

INTERNATIONAL COURT OF JUSTICE

Maritime Delimitation in the Indian Ocean
(Somalia v Kenya)

REJOINDER OF THE REPUBLIC OF KENYA

VOLUME II

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18 DECEMBER 2018

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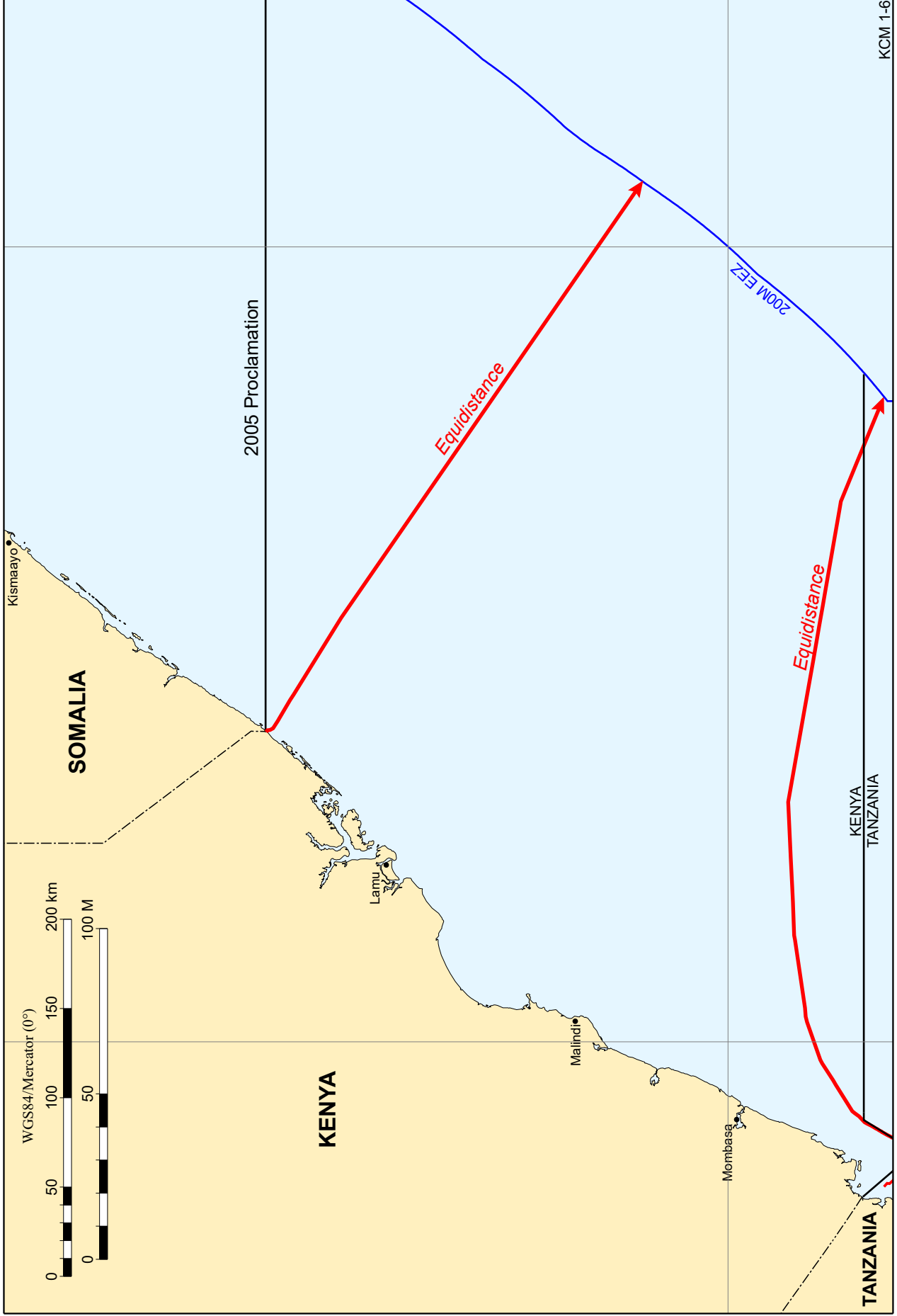
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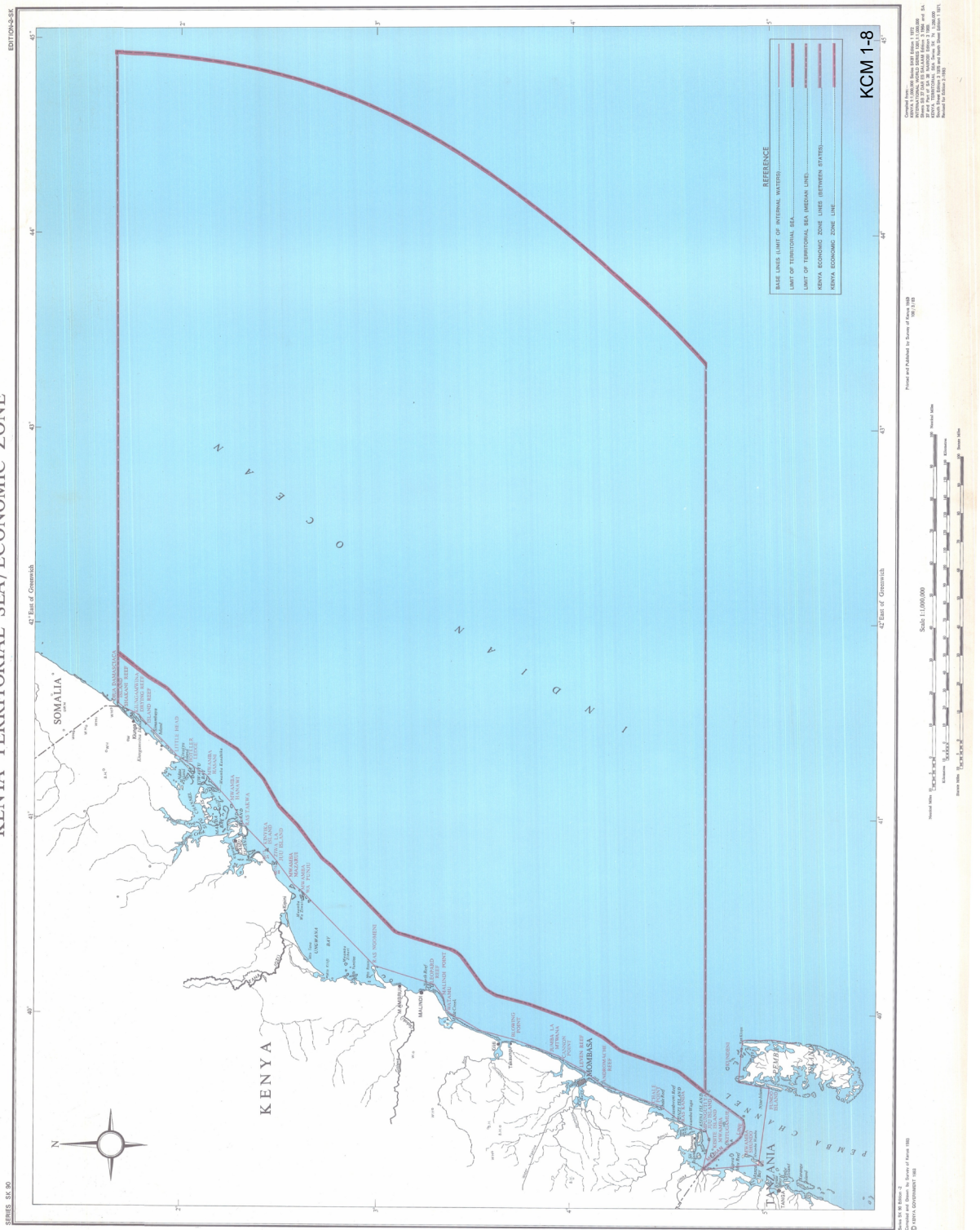
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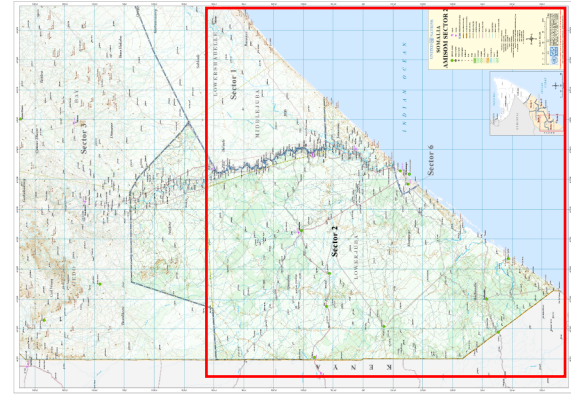
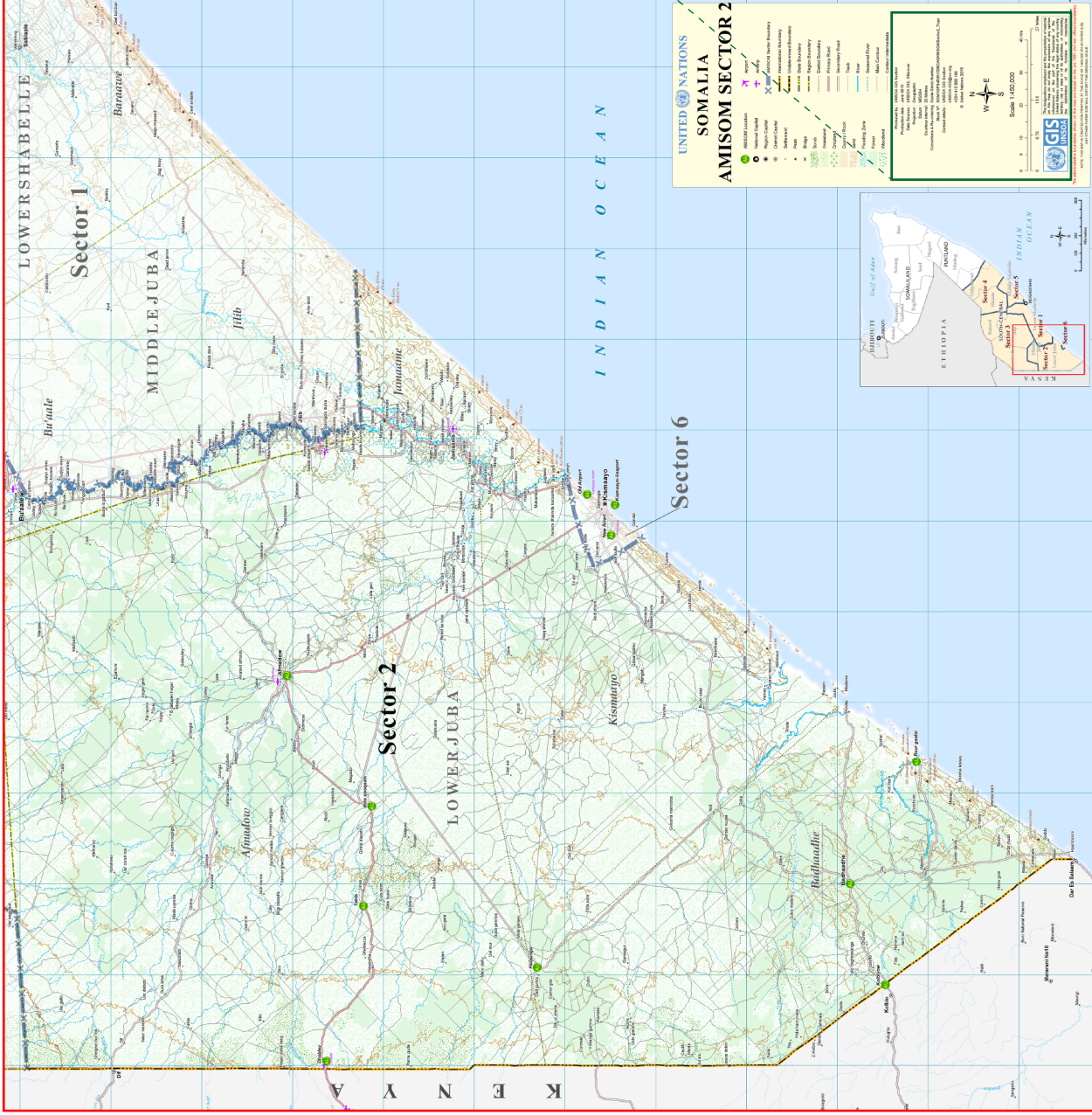


