

**Annex K: Marine Biological Diversity Aspects Break-Out Group (Part VI, Chapters 34-43)**

**Co-Chairs:** Andrew A Rosenberg & Antonio Diaz De Leon

**Rapporteurs:** Nathan Vaughan & Bill Harford

**Participants**

- 1.-Sharmer Fleming
- 2.-Philmore James
- 3.-Tamica J. Rahming
- 4.-Melanie McField
- 5.-Linnethe Petricia Flosei Aries
- 6.-Robert Kock
- 7.-Juan L. Mate
- 8.-Renison Ruwa
- 9.-Patricia Miloslavich
- 10.-Jaime Bolanos
- 11.-Henry Wilson
- 12.-Liza I. Gonzalez
- 13.-Joana Akrofi
- 14.-William Harford
- 15.-Norman Vaughan

**Overall Points Related to Completing the Table and the Marine Biological Diversity Aspects Part of the WCR Assessment.**

Within the greater Caribbean region, some delegates suggested that the spatial organization of the assessment would be better organized according to mangrove, sea grass, and reef zones, rather than as a combined coastal zone. A large fraction of the coastal shelf within the broader Caribbean falls within mangrove, sea grass, and reef zones. Correspondingly, discussions pertaining to these areas were pervasive throughout discussions, as both data availability and research capacity have been focused on these coastal regions. Readers should be aware that many details within the 'coastal' section of the table are broadly applicable to all habitats.

Knowledge gaps with regard to marine biological diversity are extensive. Some specific examples are provided in the table. More broadly, these gaps include early life history of most organisms, historical baselines against which to compare current indicators of ecosystem status, and knowledge of deepwater environments. Further knowledge gaps exist with respect to how to integrate many regional data sources into useful frameworks for characterizing the Caribbean. Some delegates cautioned that regional aggregation of data must proceed based upon appropriate biological and/or socioeconomic spatial frames of reference. There remains a related need for tools to synthesize information, including global reporting and database management.

