globally**.**					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking The seabird colonies are fragile and vulnerable to egg-collection, uncontrolled ecotourism, and introduction of exotic species of predators.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.				X
Explanation for ranking The area is extremely productive year round, and its isolation from ENSO events makes it outstanding compared with adjacent areas.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.				X
Explanation for ranking The Gulf of California is an area of high biological diversity. The Midriff Islands region covers a relatively small area, with a multitude of ecosystems, habitats, communities and species, providing this area with special importance in Mexican coastal waters.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking The Midriff Islands are located in an area of low human population density and are uninhabited, making them natural and pristine compared to other places along the coast.					

Maps and Figures

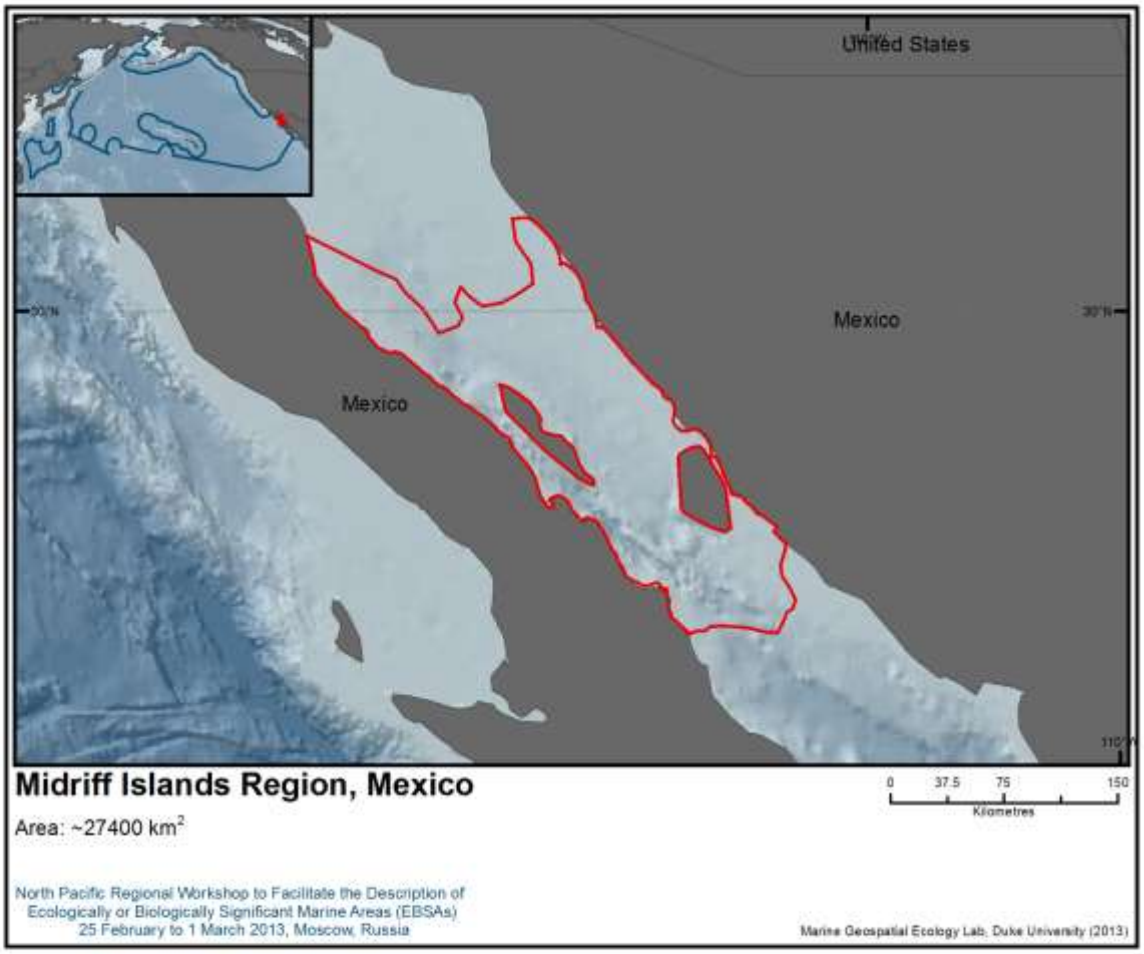

Figure 1. Area meeting EBSA criteria

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Area No. 15: Coastal Waters off Baja California, Mexico

Abstract

This large coastal area includes large coastal lagoons that serve as nursing and breeding grounds for endangered grey whale populations, and islands and offshore areas that are important feeding grounds for pelagic fauna. The area extends from the north at Guerrero Negro lagoon and Cedros and San Benitos Islands and Natividad Island, and incorporates San Ignacio lagoon and Magdalena Bay and the areas offshore directly west and north of this productive bay. Coastal lagoons are important not only for whales but also for shorebirds, sea turtles, invertebrates and fish. Islands provide nesting sites for the endangered sooty shearwater, and offshore areas are critical for feeding of loggerhead sea turtles, sharks and tuna. These breeding and feeding grounds provide connectivity for populations that migrate along the Pacific coast of North America in the case of grey whales, and across the Pacific to Japan in the case of loggerhead turtles.

Introduction

The description of the coastal lagoons off Baja California and the offshore island waters complex is presented from north to south beginning with Guerrero Negro lagoon and finishing with Magdalena Bay. The area of Guerrero Negro and its connected Manuela lagoons is marked by the influence of the California current that reaches Vizcaíno Bay, bringing superficial masses of oceanic water to the area, with high oxygen contents; nevertheless, during strong ENSO episodes red tides are present in the area. The coastal lagoons of Guerrero Negro and San Ignacio have similar physiographic characteristics, products of erosion, with low sandy beaches, tidal flats, sandy and muddy bottoms, and shallow bottoms (average 5 m). Water temperature ranges from 15 to 30°C, tides are semi-diurnal, and offshore upwelling due to wind and Ekman transport is reported for spring and summer months. Occasionally, the area is influenced by cold winter fronts moving from the North Pacific and tropical hurricanes arriving from the south. In the case of the Natividad, San Benitos and Cedros islands, which are all of volcanic origin, like the Baja California Peninsula, a narrow continental shelf and deep, productive waters surround them, which support important invertebrate populations and areas of inland harbour with seabird nesting areas. Benitos and Cedros Islands have large elephant seal (*Mirounga angustirostris*), sea lion (*Zalophus californianus*), and harbour seal (*Phoca vitulina*) rookeries. Magdalena Bay has a different origin, being a large bay formed by three large barrier islands with sections of mountains, and with deep waters inside the bay. The lagoons and bay are the breeding grounds of grey whales (*Eschrichtius robustus*), which arrive each year in the winter and spring months to give birth to their calves and mate during their seasonal reproductive migration from the feeding grounds in the cold waters of the North Pacific.

Important mangrove forests have developed along the margins of all three coastal bodies of water, and in the shallow portions seagrass beds are critical for wintering birds like the Brant goose (*Branta bernicla*). Several species of shore birds use the sandy tidal flats extensively for feeding. The waters offshore Magdalena Bay, to the west and north, have extremely productive banks that have been described as very important feeding grounds for marine animals, especially loggerhead turtles (*Caretta caretta*), which are in danger of extinction.

Location

The areas described are all within Mexico's national jurisdiction. See Figure 1 for a map of the area proposed.

Feature description of the proposed area

The area includes a variety of features that are interconnected ecologically and include benthic and water column elements. The coastal lagoons and the bay have shallow waters that are protected and calm, making them ideal for grey whale courtship, mating, and nursing. The majority of the population of grey whales in the eastern portion of the Pacific reproduces in these lagoons. The productive waters outside the lagoons are characterized by Wingfield et al. (2011), and are located at the southern end of the highly productive California Current and characterized by year-round coastal upwelling conditions with mesoscale eddies, and fronts with seasonally variable SSTs (15 to 26°C), and high chlorophyll *a* concentrations (0.2 to 19.0 mg m–3) (Espinosa-Carreon et al. 2004, Legaard & Thomas 2006, Gonzalez-Rodriguez 2008). Generally, primary production in the region remains high relative to the rest of the Pacific Ocean, with chlorophyll *a* concentrations rarely dropping below 1.0 mg m^{-3}; surface currents are weak and variable in direction (Espinosa-Carreon et al. 2004, Legaard & Thomas 2006, Gonzalez-Rodriguez 2008).

These highly productive waters are important feeding spots for large predators (see Wingfield et al. 2011) and export nutrients into the lagoons, boosting reproduction of invertebrates and fish, which in turn sustain seabirds and large predators inside and outside the lagoons. Mangrove forests and seagrass beds offer nursing habitat for fish and invertebrates. The life-cycle stages of mollusks and crustaceans require spending time inside the lagoons before completing their development in open waters. Important species inside the lagoons and the offshore islands include several species of abalone (*Haliotis cracherodii, H. rufenscens, H. sorenseni, H. corrugata, H. fulgens),* surf clams and pismo clams (*Tivela stultorum),* pen shell (*Pinna rugosa),* lion's paw clam (*Lyropecten subnudosus),* clam (*Argopecten circularis),* shrimp (*Penneus sp.),* snail (*Astraea undosa, A. turbanica)* and lobster (*Panulirus interruptus*), as well as several sea urchin species. The abalone populations are among the best in the entire Pacific coast. The shallower banks located offshore Magdalena Bay offer ideal conditions for the development of jellyfish and pelagic crab (*Pleuroncodes planipes*), the favorite prey of loggerhead turtles in this area. Kobayashi et al. (2008) concluded that feeding on these pelagic crabs is a specialized feeding habitat in the North Pacific range of this species. The same areas are also important feeding grounds for blue and mako sharks, and flounder.

The islands' strategic importance for nesting endangered shearwater (*Puffinus opisthomelas)* populations should be noted. Recent eradication of introduced Norwegian rats in Natividad Island has produced an important positive effect in breeding success of these birds. Isla Natividad also has large nesting colonies of Brant's cormorant (*Phalacrocorax penicillatus*). The waters surrounding the islands have healthy kelp beds (*Macrocystis* spp.).

Feature condition and future outlook of the proposed area

Several research projects are carried out in these areas, due to their proximity to research centres in Mexico and the USA. Researchers from universities and the Mexican Government monitor the grey whale population. The impact of climate change on the abalone populations is being studied, as mortality due to hypoxia has been recorded. These events are also affecting mollusks inside the coastal lagoons. Sea turtle population and mortality due to fishing interactions is studied. In general, the area's condition is static, with deteriorating status in some components, like sea turtles, which is worrisome, as they are the largest by-catch rates in the world for this species (Peckham et al. 2008, 2007).

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or		X		

	oceanographic features.				
Explanation for ranking					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.				X
Explanation for ranking Nursing and breeding areas for grey whales in the coastal area, the only sites along the Pacific Coast where this phenomenon is reported in such numbers. Loggerhead feeding grounds that are critical for the entire North Pacific population.					
Importance for threatened, endangered or declining species and/or habitats	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.				X
Explanation for ranking Loggerhead population endangered and under increased risk due to bycatch in gillnet fisheries.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.				X
Explanation for ranking The majority of the breeding grounds for grey whales in the eastern population of the North Pacific are within this area, as are the most important feeding grounds for North Pacific loggerhead turtles.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
Explanation for ranking Areas around Isla Natividad, Cedros Island and Vizcaíno Bay are very productive and sustain large population of seabirds, invertebrates and marine mammals.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
Explanation for ranking The area is important for genetic diversity of abalone species, due to the fact that it still maintains stocks of species that are almost extinct in the rest of their range, due to overfishing.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.				X
Explanation for ranking Isolation, remoteness, very low human population and successful conservation and management have combined to produce probably the most natural and pristine stretch of coastline along the Mexican North Pacific.					

Other important species for commercial fisheries in the area

Kelp (*Macrocystis pyrifera)* algae: *Gelidium robustum*, *Gelidium sp.*, *Gigartina californica*, *Gigartina sp.*, *Euchema sp.*, *Gracilaria chilensi*, *Chondracantus canaliculatus.*

- Fish: Cabrillas (*Myteroperca rosacea*, *M. jordani* and *Epinephelus labriformis*), skipjack tuna (*Katswonus pelamis*, *Thunnus albacares*, *Sarda chiliensis).*
- Small pelagics: Sardine (*Sardinas sagax)*, Anchovy (*Engraulis mordax)* Giant squid (*Dosidicus gigas).*
- Invertebrates: Chocolate clam (Megapitana *spp.)*, crab (Callinectes *spp.)*, octopus (Octopus *spp.)*, Pata de mula (*Anadara tuberculosa)*, Caracol burro *(Strombus galeatus)*, Caracol Chino *(Muricanthus nigritus)*, Almeja voladora (*Pecten voqdesi)*, pepino de mar (*Isostichopus fuscus).*
- Madre perla (*Pinctada mazatlanica)*, Concha nácar (*Pteria sterna).*

Maps and Figures

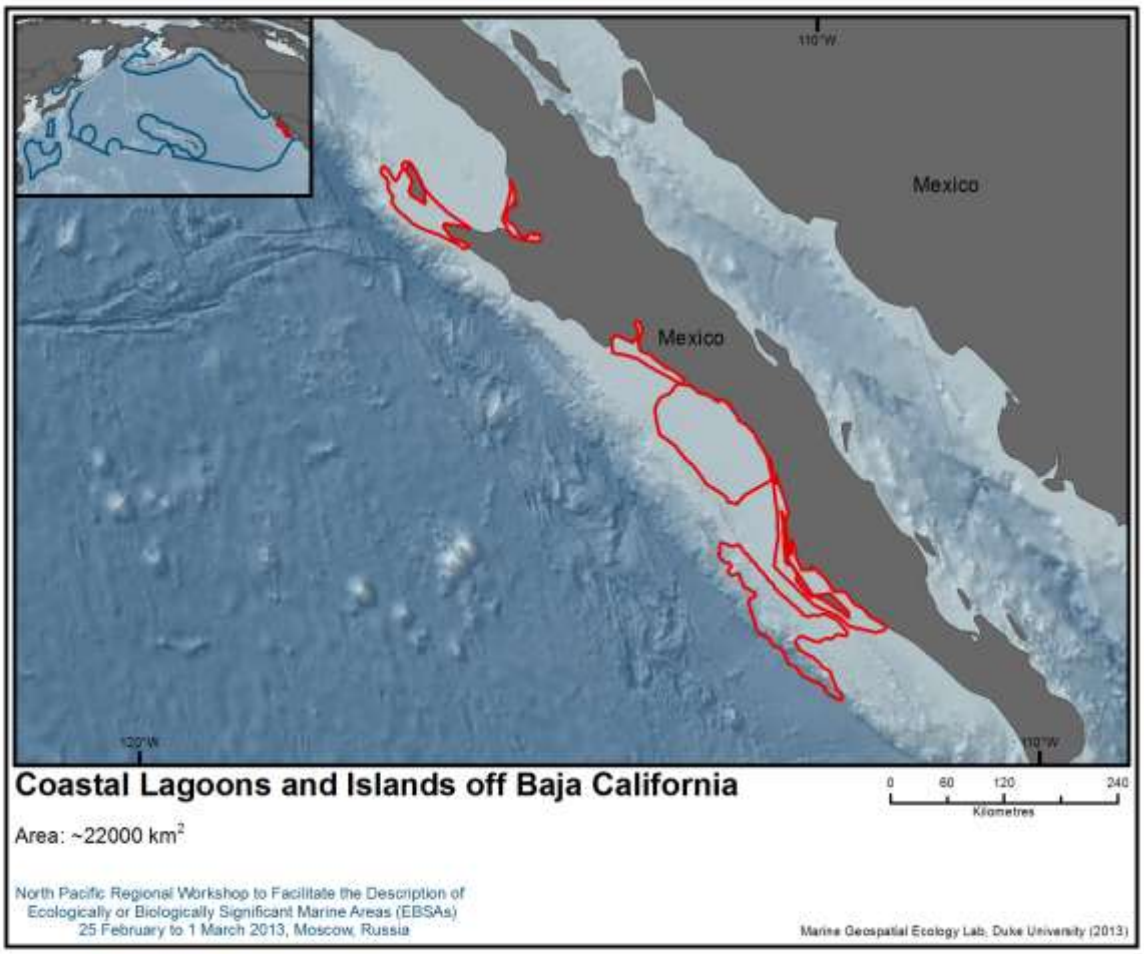

Figure 1. Area meeting EBSA criteria

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Area No. 16: Juan de Fuca Ridge hydrothermal vents

Abstract

Features described herein are hydrothermal vent fields and their associated structures, vent fluids, gases, and biological communities located in the Juan de Fuca Ridge in the Northeast Pacific Ocean, that fall outside Canadian and USA jurisdictions (i.e. exclusive economic zones, EEZs). The sea floor, physical structures associated with the vents, surrounding water column (which is influenced by chemical and thermal properties of the vent fluids and gases), and biological communities associated with the vents collectively meet the criteria. The formation of hydrothermal vents is driven by dynamic tectonic activity. Therefore the boundaries of this area meeting EBSA criteria include the length and width of Juan de Fuca Ridge.