Delimitation of the EEZ contrasting the use of equidistance and parallels of latitude
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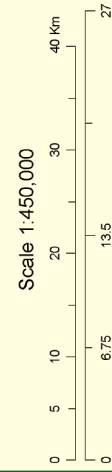
KENYA TERRITORIAL SEA/ECONOMIC ZONE




**Kenya Territorial Sea and Economic Zone, Survey of Kenya, SK-90 Edition 2, 1983
Figure KR 1-2**



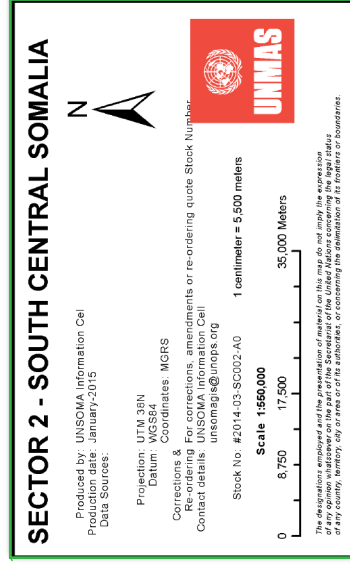
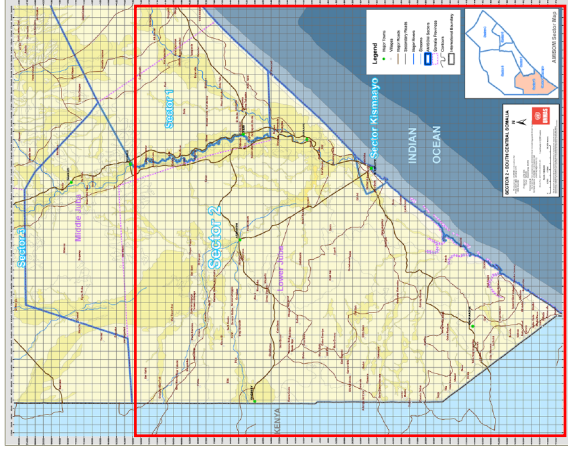
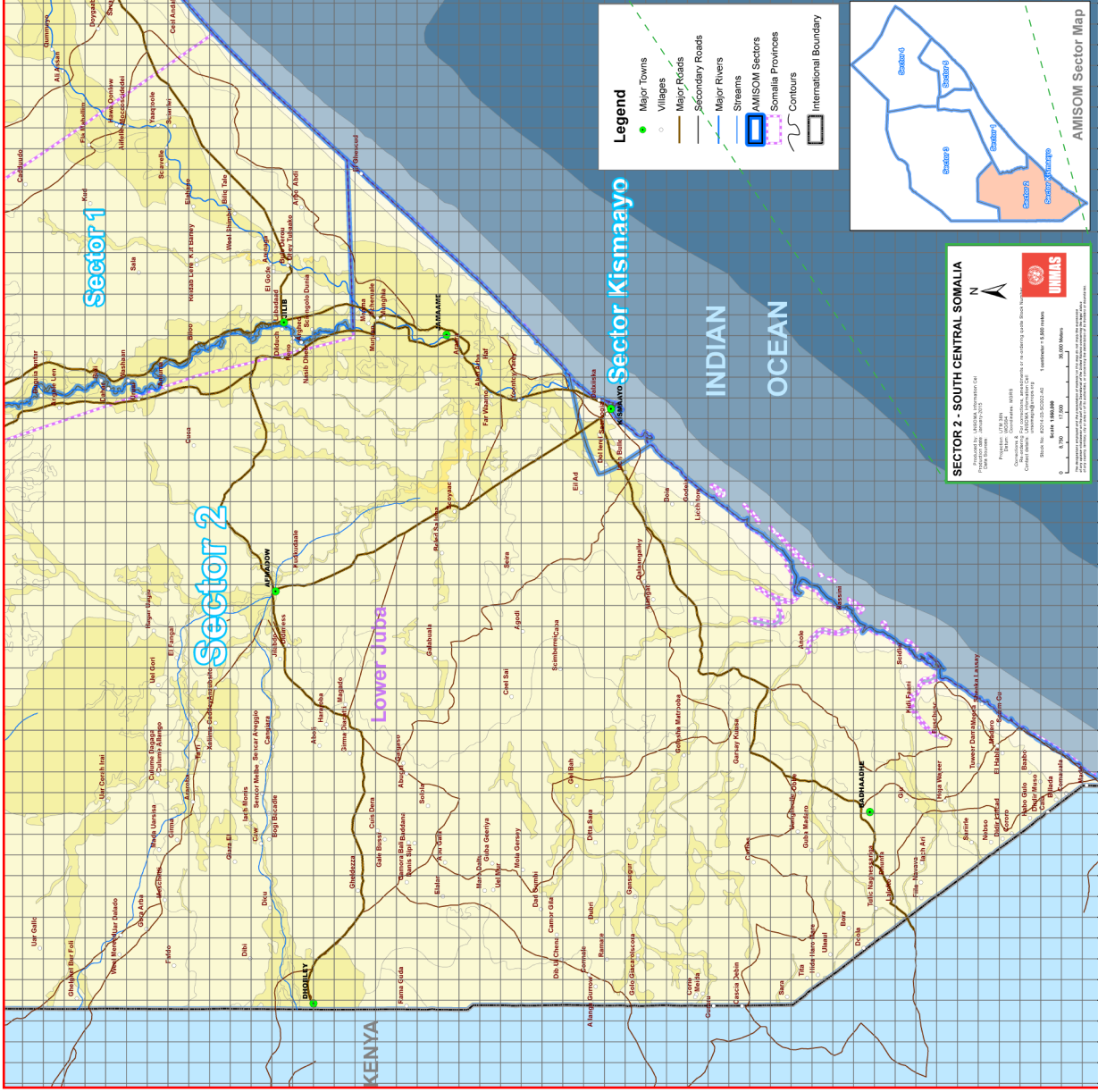
Produced by : UNSOA GIS Section
 Production date : June 2015
 Data Sources : UNSOA GIS, Africover
 Projection : Geographic
 Datum : WGS84
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 Corrections & Re-ordering: Quote Stock Number.
 Stock N°: SOM10P5460K1506CA0AMISOMSector2_Topo
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 Scale 1:450,000


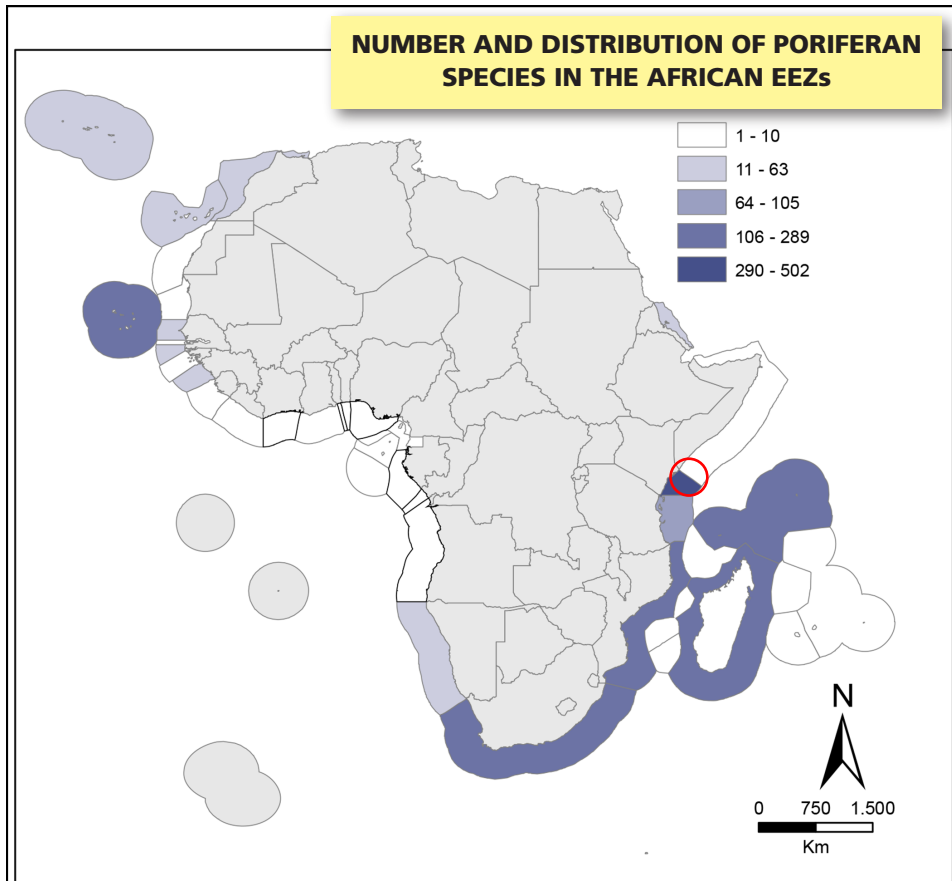


The designations employed and the presentation of material in this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of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

Official UNSOA Amisom Map showing no maritime zones
 Figure KR 1-3a

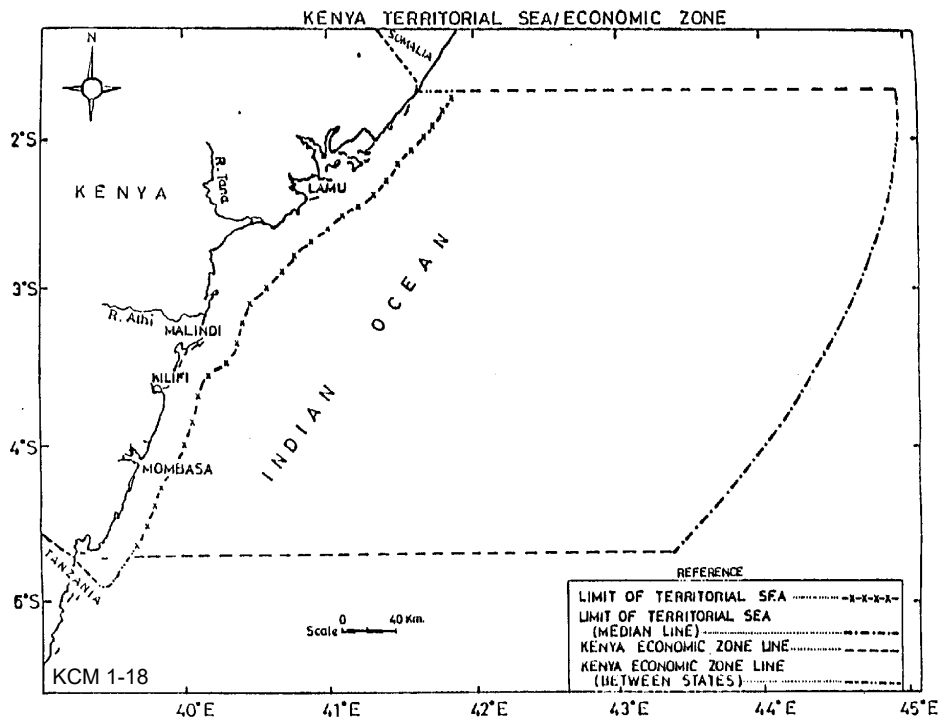


Official UNSOMA (UNMAS) Amisom Map showing no maritime zones
 Figure KR 1-3b



Source: Map published by UNESCO-IOC (1998).