Topics (e.g. Coastal sediment habitats) and Sub-Topics (e.g. Overall status of major groups...) to Include in the WCR Assessment	Relevant Studies, Documents, Reports and Other Sources of Information (refer to the Inventory list)	Priority Individuals & Institutions to Engage (email; who suggested)	Information Gaps	Comments
<p>Coastal (0 – 50 m depths) habitats (across Chapters 34-43) - coral reefs, sea grass, mangrove habitats</p> <ul style="list-style-type: none"> <li>Overall status of major groups of species and habitats within this regime</li> <li>Status and trends of, and threats to, marine ecosystems, species and habitats that are threatened, declining or otherwise in need of attention</li> <li>Significant socioeconomic aspects in relation to the conservation of marine species and habitat</li> </ul>	<p><b>Submitted by: Sharmer Fleming</b> Status of Anguilla's Marine Resources 2008 Status of Anguilla's Marine Resources 2010)</p> <p><b>Submitted by: Melanie McField</b> Regional for Mesoamerican reef reports and data. Healthy Reefs Initiative healthyreef.org. Report card on the health of the Mesoamerican reef 2010 <a href="http://www.healthyreefs.org">www.healthyreefs.org</a></p> <p>IUCN reef resiliency project: meta analysis for Caribbean (and global – 2013)</p> <p>Long-Term Region-Wide Declines in Caribbean Corals. <b>Toby A. Gardner</b> et al Science 15 August 2003: Vol. 301 no. 5635 pp. 958-960</p> <p>Jeremy Jackson- Database of Reef Time Series</p> <p><a href="http://www.iucn.org/?uNewsID=10903">IUCN - Crunch time for Caribbean corals</a> <a href="http://www.iucn.org/?uNewsID=10903">www.iucn.org/?uNewsID=10903</a> Sep 7, 2012</p> <p>Jeremy Jackson, Science Director, Global Coral Reef Monitoring Network (GCRMN) - Center for Marine Biodiversity &amp; Conservation <a href="mailto:cmcb.ucsd.edu">cmcb.ucsd.edu</a></p> <p>Sala E &amp; Jackson JBC (2006) Structure of Caribbean coral reef communities</p>	<p><b>Submitted by: Sharmer Fleming</b> Anguilla – Department of Fisheries and Marine Resources. James Gumbs / Kafi Gumbs</p> <p><b>Submitted by: Melanie McField</b> Belize – University of Belize, Leandra Cho Ricketts <a href="mailto:lricketts@ub.edu.bz">lricketts@ub.edu.bz</a>. Valerie Paul Smithsonian CCRE <a href="mailto:paul@si.edu">paul@si.edu</a>, CCRE.si.edu. Honduras – CREDIA.hn Oscar Castillo <a href="mailto:ocastillorivera@yahoo.com">ocastillorivera@yahoo.com</a> Jeremy Jackson &lt;<a href="mailto:jeremybcjackson@gmail.com">jeremybcjackson@gmail.com</a>&gt; Katie Cramer &lt;<a href="mailto:katie.cramer@gmail.com">katie.cramer@gmail.com</a>&gt; Mary Donovan &lt;<a href="mailto:mldono@hawaii.edu">mldono@hawaii.edu</a>&gt;, (fish – in situ meta-analys) Alan Friedlander &lt;<a href="mailto:friedlan@hawaii.edu">friedlan@hawaii.edu</a>&gt;, (fish) LUNDIN Carl Gustaf &lt;<a href="mailto:carl.lundin@iucn.org">carl.lundin@iucn.org</a>&gt; vivian.lam@iucn.org Global Coral Reef Monitoring Network coordinator: Andy Hooten &lt;<a href="mailto:ajh@environmentsservices.com">ajh@environmentsservices.com</a>&gt;</p> <p><b>Submitted by: Liza Gonzalez</b> Nicaragua – Cynthia Lagueur WCS <a href="mailto:clagueux@wcs.org">clagueux@wcs.org</a> – turtle management program in the Caribbean coast of Nicaragua. <a href="http://www.sica.int/ccad">www.sica.int/ccad</a>. Have dataset for biodiversity in central America, incl. Mesoamerican coral reef corridor project. Joe Ryan – coral reef mapping. Miguel Gonzalez – York University, fisheries, indigenous people, and socioeconomic aspect <a href="mailto:mjgon@yorku.ca">mjgon@yorku.ca</a>. Martin Lezano <a href="mailto:nicapino12002@yahoo.com">nicapino12002@yahoo.com</a> bird inventory. MARENA – <a href="http://www.marena.gob.ni">www.marena.gob.ni</a> . Costa Rica – CIMAR UCR Jorge Corte. Coral reef, mangrove, fish</p>	<p>Knowledge on “small size” taxonomic groups: almost anything smaller than a polychaete (e.g. all meiofaunal groups)</p> <p>Lack of knowledge on Cryptic Species, macro+micro invertebrates.</p> <p>Cumulative impacts of over-exploitation when compounded with nutrient loading</p> <p>Limited understanding of the realized exploitation effects on marine resources across the shelf</p> <p>Even in multispecies assessments ie AGGRA the species monitored are very limited to a small number of target species. No true understanding of the true biodiversity of low abundance/cryptic species.</p> <p>Nicaragua is caught in the gap between major regional assessments and as a result is left with only local assessment effort which is not readily incorporated into the wider system.</p> <p>Understanding of the remaining</p>	<p>A key often unspoken issue in this field is the growing impact of population density on biodiversity.</p> <p>New fields are currently opening up in the study of bacterial communities with second generation DNA analysis techniques.</p> <p>This workshop spent very little time in the discussion of climate change impacts. (Dr Leonard Nurse - WHOI)</p> <p>Efforts are underway though barcoding programs to understand the genetic structure of regional populations. This could have application through connectivity analysis. (the working group was undecided on the importance of this field to the WOA)</p>