Introduction

General geology and features

Hydrothermal vents are associated with the spreading of tectonic plates, and in the North Pacific Ocean, they are generally located close to continents. Globally, they are a relatively rare geological feature. Hydrothermal vents are also unique: they vary in size, structure, fluid chemistry and thermal properties (Tsurumi and Tunnicliffe 2003), and are associated with diverse, unique and endemic faunal assemblages. Fauna associated with hydrothermal vents are distinct over short and long distances and vary according to the physical, chemical and thermal properties of the vents. Fauna associated with hydrothermal vents are adapted to dynamic and extreme habitats, and exhibit unusual life-history strategies and physiologies, including the capacity for chemosynthesis and tolerating extremely warm or saline water.

The features described herein that meet EBSA criteria are hydrothermal vent fields and their associated structures, vent fluids, gases, surrounding water column, and biological communities associated with the Juan de Fuca Ridge in the Northeast Pacific Ocean, that fall outside the jurisdiction (i.e. exclusive economic zone, EEZ) of Canada and the United States of America (USA). The sea floor, physical structures associated with the vents, associated water column (which is influenced by chemical and thermal properties of the vents), and biological communities associated with the vents collectively meet the criteria. The formation of hydrothermal vents is driven by dynamic tectonic activity, which can lead to the extinguishing of existing vents or eruption of new ones (e.g., Marcus et al. 2009). Therefore the boundaries of this area meeting EBSA criteria include the length and width of Juan de Fuca Ridge. Details on the location of hydrothermal vents, physical structures, chemical and thermal properties and associated biological communities are described in the following sections.

Location

Hydrothermal vents that meet the EBSA criteria in the area under consideration during the workshop are part of a complex of vents located on three short spreading areas, specifically the Juan de Fuca Ridge, Gorda Ridge and Explorer Ridge (Figure 1) off the coasts of British Columbia, Canada, and the states of Washington, Oregon and California, USA. The entire complex straddles the EEZs of Canada and the USA. Those vents on Gorda Ridge and Explorer Ridge fall exclusively within jurisdictional waters of the USA and Canada, respectively. Here, only vents that fall outside the EEZs of Canada and the USA (Figure 2) are evaluated with respect to EBSA criteria. However, given that the tectonic processes giving rise to the hydrothermal vents along the Explorer, Juan de Fuca, and Gorda Ridges are related, and that these vent fields are similar in terms of structures, biological communities, and degree of endemism (Tunnicliffe et al. 1986) and are spatially proximate, the whole set of hydrothermal vents that fall along the Explorer, Juan de Fuca and Gorda Ridges can be considered a meta-community and an area meeting EBSA criteria that straddles the EEZs of Canada and the USA.

It should be noted as well that those hydrothermal vents that fall in international waters are in close proximity to Axial and Brown Bear seamounts, which are at the southern end of the Cobb-Eikelberg Seamount Chain, which also meets EBSA criteria.

Feature description of the proposed area

Physical, chemical, and thermal properties of hydrothermal vents in the Northeast Pacific Ocean

The depths of hydrothermal vents in the Endeavour Segment of Juan de Fuca Ridge vary from approximately 1500 m to more than 2500 m (Kaye and Baross 2000).

Hydrothermal vents vary in structure within and among vent fields and ridges. Vigorously venting hydrothermal fields can produce large (e.g. 1000 m^3), steep-sided deposits of sulfide-sulfate-silica (Delaney et al. 1992) that can attain diameters >30 m and heights of 20 to 25 m (Delaney et al. 1992; Tunnicliffe et al. 1986). For instance, large vents up to 25 m were observed emitting fluids over 300°C (Tunnicliffe et al. 1986). Growth of structures is due to the accumulation of chimney sulfide (Delaney et al. 1992), and the flow of venting fluids and gases varies among structures (Delaney et al. 1992). Three types of vents were found on Explorer Ridge and Juan de Fuca Ridge: those rich in abiotic iron and zinc; high temperature vents rich in H_2S, and vents associated with lower temperatures (Tunnicliffe et al. 1986). Each sulfide structure varies in fluid composition, even within a vent field (Butterfield et al. 1994).

High densities of sulfide structures and associated fauna can occur on small scales (e.g. 200 m x 400 m, Delaney et al. 1992) and be surrounded by many smaller inactive sulfide structures (e.g. Delaney et al. 1992). For example, Kelley et al. (2001) observed structures spaced 40 to 200 m apart that were awash in venting fluids ranging from 30 to 200°C and supported diverse macrofaunal and microbial communities (Kelley et al. 2001). Venting temperatures of 345 to 375°C are reported from a vent field in Endeavour, but temperatures from diffuse venting can range as low as 8 to 15°C (Delaney et al. 1992).

Biological communities

The microbrial communities associated with vents in the northeast Pacific Ocean are diverse, rare, and unique in terms of physiologies, metabolism, thermal tolerance and halotolerance. Moreover, microbes are highly variable in density and composition among vent sites, which can support dense microbial communities of archaebacteria, *Thiobacilli*, and barophilic eubacteria (Hedrick et al. 1992). In a study by Zhou et al. (2009), high microbial diversity at the Dudley hydrothermal site included clones belonging to Thermococcales and deep-sea hydrothermal vent *Euryarchaeota* (DHVE). The associated microbes were characterized by thermophilic or hyperthermophilic physiologies. Sulphur-related metabolism by thermophilic archaea and mesophilic bacteria was common at the vent ecosystem in Dudley hydrothermal site (Zhou et al. 2009). Kaye and Baross (2000) found halotolerant bacteria from Endeavour (Juan de Fuca Ridge), and in the same area (de Angelis et al. 1993), found evidence that microbial methane oxidation can play an important role in productivity.

Endemic species and distinct macrofaunal assemblages are noted from surveys of Juan de Fuca Ridge (e.g. Chase et al. 1985; Tunnicliffe et al. 1993), although endemic fauna are generally lower in diversity than among East Pacific Rise vents to the south (Tunnicliffe 1988). Tunnicliffe et al. (1993) describe a new polychaete, *Paralvinella sulfincola*, which inhabits tubes on the sides of active smoker chimneys venting fluids in excess of 300°C, and 14 vent animals previously unreported from the caldeira of Axial Seamount were noted by Chase et al. (1985), including a new vestimentiferan with intracellular bacteria, two alvinellid polychaetes in the genus *Paralvinella*, a tropical vent polychaete species, *Amphysamytha galapagensis*, two new polynoid polychaetes, three gastropods in new subfamilies, a copepod found in a tubeworm tube, and a few tiny bivalves that appear to be related to mussels and clams from other vents.

Macrofaunal species characteristic of hydrothermal vents include the tubeworm *Ridgeia piscesae*, common to >50 vents in the northeast Pacific Ocean, including Gordo Ridge (Southward et al. 1995). Another tubeworm species, *Lamellibrachia barhami*, was found at the sedimented Middle Valley on Juan de Fuca Ridge (Southward et al. 1996). Vestimentiferans are genetically structured within the northeast Pacific Ocean indicating limited gene flow over long distances (Southward et al. 1996). There appears to be significant larval retention on the scale of vent fields and ridge segments (Metaxas 2004) in the northeast Pacific Ocean, possibly because the location of hydrothermal vents in mid-ocean ridges shields them from currents (Thomson et al. 2003; Metaxas 2004).

Axial Volcano exhibits the highest richness and diversity indicators in a comparison of sites in three segments of the Juan de Fuca Ridge, but the density of fauna associated with vestimentiferan tubeworm bushes was similar across sites (Tsurumi and Tunnicliffe 2003). Thus, community structure may be more influenced by substratum, vent flow characteristics and the structure of the tubes of tubeworms than by location. Fauna associated with tubeworm tube bushes were dominated by four taxa: two gastropods (*Lepetodrilus fucensis* and *Depressigyra globulus*) and two polychaetes (*Paralvinella pandorae* and *Amphisamytha galapagensis*) (Tsurumi and Tunnicliffe 2003). Vestimentiferan worms were found on small sulfide mounds, whereas high temperature vents appeared to attract alvinellid polychaetes (Tunnicliffe and Juniper 1990), and larger structures were inhabited by more species, potentially reflecting greater diversity of habitats (and larger structures are inhabited by more species). *Lepetodrilus fucensis*, *Depressigyra globulus* and *Provanna variabilis* were most abundant at distances from vent flows, with temperatures varying on average from 3 to 10°C (Bates et al. 2005). Community structure can also vary with succession following eruption of new vents (e.g., Marcus et al. 2009).

More mobile species, such as the Majid crab (*Macroregonia macrochira*) are also associated with hydrothermal vents. The majid crab is a predator of hydrothermal vent species, occurs in greater densities around vent sites in the northeast Pacific, and plays a role in transferring production of chemosynthesis to surrounding deep-sea environments (Tunnicliffe and Jensen 1987). High mortality rates of vestimentiferan tubeworms were associated with falling sulphate/sulphide spires and predation by rattail fish and polynoid polychaetes (Tunnicliffe et al. 1990). Distinct and more abundant assemblages of vertically migrating zooplankton occupy the water column above the hydrothermal flume of the main vent field on Endeavour Ridge (Bur and Thomson 1994), thereby linking the deep sea vent communities to pelagic ecosystems.

Feature condition and future outlook of the proposed area

No measures were known by workshop participants to be in place to protect the hydrothermal vents located outside national jurisdictions. However, Canada has established a marine protected area around the Endeavour hydrothermal vents located within its jurisdiction, and activities affecting the vents are managed by Fisheries and Oceans Canada.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
The hydrothermal vents associated with the Juan de Fuca Ridge are regionally unique and globally rare, and are the only hydrothermal vents known to fall within areas beyond national jurisdiction considered at the workshop (Beaulieu et al. 2010). These vents support dense populations of unique species, including					

<table>
<tr><td colspan="6">Ridgeia piscesae, a vestimentiforan tubeworm, and endemic species (Chase et al. 1985), including Paralvinella sulfincola, a polychaete that inhabits tubes on the sides of active smoker chimneys venting fluids in excess of 300°C (Tunnicliffe et al. 1993).

Microbial taxa include those with rare physiologies, including the capacity for chemosynthesis (e.g., by thermophilic archaea and mesophilic bacteria, Zhou et al. 2009, and see de Angelis et al. 1993), and tolerance for extreme temperatures and salinities (Kaye and Baross 2000). The production via chemosynthesis of sulfur/sulfides provides a unique source of energy to ecosystems on the sea floor and in the pelagic zone (Tunnicliffe and Jensen 1987; Bur and Thomson 1994).

Community structure varies on local scales according to substratum, vent flow characteristics, the structure of vents and tubeworm tubes (Tunnicliffe and Juniper 1990; Tsurumi and Tunnicliffe 2003; Bates et al. 2005). While vent fields are similar, each supports a structurally distinct community.</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">The specialized fauna associated with hydrothermal vents depend on the thermal and chemical properties of the water column associated with the vents. Production based on chemosynthesis forms the basis of food webs associated with hydrothermal vents; therefore sulphur-related metabolism is crucial to vent ecosystems (Zhou et al. 2009).</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td>X</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">There was insufficient information available to participants to evaluate the area meeting EBSA criteria according to this criterion at the time the workshop was held.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Damage to vent structures can lead to irreversible changes to the thermal and chemical properties of the surrounding water column. Given that vent ecosystems rely on vent fluids and gases for production, and that many taxa inhabit the structures formed by venting, any damage to the vent structures can lead to significant mortality through crushing (Tunnicliffe et al. 1990), loss of available habitat, or the loss of localized communities.

Hydrothermal vents form relatively small structures and have communities that are highly localized and are therefore vulnerable to disturbances on local scales.

The spatial structure and distinct community structure of fauna associated with vents may themselves be vulnerable to introduction of novel vent taxa (e.g., during scientific surveys in multiple vent fields).</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">In terms of chemosynthesis, and in relation to the surrounding oligotrophic benthic habitats, these localized vent communities are highly productive and support dense populations of microbes, limpets and</td></tr>
</table>

tube worms (*Ridgeia* sp.) (e.g. Hedrick et al. 1992; Southward et al. 1995). In the absence of active venting, biological productivity would be significantly reduced, as the food web structure and flow of energy depend almost exclusively on chemosynthesis.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
In the absence of active venting, species diversity would be significantly lower in the localized vent fields, as food web structure and productivity depend on chemosynthesis. While the vents surrounding Axial Seamount have the same faunal community as Endeavour (Canadian jurisdiction), there are fewer species than observed within national jurisdictions, or within the East Pacific Rise vent systems (Tunnicliffe 1988).					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Many vent fields have been subject to scientific and other surveys, and may have been subject to the impacts of fishing activities. The ranking for this criterion reflects uncertainty among workshop participants about the impacts such activities have had on the naturalness of vent communities on the Juan de Fuca Ridge: naturalness may be high.					

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Maps and Figures

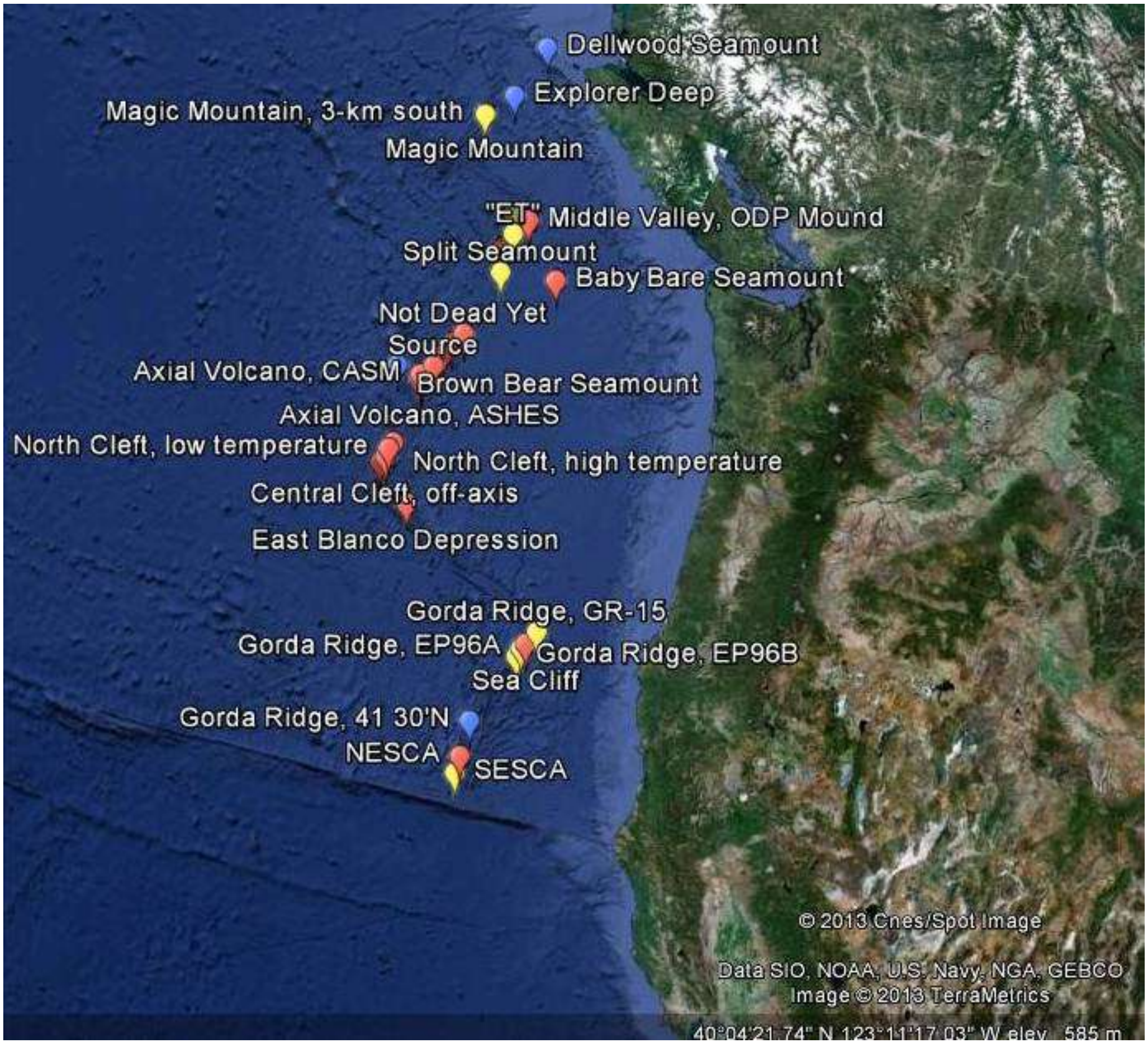

Figure 1: Map of the distribution of hydrothermal vents in the northeast Pacific Ocean, including those on the Gorda Ridge, Explorer Ridge, and Juan de Fuca Ridge (Beaulieu et al. 2010; data source available at: http://www.interridge.org/irvents/maps). Hydrothermal vents on Gorda Ridge and Explorer Ridge fall exclusively within the jurisdictional waters of the USA and Canada, respectively.