Figure R2.3



INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION & WESTERN INDIAN OCEAN MARINE SCIENCE ASSOCIATION
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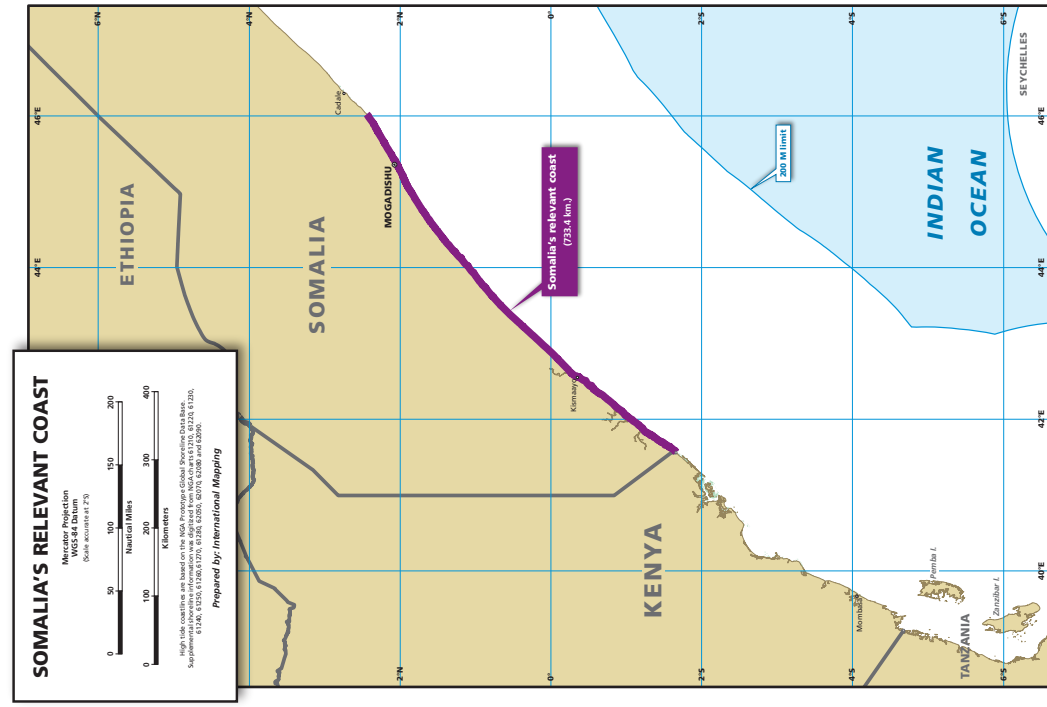


Figure 6.6



Figure 6.7

Somalia's depiction of the relevant coasts and its excluded section of Kenya's coast
 Figure KR 2-1

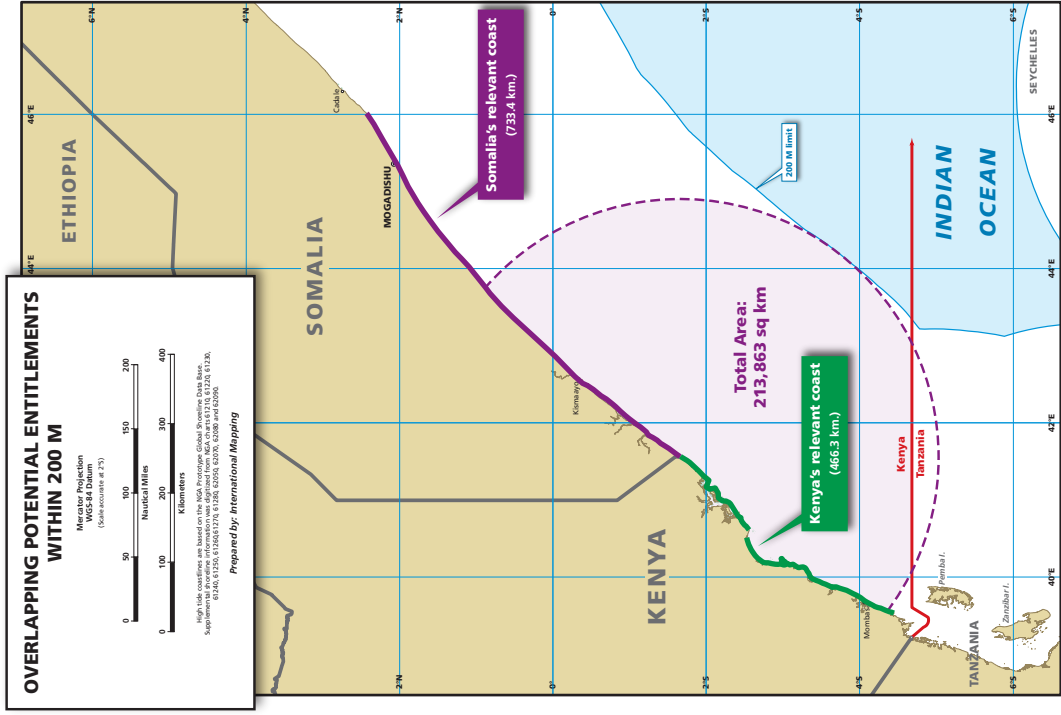


Figure 6.8

Figures 6.8 and 6.9 from Somalia Memorial (relevant coasts added from SM Figs 6-6 and 6-7)

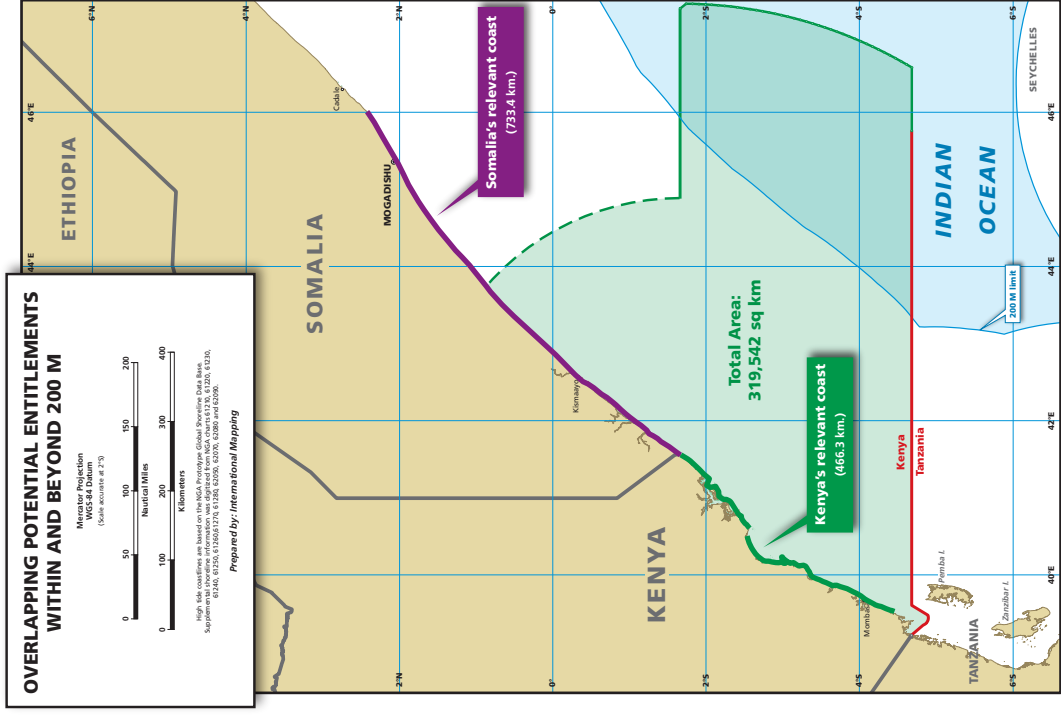
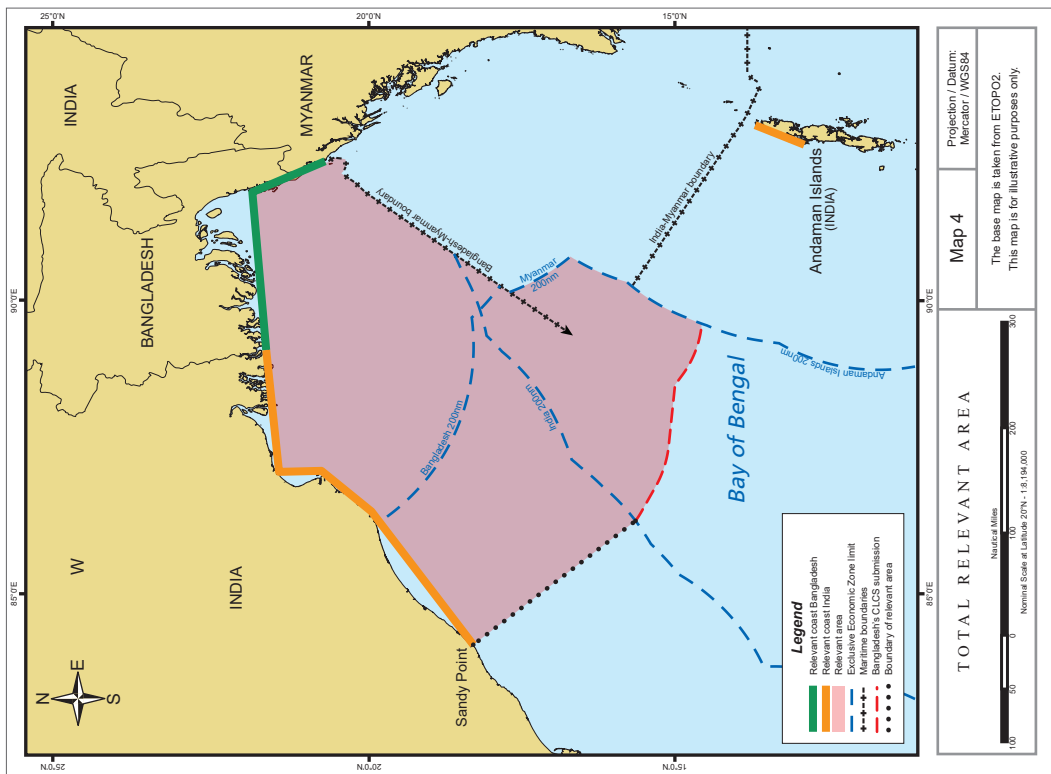
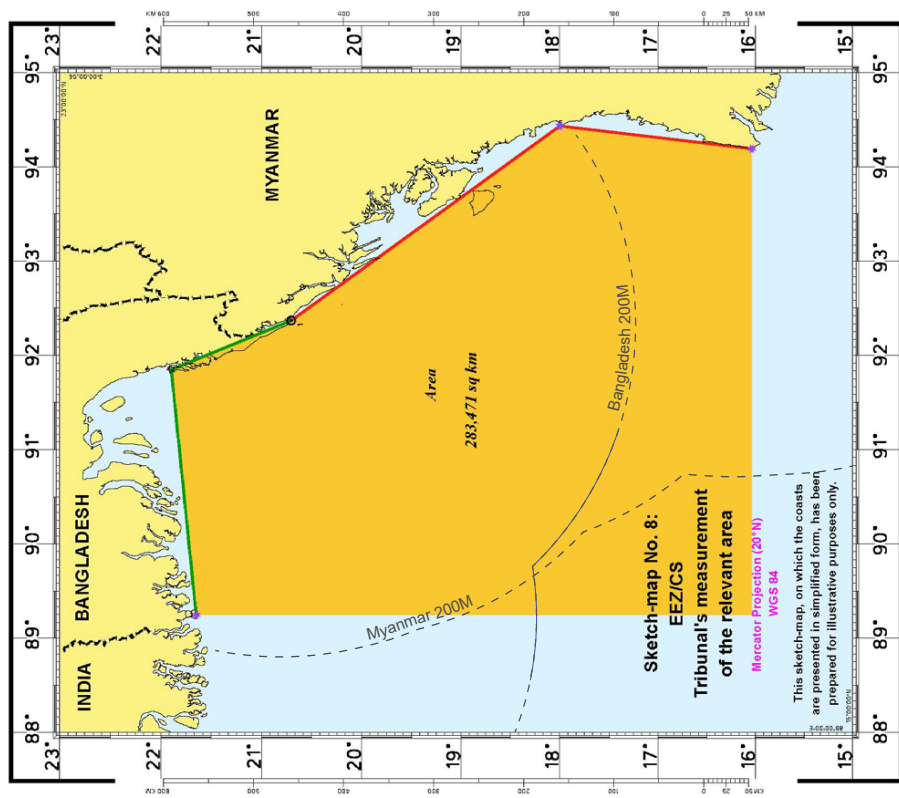