	<p>Consensus statement form Int'l society of Reef Studies 2012: <a href="http://www.icrs2012.com/Consensus_Statement.htm">www.icrs2012.com/Consensus_Statement.htm</a></p> <p>Data set available from Caribbean is: <a href="http://www.agrra.org">www.agrra.org</a> with a summary document in : <a href="http://www.agrra.org/updates/agrra_bulletin.pdf">www.agrra.org/updates/agrra_bulletin.pdf</a></p> <p>Robert N. Ginsburg and Judith C. Lang <a href="http://www.agrra.org/arb_volume.html">www.agrra.org/arb_volume.html</a></p> <p>AGRRA "initial results" volume for seagrasses: <a href="http://www.seagrassnet.org/">www.seagrassnet.org/</a> <a href="http://www.seagrassnet.org/global-monitoring">Global monitoring and information network for seagrass meadows.</a> <a href="http://www.seagrassnet.org/global-monitoring">www.seagrassnet.org/global-monitoring</a></p> <p>for mangroves: Emil Cherrington, CATHALAC has mangrove analysis for central America over time... several reports available. "Emil Cherrington" &lt;emil.cherrington@cathalac.org&gt;</p> <p><b>Submitted by: Tamica Rahming</b> 2006 Ecological Gap Analysis</p> <p>2011 Coral Reef Assessment – Khalid Bin Sultan Living Oceans Foundation (surveyed areas were Andros, Cay Sal and Inagua)...final report is still in progress)</p> <p><b>Submitted by: Juan Mate STRI</b> <a href="mailto:mates@si.edu">mates@si.edu</a> Dr. Ross Robertson (<a href="mailto:DRR@stri.org">DRR@stri.org</a>) Fishes ecology, biogeography, systematic</p>	<p>Joe Ryan – <a href="mailto:nicavet2000@yahoo.com">nicavet2000@yahoo.com</a>)</p> <p><b>Submitted by: Andrew Rosenberg</b> Dr. Wes Tunnel Univ. Texas, Corpus Christi. Wilford Schmidt, Univ. Puerto Rico, Greater Antilles Biodiv. Report</p> <p><b>Submitted by: Antonio Diaz de Leon</b> Mexico – Dr. Jose Sarukhan Dra. Patricia Kolef Dr. Elba Escobar. CONABIO <a href="http://www.conabio.mx">www.conabio.mx</a>. ECOSUR (Mexico) <a href="http://www.ecosur.mx">www.ecosur.mx</a> for conservation and biodiversity <a href="http://www.gulfbase.org">www.gulfbase.org</a> CINVESTAV-MERIDA <a href="http://www.MDA.CINVESTAV.mx">www.MDA.CINVESTAV.mx</a> Biodiversidad Marina y Costera de Mexico Sergio I Salazar-Vallijo Norma Emilia Gonzalez ECOJUR.org. Cuba – Guillermo Garcia Montero (Director Acuario de Cuba) <a href="mailto:guillermog@acuariocuba.cub">guillermog@acuariocuba.cub</a></p> <p><b>Submitted by: Joseph Wagnac</b> Haiti - Lucienne Exil <a href="mailto:exillucienna@yahoo.fr">exillucienna@yahoo.fr</a> specialist in ecosystem studies Joseph Wagnac <a href="mailto:jeanmaog@hotmail.com">jeanmaog@hotmail.com</a> Cdr. Haitian Coast Guard)</p> <p><b>Submitted by: Juan Mate STRI</b> <a href="mailto:mates@si.edu">mates@si.edu</a> <b>Dr. Ross Robertson</b> (<a href="mailto:DRR@stri.org">DRR@stri.org</a>) Dr. Harilaos Lessios (<a href="mailto:Lessiosh@si.edu">Lessiosh@si.edu</a>) Echinoderm biodiversity Link to pdf:<a href="http://www.stri.si.edu/sites/publications/results.php?scientist=Harilaos+A.+Lessios">http://www.stri.si.edu/sites/publications/results.php?scientist=Harilaos+A.+Lessios</a> . Dr. Rachel Collin (<a href="mailto:collinr@si.edu">collinr@si.edu</a>) <a href="http://biogeodb.stri.si.edu/bocas_database/">http://biogeodb.stri.si.edu/bocas_database/</a> . Dr. Nancy Knowlton (<a href="mailto:knowltonn@si.edu">knowltonn@si.edu</a>) Biodiversity <a href="http://biogeodb.stri.si.edu/bioinformatics/alpheus/HomeAlpheus.html">http://biogeodb.stri.si.edu/bioinformatics/alpheus/HomeAlpheus.html</a> . Ilka Feller (<a href="mailto:felleri@si.edu">felleri@si.edu</a>) Mangroves <a href="http://www.serc.si.edu/labs/animal_plant_interaction/Trail/VirtualTour.html">http://www.serc.si.edu/labs/animal_plant_interaction/Trail/VirtualTour.html</a> ) Araelis Ruiz – Marine turtles - <a href="http://ruizaesi.edu">ruizaesi.edu</a>)</p>	<p>distributions of IUCN Redlist species. Directing more effort to detect local regions of possible functional extinction. Also local regulations may fail to enforce protection of recognized endangered species. May also be local populations able to sustain some exploitation.</p> <p>Solid wastes in the port of Haiti are a growing problem. This is a local problem, yet it is hoped that there may be some potential expert assistance offered in the form of management strategy guidance to help educate government and local communities.</p> <p>Any assessment strategy must take critical account of the complex interdependencies between Mangroves-Sea Grasses-Coral Reefs habitats and the exploited animal communities that rely on them.</p> <p>Large knowledge gaps and hotspots are linked to institutional expertise and capacity. Strategies need to be developed to prevent these localized regions of low capacity and highlight this need.</p> <p>Population status of apex predators.</p> <p>Geospatial mapping capabilities.</p> <p>Limited taxonomic information for killer whale, dolphins, manatees, other</p>	
--	---	--	---	--