Figure 2: Names and locations of hydrothermal vents on the Juan de Fuca Ridge, northeast Pacific Ocean, located in areas beyond national jurisdiction (Beaulieu et al. 2010, data source available at: http://www.interridge.org/irvents/maps).

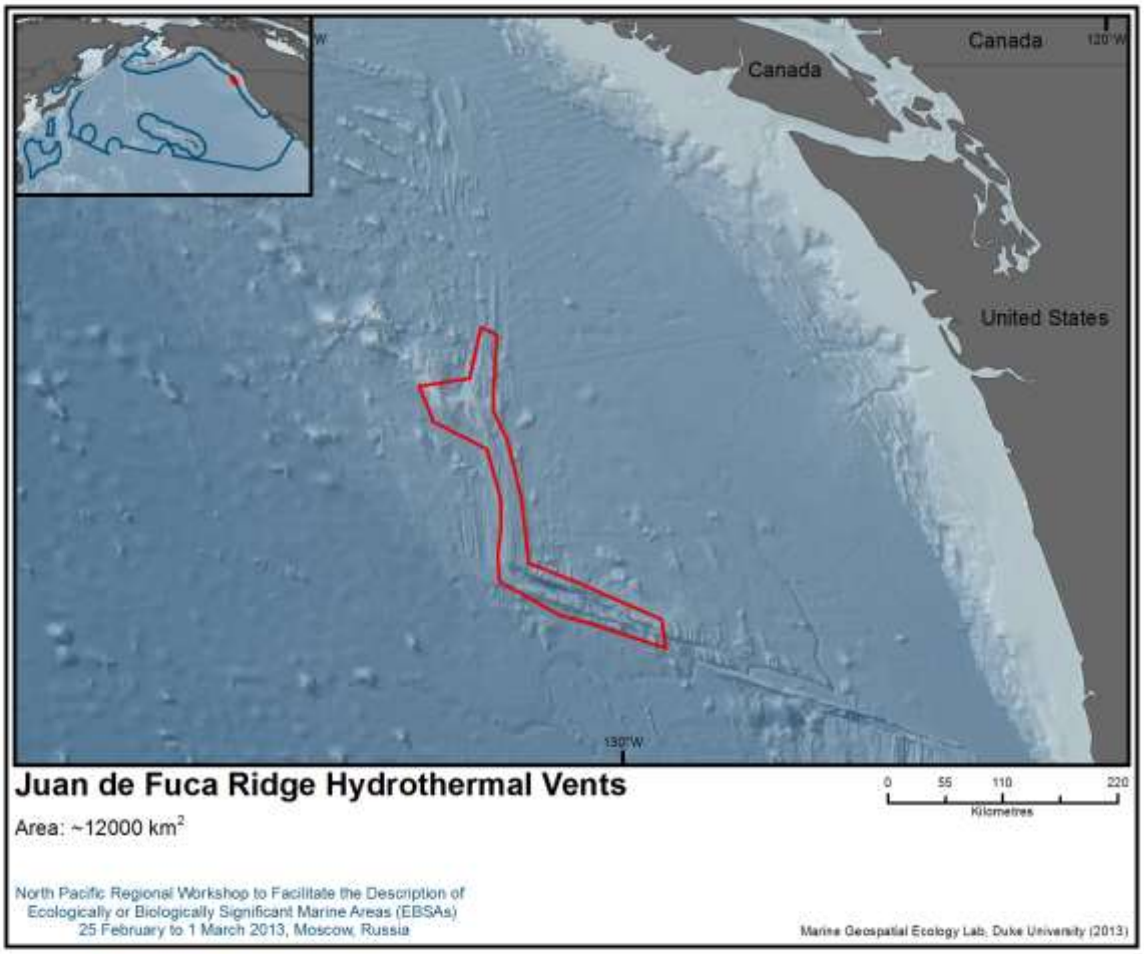

Figure 3. Area meeting EBSA criteria

Area No. 17: Northeast Pacific Ocean Seamounts[7]

Abstract

The Northeast Pacific Ocean Seamounts are a series of seamount complexes that range from the Gulf of Alaska to the coasts of British Columbia, Canada, and Washington and Oregon States, USA. Eight seamount complexes are evaluated against EBSA criteria on the basis of survey data, knowledge of the seamount morphologies (including depth, height, proximity to neighbouring seamounts), models that predict occurrences of octocorals and deepwater corals, and inferences about the distribution and abundance of corals based on similar seamounts within national jurisdictions. The chain of seamount complexes is evaluated as a single EBSA because they have similar geological origins, and their configuration may facilitate gene flow and migration of benthic and pelagic species from southern to northern latitudes.

Introduction

A series of seamount complexes, including the Cobb-Eickleberg seamount chain, are located in the northeast Pacific Ocean and range along the Cascadia subduction zone from the Aleutian Islands in the north to Axial Seamount in the south, approximately 480 km off the west coast of Oregon State, USA. The seamounts in these complex chains were created by several hotspots, including the Cobb hotspot, and range in age from 33 to 27.6 million years (Desonie and Duncan 1990). All of the northeast Pacific Ocean seamounts are known to be volcanic in nature and are therefore geologically young in age and generally rich in species diversity. Seamounts within the chains are generally aggregated into seamount complexes. As one example, Patton Seamount complex comprises more than 10 distinct summits (see figures in Gibson 1960; Smoot 1985; Wessel and Kroenke 1998). Eikelberg, Cobb, Corn, Brown Bear and Axial Seamounts also form a complex of seamounts at the southern end of the range of this series of spatially structured seamount complexes, which are henceforth referred to as the northeast Pacific Ocean seamounts for the purposes of this assessment.

Deep-water corals are widespread on seamounts in Alaskan waters, including seamounts in the Bering and Beaufort seas (Stone and Shotwell 2007) and also on seamounts at the southern end of this area meeting EBSA criteria. Antipatharians and gorgonians have been observed to depths of 4784 m on Gulf of Alaska seamounts, and deep-water corals are found on all the megahabitats and mesohabitats defined by Greene et al. (1999) (Stone and Shotwell 2007). Within Alaskan waters, coral assemblages exhibit high diversity in six major taxonomic groups, including true or stony corals (Order Scleractinia), black corals (Order Antipatharia), true soft corals (Order Alcyonacea) including the stoloniferans (Suborder Stolonifera), sea fans (Order Gorgonacea), sea pens (Order Pennatulacea), and stylasterids (Order Anthoathecatae) (Stone and Shotwell 2007). In a review of the state of deep-water coral ecosystems in the Alaska Region, Stone and Shotwell (2007) documented the distribution of 141 unique coral taxa in Alaskan waters, including 11 species of stony corals, 14 species of black corals, 15 species of true soft corals (including six species of stoloniferans), 63 species of gorgonians, 10 species of sea pens, and 28 species of stylasterids. Surveys of Cobb and Brown Bear seamounts at the southern end of this area meeting EBSA criteria identified at least 200 taxa, including dense aggregations of *Stylaster* sp., large bioherms of *Lophelia pertusa*, and at least 15 other coral taxa and seven sponge species. Species distribution models and habitat suitability models predict that octocorals and cold-water corals occur or have suitable habitat within most of the complexes of seamounts in the northeast Pacific Ocean (Davies and Guinotte 2011; Yesson et al. 2012). Like corals, sponges are highly diverse and broadly distributed on seamounts in the Gulf of Alaska.

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[7] Note: The textual description of this area may refer to the area within the national jurisdiction of the USA, because of its geological, ecological or biological connectivity. The workshop, however, considered only the area outside the national jurisdiction of the USA. This is the area reflected in the polygons depicted in Figure 1, below.

Here we evaluate the series of seamount complexes (Gibson 1960; Wessel and Kroenke 1998) that range from the Gulf of Alaska to the coasts of British Columbia, Canada, and Washington and Oregon States, USA, with respect to EBSA criteria. We limited our evaluation to those large complexes of seamounts with summit depths <2000 m and populations of deep water corals (Davies and Guinotte 2011; Yesson et al. 2012). Eight seamount complexes are selected for evaluation and inclusion in the area meeting EBSA criteria primarily on the basis of survey data, but also on knowledge of the seamount morphologies (including depth and proximity to neighbouring seamounts), models that predict occurrences of octocorals and deepwater corals (Davies and Guinotte 2011; Yesson et al. 2012), and inferences about the distribution and abundance of corals based on knowledge of similar seamounts within national jurisdictions (e.g,. Stone and Shotwell 2007). While the presence of seamounts can be defined on the basis of their height above the surrounding sea floor (e.g., 500 m), shallower seamounts (i.e., those closest to the surface) are more ecologically and biologically significant than deeper seamounts. Shallower seamounts, especially those with summits that fall within the euphotic zone, are generally more productive and are more accessible to pelagic species, including deep-diving marine mammals. Seamounts at intermediate depths are also important because dense aggregations of corals can occur at these depths in the Gulf of Alaska (e.g., between 700 m and 2600 m, Stone and Shotwell 2007). While prominent seamounts within Canadian and USA waters have been surveyed to assess biological diversity and the potential for fisheries development, the study of more remote seamounts has generally focused on geological surveys (Gibson 1960; Smoot 1985; Wessen and Kroenke 1998). In such cases, it is appropriate to infer the distribution or relative abundance of corals and other ecologically and biologically important taxa from predictive models developed with data from ecologically similar areas (e.g., Davies and Guinotte 2011; Yesson et al. 2012). Considerable biological data are available for the two complexes at the northern extent of the range as well as for the largest complex evaluated at the southern end (Axial-Cobb-Eickelberg), while most of the information available for the remaining seamount complexes is geological in nature.

Location[8]

The eight areas encompassing complexes of seamounts in the area meeting EBSA critieria are listed in Table 1, generally from north to south.

Table 1. Seamount names (where available) associated with each of the eight areas and their locations were obtained from the Seamount Biogeosciences Network at http://earthref.org/SC/ and Smoot (1985). Seamount names were not available to workshop participants in two of the areas (6 and 7) that are part of this area meeting EBSA criteria. Seamount names may also be available in Gibson (1960).

Sub-area	Seamounts	Seamount Location
1	Applequist Seamount	55° 30.60'N, 142° 48.60' W
	Durgin Guyot	55° 48.00'N, 141° 52.20' W
	Pratt Guyot	56° 15.00'N, 142° 36.00' W
	Surveyor Seamount	56° 03.60'N, 144° 10.00' W
2	Cowie Seamount	54° 08.40'N, 149° 21.00' W
	Faris Seamount	54° 29.58'N, 147° 13.80' W
	Murray Seamount	54° 00.00'N, 148° 30.00' W
	Odessey Seamount	54° 36.00'N, 149° 40.80' W
	Patton Seamount	54° 34.80'N, 150° 26.40' W
	Smoot Seamount	55° 04.20'N, 150° 00.00' W
	Wyer Seamount	54° 25.80'N, 148° 42.00' W

[8] Note: The textual description of this area may refer to the area within the national jurisdiction of the USA, because of its geological, ecological or biological connectivity. The workshop, however, considered only the area outside the national jurisdiction of the USA. This is the area reflected in the polygons depicted in Figure 1, below.

3	*Parker-Gilbert Seamount Complex* Bean Seamount Gibson Seamount Gilbert Seamount Jones Seamount Parker Seamount Shaw Seamount Woodward Seamount	 52º 18.00’N, 146º 57.00’ W 52º 07.80’N, 148º 36.00’ W 52º 50.00’N, 150º 05.00’ W 52º 21.60’N, 148º 47.40’ W 52º 34.20’N, 151º 18.60’ W 52º 44.00’N, 150º 45.00’ W 52º 15.00’N, 149º 30.00’ W
4	*Miller-White Marsh Seamount Complex* Miller Seamount White Marsh Seamount	 53º 33.60’N, 144º 19.20’ W 53º 09.60’N, 143º 36.60’ W
5	*Scott-Campbell-Morton-Pathfinder Seamount Complex* Campbell Seamount Morton Seamount Pathfinder Seamount Scott Seamount	 50º 18.00’N, 141º 57.00’ W 50º 18.00’N, 142º 33.60’ W 50º 55.00’N, 143º 18.20’ W 50º 22.80’N, 141º 23.40’ W
6	Whitney Ridge: Seamount names on Whitney Ridge were not available at the time of the workshop.	Longitude: -141.81 Latitude: 50.767
7	Seamount names were not available at the time of the workshop. At least two seamounts are in this complex.	Longitude: -139.38 Latitude: 49.141
8	*Axial-Cobb-Eickelberg Seamount Complex* Axial Seamount Brown Bear Seamount Cobb Seamount Eickelberg Seamount Foster Seamount Vance Seamount Warwick	 46.06°N, 130°W46º 02.40’N, 130º 27.60’ W 46º 44.40’N, 130º 48.00’ W 48º 31.20’N, 133º 09.00’ W 48º 56.40’N, 133º 52.80’ W 45º 24.30’N, 130º 29.10’ W 48º 03.60’N, 132º 46.20’ W

Feature description of the proposed area[9]

Given that the chain of seamounts was created by a series of hotspots in the same process (Gibson 1960; Wessel and Kroenke 1998), and given their proximity and continuity, which may facilitate gene flow and migration among seamounts, the whole complex of spatially structured seamounts is described as a single area. The ecologically or biologically significant features within each of these areas include all of the seamounts (regardless of summit depth) in the complex, their entire footprint area from the sea floor to

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the summit as well as the water column above the seamount footprints. Information about six of these complexes is provided in the following section.

Sub-area 1, Central Gulf of Alaska Seamount Complex: This complex is located in the central Gulf of Alaska, in the vicinity of 56° north and 142° west. Descriptions of the major topographical features of the four seamounts named above are described in Hughes et al. (1981). The seamounts rise from abyssal plain depths of 800 m to within 100 m of the ocean surface at the central position of the seamounts. The substrate is patchy (areas of hard and soft sediment) with scattered rock pinnacles.

Nine seamounts were surveyed in 1979. The four seamounts in the central Gulf of Alaska (Durgin, Pratt, Applequist, and Surveyor) were surveyed by NOAA Fisheries during June-July 1979 (Hughes 1981). The seamounts are typical of volcanic seamounts in the entire northeast Pacific Rim region. They are relative young by geological time frame and biologically and ecologically rich. The seamounts' summit depths generally range from 20 m to much deeper. The survey conducted in 1979 was a trawl and drop camera survey to assess the fisheries resources potential over the seamounts. Various fish, crab, and benthic species were detected. Corals and other vulnerable marine ecosystem components were not assessed during those surveys.

Stone and Shotwell (2007) summarize the results of a survey with the Alvin submersible, which was used to obtain video and specimens down to a depth of 2700 m on Dickens, Denson, Welker, Giacomini, and Pratt seamounts. Abundant corals were observed on seamount summits at approximately 700 m, where *Paragorgia* spp. and bamboo corals dominated coral communities. By contrast, Gorgonians were the most abundant corals at 2700 m. At mid-depths (1700 m), coral abundance was lower, and dominated by black corals and Primnoidae.

In general, the four main seamounts in this complex have fairly high diversity of species, including sablefish (*Anoplopoma fimbria*), deep sea king crabs (*Lithodes cousei*), golden king crab (*L. aequispina*) and snow/tanner crab (*Chionectes tanneri*). These are potentially commercial important species. Other species detected were rattails (3 species) and rare species of spookfish (*Dolichopterya* sp. and *Macropinna microstma*). The survey in 1979 was not designed to study corals or other vulnerable marine ecosystem components. Based on expert testimonies from Dr. Boris Preobrazhensky (Russian Academy of Sciences, Vladivostok), the benthic organisms are expected to be rich in diversity of all orders of cold-water corals and sponges. Precious corals, like pink corals, are expected to be widely present over these volcanic seamounts. These and other orders of corals and sponge fields are known to be vulnerable and fragile, exhibit slow recovery and growth rates, and are long-lived. These four seamounts in the central Gulf of Alaska and other seamounts in the international waters of the northeast Pacific Ocean are generally devoid of human activities, like fishing and other commercial use, and few research studies have been carried out. Because these seamounts are subject to relatively few surveys or fishing activities, they have high degrees of naturalness.