Figure 6.9

Somalia's depictions of the relevant area and the relevant coasts
 Figure KR 2-2



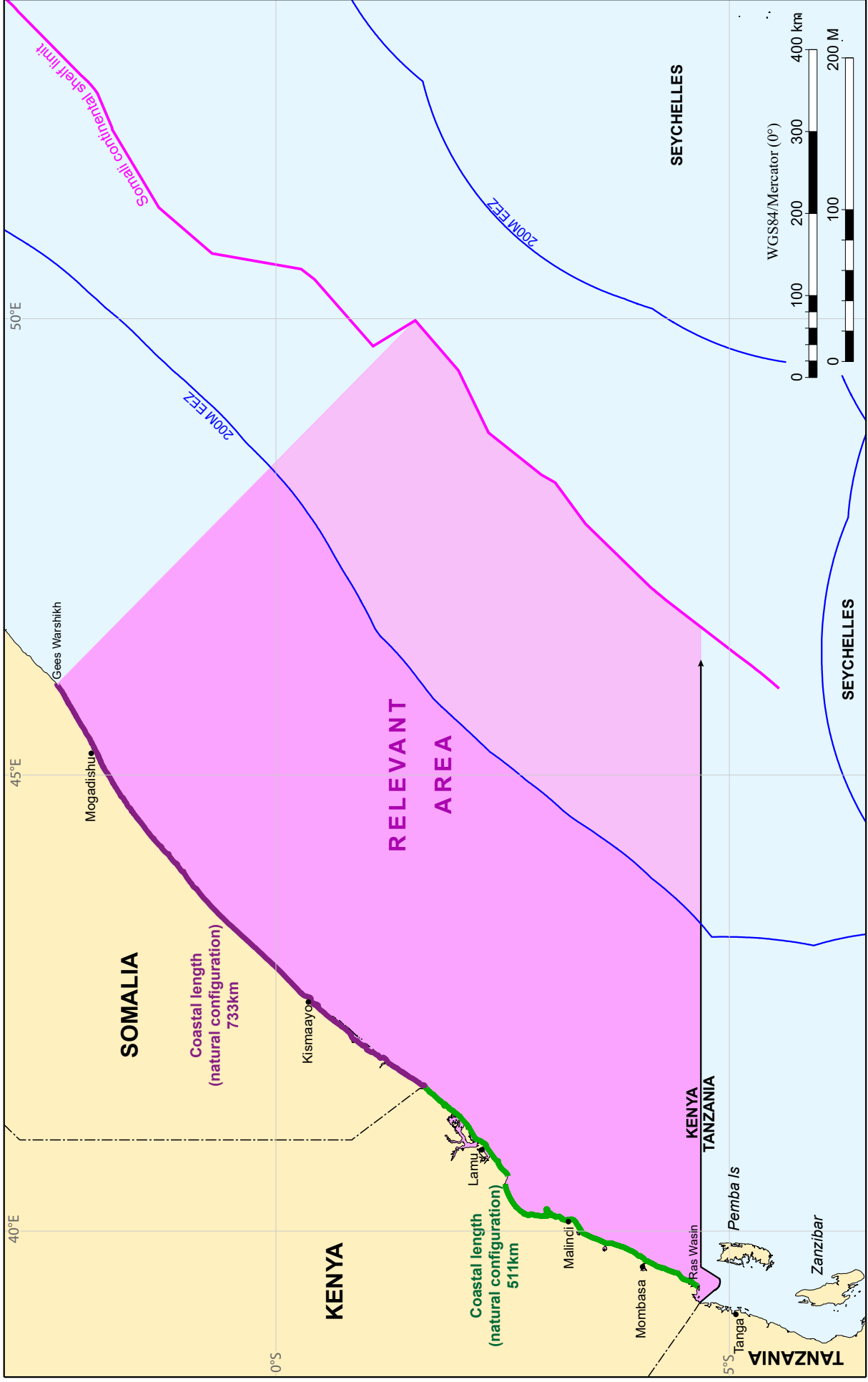
Map 4 from the Tribunal's Award in *Bangladesh v India*



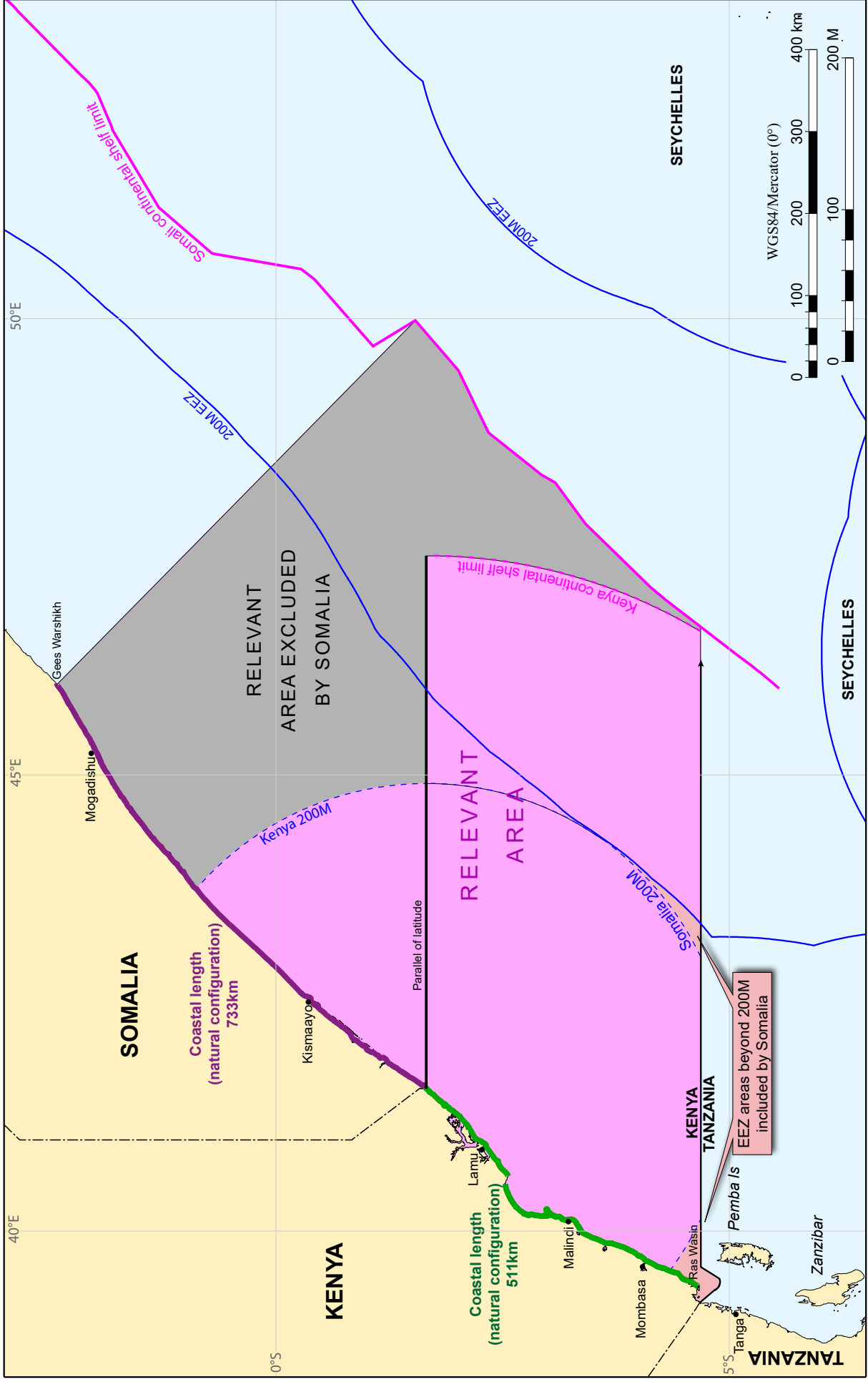
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Figure KR 2-3



The correct identification of the relevant area
 Figure KR 2-4



The relevant area excluded by Somalia
 Figure KR 2-5

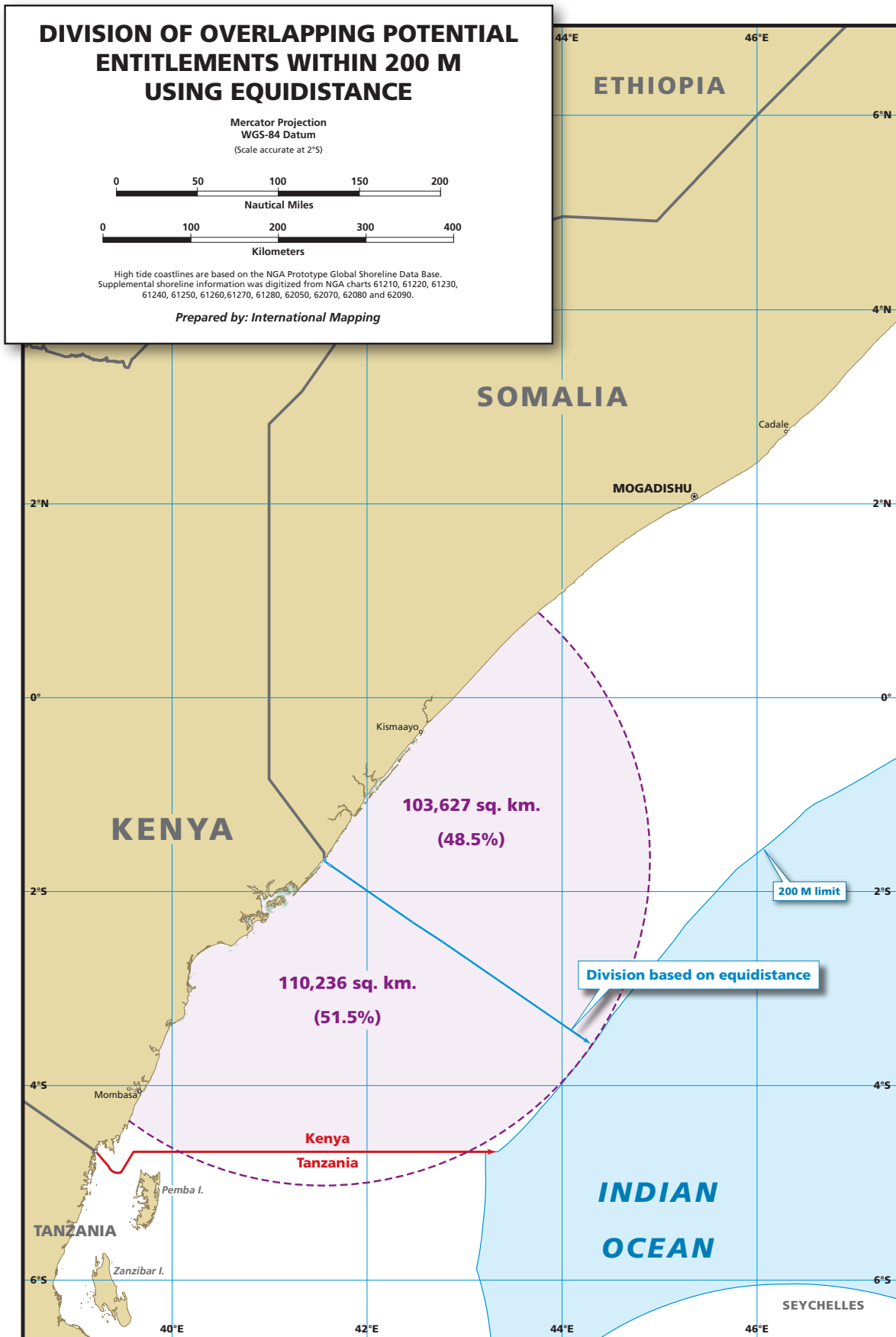
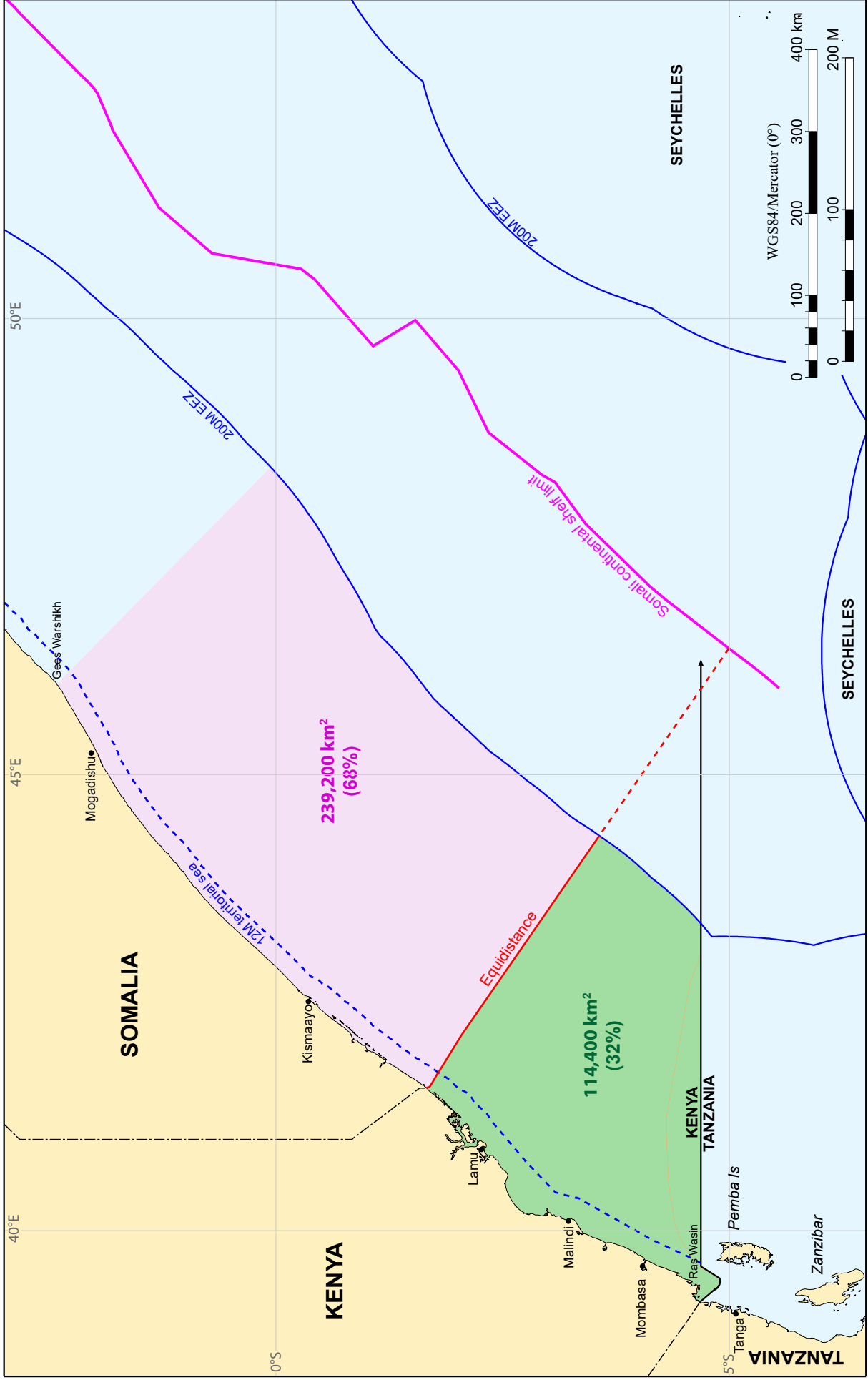
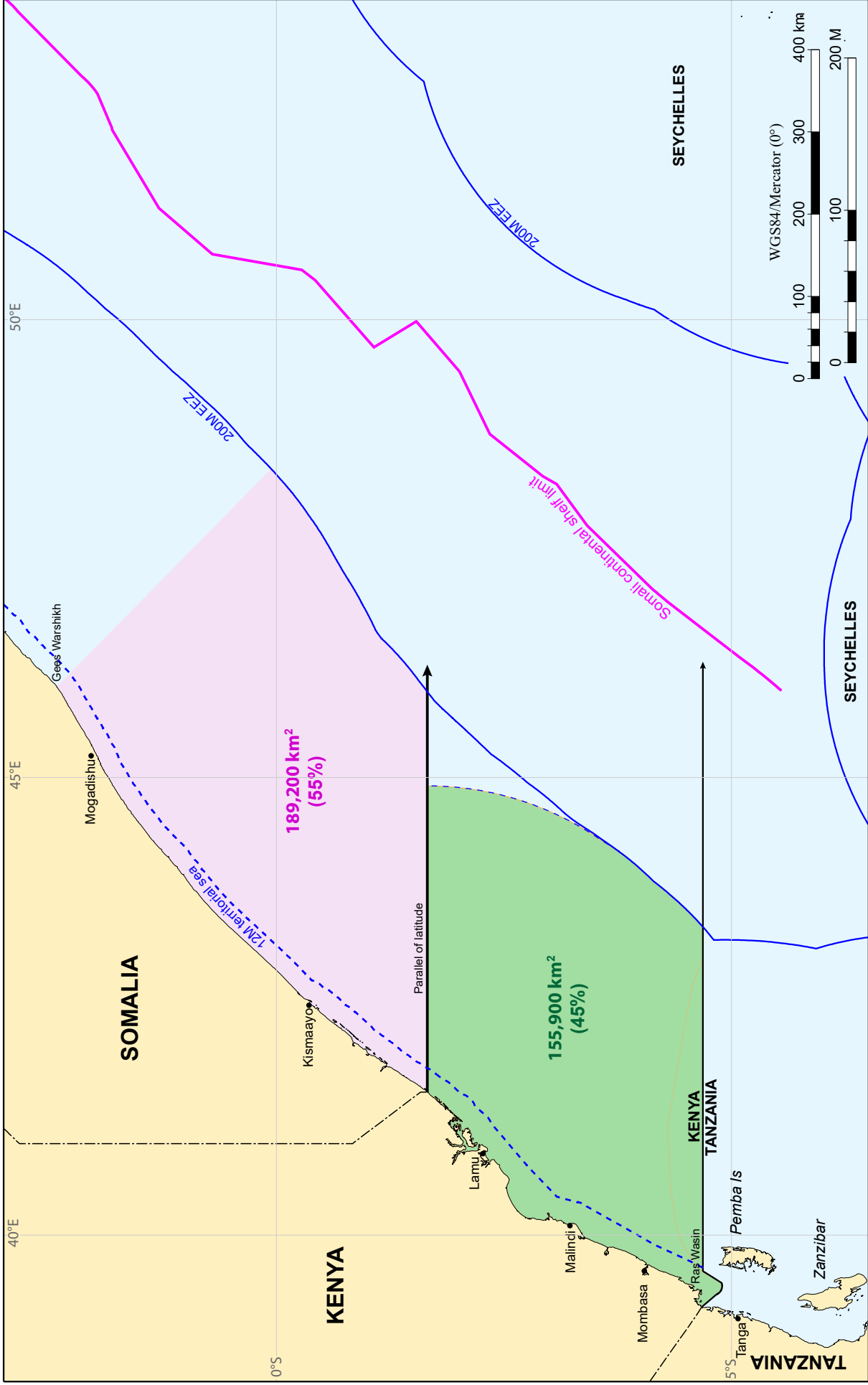