	<p><a href="http://www.stri.si.edu/sites/publications/results.php?scientist=D.+Ross+Robertson">http://www.stri.si.edu/sites/publications/results.php?scientist=D.+Ross+Robertson</a>.</p> <p>Fishes: Greater Caribbean, version 1 for iPhone Covers 1,599 species, &amp; includes 5,500+ images  <a href="https://itunes.apple.com/us/app/fishes-greater-caribbean/id570048678?mt=8">https://itunes.apple.com/us/app/fishes-greater-caribbean/id570048678?mt=8</a> or search in iTunes <u>store</u> for <i>fishes greater Caribbean</i></p> <p>Dr. Hector Guzmán (guzmanh@si.edu)  Coral reef ecology, systematic  Link to PDF publications:  <a href="http://www.stri.si.edu/sites/publications/results.php?scientist=H%E9ctor+M.+Guzm%E1n">http://www.stri.si.edu/sites/publications/results.php?scientist=H%E9ctor+M.+Guzm%E1n</a></p> <p>Guzmán, H.M. &amp; C.A. Guevara. 1998a. Arrecifes coralinos de Bocas del Toro, Panamá: I. Distribución, estructura y estado de conservación de los arrecifes continentales de la laguna de Chiriquí y la Bahía Almirante. Rev. Biol. Trop. 46: 601-623.</p> <p>Guzmán, H.M. &amp; C.A. Guevara. 1998b. Arrecifes coralinos de Bocas del Toro, Panamá: II. Distribución, estructura y estado de conservación de los arrecifes de las islas Bastimentos, Solarte, Carenero y Colón. Rev. Biol. Trop. 46: 893-916.</p> <p>Guzmán, H.M. &amp; C.A. Guevara. 1999. Arrecifes coralinos de Bocas del Toro, Panamá: III. Distribución, estructura y estado de conservación de los arrecifes de las islas Pastores, Cristóbal, Popa y Cayo Agua. Rev. Biol. Trop. 47: 659-675.)</p> <p><b>Submitted by Philmore James</b>  Inventory of mangroves for Antigua and Barbuda should be finalised by early 2013. This is under the Fisheries Division as focal point for Ramsar.</p>	<p><b>Submitted by: Robert Kock</b>  Dept Agriculture &amp; Fisheries Aruba; contact - Faciendo Franken  Aruba Marine Mammal Foundation (NGO); Contact – Angiolina Henriquez  Tortugaruba (NGO); Contact – Richard VanderWal  Carmabi (Curacao) Regional Coastal+Shelf Rock  Dutch Caribbean Nature Alliance  Mangrove Inventory of Aruba, Department of Infrastructure and Planning;  Contact-Theo Oord  Sea Birds assessment of San Nicolas Keys Aruba (Reef Islands); Author –Adrian del Nevo)</p> <p><b>Submitted by: Tamica Rahming,</b>  <i>Bahamas National Trust:</i>  Eric Carey – ecarey@bnt.bs  Tamica Rahming – trahming@bnt.bs  Krista Sherman – ksherman@bnt.bs  Lindy Knowles – lknowles@bnt.bs  Lakeshia Anderson – landerson@bnt.bs</p> <p><i>Bahamas Department of Marine Resources</i>  Michael Braynen –mbraynen@bahamas.gov.bs</p> <p><i>BEST Commission</i>  Philip Weech –philipweech@bahamas.gov.bs</p> <p><i>The Nature Conservancy</i>  Eleanor Phillips – ephillips@tnc.org</p> <p><i>Long Term Scientific Researchers</i>  Craig Dahlgren –craigdahlgren@yahoo.com  Peter Mumby –p.j.mumby@uq.edu.au  Dan Brumbaugh-dbrumbaugh@amnh.org  Kathleen <a href="mailto:Sealey-ksealey56@gmail.com">Sealey-ksealey56@gmail.com</a></p>	<p>mammals.</p> <p>Across all spatial scales need a more detailed understanding of the ecosystem function. Specifically with respect to complex trophodynamic webs.</p>	
--	---	--	---	--