Sub-area 2, Patton Seamount Complex: The summit depths are as shallow as approximately 600 ft, and Patton Seamount's height is approximately 3000 m. Patton Seamount is one of largest and most well-studied seamounts meeting EBSA criteria. Major expeditions (e.g., with DSV Alvin in 1999 and another in 2002) revealed that much of the substrate was encrusted with benthic organisms. Patton Seamount supports communities of corals; sponges; and a high degree of endemism. The shallow ecosystem is dominated by demersal rockfishes. The mid-community is dominated by suspension feeders, including corals and sponges, and the deep community is dominated by more mobile species. Stone and Shotwell (2007) reported that precious red coral (*Corallium* sp.) was collected from Patton Seamount, expanding its known range to the north**.**

Sub-area 3, Parker-Gilbert Seamount Complex: This complex includes at least seven summits and is predicted to be suitable habitat for or support populations of octocorals and cold-water corals (Davies and Guinotte 2011; Yesson et al. 2012).

Sub-area 4, Miller-White Marsh Seamount Complex: This complex includes at least two prominent summits and is predicted to be suitable habitat for or support populations of octocorals and cold-water corals (Davies and Guinotte 2011; Yesson et al. 2012).

Sub-area 5, Scott-Campbell-Morton-Pathfinder Seamount Complex: This complex includes at least six prominent summits and is predicted to be suitable habitat for or support populations of octocorals and cold water corals (Yesson et al. 2012, Davies and Guinotte 2011).

Sub-area 6, Whitney Ridge: Seamount names on Whitney Ridge were not available at the time of the workshop. This complex is characterized by several seamounts linked by a long ridge running from east to west (Smoot 1985), and is predicted to be suitable habitat for or support populations of octocorals and cold-water corals (Yesson et al. 2012, Davies and Guinotte 2011). A parallel complex of seamounts exists on Schoppe Ridge (Smoot 1985) at approximately at longitude of -142.02° and latitude of 50.800°. Deep-water corals and octorals are predicted to occur (or have suitable habitat) in this complex (Davies and Guinotte 2011; Yesson et al. 2012). These seamounts are assumed to have a high degree of naturalness.

Sub-area 7: Seamount names were not available at the time of the workshop. At least two prominent seamounts are in this complex, and they are predicted to be suitable habitat for or support populations of octocorals and cold-water corals (Yesson et al. 2012, Davies and Guinotte 2011). These seamounts are assumed to have a high degree of naturalness.

Sub-area 8, Axial-Cobb-Eickelberg Seamount Complex: This complex includes at least seven prominent and relatively shallow seamounts (Smoot 1985). Its summit depth is 1410 m and height is 1,100 m. It is the youngest volcano in this chain and is characterized by a complex geology, long low-lying plateau, two rift zones to the northeast and southwest of its centre and a rectangular caldera (3 km x 8 km). The seamount features fissures, hydrothermal vents, sheet flows and pit craters, and is surrounded by several smaller seamounts. This is a volcanically active seamount; surveys in 1983 discovered low-temperature venting (35°C) and the first active smoker vents in the north Pacific. A submarine eruption occurred in January 1998. Three venting centres are recognized in the seamount: the original site named CHASM, the southwestern caldera field discovered in late 1980s called ASHES, and a site located on its southeast rift zone named CASTLE. All hydrothermal vents primarily emit sulphur/sulphide. Temperature and composition of the vents vary over time but generally maintain similar emissions and structures and support similar microbial communities. Vents usually have lower pH, and are more acidic and alkaline. The vents on Axial Seamount are enriched with helium. The vents support dense populations of bacterial mats, limpets and tube worms, including *Ridgeia piscesae*, which is common to other vent systems on the Juan de Fuca Ridge.

The hydrothermal vents associated with Axial Seamount are part of a collection of vents located on the Juan de Fuca Ridge, and this collection of vents also meet EBSA criteria and is proposed as a separate area (area no. 16).

Cobb Seamount is located in the Cascadia Basin. Its summit depth is 34 m, height is 2743 m, and area is 824 km^2. It is characterized by a terraced pinnacle structure and slopes averaging 12 degrees. A Taylor Column may help retain larvae and support self-recruitment. Based on surveys carried out during the past three decades with remote operated vehicles, an autonomous underwater vehicle and a submersible, the shallow community is dominated by rockfishes (which were historically abundant), and notable for its abundant population of rock scallop (*Hinnites multirugosus*), which is otherwise scarce in the Pacific. At least 200 species have been observed on Cobb Seamount, including dense aggregations of *Stylaster* sp., large bioherms of *Lophelia pertusa*, and at least 15 other coral taxa and seven sponge species.

Brown Bear Seamount is connected to Axial Seamount. Surveys carried out in the 1980s revealed several species of coral and sponge taxa.

Feature condition and future outlook of the proposed area

There is evidence of overfishing on Cobb Seamount: a report (Douglas 2011) documents changes in the structure and abundance of rockfish populations over time, and visual surveys of Cobb Seamount document lost or abandoned fishing gear on most transects.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.				X
Explanation for ranking In relation to the area under consideration at this workshop, these complexes of seamounts are unique in the northeast Pacific Ocean. Moreover, these form a series of spatially structured seamount complexes. In general seamounts, owing to their isolation tend to support endemic populations and unique faunal assemblages (Pitcher et al. 2007). Patton Seamount is noted for its high degree of endemism. Hoff and Stevens (2005) describe this seamount as having a unique subset of the nearshore fauna but it maintains distinct assemblage characteristics. Cobb Seamount supports an unusually high abundance of rock scallop, which are otherwise scarce in the Pacific Ocean. Axial Seamount features three known fields of regionally unique and rare hydrothermal vents that support locally abundant populations of globally rare and unique fauna (e.g., *Ridgea piscesae*). Rare species of spookfish (*Dolichopterya* sp. and *Macropinna microstma*) were observed in the central Gulf of Alaska.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.			X	
Explanation for ranking The chain of seamounts collectively provides a series of spatially structured complexes of seamounts that form a broad corridor that may facilitate gene flow among populations of deep-sea and pelagic fauna, or provide nursery or feeding opportunities for migratory species (Pitcher et al. 2001). There is evidence that Cobb Seamount is a nursery area for white sharks, and a Taylor column on Cobb Seamount likely helps retain larvae and facilitate local recruitment (Dower and Perry 2001). Hydrothermal vents on Axial Seamount support an association of rare, unique, or endemic species, which depend on chemosynthesis as the base of localized foodwebs.					
Importance for threatened, endangered or declining	Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.		X		

<table>
<tr><td>species and/or habitats</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
There is evidence that Cobb Seamount is a nursery area for white sharks, but little information was available on threatened or endangered species at the time of the workshop. Importance for such species may be moderate or high.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

Axial, Brown Bear, Cobb, and Patton seamounts have documented populations of deepwater corals and sponges, and in some cases these form dense aggregations (e.g., Stylaster sp.), large bioherms (Lophelia sp.), and relatively diverse communities (e.g., >140 coral taxa in the Gulf of Alaska and at least 15 species of coral documented on Cobb Seamount). During a survey of Patton Seamount, researchers observed more than 17,680 sponges from 151 to 3200 m and 10,360 unidentified corals from 152 to 3303 m (Hoff and Stevens 2005), indicating abundant populations of corals and sponges in this complex. Precious corals are expected to be widely present over these volcanic seamounts.

In Alaskan waters, more than 140 distinct coral taxa are reported and broadly distributed throughout the eastern and western Gulf of Alaska, in all habitat types and down to depths exceeding 4000 on seamounts (Stone and Shotwell 2007). Abundant populations of corals are documented on pinnacles around 700 m and at depths down to 2700 m. By extrapolation, and by species distribution modeling, coldwater corals/octocorals are predicted to occur or have suitable habitat on several seamounts in the chain (Davies and Guinotte 2011; Yesson et al. 2012).

Fauna associated with seamounts are vulnerable to disturbance (Pitcher et al. 2007). Orders of corals and sponge communities are known to be vulnerable, fragile, and sensitive, exhibit slow recovery and growth rates, and are long-lived.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking

Some of the studied seamounts have or currently support commercial fisheries, indicating that they are productive areas. Historically, Cobb Seamount supported large populations of rockfishes. Evidence suggests these have declined due to overfishing (Douglas 2011). However, Cobb seamount still supports a commercially viable fishery for sablefish managed by Canada. Seamounts in the Gulf of Alaska have fairly high diversity of species like sablefish (Anoplopoma fimbria), deep sea king crabs (Lithodes cousei), Golden king crab (L. aequispina) and snow/tanner crab (Chionectes tanneri). These are potentially important commercial species. Other species detected were rattails (3 species) and rare species of spookfish (Dolichopterya sp. and Macropinna microstma). Biological productivity is considered medium as it is never expected to be as productive as neighboring US EEZ areas, where major fisheries may take place. However, the productivity of biological communities is definitely higher than in the deep waters of the North Pacific Ocean.

In the context of the area under consideration in the northeast Pacific Ocean (i.e., excluding coastal areas within EEZs), this series of seamount complexes represents areas of relatively high biological productivity.</td></tr>
<tr><td>Biological</td><td>Area contains comparatively higher diversity</td><td></td><td></td><td></td><td>X</td></tr>
</table>

<table>
<tr><td>diversity</td><td>of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking
In general, seamounts are often highly productive ecosystems that can support high biodiversity (Pitcher et al. 2007).
More than 200 species or putative species have been identified from various surveys of Cobb Seamount, including bony fishes, sharks, corals, sponges and other invertebrates. More impressively, at least 140 distinct coral taxa have been observed in Alaskan waters, and sponge diversity is also very high on surveyed seamounts. Given the proximity of the Alaskan seamounts in the northeast Pacific Ocean, it is reasonable to infer that similar levels of biological diversity exist across the series of seamount complexes in this area meeting EBSA criteria.
While absolute diversity within complexes may be lower than in comparable coastal ecosystems, they represent areas of relatively high diversity relative to surrounding waters, and there are locally and regionally endemic species on Patton, Cobb, and Axial seamounts. The complexes represent a continuum of biodiversity from north to south in the northeast Pacific Ocean.</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking
The seamounts of the northeast Pacific Ocean have rarely been visited or exploited by human activities. As such, they have high degrees of naturalness, although some seamounts (e.g., Cobb Seamount) are subject to fishing activities. Visual surveys of Cobb Seamount indicate some degree of disturbance associated with fishing, and there is a history of trawl, gillnet and trap fishing on Cobb Seamount. Patton, Cobb, Brown Bear, and Axial seamounts have been surveyed on multiple occasions. It is, however, difficult to assess the degree to which surveys and fishing activities have altered ecosystem structure and function. No information is available for some other seamounts in the chain.</td></tr>
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Maps and Figures

See figures in Gibson (1960), Smoot (1985), and Wessel and Kroenke (1998), and seamount data documented by the Seamount Biogeosciences Network at http://earthref.org/SC/.

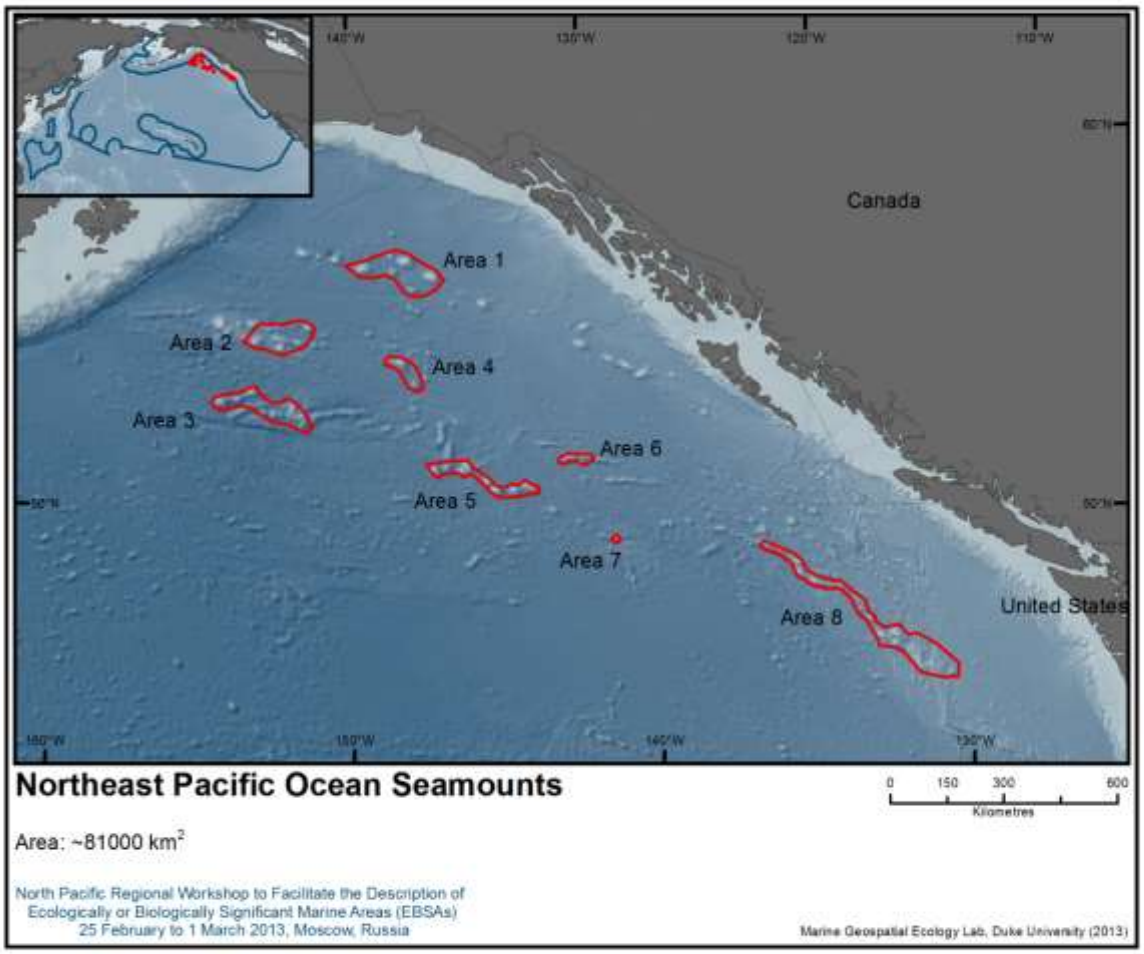

Figure 1: Area meeting EBSA criteria.[10]

[10] Note: The textual description of this area may refer to the area within the national jurisdiction of the USA, because of its geological, ecological or biological connectivity. The workshop, however, considered only the area outside the national jurisdiction of the USA. This is the area reflected in the polygons depicted in Figure 1.

Area No. 18: Emperor Seamount Chain and Northern Hawaiian Ridge (outside of the US EEZ)

Abstract

The Emperor Seamount Chain and Northern Hawaiian Ridge stretch from the Aleutian Trench to the northwestern Hawaiian Islands across the North Pacific Basin (Figure 1). This is a series of seamounts in the area beyond US national jurisdiction (Figures 2 and 3). Many of the seamounts in the area have been fully utilized by the commercial fishery since 1967. Currently, bottom fisheries in the area are managed by interim conservation measures of the North Pacific Fisheries Commission (NPFC) and voluntary measures of NPFC participants, including capacity limits, effort control, time-area closures, and deployment of vessel monitoring systems and onboard scientific observers.

Introduction

The Emperor Seamount Chain and Northern Hawaiian Ridge stretch from the Aleutian Trench to the northwestern Hawaiian Islands across the North Pacific basin (Figure 1). A series of seamounts outside the US EEZ (Figures 2 and 3) comprise an area meeting EBSA criteria.

Many of the seamounts in the area have been fully utilized by the commercial fishery since 1967. However, bottom fisheries in the area are currently managed by interim conservation measures of the North Pacific Fisheries Commission (NPFC) and voluntary measures of participants of the NPFC, including capacity limits, effort control, time-area closure, and deployment of vessel monitoring systems and onboard scientific observers.

Scientific surveys of commercial fish species, and benthic habitat and fauna have been conducted by some NPFC participants. Results of the scientific activities have been submitted to the Scientific Working Group of the NPFC. Former assessment reports are available from the NPFC website (http://nwpbfo.nomaki.jp/Assessment.html). Scientific information collected by these activities indicated that the area has moderate uniqueness, special importance for life-history stages of some species, vulnerability, biological productivity, and biological diversity relative to the surrounding deep sea floor.

Location

Emperor Seamount Chain and Northern Hawaiian Ridge stretch for ca. 3000 km from the Aleutian Trench to the northwestern Hawaiian Islands in the western North Pacific Ocean (53-30°N, 164-177°E, Table 1). A series of seamounts in the area outside US national jurisdiction was described as an area meeting EBSA criteria based on the scientific information described below (Figures 2 and 3).