Figure 6.12 from Somalia Memorial

Somalia's depiction of an 'equitable' division of its version of the relevant area within 200M
Figure KR 2-6



Division of the relevant area within 200M using the equidistance line
 Figure KR 2-7



Division of the relevant area within 200M using the parallel of latitude

Figure KR 2-8

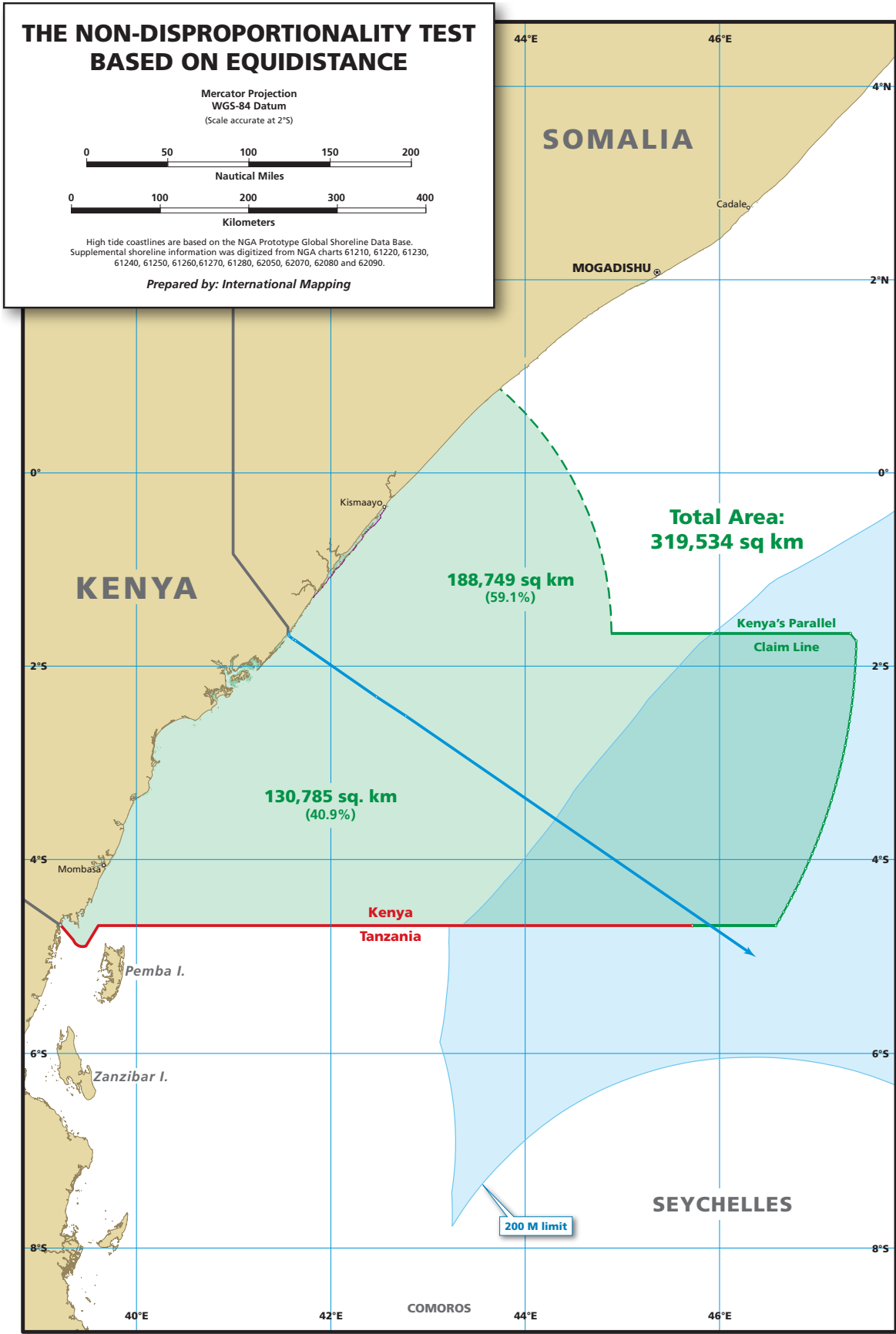
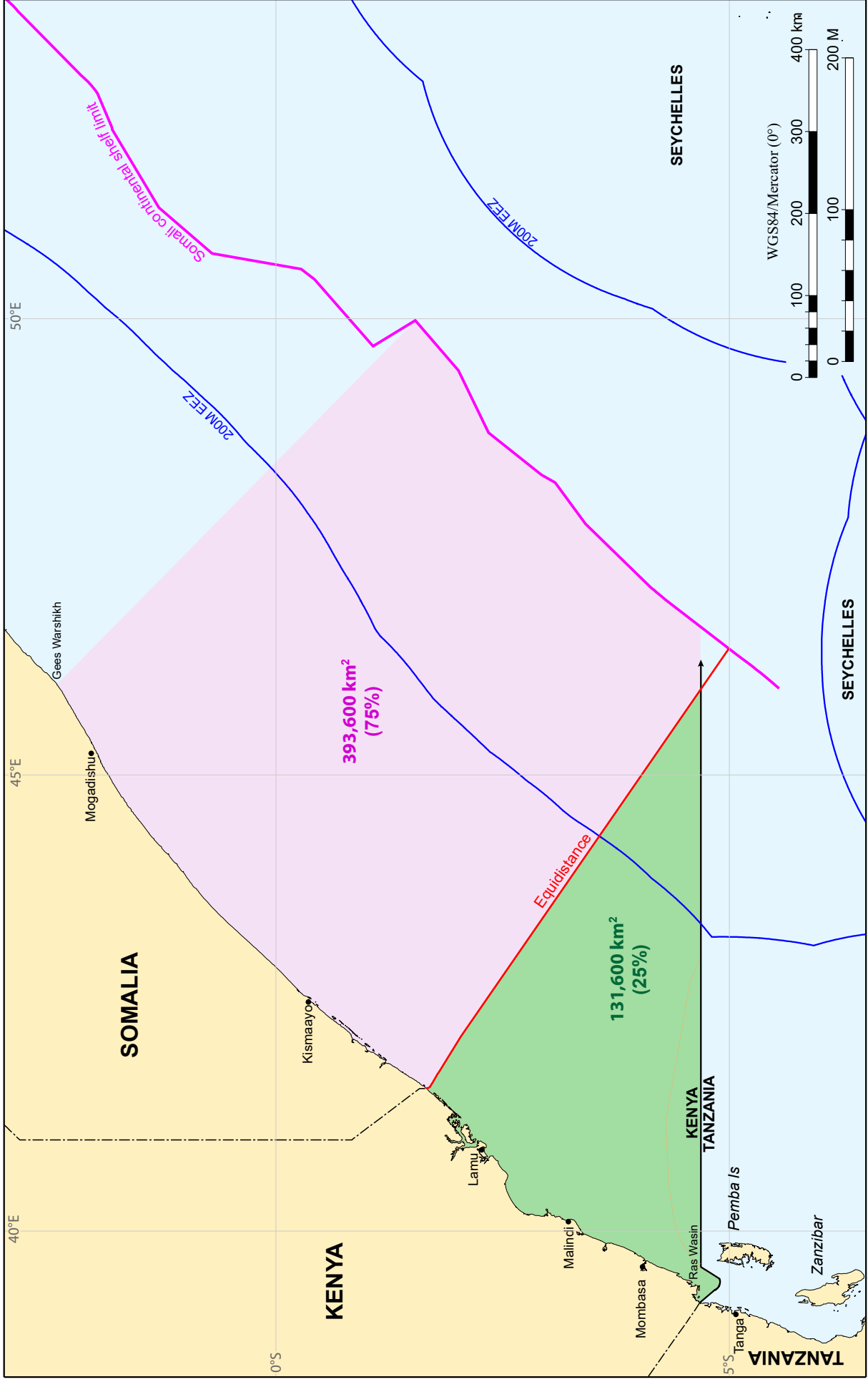