		<p><i>Regional Key people:</i>  Wes Tunnell (USA)  Patricia Miloslavich (Venezuela, coastal)  Elba Escobar-Briones (Mexico, Deep sea benthic)  Juan Manuel Díaz (Colombia, molluscs, biogeography)  Jorge Cortés (Costa Rica, coral reefs)  Juan Alvarado (Mexico/Costa Rica, echinoderms)  Ross Robertson (STRI-Panama, fishes)  Judith Gobin (Trinidad &amp; Tobago)  Eduardo Klein (Venezuela – data management, data visualization)</p> <p><i>Regional key institutions:</i>  Universidad Simón Bolívar-INTECMAR-Centro de Biodiversidad Marina, Venezuela  STRI-Panama  INVEMAR, Colombia  CONABIO-Mexico  UNAM-Mexico  Universidad de Costa Rica  University of Puerto Rico-Mayaguez  University of West Indies (Trinidad &amp; Tobago / Barbados))</p> <p><b>Submitted by Philmore James</b>  Institution or Agency-Area of Focus-Comments-Contact Detail  Fisheries Division Antigua and Barbuda-Information on Beaches, Mangroves, Sea  Grass, Coral Reefs-Data not continuous for these habitats-Chief Fisheries Officer  <a href="mailto:fisheriesantigua@gmail.com">fisheriesantigua@gmail.com</a> <a href="http://www.fisheries.gov.ag">http://www.fisheries.gov.ag</a></p> <p>Organisation of. Eastern Caribbean States Environment and Sustainable.  Development Unit (OECS-ESDU)-Regional Projects for 6 Eastern Caribbean States e.g  OPAAL- May have documents for specific countries of the <a href="mailto:region-esdu@oecs.org">region-esdu@oecs.org</a>  <a href="http://www.oecs.org/esdu/">http://www.oecs.org/esdu/</a></p> <p>CERMES, UWI, Cave Hill, Barbados-Various research projects on Caribbean coastal  and marine habitats-May have documents on various Caribbean coastal and marine</p>		
--	--	---	--	--