Feature description of the proposed area

Physical characteristics: The Emperor Seamounts and Northern Hawaiian Ridge were formed as volcanic hotspot tracks as the Pacific tectonic plate moved over a mantle magma source (Wilson 1963, Sharp and Clague 2006, Stock 2006). The seamounts get progressively younger from north to south (85-30 million years old). Most of the seamounts in this region are classified as guyots (Smoot 1991). Topography of a guyot is characterized by flat plateau, upper slope and flanking slope near the base. Hard substrate on exposed top, ledges and slopes, and ledges and soft sediments on depressions provide habitats for some benthic organisms. The minimum depths of the seamounts range approximately 300 m to 2000 m, and southern seamounts are generally shallower than northern seamounts (Smoot 1985, 1986, 1991, Table 1). The chain of seamounts creates an oceanographical boundary and mesoscale eddies in the upper water column, and attract some pelagic species (Yasui 1986, Boehlert 1988).

Utilization by fishery: Most of the seamounts in the area have been utilized by commercial fisheries since 1967, and biological information on fish and benthos has been collected through scientific surveys, exploratory fisheries, and scientific observers onboard commercial vessels. North Pacific armorhead (*Pseudopentaceros wheeleri*) and Splendid alfonsin (*Beryx splendens*) are major target species in demersal fisheries in the Emperor Seamounts/Northern Hawaiian Ridge area (Fisheries Agency of Japan 2008 Appendices D and E). The North Pacific armorhead utilizes southern seamounts in this area as adult habitat and spawning ground, whereas larvae and juvenile are widely distributed in the epipelagic zone of the North Pacific Ocean (Fisheries Agency of Japan 2008 Appendix E). Splendid alfonsin is supposed to have a meta-population structure in the whole North Pacific Ocean, since there is no genetic differentiation within the ocean, and larvae can be transported from the Japanese archipelago to the Emperor Seamounts/Northern Hawaiian Ridge via the Kuroshio and Kuroshio Extension Currents. Both species mature in three to four years and are moderately fecund and productive (Fisheries Agency of Japan 2008 Appendix D). Productivity of these two species is relativiely higher than those of typical deepwater fish species, such as orange roughy (*Hoplostethus atlanticus*) and sablefish (*Anoplopoma fimbria*), which have extremely slow growth rates, late maturity, long life spans, and low natural mortality.

Biological characteristics: Forty-six fish species were recorded from the exploratory fishing operations (Fisheries Agency of Japan 2008 Appendix A), but none of these species are endemic to the Emperor Seamounts nor listed as vulnerable or endangered on the IUCN Red List. Hart and Pearson (2011) analyzed fish species recorded from the Emperor Seamounts and found that 41 out of 49 fish species were also recorded elsewhere in the Pacific Ocean.

Some precious corals were harvested from the 1960s to the 1980s; however, the initial abundance of precious corals is unknown. The interim measures to protect the cold-water corals were introduced in 2006 in the Emperor Seamount/Northern Hawaiian Ridge area.

Gorgonaceans (8 families, 24 genera), Alcyonaceans (6 families, 7 genera), Antipatharians (4 families, 5 genera) and Scleractinians (6 families, 16 genera) have been observed in Japanese scientific surveys in the Emperor Seamounts/Northern Hawaiian Ridge area. No endemic coral species have been identified. Although the prediction of habitat suitability models for some cold-water corals indicated higher probability of occurrence compared to the surrounding deep sea floor (e.g., Davies and Guinotte 2011), results of the actual sea floor observation with underwater cameras revealed that distribution of cold-water corals was sporadic and sparse both inside and outside the traditional fishing grounds (Yanagimoto et al. 2008), indicating relatively low density and diversity of corals in the area compared to adjacent Aleutinan Islands or other Pacific seamounts (Etnoyer and Morgan 2005, Heifetz et al. 2005, Stone and Shotwell 2007). Besides cold-water corals, some literature information is available for benthic crustaceans (Sakai 1978) and foraminiferans (Ohkushi and Natori 2001).

No marine teleost species, deep-water shark species or cold-water coral species found on these seamounts in this area so far are listed as the vulnerable or endangered species on the IUCN Red List. The relatively low diversity and endemism of fish and coral fauna observed in this area is in line with the recent views that seamounts are generally not isolated habitats with a highly endemic diverse fauna (Samadi et al. 2006, O'Hara 2007, Clark et al. 2012).

Source of scientific data: Underwater camera survey and dredge sampling have been conducted to collect scientific information on species composition, distribution and abundance of benthic organisms on some seamounts in the area. Scientific observers onboard commercial fishing vessels collect data on fish species and incidental catch of benthic organisms. These scientific data, together with commercial catch and effort statistics, are reported to the Scientific Working Group of the NPFC for rigorous scientific review.

Feature condition and future outlook of the proposed area

Current fishery management: Many of the seamounts in the Emperor Seamounts/Northern Hawaiian Ridge area have been utilized by commercial bottom fisheries since 1967. Currently, bottom fisheries in the area are managed by interim conservation measures of the NPFC, which require fishing participants of the NPFC (i) to limit fishing effort to the existing level, (ii) not to allow bottom fisheries to expand into new areas (in particular, north of 45°N), (iii) to assess the impact of bottom fisheries on marine species or any vulnerable marine ecosystem (VME), and (iv) to cease bottom-fishing operations and move 5 miles away from the location where a fishing vessel encounters cold-water corals.

Japan and Republic of Korea have introduced additional voluntary measures as below:

Japan

Limit the number and capacity of bottom-fishing vessels at current level
Limit fishing effort at 80% of the 1996-2006 level
No fishing operation north of 45°N
No fishing operation on sea floor deeper than 1500m
Equipment of each fishing vessel with vessel monitoring system
Deployment of onboard scientific observers on each fishing vessel
Temporary closure of fishing season in November and December
Temporary closure of the C-H Seamount
Temporary closure of southeastern part of the Koko Seamount

Republic of Korea

Limit the number of bottom-fishing vessels at current level
Equip each fishing vessel with a vessel monitoring system
Deployment of onboard scientific observers on each fishing vessel

Scientific surveys of fish species, and benthic habitat and fauna have been conducted by some participants of the NPFC. Results of these activities are reported to the Scientific Working Group of the NPFC.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.			X	
Explanation for ranking Seamounts have unique geographical features and provide habitat for a variety of benthic species. However, most of the species of demersal fish and benthic organisms recorded in this area are common to other areas in the Indo-Pacific, and no endemic species has been recorded on these seamounts.					
Special importance for life-history stages of species	Areas that are required for a population to survive and thrive.			X	
Explanation for ranking North Pacific armorhead, *Pseudopentaceros wheeleri*, uses southern seamounts of this area as adult habitat and spawning ground while larvae and juveniles are widely distributed in the epipelagic zone of the North Pacific Ocean. Some pelagic species also utilize the water column over the seamounts in the area for feeding or migration.					
Importance	Area containing habitat for the survival and		X		

for threatened, endangered or declining species and/or habitats	recovery of endangered, threatened, declining species or area with significant assemblages of such species.				
Explanation for ranking No marine teleost species, deep-water shark species or cold-water coral species found in these seamounts are listed as vulnerable or endangered species in the IUCN Red List. A few sparse colonies of precious coral were reported, but no dense aggregation has been reported.					
Vulnerability, fragility, sensitivity, or slow recovery	Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.			X	
Explanation for ranking Some precious corals were harvested from the 1960s to 1980s; however, the initial abundance of precious corals is unknown. The interim measures to protect the cold-water corals were introduced in 2006 in the Emperor Seamount Chain. The prediction of habitat suitability model of some cold-water corals indicated higher probability of occurrence compared to the surrounding deep-sea floor, but actual results of the underwater observation indicated that distribution of corals was sporadic and sparse in most cases.					
Biological productivity	Area containing species, populations or communities with comparatively higher natural biological productivity.			X	
Explanation for ranking The biological productivity of these seamounts is higher than that of the neighbouring deep-sea floor, but is relatively lower than that of other productive seamounts located in northern North Pacific Ocean.					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
Explanation for ranking The species compositions of deep-sea corals showed low species diversity, but 46 fish species were reported in the exploratory fisheries in the area.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.		X		
Explanation for ranking Most of the seamounts in the area have been fully utilized by commercial fisheries since the 1970s, and currently managed by interim conservation measures of the NPFC. Therefore the naturalness of these seamounts is low.					

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Maps and Figures

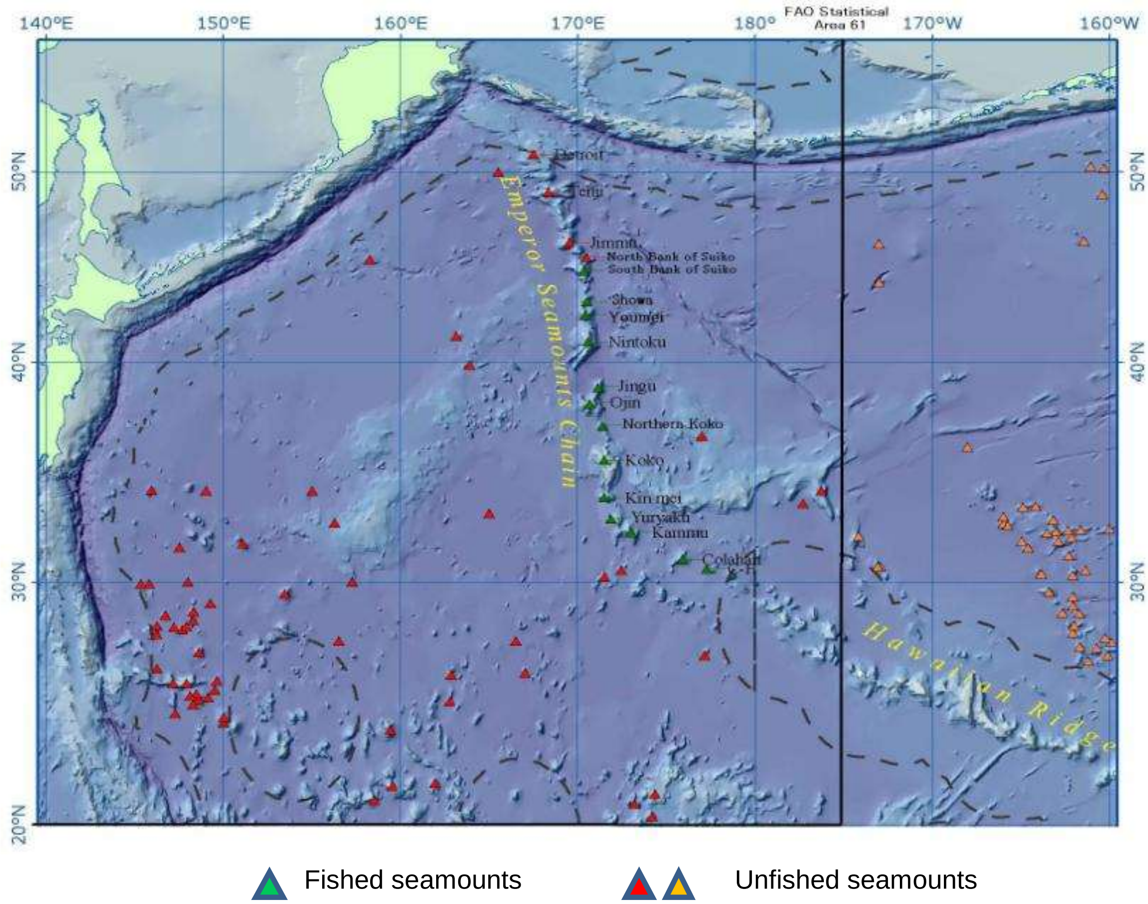

Figure 1. Map showing major seamounts of the Emperor Seamount/Northern Hawaiian Ridge (cited from NPFC website, http://nwpbfo.nomaki.jp/Map.html).

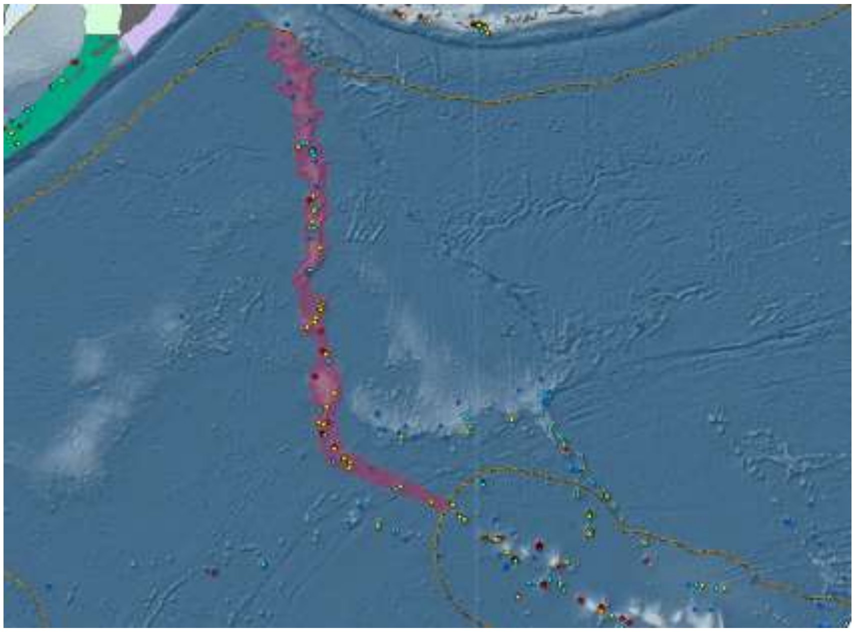

Figure 2. Emperor Seamount Chain and Northern Hawaiian Ridge (outside of the US EEZ).

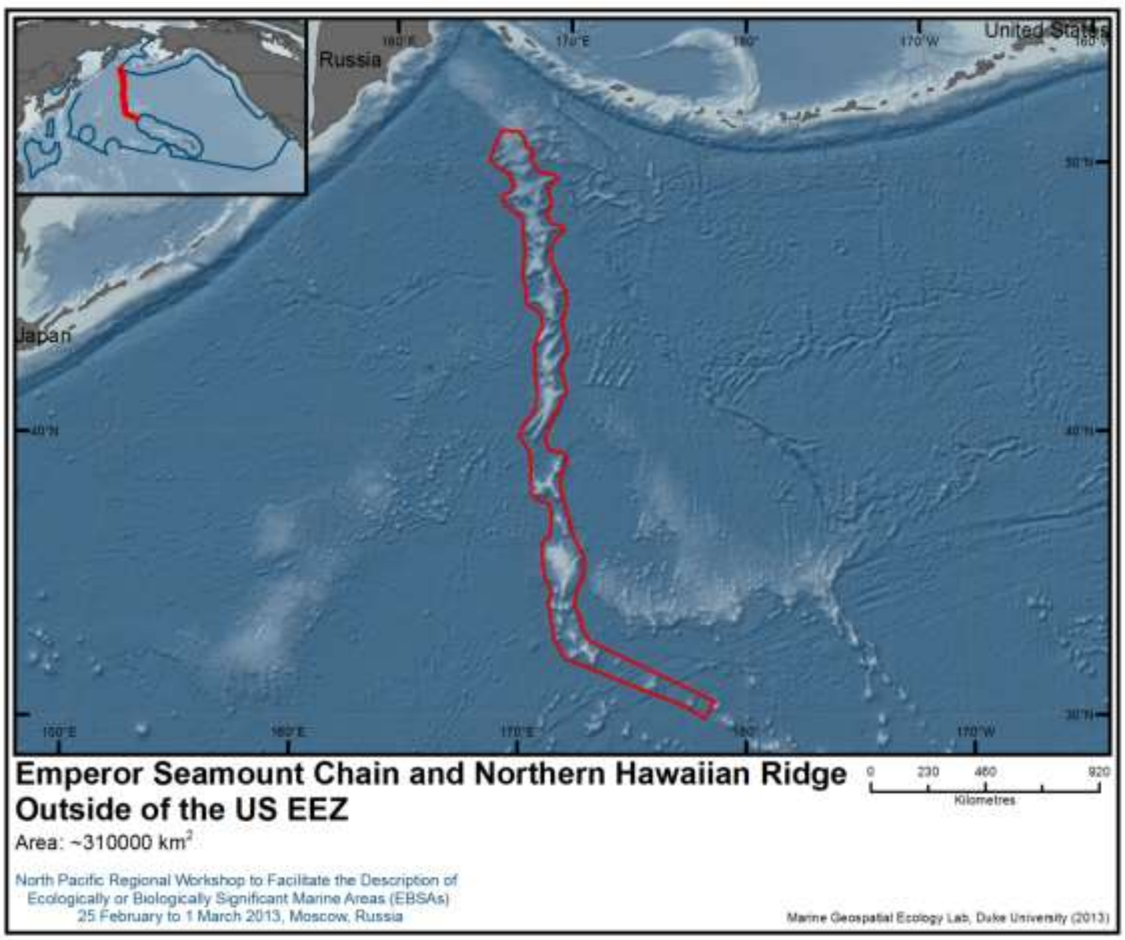

Figure 3. Area meeting EBSA criteria.