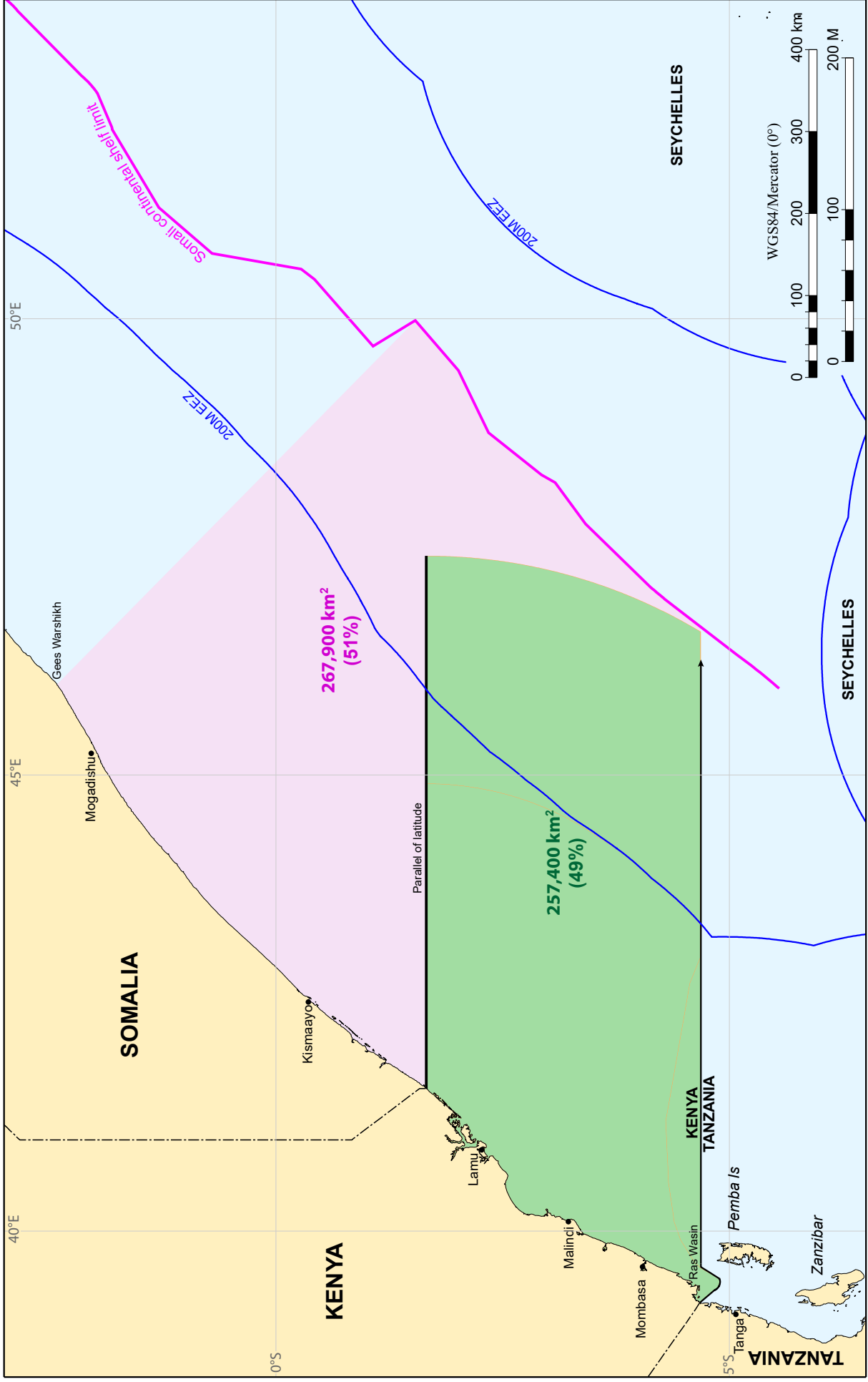
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Somalia's depiction of an 'equitable' division
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Figure KR 2-9



Division of the relevant area, including the area beyond 200M, using the equidistance line
 Figure KR 2-10



Division of the relevant area, including the area beyond 200M, using the parallel of latitude

Figure KR 2-11

Annex 1

Production Sharing Contract between the Government of the Republic of
Kenya and Sohi-Gas Dodori Ltd Relating to Block L13 (3 September 2008)
(extract showing map)



REPUBLIC OF KENYA

PRODUCTION SHARING CONTRACT

Between

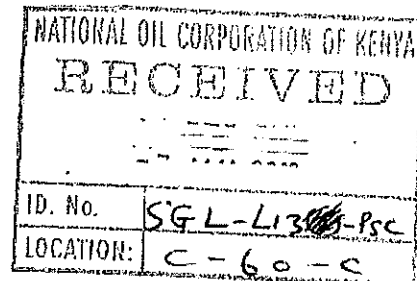
**THE GOVERNMENT OF THE REPUBLIC OF
KENYA**

And

SOHI-GAS Dodori LTD

RELATING TO

BLOCK L13



Ju

AB

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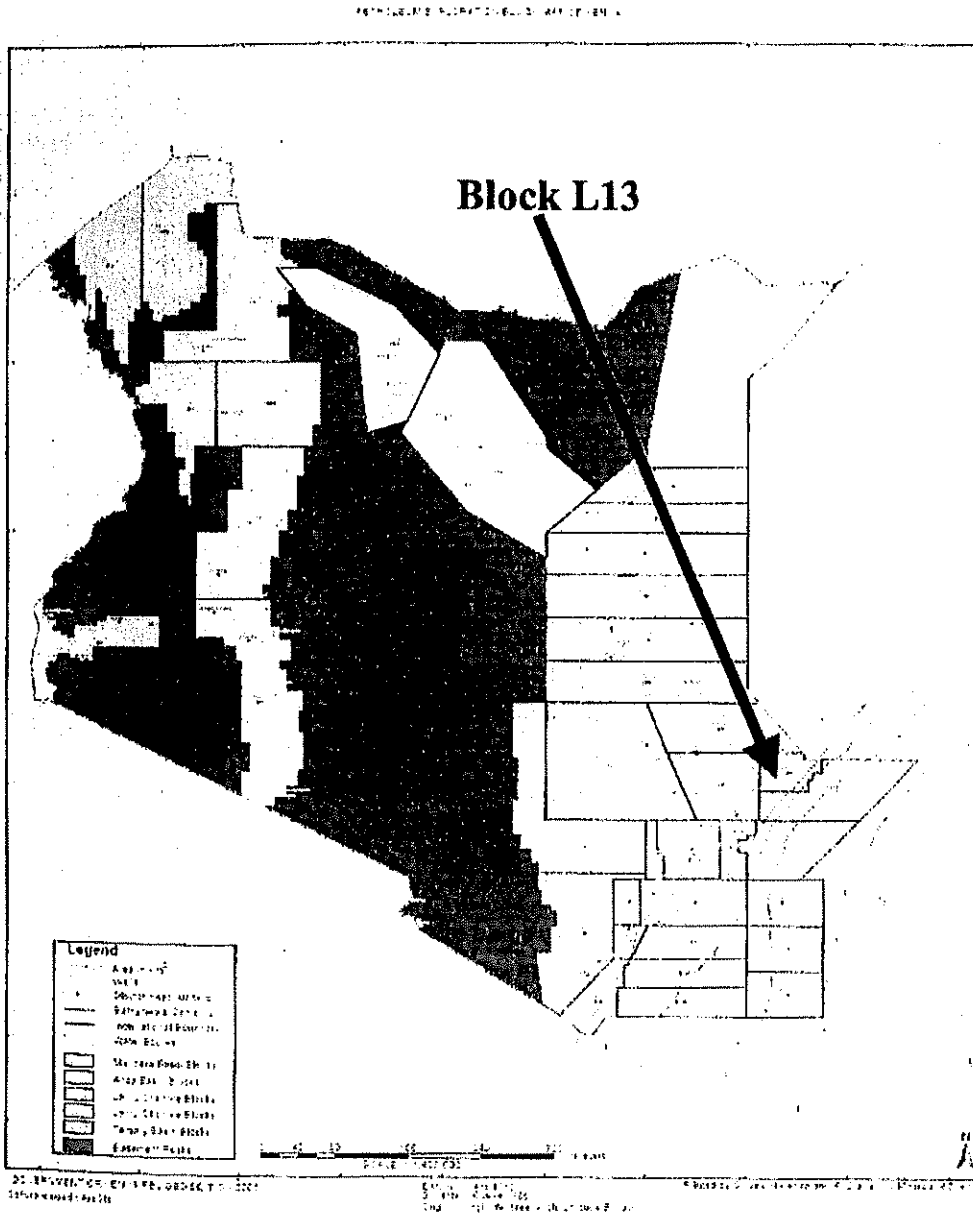



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CONTRACT AREA BLOCK L13 HIGHLIGHTED BY THE BLUE ARROW



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PRODUCTION SHARING CONTRACT**BETWEEN****THE GOVERNMENT OF THE REPUBLIC OF KENYA****AND****SOHI- GAS LAMU LTD**

This CONTRACT, is made and entered into on the third day of September, 2008 by and between the Government of the Republic of Kenya (hereinafter referred to as the "Government") represented for the purpose of this Contract by the Minister for the time being responsible for energy (hereinafter referred to as the "Minister") and SOHI-Gas Dodori Ltd., a wholly owned Kenya subsidiary of SOHI Oil & Gas Limited, incorporated under of the Laws of Mauritius and having established a place of business at Lonrho House, 8th Floor, Standard Street, Nairobi, Kenya 00100 (hereinafter referred to as the "Contractor").

The Government and the Contractor herein are referred to either individually as "Party" or collectively as "Parties".

WITNESSETH:

WHEREAS the title to all petroleum resources existing in their natural conditions in Kenya is vested in the Government; and

WHEREAS the Government wishes to promote and encourage the exploration and the development of petroleum resources in and throughout the Contract Area, as defined herein; and

WHEREAS the Contractor desires to join and assist the Government in accelerating the exploration and development of the potential petroleum resources within the Contract Area; and

WHEREAS the Contractor has access to the financial ability, technical competence and professional skills necessary to carry out the Petroleum Operations hereinafter described; and

WHEREAS in accordance with the Petroleum (Exploration and Production) Act (Cap 308) laws of Kenya, 1986, enacted by the Parliament of the



Republic of Kenya, agreements, in the form of production sharing contracts, may be entered between the Government and capital investors;

NOW THEREFORE in consideration of the undertaking and covenants herein contained, the Parties hereby agree as follows:

PART I SCOPE AND INTERPRETATION

1 SCOPE

This Contract is a production-sharing contract, in accordance with the provisions herein contained.

The Contractor shall -

(a) Be responsible to the Government for the execution of the Petroleum Operations contemplated hereunder in accordance with the provisions of this Contract and is hereby appointed and constituted the exclusive legal entity to conduct Petroleum Operations in the contract area for the term hereof;

(b) Provide all capital, machinery, equipment, technology and personnel necessary for the conduct of Petroleum Operations;

(c) Bear the risk of petroleum costs required in carrying out Petroleum Operations and shall therefore have an economic interest in the development of the petroleum deposits in the Contract area. Such costs shall be included in petroleum costs recoverable as provided in clause 27 hereof.

During the term of this Contract, the total production achieved in the conduct of the Petroleum Operations shall be divided between the parties hereto in accordance with the provisions of clause 27 hereof.

1A INTERPRETATION

In this Contract, words in the singular include the plural and vice versa, and except where the context otherwise requires:

"Acceptable Assignee" means a reputable Person experienced in the oil industry;



Annex 2

Agreed Minutes of the Joint Technical Committee Meeting on the
Tanzania/Kenya Maritime Boundary held in Dar es Salaam, Tanzania
(30-31 October 2008)

**AGREED MINUTES OF THE JOINT TECHNICAL COMMITTEE
MEETING ON THE TANZANIA/KENYA MARITIME BOUNDARY
HELD IN DAR ES SALAAM, TANZANIA, 30TH – 31ST OCTOBER
2008**

MIN 1/2008 OPENING OF THE MEETING

The meeting was called to order at 11.25 am. The head of the Tanzanian technical team, Mr. Zabron Y. Masele on behalf of the Permanent Secretary Ministry of Lands, Housing and Human Settlements Development the Kenyan delegation to Tanzania and to Dar es Salaam city in particular.