		<p>habitats-Professor Robin Mahon, Director, <a href="mailto:cermes@cavehill.uwi.edu">cermes@cavehill.uwi.edu</a>  <a href="http://www.cavehill.uwi.edu/cermes/">www.cavehill.uwi.edu/cermes/</a></p> <p>Caribbean Regional Fisheries Mechanism-Various research projects on Caribbean fisheries management, some dealing with coastal and marine habitats-Executive Director <a href="mailto:crfm@btj.net">crfm@btj.net</a> <a href="http://www.caricom-fisheries.com/PublicationsandDocuments/CRFMResearchPaperCollection/tabid/86/Default.aspx">http://www.caricom-fisheries.com/PublicationsandDocuments/CRFMResearchPaperCollection/tabid/86/Default.aspx</a></p> <p><b>Submitted by Jamie Bolanos</b>  Hedelvy Guada CICTMAR/WIDECASST higuada@gmail.com  Clemente Balladares MINAMB/ONDB <a href="http://www.minamb.gob.ve">www.minamb.gob.ve</a>  cballadares@minamb.gob.ve  Héctor Barrios LUZ-LEG <a href="http://www.luz.edu.ve">www.luz.edu.ve</a> hbarrios@gmail.com  Luis Bermúdez MINAMB/ONDB <a href="http://www.minamb.gob.ve">www.minamb.gob.ve</a> cicvenezuela@yahoo.com  Héctor Barrios LUZ-LEG <a href="http://www.luz.edu.ve">www.luz.edu.ve</a> hbarrios@gmail.com  Jaime Bolaños Sea Vida bolanos.jimenez@gmail.com  Freddy Arocha Inst. Oceanográfico farochap@gmail.com  José Alió MPPAT/INIA josealio@hotmail.com</p>		
<p>Shelf rock (50 – 200 m depths) and habitats (across Chapters 34-43)</p> <ul style="list-style-type: none"> <li>• Overall status of major groups of species and habitats within this regime</li> <li>• Status and trends of, and threats to, marine ecosystems, species and habitats that are threatened, declining or otherwise in need of attention</li> <li>• Significant socioeconomic aspects in relation to the conservation of marine species and habitat</li> </ul>		<p><b>Submitted by: Robert Kock</b>  Carmabi (Curacao) Regional Coastal+Shelf Rock</p>	<p>Knowledge on ecosystems such as rocky shores, shelf rock (data collection currently underway)</p> <p>Across all spatial scales need a more detailed understanding of the ecosystem function. Specifically with respect to complex trophodynamic webs.</p>	

<p>Deep sea (&gt; 200 m depths) benthic habitats (across Chapters 34-43)</p> <ul style="list-style-type: none"> <li>• Overall status of major groups of species and habitats within this regime</li> <li>• Status and trends of, and threats to, marine ecosystems, species and habitats that are threatened, declining or otherwise in need of attention</li> <li>• Significant socioeconomic aspects in relation to the conservation of marine species and habitat</li> </ul>	<p>See references described under Water Column Habitats</p>	<p>See experts listed under Water Column Habitats</p>	<p>Knowledge on deep sea: very little knowledge below 200 m in depth</p> <p>There has been some data collected but there is no open access available to these data sets.</p> <p>Understanding pelagic and benthic early life-history stages.</p> <p>Across all spatial scales need a more detailed understanding of the ecosystem function. Specifically with respect to complex trophodynamic webs.</p>	
<p>Water column habitats (0 m to hadal depths) (across Chapters 34-43)</p> <ul style="list-style-type: none"> <li>• Overall status of major groups of species and habitats within this regime</li> <li>• Status and trends of, and threats to, marine ecosystems, species and habitats that are threatened, declining or otherwise in need of attention</li> <li>• Significant socioeconomic aspects in relation to the conservation of marine species and habitat</li> </ul>	<p><b>Submitted by Patricia Miloslavich</b>  Miloslavich, P. et al 2010. Marine Biodiversity in the Caribbean: regional estimates and distribution patterns. PLOS ONE, Vol. 5 (8):e11916, pp. 1 - 25.</p> <p>Miloslavich, P. y E. Klein (Eds.). 2005. Caribbean Marine Biodiversity: the Known and the Unknown. DesTech Publications, USA.</p> <p>Cortés, J. 2003 (Ed.). Latin American Coral Reefs. Elsevier. ISBN: 978-0-444-51388-5.</p> <p>Alvarado, J.J. 2011. Echinoderm diversity in the Caribbean Sea. Marine Biodiversity, 41</p>	<p><b>Submitted by Patricia Miloslavich</b>  INVEMAR-Colombia  INTECMAR/Centro de Biodiversidad Marina, Venezuela  Fundación La Salle de Ciencias Naturales, Venezuela</p>	<p>Knowledge on the water column beyond the coast (e.g. center of the Caribbean basin)</p> <p>General lack of knowledge about marine mammal communities.</p> <p>Understanding pelagic and benthic early life-history stages.</p> <p>Across all spatial scales need a more detailed understanding of the ecosystem function, specifically with respect to complex trophodynamic webs.</p>	<p>Large problem in the Caribbean with bio-accumulated toxins such as Ciguatera. This is critical in nations where apex marine species such as barracuda are a common food source.</p>