Table 1. List of major seamounts in the Emperor Seamount Northern Hawaiian Ridge area outside the US EEZ

Name	Type	Latitude	Longitude	Minimum Depth (m)	Height (m)
Meiji	guyot	53-10'N	164-42'E	2000	N/A
Detroit	guyot	51-10'N	167-35'E	1550	N/A
jinmu	guyot	46-00'N	169-24'E	1300	N/A
Suiko	guyot	45-00'N	170-00'E	1000	4900
Saga	guyot	43-25'N	170-00'E	1300	3800
Showa	guyot	43-00'N	170-20'E	1400	4200
Yomei	guyot	42-20'N	170-20'E	900	4600
Nintoku	guyot	41-00'N	170-30'E	1000	4900
Jingu	guyot	38-40'N	171-10'E	900	4900
Ojin	guyot	38-00'N	170-30'E	1000	4800
Koko	guyot	35-00'N	171-30'E	300	5100
Kinmei	seamount	33-45'N	171-20'E	1600	2200
Taisho	seamount	33-45'N	171-50'E	700	4800
Antoku	guyot	33-40'N	171-40'E	600	4600
Genji	seamount	33-20'N	172-15'E	1500	4000
Toba	guyot	33-15'N	171-40'E	1100	2200
Go-Sanjo	seamount	32-53'N	171-28'E	2800	2700
Go-Shirakawa	seamount	32-40'N	171-35'E	2000	3500
Yuryaku	guyot	32-40'N	172-20'E	500	4900
Kammu	guyot	32-15'N	173-00'E	350	2600
Daikakuji	guyot	32-05'N	172-15'E	1100	4400
Abbott	seamount	31-48'N	174-18'E	N/A	N/A
Colahan	guyot	31-02'N	175-55'E	240	4600
C-H	guyot	30-23'N	177-34'E	340	4900

Area No. 19: North Pacific Transition Zone

Abstract

The North Pacific Transition Zone is an oceanographic feature of special importance to the biology of many species in the North Pacific Ocean. The North Pacific Transition Zone is a 9000-km wide upper-water column oceanographic feature bounded to the north and south by thermohaline fronts. A latitudinal gradient of physical features, including eddies and frontal zones, establishes a highly productive habitat that aggregates prey resources, thereby attracting many species of pelagic predators—including endangered and commercially valuable species. In addition to providing key North Pacific foraging areas, the feature also serves as a migratory corridor for species such as bluefin tuna and juvenile loggerhead sea turtles.

Introduction

Representing a dominant feature of North Pacific open marine ecosystems, the North Pacific Transition Zone (NPTZ) is a large-scale, basin-wide upper water column feature determined by oceanic and atmospheric gyre circulations (Roden 1991). Bounded in latitude by thermohaline fronts—to the south by the Subtropical Frontal Zone and to the north by the Subarctic Frontal Zone (Roden, 1991)—the Transition Zone is an interface between colder nutrient-rich polar water and warmer nutrient-poor subtropical water. It is a pelagic feature that does not extend to depth—which in these areas of the Pacific can reach thousands of metres.

The latitudinal gradients of physical features between the North Pacific subtropical and subarctic gyres include eddies and frontal zones. An abrupt transition in surface phytoplankton chlorophyll *a* concentration—the Transition Zone Chlorophyll Front (TZCF)—aggregates zooplankton and other prey resources, ultimately attracting higher trophic level predators (Polovina 2000, 2001). A large body of research supports the importance of this feature for large pelagics in the North Pacific Ocean, including endangered and commercially valuable species (e.g. see references in Harrison, 2012).

Location

The NPTZ is a basin-wide feature. The latitudinal extent of the NPTZ changes seasonally between 28° to 34°N and 40° to 43°N (Bograd et al., 2004), being further south during northern winters. The feature is bounded to the south by the Subtropical Frontal Zone and to the north by the Subarctic Frontal Zone (Roden, 1991). The NPTZ represents a continuation of major coastal currents in the exclusive economic aones of nations on both sides of the North Pacific. In the west, the transition zone includes the Kuroshio Current Extension region and the advection of its high productivity waters eastward. In the east, the Transition Zone feeds into coastal currents of Canada, USA, and Mexico, including the California Current large marine ecosystem.

Note that because the positions of the subtropical and subarctic gyres vary seasonally, the precise locations of the fronts between these two gyres also vary seasonally. For the purpose of defining the location of this feature, the mean minimum and maximum latitudes have been chosen to represent the northern and southern boundaries. This implies that the actual frontal zone does not occupy every location within this mapped area at every time. Figure 1 provides an example of the seasonal changes in the mean position of the chlorophyll front as an index of the position for the core of the transition zone.

Feature description of the proposed area

Due to the frontal nature of this feature, the specific boundaries change seasonally and interannually as a result of changes in thermohaline structure and hydrostatic stability (Roden 1991). The western section of the Transition Zone, in particular associated with the Kuroshio Current Extension, is a region of higher than background eddy kinetic energy (e.g. Roberts et al., 2010). Further, the NPTZ contains a chlorophyll front that extends across the North Pacific between the lower chlorophyll subtropical gyre and the higher chlorophyll subarctic gyre. The mean position of this chlorophyll front also migrates seasonally with a latitudinal minimum in January-February and latitudinal maximum in July-August (Polovina et al. 2001; Figure 1). It is important to note that the exact position of this front shows considerable interannual variability and that it is strongly influenced by El Niño/La Niña events (McKinnel and Dagg 2010).

In addition to representing an area of higher primary productivity, the NPTZ supports higher secondary productivity with respect to zooplankton biomass (McKinnell and Dagg 2010). This higher productivity has resulted in persistent exploitation of this feature by a number of higher trophic level species, including loggerhead turtles (*Caretta caretta*) and albacore tuna (*Thunnus alalunga*; Polovina et al., 2000, 2001); Pacific bluefin tuna (*Thunnus orientalis*; Boustany et al., 2010); albatrosses (*Phoebastria nigripes* and *Phoebastria immutabilis*; Hyrenbach et al., 2002; Kappes et al., 2010); elephant seals (*Mirounga angustirostris*; Simmons et al., 2010); flying squid (*Ommastrephes bartrami*), Pacific pomfret (*Brama japonica*), blue shark (*Prionace glauca*) and Pacific saury (*Cololabis saira*) (McKinnell and Dagg 2010). Many of these species undergo extensive seasonal migrations both across and along this region between summer feeding grounds and winter spawning grounds to capitalize on productivity of the NPTZ. In the case of loggerhead turtles, which migrate across the North Pacific between feeding grounds in the Bahia Magdalena, Mexico, and Japan, the transition zone and in particular its chlorophyll front forms a major migration route (Polovina et al., 2001; Kobayashi et al., 2008; Figure 2).

Multiple commercial fisheries operate in the Transition Zone, including Japanese and US vessels targeting tunas and billfishes, Japanese and US trawl vessels targeting tunas (notably albacore tuna), and a distant-water Japanese squid jigging fishery. The multinational Asian high-seas driftnet fishing fleets that used to catch squid, tunas, and billfish also operated in Transition Zone waters (Seki et al., 2003).

Feature condition and future outlook of the proposed area

The NPTZ by definition will continue to exist as a feature as long as the subarctic and subtropical gyres continue to exist. However, the specific location of this transition zone is likely to change in response to climate change in predictable and unpredictable ways. The specific location of the NPTZ has been noted to change due to El Niño/La Niña events (McKinnell and Dagg 2010) providing further evidence that this feature is strongly influenced by large-scale climatic processes. Further, the strength of the Kuroshio Current is primarily determined by the strength of the Aleutian Low (McKinnell and Dagg 2010), and climate change scenarios suggest seasonal changes in large- to medium-scale atmospheric and oceanographic processes will further influence the specific location of the NPTZ both temporally and spatially. Also, Polovina and Powell (2008) suggest the low productivity zone in the North Pacific is expanding, which could suggest a potential narrowing of the NPTZ.

The feature overall is not expected to be influenced by specific stresses, although local vulnerabilities associated with biological communities can be expected as a result of local and remote stresses. For example, climate change (Hazen 2012), marine traffic, and fisheries bycatch could affect the productivity and diversity of specific biological components within the NPTZ. Hazen et al. (2012) predicted that the region could shift by as much as 600 miles, resulting in a 20 percent loss of pelagic predator diversity in the region.

Assessment of the area against CBD EBSA criteria

CBD EBSA criteria (Annex I to decision IX/20)	**Description** (Annex I to decision IX/20)	**Ranking of criterion relevance** (please mark one column with an X)			
		No information	**Low**	**Medium**	**High**
Uniqueness or rarity	Area contains either (i) unique ("the only one of its kind"), rare (occurs only in few		X		

<table>
<tr><td></td><td>locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking: The NPTZ is a unique oceanographic feature within the North Pacific current system. However, it is not globally unique and due to its large spatial extent, is not a rare habitat.</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking: A large number of species migrate from the subtropical frontal zone (eg., albacore, skipjack tuna, blue shark), or from the subarctic domain (e.g., saury, pomfret, flying squid) and spend their critical life stages in the NPTZ. It also provides important foraging area for many seabird species, such as Laysan and black-footed albatross (Hyrenbach et al., 2002). It is indispensable for some species, and its importance for life history is high.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking: The NPTZ provides a transoceanic migration corridor for juvenile (Polovina et al. 2006) and adult (Kobayashi et al., 2008) loggerhead sea turtle and Pacific bluefin tuna (Boustany et al., 2010). The habitat is critical for the survival of these threatened or depleted species.</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking: Since the NPTZ is a dynamic zone that is prone to geographic shifts, the vulnerability of the oceanographic feature itself is considered low. Although the position of the zone may change with climate change, it is assumed that the zone itself would retain its physical properties within the foreseeable future. Vulnerability of the associated biological communities was not assessed under this criterion.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking: The transition zone chlorophyll front (TZCF), which indicates higher concentrations of chlorophyll a relative to the subtropical gyre, migrates from south to north over 1000 km annually (Polovina et al. 2001). The NPTZ is the area between the southern and northern extremes of the TZCF. Ocean productivity estimates derived from models and satellite observations (Behrenfeld and Falkowski, 1997) indicate high annual average phytoplankton production throughout the NPTZ, in particular in the west related to the Kuroshio Extension region. Chlorophyll concentrations in the subtropical gyre surface are usually <0.15 mg/m^3 whereas in the subarctic gyre and Transition Zone they can be >0.25 mg/m^3; a chlorophyll density of 0.2 mg/m^3 has been used as a good indicator of the position of the chlorophyll front (Polovina et al., 2001). In combination with the adjacent Subarctic domain, which provides seasonal high productivity in spring, the NPTZ forms a highly productive area in the oceanic</td></tr>
</table>

North Pacific. It supports many higher trophic level species and commercially important species such as albacore tuna (Polovina et al., 2001; Harrison, 2012) and flying squid (Ichii 2011).					
Biological diversity	Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.			X	
Explanation for ranking: The transition zone includes the edges of two different water domains. One expects a latitudinal cline in diversity, but because this is a juxtaposition of two water masses, there is the expectation that this area is highly diverse, and the feature attracts a large number of species. It has distinct endemic species of zooplankton and micronekton (Pearcy1991); however, more information is needed for an appropriate assessment of diversity.					
Naturalness	Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.			X	
Explanation for ranking: For an open ocean region, and due to the presence of commercially valuable species, this area has been consistently utilized by humans. The populations of several of the species using this region have been exploited and perturbed.					

Maps and Figures

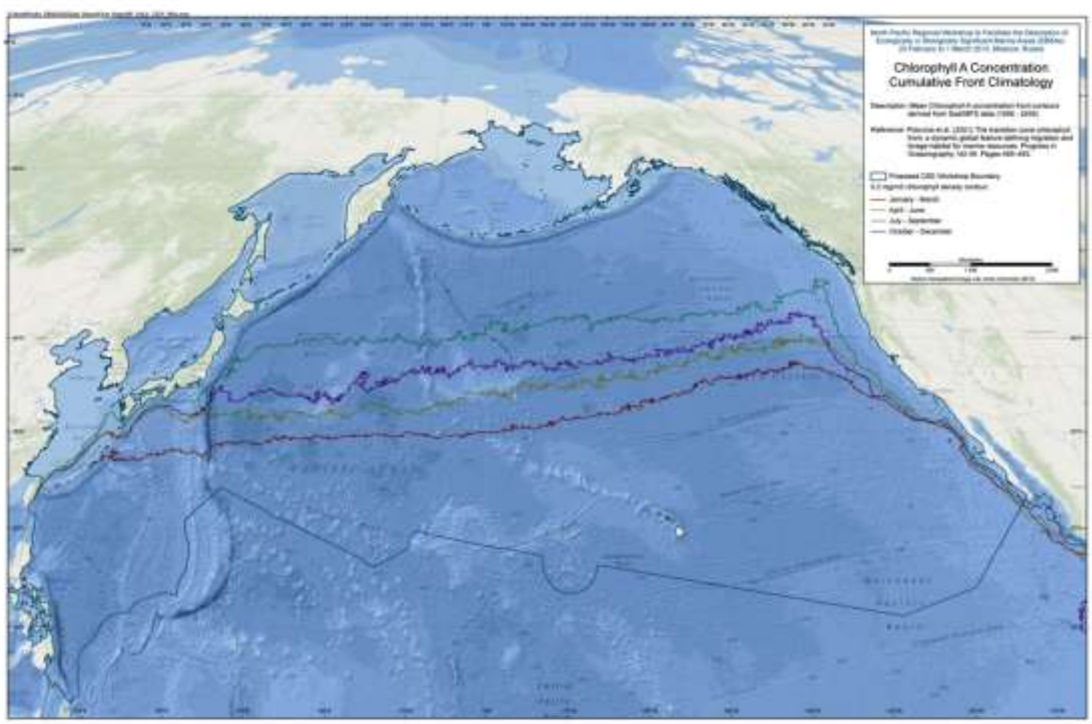

Figure 1. Climatology of the seasonal position of the chlorophyll front in the North Pacific, as an index of the mean position of the transition between subtropical and subarctic gyres.

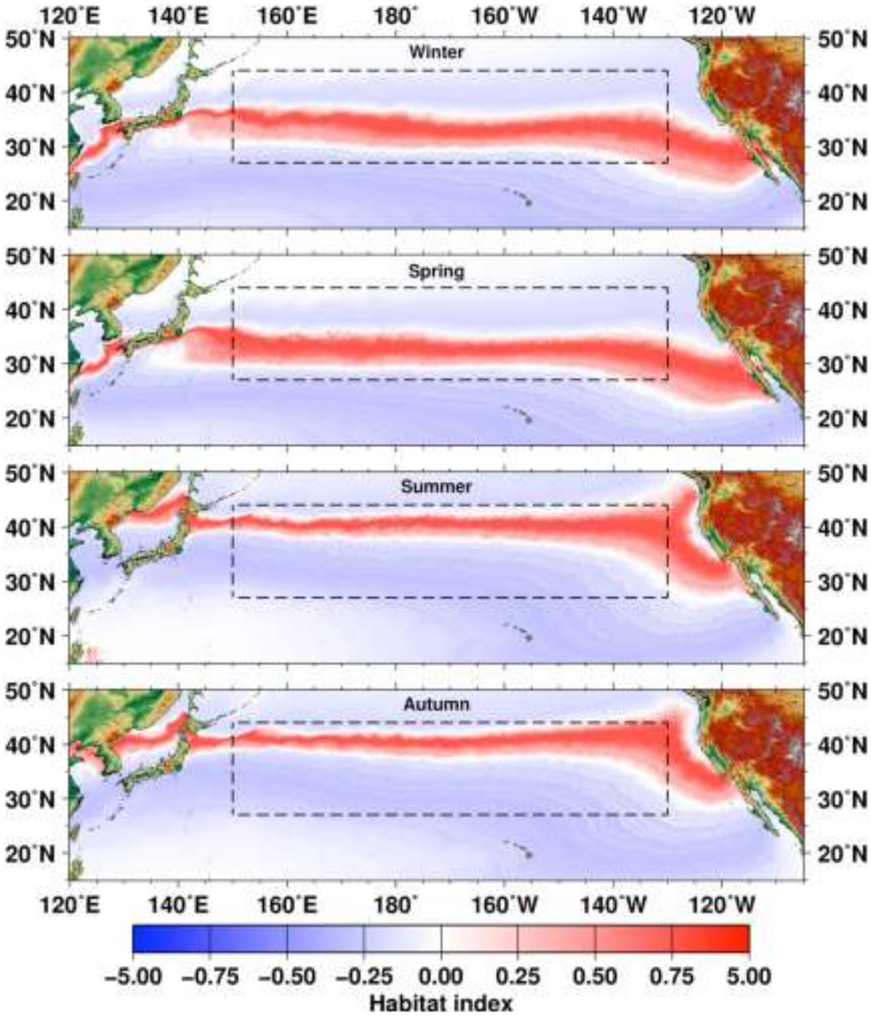

Figure 2. Seasonal climatological habitat map for pelagic loggerhead sea turtles in the North Pacific Ocean (from Kobayashi et al., 2008).