He then informed the meeting that the discussions were going to be held at technical level and thereafter each team would brief their respective authorities on the outcome of the technical discussions for further action. He subsequently proposed that:

1. the heads of the technical teams co-chair the meeting;
2. the secretariat be formed from both teams; and
3. the draft agenda be discussed and approved.

The Head of Technical Team from Kenya informed the meeting that Kenya was indeed aware of the intention to hold the meeting at a technical level and was agreeable to that.

Thereafter a Secretariat was appointed (attached hereto and marked Annex V) and the draft agenda was discussed and agreed as follows;



Agenda

1. Opening of the meeting;
2. Current Status of maritime boundary between Tanzania and Kenya in the Indian Ocean;
3. Proposed extension of maritime boundary beyond the current limits in the Exclusive Economic Zone;
4. Application of the Statement of Understanding Concerning a Specific Method to be used in Establishing the Outer Edge of the Continental Margin (hereinafter referred to as the Statement of Understanding);
5. AOB:
 - a) Exchange of data and technical collaboration
 - b) Draft maritime boundary agreement between Tanzania and Kenya beyond the Territorial Sea; and
6. Closure of the meeting.

OPENING REMARKS BY THE HEADS OF TECHNICAL TEAMS

In his opening remarks, the head of the Tanzanian team informed the participants that the overall objective of the meeting was to pave way for both countries towards their respective submissions to the UN of claims of extended continental shelves as provided for under article 76 of UNCLOS. The specific objectives were to discuss the status of the maritime boundary between Tanzania and Kenya in the Indian Ocean up to the Exclusive Economic Zone limits; secondly to propose common maritime boundary line between Tanzania and Kenya beyond the EEZ limits.



The head of the Tanzanian technical team then welcomed Ms. Juster Nkoroi, the Co- Chairperson Kenyan team to make some opening remarks.

The head of the Kenyan Technical Team thanked the Tanzanian Government for convening the meeting to discuss the status of the current Maritime boundary as well as its extension to cover limits of the Exclusive Economic Zone at such a short notice.

Noting the importance of the meeting, the head of the Kenyan team observed that the Convention provides that States with adjacent coast lines need to conclude agreements on the delimitation of their maritime boundaries for their territorial sea, Exclusive Economic Zone and the continental shelves by means of an agreement on the basis of international law. This meeting therefore will provide a good foundation for the two Governments to prepare for the signing of a maritime boundary agreement extending to the Exclusive Economic Zone and such further outer limits of national jurisdiction that may be determined in the future. The Agreement in question should be concluded as soon as is practicable to ensure that the two States are prepared in time to make their submissions to the Commission on the Limits of the Continental Shelf before 13th May 2009, the deadline for making the submissions to the Commission.

The Kenyan team noted that Article 76 of the Convention avails the opportunity to coastal states to claim the continental shelf beyond 200 nautical miles and up to 350 nautical miles upon submitting scientific evidence to support this extension by use of either the formulae lines in Article 76 4(1) and (2) or by application of the Statement of Understanding.



After further deliberation the meeting noted that the Statement is only applicable to a certain group of States situated in the Southern part of the Bay of Bengal. The meeting further noted that scientifically this Statement can be applicable within the East African Margin. Therefore, the two Governments should seek modalities of using this Statement in order to maximize on the size of the area to be claimed.

The Kenyan team appreciated the support accorded by the team of Tanzania to Kenya during the 18th States Parties Meeting held in June 2008 concerning the intended use of the Statement of Understanding, and indicated that the two Governments should explore the possibility of applying the Statement of Understanding for the mutual benefit of the two States.

**MIN 2/2008 CURRENT STATUS OF MARITIME BOUNDARY
BETWEEN TANZANIA AND KENYA IN THE INDIAN OCEAN:**

The Tanzanian team informed the meeting that currently they uphold the 1976 Maritime Boundary Agreement between the two States. At the same time Tanzania is aware of the proclamation by the Government of Kenya made in 2005. However since Tanzania is not well versed with how the transformation of coordinates was done in 2005. Tanzania therefore, requests for technical clarification on the mathematical model or parameters used by Kenya in the transformation.


4

In response, Kenya indicated that it had made the proclamation based on the 1976 Agreement by adopting the parallel of latitude from point "C" as contained in paragraph 2 (d) of the 1976 Agreement and in accordance with international law. The meeting was further informed that, the revision to the 1976 proclamation was to rectify the inequity arising as a result of using the median line to determine maritime northern boundary.

The meeting discussed this issue and agreed that the Government of Kenya will provide clarification on the points raised above.

MIN 3/2008: PROPOSED EXTENSION OF THE MARITIME BOUNDARY BEYOND THE CURRENT LIMITS IN THE EEZ:

The meeting discussed and noted that under the United Nation Convention on the Law of the Sea, States are required to finalise and agree on their maritime boundaries and submit their claims on the Exclusive Economic Zone. The meeting appreciated the need of their respective States to extend their maritime boundaries beyond the current limits of their territorial sea.

Further, the meeting recommended the use of parallel of latitude as the basis of maritime boundary delimitation between the two States. In making this recommendation, the meeting was also guided by the common State practice of adopting the parallel of latitude for mapping. The points of future reference were agreed upon as 'point C' as contained in the 1976 agreement and 'point EC' to be agreed upon as contained in the 2005 proclamation of Kenya's Exclusive Economic Zone.

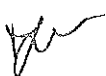


MIN 4/2008: APPLICATION OF THE STATEMENT OF UNDERSTANDING CONCERNING A SPECIFIC METHOD TO BE USED IN ESTABLISHING THE OUTER EDGE OF THE CONTINENTAL MARGIN:

The meeting discussed and recognised the use of the Statement of Understanding as an exception to Article 76 where the use of the paragraph 4 a (i) and (ii) would result in an inequity. The meeting noted that the application of this Statement as an exception to Article 76 is only available to States situated south of the Bay of Bengal. The meeting discussed the possibility of using the Statement of Understanding as an alternative to Article 76 in the delineation process for the benefit of the two States based on Scientific Criteria.

After discussions the meeting resolved to recommend the following strategies for adoption by their respective governments in pursuit of the objective of using the Statement of Understanding.

- The two Governments to consider a political approach to lobby friendly nations to support the use of the Statement of Understanding outside the Bay of Bengal States . A good starting point was identified as the African Union which Tanzania currently chairs. On account of this position, the Government of Tanzania to take a significant role as the Chair of the AU to push for an African position on this matter.
- Additionally, the two Governments should ensure that the issue is tabled before the next States Parties Meeting of the UNCLOS which



will be held in June 2009 in New York. The issue should form part of the substantive agenda for discussion at the meeting. Lobbying should commence immediately to ensure good support is received at the said Meeting.

- The meeting also resolved on the need to prepare a common legal strategy to ensure that the Statement of Understanding will apply to both States when making their submissions.

MIN 5: ANY OTHER BUSINESS

a. Exchange of data and technical collaboration:

The meeting discussed and agreed on the need to collaborate and harmonise their analysis on points falling along the boundary points in order to aid their submission starting from January 2009.

The meeting agreed on the need to exchange data and information on the common maritime boundary for the mutual benefit of the two States. This collaboration will be aimed at ensuring that there is a successful implementation of the delineation process of the outer limits of the continental shelf for the two States.

b. Draft Maritime Boundary Agreement

The Kenyan team presented a draft Maritime Boundary Agreement for consideration. The meeting agreed that the draft Maritime Boundary Agreement to form part of these minutes.



Way forward:

The meeting prepared a matrix (attached hereto and marked annex III) to indicate the timeframe for implementation of the recommendations.

Min 6/2008 CLOSURE OF THE MEETING

In closing the meeting, the co-chair from Kenya, once again, thanked the Government of the United Republic of Tanzania for convening the meeting. She noted that the meeting was conducted in cordial and friendly atmosphere. She also expressed appreciation for the smooth and efficient manner in which the meeting was conducted and also congratulated the Secretariat for preparing the minutes very well. She expressed her confidence that the subsequent joint technical meetings will be held in alike manner. She then declared the meeting closed.


There being no other business, the meeting adjourned at 1.30 pm.

Signed in duplicate at Dar es Salaam, Tanzania, this *31st* day of *October* 2008.


.....

ZABRON Y. MASELE

**For the Government
of the United Republic of
Tanzania**


.....

**JUSTER NKOROI,
MBS, OGW**

**For the Government
of the Republic of
Kenya**

ANNEX I

TANZANIAN TEAM

NO.	NAME	MINISTRY/DEPARTMENT	CONTACT NO./E-MAIL
1.	Mr. Zabron Y. Masele	Director of Surveys and Mapping, Ministry of Lands, Housing and Human Settlements Head of Tanzania team	0754-210258 255-22-2121894 smd@raha.com dsm@ardhi.go.tz
2.	Mr. Abdon D. Makishe	Tanzania Petroleum Development Corporation (TPDC)	makishe@tpdc-tz.com 0784 673719
3.	Mr. Omary S. Mtunguja	Tanzania Petroleum Development Corporation (TPDC)	mtunguja@tpdc-tz.com 0782895525
4.	Mr. Steven L. Chima	President's Office DSM	0754-563749 stevechima@yahoo.com
5.	Mr. Yason E. Mndeme	Livestock Development and Fisheries	0754-271504 mndemem@yahoo.com
6.	Lt Col A. V. Chakila	Tanzania Peoples Defence Forces (TPDF)	Chakila45@yahoo.com
7.	Mr. Adam I. Zuberi	Ministry of Energy and Minerals	0754-273359 zuberi@mem.go.tz
8.	Mr. John A. Msemwa	Ministry of Lands, Housing, Human and Settlements Development	0784-517830 msemwa@yahoo.com
9.	Mr. Sebastian B. K. Bebwa	Ministry of Defence and National Service	0784-280356 sebabebwa@yahoo.com
10.	Mr. Richard Maridadi	Legal Officer Ministry of Foreign Affairs and International Cooperation	0755-277808 rkunda@yahoo.com




ANNEX II

KENYAN TEAM

NO.	NAME	MINISTRY/DEPARTMENT	CONTACT NO./E-MAIL
1.	Ms. Juster Nkoroi	Cabinet Office Head of Team	0720-787809 mwalimnkoroi@yahoo.com
2.	Mr. Patrick Nzusi	Kenya High Commission	0767-229931 PNZUSI@MFA.GO.KE
3.	Mr. John Kagasi	Task Force on Delineation of Kenya's Outer Continental Shelf, Kenya/Cabinet Office	0722-655815 kagasi@kenyaweb.com
4.	Mr. Simon Njuguna	Task Force on Delineation of Kenya's Outer Continental Shelf, Kenya/Cabinet Office	0722-874772 simonnjuguna@hotmail.com
5.	Mr. Kaitikei Rotiken	Task Force Member/ Ministry of Foreign Affairs	0722-598495 rkaitikei@mfa.go.ke
6.	Colonel Joseph Kivunzi	Kenya High Commission	0762-878500 kivjoseph@yahoo.com
7.	Mr. Kenneth Gathuma	State Law Office, Kenya	0722-789370 kgathuma@ag.co.ke

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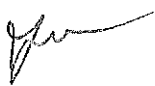
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ANNEX III
IMPLEMENTATION MATRIX

ACTION	TIMEFRAME	ACTOR	REQUIREMENTS
<p>a) Kenya to submit to Tanzania mathematical model or parameters used to transform the 1976 definition of maritime boundary to WGS 84 system which Kenya deposited to UN in 2005.</p> <p>b) Tanzania to respond to this information</p>	<p>End of November 2008</p> <p>Before end of December 2008</p>	<p>GOK</p>	<p>Internal consultations</p>
<p>Conclude a maritime boundary agreement beyond the current limits of the territorial sea between the two Governments</p>	<p>End of January 2009</p>	<p>GOT, GOK</p>	<p>Regular and frequent consultations between the two Governments on the content of the agreement</p>
<ul style="list-style-type: none"> ◦ Organise joint fora to sensitise high level decision makers on utilisation of ocean resources ◦ Lobbying for political support at the International stage ◦ Recommend the inclusion of the issue in the next SPLOS 	<p>End of January 2009</p> <p>Continuous, but before May 2009</p> <p>Before end of December 2008</p>	<p>Technical Teams GOT, GOK</p> <p>GOT, GOK</p> <p>GOT, GOK</p>	<p>Approval by Governments</p>