	<p>(2): 261-285.</p> <p>Warner, G.F. 2012. Corals of Florida and the Caribbean. University Press of Florida.</p> <p><b>Important databases:</b></p> <p>Global marine biodiversity  <a href="http://www.iobis.org">www.iobis.org</a></p> <p>Global Distribution of Coral Reefs (2010) data available from:  <a href="http://data.unep-wcmc.org/datasets/13">http://data.unep-wcmc.org/datasets/13</a>  Global Distribution of Seagrasses (2005) data available from:  <a href="http://data.unep-wcmc.org/datasets/10">http://data.unep-wcmc.org/datasets/10</a>  Global Distribution of Mangroves (1997) data available from:  <a href="http://data.unep-wcmc.org/datasets/6">http://data.unep-wcmc.org/datasets/6</a></p> <p>Historical whale captures  <a href="http://web.archive.org/web/20070926224128/http://wcs.org/townsend_charts">http://web.archive.org/web/20070926224128/http://wcs.org/townsend_charts</a>  <a href="http://web.archive.org/web/20070926224128/http://wcs.org/townsend_charts#GIS Data">http://web.archive.org/web/20070926224128/http://wcs.org/townsend_charts#GIS Data</a></p> <p>Important bird areas  <a href="http://www.birdlife.org/datazone/site/search">http://www.birdlife.org/datazone/site/search</a></p> <p>Southern Caribbean (CARIACO basin)  <a href="http://cariaco.ws/">http://cariaco.ws/</a></p> <p>Vents and seeps  <a href="http://www.noc.soton.ac.uk/chess/">http://www.noc.soton.ac.uk/chess/</a></p> <p>Seamounts  Yesson, C., et al., The global distribution of seamounts based</p>		<p>Limited taxonomic information for killer whale, dolphins, manatees, other mammals.</p>	
--	---	--	---	--



	<p>on 30 arc seconds bathymetry data. Deep-Sea Research I (2011), doi:10.1016/j.dsr.2011.02.004</p> <p>Bathymetry  <a href="http://www.gebco.net/data_and_products/gridded_bathymetry_data/">http://www.gebco.net/data_and_products/gridded_bathymetry_data/</a></p> <p>Sediments  <a href="http://www.ngdc.noaa.gov/mgg/sedthick/sedthick.html">http://www.ngdc.noaa.gov/mgg/sedthick/sedthick.html</a></p> <p>Climatology (salinity, oxygen, nitrates, etc)          CSIRO Atlas of Regional Seas (CARS) Physical Ocean Climatologies  <a href="http://www.marine.csiro.au/~dunn/cars2009/">http://www.marine.csiro.au/~dunn/cars2009/</a></p> <p>Ocean Surface Temperature          AVHRR Pathfinder dataset, published by the NOAA National Oceanographic Data Center (NODC)</p> <p>Chlorophyll concentration  <a href="http://oceancolor.gsfc.nasa.gov/SeaWiFS/BACKGROUND/SEAWIFS_BACKGROUND.html">http://oceancolor.gsfc.nasa.gov/SeaWiFS/BACKGROUND/SEAWIFS_BACKGROUND.html</a></p> <p>VGPM Ocean Productivity          MODIS AQUA data          Sea Surface Height          Archiving, Validation and Interpretation of Satellite Oceanographic data (AVISO) group</p> <p>Surface Current Velocity          NOAA Ocean Surface Current Analysis - Real Time (OSCAR) project: <a href="http://">http://</a></p>			
--	--	--	--	--

	<a href="http://www.oscar.noaa.gov/">www.oscar.noaa.gov/</a>			
--	--	--	--	--

#### Information Gaps:

Overall knowledge gaps were highlighted in the summary presentation, which noted gaps are extensive in the following fields: early life history of most organisms; historical baselines against which to compare current indicators of ecosystem status; and deep water environments. In addition, the lack of regional coverage (Nicaragua) was noted, the importance of grey and undisclosed databases (7000 sp.) and the need for tools for integrating regional data sources and tools to synthesize information, including global reporting and database management.