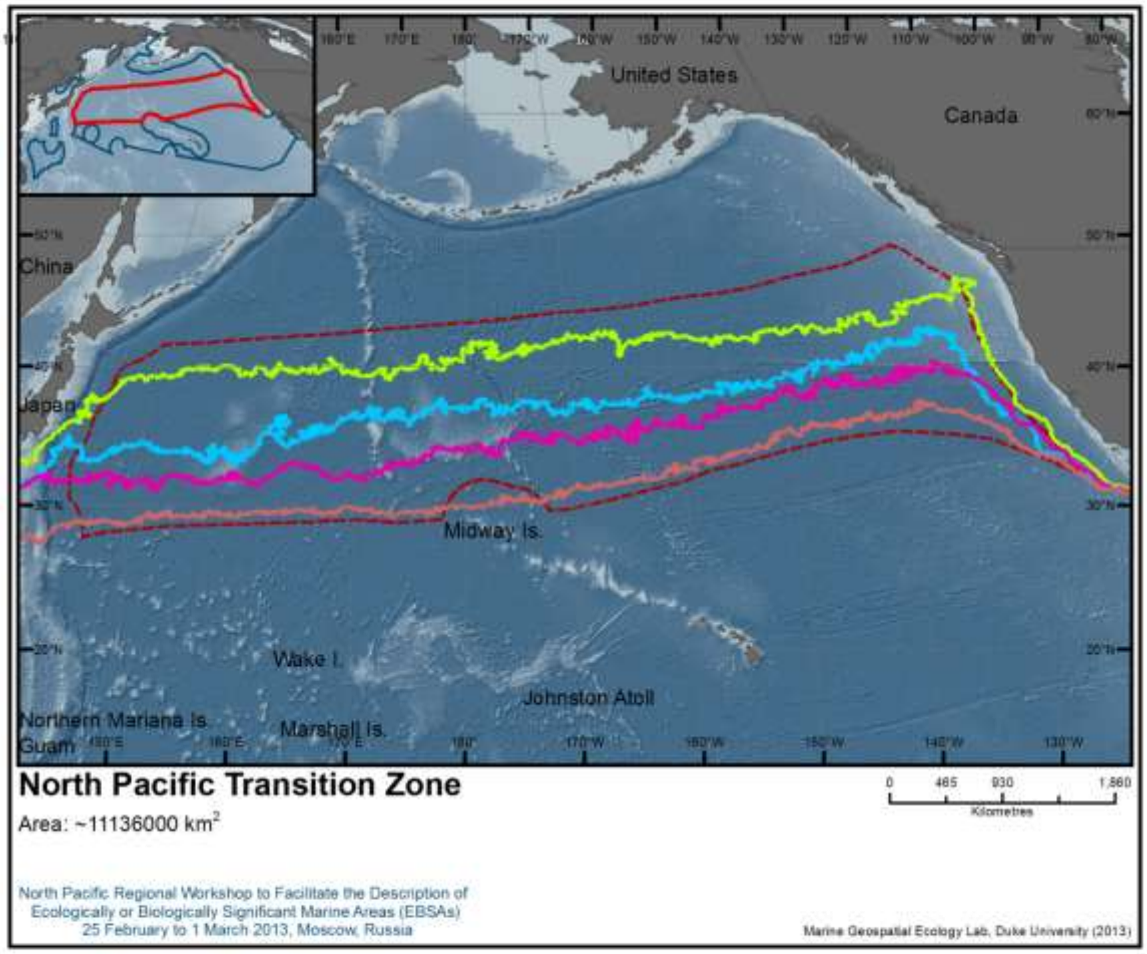

Figure 3. Area meeting EBSA criteria. The coloured lines inside the polygon represent the climatology of the seasonal position of the chlorophyll front across the North Pacific, as an index of the mean position of the transition between Subtropical and Subarctic gyres (further south in winter, further north in summer).

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Area No. 20: Focal foraging areas for Hawaiian albatrosses during egg-laying and incubation

Abstract

Northwest Hawaiian Island breeding colonies of black-footed albatross (*Phoebastria nigripes*, Vulnerable, IUCN Red List) and Laysan albatross (*Phoebastria immutabilis*, Near Threatened, IUCN Red List) account for 90% of the global population of each species (Naughton et al. 2007). Observer records and satellite telemetry data identify a temporally limited area of special importance to these species. Although widely distributed during much of the annual cycle, during egg-laying and incubation (November-February), adults concentrate their foraging effort in an area of frontal habitats close to the breeding colony. Within this area, the two species segregate by sea surface temperature. Black-footed albatrosses concentrate effort within a more restricted band south of the subarctic front, while Laysan albatross capitalize on the colder waters within the subarctic front to the north. The mapped area encompasses the range of interannual variability in the position of frontal habitats (Bograd 2004).

Introduction

Albatrosses are highly pelagic foragers with extraordinary flying abilities (Croxall et al., 2005; Shaffer et al., 2006). They are colonial and monogamous nesters and exhibit strong philopatry to their remote nesting islands. A single egg is typically laid per year (Lack, 1968), and a high level of parental investment is provided until the chick edges. Both sexes incubate and rear chicks (Warham, 1990; Weimerskirch et al., 2000).

Black-footed albatross (*Phoebastria nigripes,* Vulnerable, IUCN Red List 2009) and Laysan albatross (*Phoebastria immutabilis*, Near Threatened, IUCN Red List) nest on islands of the North Pacific. Three colonies in the Northwest Hawaiian Islands account for 90% of the global population of each species (Naughton 2007). Although breeding colonies are located within EEZs, the two species spend most of their annual cycles foraging in areas beyond national jurisdiction. Both species utilize the North Pacific Transition Zone while foraging (Fernández et al., 2001; Hyrenbach et al., 2002; Kappes et al. 2010). They are surface-feeders, foraging within the top metre of the water column, and as such rely on vertically migrating prey, as well as carrion and fishing discards (Harrison et al., 1983; Whittow, 1993a, b; Gould et al., 1997). Hawaiian albatrosses consume a diverse array of prey items. Ommastrephid squid and flying fish (Exocoetidae) eggs comprise the largest proportion of the Laysan and black-footed albatross diet, respectively (Harrison et al., 1983). Previous studies have demonstrated a relationship between catches of Ommastrephid squid and sea surface temperature (SST; Gong et al., 1993; Yatsu et al., 1993; Pearcy et al., 1996), productivity (Ichii et al., 2004), and position relative to the North Pacific Subarctic Frontal Zone (SAFZ) (Pearcy et al., 1996).

Many procellariiformes are endangered due to introduced predators on breeding islands, marine pollution and debris ingestion, and direct incidental take as bycatch in pelagic fisheries. In some fisheries, black-footed and Laysan albatrosses are bycaught in large numbers in the Central and Western Pacific (Miller and Skalski, 2006; Lewison et al., 2009).

Although very widely distributed throughout the Pacific basin during the post-breeding stage of their life history, the foraging extent of albatrosses is restricted during egg-laying and incubation (October, November, December, and January). Tracking and observer data support the identification of an area of special importance to these species during this important life-history stage.

During the incubation periods of 2002-2006, Kappes et al. used satellite telemetry to track a total of 37 Laysan and 36 black-footed albatrosses at Tern Island, Northwest Hawaiian Islands. This tracking effort was a part of the Tagging of Pacific Predators research programme, a field project of the Census of Marine Life (Block et al. 2011). First passage time analysis was used to determine search effort (Figure 1) of individual albatrosses along their respective tracks, and this metric was then related to oceanographic habitat variables using linear mixed-effects regression. Most individuals of both species traveled to the

North Pacific Transition Zone where they were shown to concentrate in a distinct foraging area of the central North Pacific located between 35 and 45 degrees north, and between 175 and 155 degrees west (Figures 1 and 2).

This important foraging area is characterized by frontal habitats of the North Pacific Transition Zone (Figure 1) that are within close proximity to the nesting colonies. Within the area, black-footed and Laysan albatrosses segregate by sea surface temperature (16 and 12°C respectively). Black-footed albatrosses occupy a more restricted band to the south and closer to the subtropical front, while laysan albatross capitalize on the colder waters within the subarctic front to the north (Figure 2).

The core foraging habitats highlighted here are not spatially fixed. The North Pacific Transition Zone and its associated sea surface temperature and chlorophyll fronts exhibit interannual variability in latitude. Both species track sea surface temperature, shifting their foraging habitats during incubation north or south in any given year depending upon the position of the Transition Zone in that year. The mapped area is intended to encompass the range of interannual variability in the position of frontal habitats and associated core foraging areas (Bograd 2004).

Location

Located within the central frontal habitats of the North Pacific Transition Zone and entirely located beyond national jurisdiction, this feature is located between 35 and 45 degrees north, and between 175 and 155 degrees west. This feature is of most importance during the breeding season of black-footed and Laysan albatrosses (December-January) when the majority of individuals are concentrated within foraging areas close in proximity to breeding colonies during incubation. High-use areas within this feature also exhibit interannual variability corresponding to the interannual variability of the North Pacific Transition Zone (Bograd 2004).

Feature description of the proposed area

During breeding, the foraging extent of adult albatrosses is limited by the need to return to the colony to incubate and provision their chicks. During this important life-history stage, foraging effort is concentrated in discrete bands in the frontal habitats of the North Pacific Transition Zone. The North Pacific Transition Zone is a 9000-km wide upper-water column oceanographic feature bounded to the north and south by thermohaline fronts. A latitudinal gradient of physical features, including eddies and frontal zones, establishes a highly productive habitat that aggregates prey resources, thereby attracting many species of pelagic predators, including albatrosses.

Laysan albatrosses exhibit a more northerly foraging distribution during incubation (Kappes et al. 2010) than black-footed albatrosses. The majority of individuals traveled to pelagic waters of the North Pacific, while Laysan albatrosses traveled farther, for longer periods, and demonstrated greater interannual variability in trip characteristics than black-footed albatrosses. For Laysan albatrosses, maximum trip distance was negatively correlated with body mass change during foraging and overall breeding success.

Foraging areas were shown to shift with the interannual variability of the North Pacific Transition Zone, but are predictably associated with specific sea surface temperature regimes. Sea surface temperature was consistently the most important environmental variable predicting search effort of albatrosses, suggesting that both species use similar environmental cues when searching for prey (Kappes et al. 2010). Black-footed albatrosses prefer the warmer waters (~16°C) of the subtropical front while Laysan albatrosses prefer the cooler waters (~12°C) of the subarctic front. The interannual variability of frontal zones led to interannual variability of foraging distribution; however, the two species tracked similar temperatures in each year.

Feature condition and future outlook of the proposed area

Both species have recently been downlisted by the IUCN Red List because the model used to project a future population decline due to incidental mortality in longline fisheries has been criticized and it is implied that the rate of decline has been overestimated. Black-footed albatross populations are increasing, and the species has been downlisted to Vulnerable, indicating that the species is expected to decline rapidly over a period of three generations (2009-2065) owing primarily to mortality caused by longline fishing fleets, assuming that overall mitigation measures are inadequate.

Laysan albatross populations are estimated to be stable. They have rebounded from declines in the late 1990s and early 2000s, perhaps because apparent changes in the breeding populations reflected large-scale environmental conditions that affected the number of birds that returned to the colonies to nest rather than actual declines in the population. Given the difficulty of predicting long-term trends for such a long-lived species, and the number of documented threats and the uncertainty over their future effects, the species is precautionarily projected to undergo a moderately rapid population decline over three generations (84 years), and as such qualifies as Near Threatened.

Bycatch

The greatest source of mortality to both species is bycatch in commercial fisheries (IUCN 2007; Naughton et al., 2007). Historically, high seas driftnet and pelagic longline fisheries have been the most important sources of mortality; however, after closure of the high seas driftnet fishery, pelagic longline fisheries are currently considered the greatest primary threat to these species (Lewison and Crowder, 2003; Naughton et al., 2007; Véran et al., 2007). The Hawaiian longline swordfish fishery has been a consistent source of bycatch of these two species during the breeding season (as well as of leatherback and loggerhead turtles). Required mitigation efforts in the Hawaiian longline fishery have successfully reduced bycatch rates.

Some Asian tuna fisheries also operate within this region. Observer data collected from 2004-2007 reported that seabird bycatch occurred most often north of 30 degrees north, and between the longitudinal bounds of 165 E to 155 W. The major species bycaught and seasons with highest bycatch rates were black-footed albatross and Laysan albatross in North Pacific from October to February. The area and months of highest bycatch match the geographic and temporal scope of the area we identify as important to the life history of these species.

Climate

Both albatross species have experienced dramatic declines in breeding success after major El Niño-Southern Oscillation (ENSO) events (Dearborn et al., 2001; Seki et al., 2004). Kappes et al. (2010) modeled the relationship between area restricted search and oceanographic variables. Sea surface temperature was the primary predictor of presence. The two species tracked the interannual variability of their sea surface temperature, suggesting that the two species demonstrate flexibility in their ability to track preferred oceanographic habitats.

Although both species forage basin-wide during the post-breeding period, the breeding life-history stage poses an energetic cost that limits foraging distance. Laysan albatrosses were shown to forage farther from the nesting colony than black-footed albatrosses, and maximum trip distance was negatively correlated with body mass change during foraging and overall breeding success. Both albatross species have demonstrated dramatic declines in breeding success after major El Niño–Southern Oscillation events (Dearborn et al., 2001; Seki et al., 2004). Kappes et al. (2010) note that while both species appeared to track particular thermal characteristics, changes in SST predicted under global climate change scenarios are likely to alter the distribution of SSTs in the North Pacific.

Hazen et al. (2012) modeled the availability of habitat under IPCC climate change scenarios, and predicted that the region could shift by as much as 600 miles, resulting in a 20 percent loss of pelagic predator diversity in the region. However, Hazen et al. predicted that albatrosses would receive energetic benefits under IPCC climate change scenarios due to a closer proximity of frontal areas to their breeding colonies. Available habitat for albatrosses is predicted to increase. The Hazen et al. approach did not consider expected shifts in prey availability, and their predictions considered only relationships between presence and oceanographic variables. Kappes et al. (2010) suggest that reliable associations between water temperature and prey availability may break down in such an altered ecosystem.

Assessment of the area against CBD EBSA criteria

<table>
<tr><td rowspan="2">CBD EBSA criteria
(Annex I to decision IX/20)</td><td rowspan="2">Description
(Annex I to decision IX/20)</td><td colspan="4">Ranking of criterion relevance
(please mark one column with an X)</td></tr>
<tr><td>No informat ion</td><td>Low</td><td>Medium</td><td>High</td></tr>
<tr><td>Uniqueness or rarity</td><td>Area contains either (i) unique (“the only one of its kind”), rare (occurs only in few locations) or endemic species, populations or communities, and/or (ii) unique, rare or distinct, habitats or ecosystems; and/or (iii) unique or unusual geomorphological or oceanographic features.</td><td></td><td></td><td>X</td><td></td></tr>
<tr><td colspan="6">Explanation for ranking:
During the post-breeding stage of the albatross annual cycle, adults forage throughout the North Pacific. During incubation, adults must remain close enough to the nesting colony to provision their chicks. There are energetic costs to foraging farther during the breeding season. This frontal area is somewhat unique in that it is a distinct, highly productive seasonal habitat for these species that also is close in proximity to the the breeding colonies of black-footed and Laysan albatrosses.</td></tr>
<tr><td>Special importance for life-history stages of species</td><td>Areas that are required for a population to survive and thrive.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking:
Foraging distribution of the majority of breeding Laysan albatrosses is concentrated within this feature. This is an important area for this critical life-history stage.</td></tr>
<tr><td>Importance for threatened, endangered or declining species and/or habitats</td><td>Area containing habitat for the survival and recovery of endangered, threatened, declining species or area with significant assemblages of such species.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking:
Foraging distribution of the majority of breeding black-footed albatrosses is concentrated within this feature. This is an important area for this critical life-history stage.

Additional globally threatened species that utilize this productive area for foraging and migration include the leatherback turtle (Critically Endangered), loggerhead turtle (Endangered), and white shark (Vulnerable).</td></tr>
<tr><td>Vulnerability, fragility, sensitivity, or slow recovery</td><td>Areas that contain a relatively high proportion of sensitive habitats, biotopes or species that are functionally fragile (highly susceptible to degradation or depletion by human activity or by natural events) or with slow recovery.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking:

Black-footed albatross populations are increasing, and the species has been downlisted to Vulnerable on</td></tr>
</table>

<table>
<tr><td colspan="6">the IUCN Red List 2009. This status indicates that the species is expected to decline rapidly over a period of three generations (2009-2065) owing primarily to mortality caused by longline fishing fleets, assuming that overall mitigation measures are inadequate. Black-footed albatrosses are long-lived with low reproductive rates, and thus slow to recover.

Historically, high seas driftnet and pelagic longline fisheries have been the most important sources of mortality; however, after closure of the high seas driftnet fishery, pelagic longline fisheries are currently considered the greatest primary threat to these species (Lewison and Crowder, 2003; Naughton et al., 2007; Véran et al., 2007).

The foraging areas that compose this feature are also important to commercial fisheries, and these interactions contributed to previous declines. The Hawaiian longline fishery has instituted bycatch mitigation measures within this area. Other tuna fisheries also operate within the region. Observer data collected from 2004 to 2007 reported that seabird bycatch occurred most often north of 30 degrees north, and between the longitudinal bounds of 165 E to 155 W. The major species bycaught and seasons with highest bycatch rates were black-footed albatross and Laysan albatross in the North Pacific from October to February.

The area and months of highest fisheries bycatch match the geographic scope and months identified here as important to the life history of these species, indicating an area of continued bycatch risk.

The vulnerability of this feature to effects of climate change is uncertain. Hazen et al. (2012) models predict that albatross habitat will increase under IPCC climate change scenarios; however, the complex relationships between oceanography, prey, and predator in this area is uncertain.</td></tr>
<tr><td>Biological productivity</td><td>Area containing species, populations or communities with comparatively higher natural biological productivity.</td><td></td><td></td><td></td><td>X</td></tr>
<tr><td colspan="6">Explanation for ranking:
The transition zone chlorophyll front (TZCF), which indicates higher concentrations of chlorophyll a relative to the subtropical gyre, is located within the NPTZ, the highly productive area between the southern and northern extremes of the TZCF. VGPM ocean productivity (Fig. 4.11-1 in data document) demonstrates a high annual average chlorophyll a concentration throughout the NPTZ. It supports many higher trophic level species, including Laysan and black-footed albatross (data document Figs. 3.8-1 and 3.8-2 - Harrison, pelagic predator concentration) and commercially important species such as albacore tuna (data document Fig. 3.3-4) and flying squid (Ichii 2011).</td></tr>
<tr><td>Biological diversity</td><td>Area contains comparatively higher diversity of ecosystems, habitats, communities, or species, or has higher genetic diversity.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking:
The transition zone includes the edges of two different water domains. One expects a latitudinal cline in diversity, but because this is a juxtaposition of two water masses, there is the expectation that this area is highly diverse, and the feature attracts a large number of species. Multiple pelagic species utilize this area for foraging and migration (seabirds, leatherback and loggerhead turtles, white sharks, swordfish, albacore tuna). It has distinct endemic species of zooplankton and micronekton (Pearcy 1991), However, more information is needed for an appropriate assessment of diversity of this specific region within the transition zone.</td></tr>
<tr><td>Naturalness</td><td>Area with a comparatively higher degree of naturalness as a result of the lack of or low level of human-induced disturbance or degradation.</td><td></td><td>X</td><td></td><td></td></tr>
<tr><td colspan="6">Explanation for ranking:
Due to the presence of commercially valuable species, this area has been consistently utilized by humans.</td></tr>
</table>

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Maps and Figures

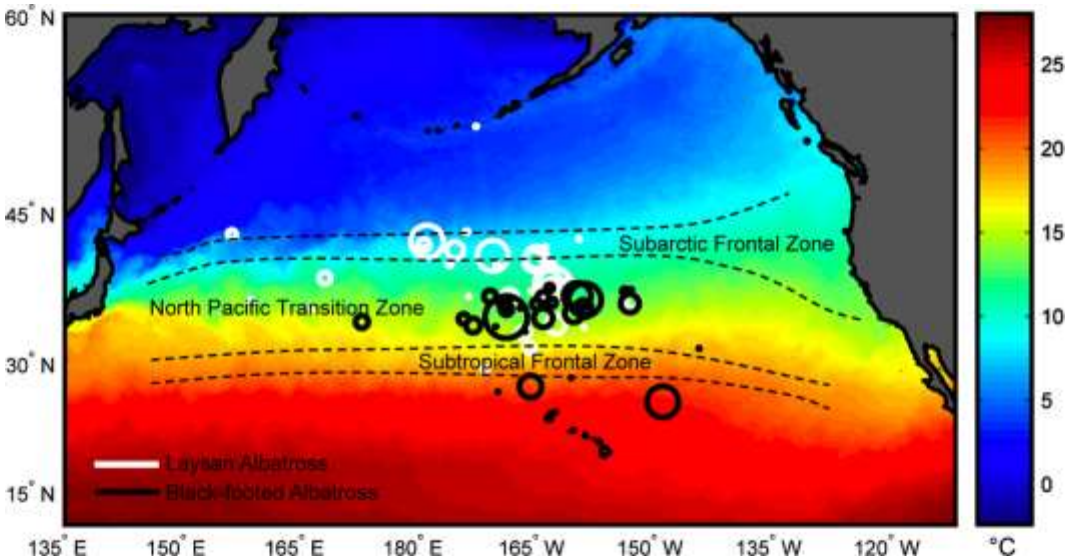

Figure 1. Intensive search areas visited by Hawaiian albatrosses as determined by first passage time analysis. Each circle represents the area where the individual demonstrated the maximum first passage time, at the appropriate ARS spatial scale determined from the individual's movements. Search areas are superimposed over time-averaged SST (degrees C) for the study period. Dashed lines indicate the location of the Subarctic Frontal Zone, the North Pacific Transition Zone, and the Subtropical Frontal Zone (after Seki et al. (2004) and Kappes et al. 2010).

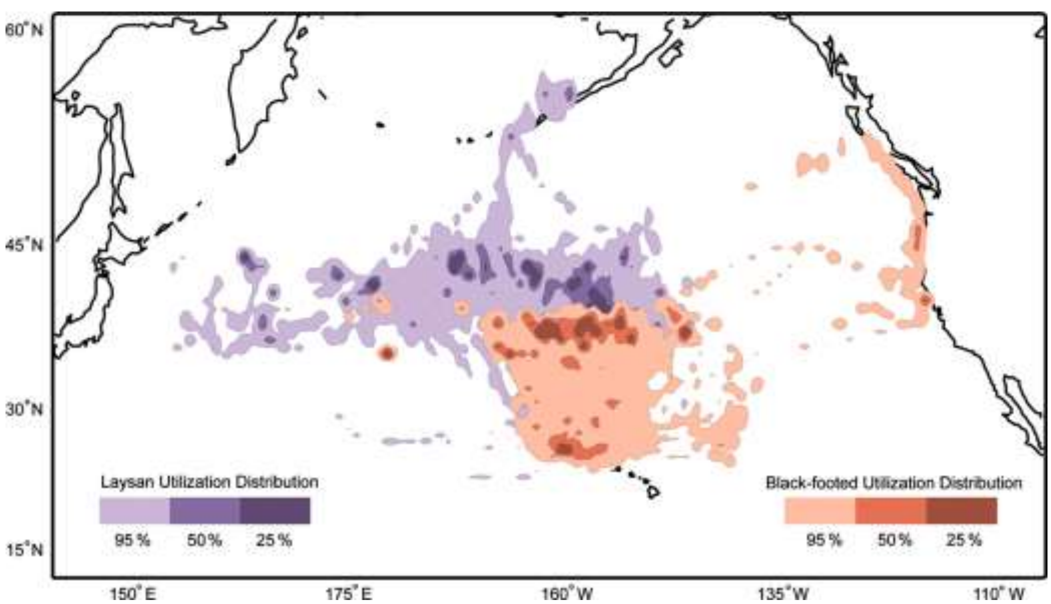

Figure 2. Foraging distributions of Hawaiian albatrosses during incubation as estimated by kernel density analysis. The spatial extent of the range (95% UD), focal areas (50% UD) and core areas (25% UD) are plotted for each species. (From Kappes et al. 2010).

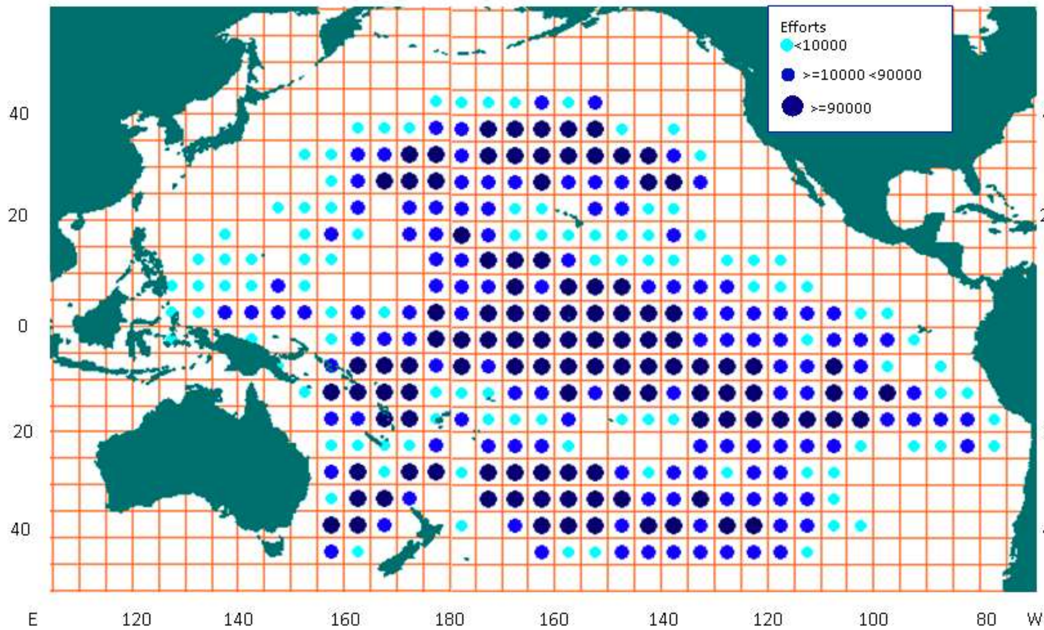

Figure 3. Distribution of fishery (hooks) 2004-2007. (Huang 2009)

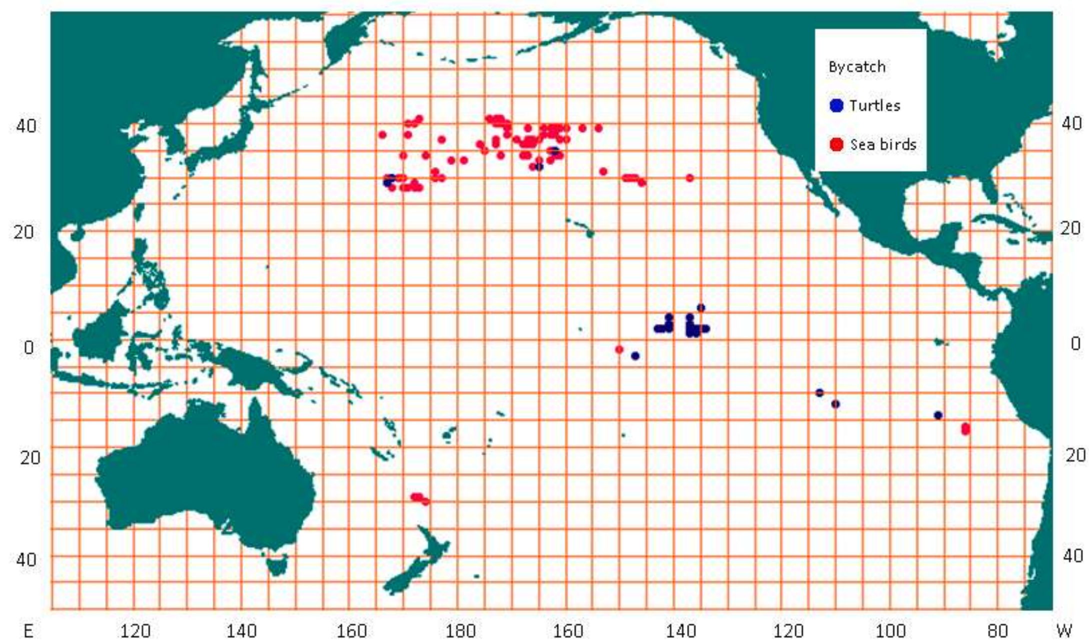

Figure 4. Seabird and turtle bycatch events, 2004-2007 as recorded by fisheries observers. Highest bycatch rates occurred between October-February. (Huang 2009)

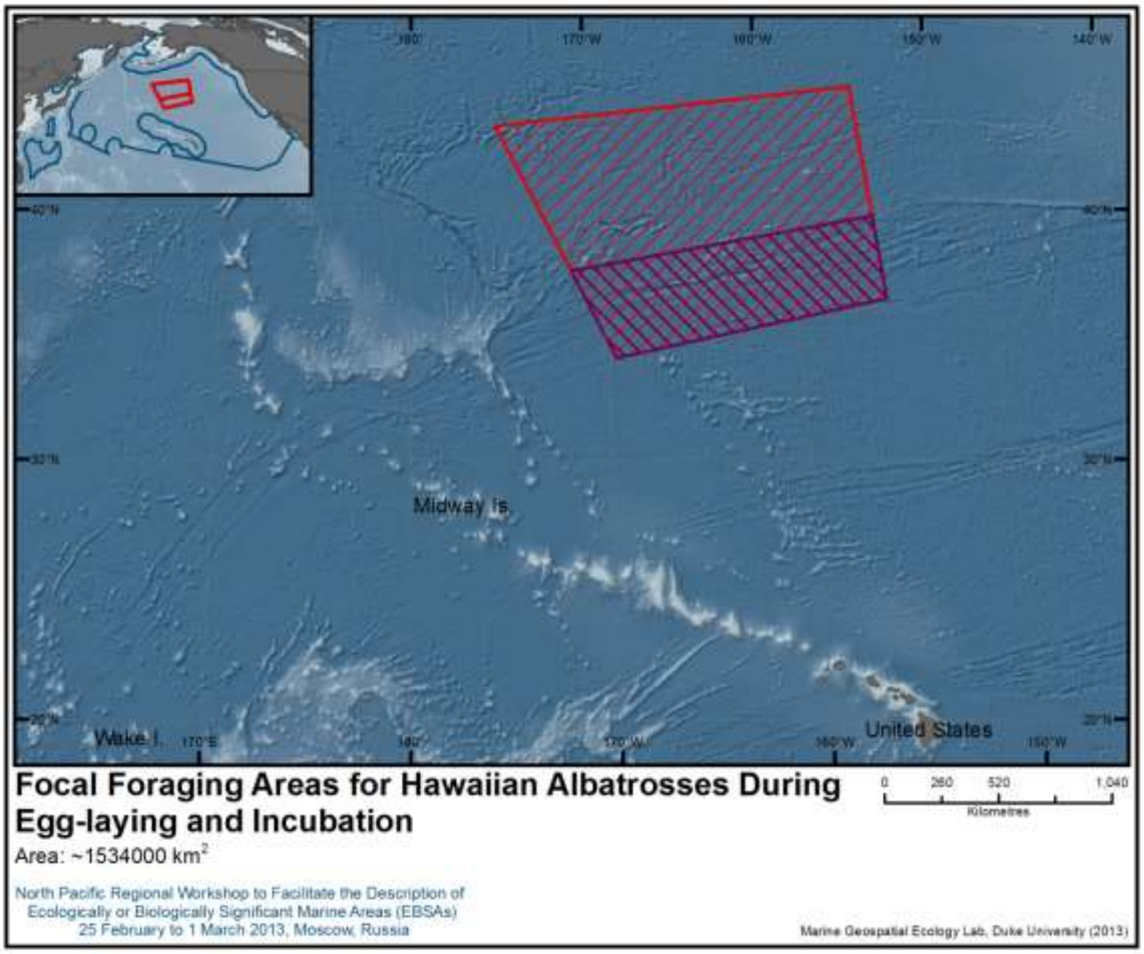

Figure 5. Area meeting EBSA criteria