The group discussions noted that overall, the taxonomy of small-sized organisms, cryptic and rare species is a major gap. In addition, surprisingly, there were few studies regarding the biodiversity of planktonic species. Phyto and zooplankton organisms represent the first and second trophic levels of the marine food chain, respectively. Phytoplankton species are one of the main primary producers in the marine environment and, thus, are responsible for the uptake of carbon from the atmosphere and its transfer to other levels. It is widely known that phytoplankton composition can be used as an indicator of environmental health (i.e., ecological indicators) and, therefore, can be used as a tool for management. On the other hand, commercial and ecologically important species, such as fishes, lobsters, and sea urchins, spend most of their larval stage in the form of meroplankton. With this in mind, they should be considered essential for studies on organisms associated with zooplankton diversity. They also represent the link between primary producers (i.e., phytoplankton) and higher trophic levels.

Marine microbes (e.g., bacteria, fungi, and yeasts) were another group of “unknowns” that required more studies. Bacterioplankton represented an important “sink” of carbon in the ocean, accounting for about half of the carbon fixation in the marine environment. In addition, they may serve as an index of water contamination, which may contribute to establishing effective management practices.

In general, there's a need for trained personnel, equipment, law enforcements, and more research and education in order to establish better management policies to protect the marine environment in the Caribbean. In addition, more efforts that integrate research and collaboration among different areas of the region are highly recommended. Dr. Miloslavich might be asked to discuss and/or update her detailed overview of marine studies needed by country, as it appears on her 2005 book, co-edited with Klein (Caribbean Marine Biodiversity: The known and the unknown. DEStech Publications, Inc. Pennsylvania. 310 pp).

In particular, there are limited amounts of data available from offshore and deep-sea environments since they have been less studied, and there is an absolute need for standardized methods of collecting data for establishing species inventory and baselines. Although many marine species have been identified, being able to obtain a sufficient amount of data collection to accurately represent and describe the marine biodiversity of the region remains a major concern. Addressing this concern may help to resolve other pertinent issues that may be directly affected by this particular need (e.g., establishing baselines of commercially-important and recreational marine organisms). It is imperative that managers, scientists, and conservationists draw the attention of important local stakeholders and agencies in making extra efforts, as a region, to address these concerns and bring about the change needed for the past few years.

In order to address these information gaps and research needs, the road map of the Census of Marine Life project <http://www.comlsecretariat.org/>, as discussed in Alexander et al (2011), can provide insight. The Census of Marine Life—evolution of worldwide marine biodiversity research. Marine Biodiversity 41: 545-554

#### Overall Assessment of Capacity Needs Related to Marine Biological Diversity Aspects and How to Address Them

The following points were discussed regarding capacity in the region and include points from the summary presentation:

- Local knowledge is tied to local capacity. There is a need for widely distributed capacity not just intense localized institutional capacity.
- The region needs to understand the dimensions and fiscal requirements of capacity building.
- Capacity needs go beyond research capacity. There is also a need for capacity to distribute knowledge and a sense of responsibility to the local individual exploiting the resource.
- There is a critical need to retain the knowledge that is invested in training employees and management leadership. This requires fiscal incentives to retain individuals in positions. The constant cycle of promotion at all levels results in an export of knowledge out of the field. Often the bulk of expert individuals will be lost from policy and management to narrow academic research fields.
- Capacity is highly variable across geographic regions and so dramatically different strategies will be needed to facilitate capacity building.
- Networks of practitioners, experts, institutions and countries need to be established and fostered.
- Education and awareness are lacking regarding biodiversity importance, loss and action.
- The knowledge gaps in deep water sites is critically limited by the funding directed to technological capacity building which is needed to be able to begin exploring these environments. Ties could be found between the industrial capacity for deep exploration for oil resources etc to apply this capacity to research efforts. Many regions are limited to data of opportunity provided by global traveling research vessels passing through the region.
- Capacity and training strategies on how to build capacity on whale watching and necropsy are needed. However these efforts are often limited by language barriers. Workshops are given in Spanish or French and if you attend these workshops your networking interactions will be limited to those colleagues who are most fluent in those particular languages.