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<ul style="list-style-type: none"> ◦ Introduce the issue of application of the Statement of Understanding at the AU 	<p>As soon as possible</p>	<p>GOT, GOK</p>	
<ul style="list-style-type: none"> ◦ Identification of the specific areas required for collaboration ◦ Meeting between the Technical personnel of the two States 	<ul style="list-style-type: none"> ◦ December 2008 for ◦ Meet in January 2009 	<ul style="list-style-type: none"> ◦ Technical Teams of both States ◦ GOT, GOK 	<ul style="list-style-type: none"> ◦ Data collected from the Ocean ◦ Logistical arrangements



Annex IV

MARITIME BOUNDARY AGREEMENT

BETWEEN

**THE GOVERNMENT OF THE REPUBLIC OF
KENYA**

AND

**THE GOVERNMENT OF THE UNITED
REPUBLIC OF TANZANIA**

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AGREEMENT BETWEEN THE REPUBLIC OF KENYA AND THE UNITED REPUBLIC OF TANZANIA ON THE MARITIME BOUNDARY

PREAMBLE

The Republic of Kenya and the United Republic of Tanzania (hereinafter "the Parties");

RECALLING the exchange of notes between the Republic of Kenya and the United Republic of Tanzania concerning the delimitation of the territorial waters boundary between the two States which constituted an agreement that entered into force on 9th July 1976;

COGNISANT of the continuous co-operation of the Parties within the framework of the East African Community as Partner States;

AWARE of the provisions of the United Nations Convention on the Law of the Sea to have States with adjacent coasts to conclude agreements on the delimitation of their maritime boundaries;

CONSIDERING the proclamation made by the President of the Republic of Kenya on the Exclusive Economic Zone of the Republic of Kenya, deposited at the United Nations and published in the United Nations Law of the Sea Bulletin Number 61;

WISHING to reach an amicable and equitable agreement pertaining to the maritime boundary between the Parties;

THE PARTIES THEREFORE AGREE AS FOLLOWS:

Article I

Scope of Agreement

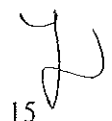

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1. The Parties reaffirm the agreement that entered into force on 9th July 1976 between them which determines the Maritime Boundary up to 12 nautical miles (the Territorial Waters). This Agreement shall define the maritime boundary from the limits of the territorial sea as defined in the 1976 Maritime Boundary Agreement starting at Point C (4° 40' 52''S, 39° 36' 18'' E) which is the Northern Intersection of arcs from Ras Kigomasha lighthouse and Mpunguti ya Juu as described under paragraph 2(b) of the 1976 Agreement.
2. The Parties confirm that the basis of maritime boundary delimitation shall be parallel of latitude as established in the 1976 Maritime Boundary Agreement. To this extent and in furtherance of the objectives of this Agreement, the Parties agree that the parallel of latitude extends eastwards to a point where it intersects the outer most limits of the continental shelf and such other outermost limits of national jurisdiction as may be determined by international law.
3. ***Need for the Parties to discuss the issue of outer limits of the EEZ and include the co-ordinates***

Article II

The maritime boundary as defined in this Agreement shall not affect or prejudice in any manner either Party's position with respect to the rules of international law relating to the law of the sea, including those concerned with the exercise of sovereignty, sovereign rights or jurisdiction with respect to the airspace, waters, seabed and subsoil.

Article III


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ANNEX V

1.	Mr. Simon Njuguna	Task Force on Delineation of Kenya's Outer Continental Shelf, Kenya/Cabinet Office	0722-874772 simonnjuguna@hotmail.com
2.	Mr. Kenneth Gathuma	State Law Office, Kenya	0722-789370 kgathuma@ag.co.ke
3.	Mr. Kaitikei Rotiken	Task Force Member/ Ministry of Foreign Affairs	0722-598495 rkaitikei@mfa.go.ke
4.	Mr. John A. Msemwa	Ministry of Lands, Housing, Human and Settlements Development	0784-517830 msemwa@yahoo.com
5.	Mr. Richard Maridadi	Legal Officer Ministry of Foreign Affairs and International Cooperation	0755-277808 rkunda@yahoo.com



Annex 3

Agreement between the National Oil Corporation of Kenya and Schlumberger
Offshore Services Limited (known as WesternGeco) (October 2013)

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AGREEMENT

Between

NATIONAL OIL CORPORATION OF KENYA LIMITED

And

SCHLUMBERGER OFFSHORE SERVICES LTD KENYA BRANCH

October 2013

**For a Non-Exclusive Geophysical Survey over Deepwater Blocks L21 to
L28, Offshore Kenya and other Related Services**

AGREEMENT FOR A NON-EXCLUSIVE GEOPHYSICAL SURVEY OVER DEEPWATER BLOCKS L21 TO L28 OFFSHORE KENYA AND OTHER RELATED SERVICES

This Agreement (the "Agreement") is entered into as of this ____ day of October 2013 (hereinafter "Effective Date"), between:

SCHLUMBERGER OFFSHORE SERVICES LIMITED, a company incorporated in British Virgin Islands with a registered branch in Kenya with Compliance Certificate Number CF/2012/76951 and branch address at 1st Floor, West End Towers, Muthangari Drive, Westlands, Nairobi 46979-00100, Kenya, acting on its behalf and on behalf of its affiliates (hereinafter "**WesternGeco**");

AND

NATIONAL OIL CORPORATION OF KENYA, a State Corporation incorporated under the Companies Act, Cap 486 of the laws of Kenya and of Post Office Box Number 58567-00200, Nairobi in the Republic of Kenya (hereinafter "**NATIONAL OIL**");

(hereinafter collectively the "**Parties**" and individually the "**Party**");

WHEREAS, the government wishes to promote the petroleum acreage onshore and offshore to prospective oil and gas companies and investors;

WHEREAS, National Oil is a State Corporation incorporated under the Companies Act [Cap 486] and is engaged in the business of importation, purchase, storage, marketing, selling and distribution of petroleum products and charged with the mandate of pursuing the Government's exploration interests and activities as well as other ancillary business as well as the performance of agency services on behalf of the Government of Kenya for the co-ordination of petroleum resources exploration in Kenya;

WHEREAS, WesternGeco is a geophysical contractor that is experienced (*inter alia*) in the acquisition, processing, reprocessing, interpretation, brokering, marketing, and licensing of geological and geophysical information, both onshore and offshore and has the financial ability, technical competence and professional skills necessary;

WHEREAS, Parties have deliberated upon the possibility of collaborating on the acquisition, processing, reprocessing, interpreting, brokering, marketing and licensing of geological and geophysical data onshore and offshore, as well as the installation of a National Data Centre and Data Processing capability;

WHEREAS, WesternGeco, together with its Affiliates, is willing and able to conduct the Survey as well as the associated data (re)processing, interpretation, marketing and licensing of the Survey Data on behalf of National Oil in accordance with terms hereunder; and

WHEREAS, the Parties have signed a Memorandum of Understanding for a proposed Joint Collaboration project on the 26th of July 2013;

THEREFORE, IN CONSIDERATION of the mutual promises and agreements set forth in this Agreement, the Parties agree as follows:

Definitions:

"Acquisition Work" means the seismic acquisition work described in Appendix I in accordance with the provisions of this Agreement.

"Agreement" means the present agreement including articles 1 to 16 and Appendices 1-8. The terms and conditions of the Agreement shall be prioritised over any content in the appendices.

"Affiliates" means any entity that, directly or indirectly through one or more intermediaries, controls, or is controlled by, or is under common control with that party, "control" being at least fifty percent (50%) ownership.

"Applicable Law" means all laws, regulations, and requirements and orders of any maritime classification societies and public authorities in Kenya which apply with respect to the fulfilment of this Agreement and/ or the Acquisition Work performed hereunder.

"Area of Operation" means the area described in the Appendix I and any other location where the Acquisition Work is carried out.

"Blocks" means an area within the territory of the Republic of Kenya delineated by geographical coordinates and designated by the Government of Kenya as an area for licensing to third parties for the purposes of exploration or production.

"Data" means the geological or geophysical data resulting from the processing of the Survey Data and for which WesternGeco has the right to grant use licenses in accordance with Appendix 2 ("Master License Agreement").

"Default" shall constitute any act contrary to the provisions of this contract which may not be classified to be 'material breach' under this contract but for which the party claiming the other to have defaulted shall be entitled to demand that the offending party starts to remedy/rectify the default within a period of fourteen (14) days whereupon the said party shall be entitled to issue a further notice of fourteen (14) days to terminate the contract upon the offending party's neglect to commence the rectification or remedy the default.

"Derivative Products" means the Data that has been either interpreted or reprocessed with a technology different from the one used to obtain the Data. Derivative Products are proprietary to WesternGeco, unless stated otherwise.

"Licensee" means a third party, to whom the Data is licensed in accordance with Appendix 2 ("Master License Agreement").

"Master License Agreement": means the license Agreement issued by WesternGeco on behalf of National Oil that defines the terms and conditions governing the Licensee's right of use of the Data, also referred to as "MLA", as per Appendix 7.

"Material Breach" means acts sufficiently serious to cause substantial failure in the performance of an agreement as to release the aggrieved party from its obligations.

"Pre-Commitment" means the offer from a third party to commit to pay wholly or partially the costs of the Survey prior to its commencement.

"Q Surveys" means Surveys conducted by WesternGeco using WesternGeco's proprietary "Q" technology.

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"Raw Sensor Measurements" For the purpose of Q Surveys, shall mean acoustic measurements acquired from individual sensors, prior to any type of adaptive (or functionally similar) digital filtration, rotation to primary axes, conversion to industry standard SEG measurements or digital group forming; this term refers both to the physical article as well as the intangible property that resides in it.

"Survey" means the conduct by WesternGeco of a geological and/or geophysical data acquisition services and ancillary services in accordance with Appendix I of this Agreement.

"Survey Data": means the geological and geophysical data acquired by WesternGeco during the Survey, including tapes and records containing industry standard format geophysical information in the form and at the spatial and temporal sampling density and any reports as agreed by the Parties in this Agreement. Survey Data may include navigation, positioning and field data but shall under no circumstances ever include Raw Sensor Measurements or Contractor Developed Technology in case of Q Survey.

"WesternGeco Developed Technology" means i) all designs, drawings, specifications, manuals, procedures, reports, calculations, discs, software (including Omega software), computer models, know-how, equations, formulae, procedures or other information which WesternGeco has or develops entirely or incrementally during or subsequent to performance of the Survey and that WesternGeco considers to be proprietary to it; ii) all technical documents including plans, sketches and intermediate data gathered by WesternGeco including but not limited to Raw Sensor Measurements which are associated with the performance of the Survey but not agreed to be delivered to National Oil as part of the Survey. WesternGeco shall retain all right title and ownership in WesternGeco Developed Technology and WesternGeco may use such in the research and development of its own technologies.

ARTICLE I - GRANT OF RIGHTS

- 1.1 National Oil is a State Corporation incorporated under the Companies Act [Cap 486] and is engaged in the business of importation, purchase, storage, marketing, selling and distribution of petroleum products and charged with the mandate of pursuing the Government's exploration interests and activities as well as other ancillary business as well as the performance of agency services on behalf of the Government of Kenya for the co-ordination of petroleum resources exploration in Kenya.
- 1.2 National Oil hereby grants exclusive rights to WesternGeco to:
- a) undertake the design, evaluation, acquisition, processing, reprocessing and where appropriate, interpretation, and all other activities related to the acquisition, processing, and interpretation of the Survey Data in the territory offshore Kenya, as described in Appendix I of this Agreement on behalf of National Oil.
 - b) Broker, market and license the Survey Data and/ or Data to Third Parties on behalf of National Oil.

ARTICLE 2 – TERM AND SCOPE OF SERVICES

- 2.1 Subject to 2.2, this Agreement shall be valid for an initial period of Seven(7) years from the Effective Date. At the end of the initial period, this Agreement will be renewed for two additional periods of three (3) years each subject to agreement between the Parties unless a Party serves a notice of termination of the Agreement to the other Party:
- a) in accordance with clause 2.2.

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- b) Not less than two (2) months before the end of the term of the Agreement. The notice shall formally confirm such Party's intention not to extend the Agreement.

In the event that at the end of the term WesternGeco has not recovered its Survey costs, as defined in Appendix 2, this Agreement may be renewed for a period of an additional 3 years upon negotiations or National Oil may opt to pay the deficit of the remainder of costs due to WesternGeco whereupon no extension of agreement will be necessary.

- 2.2 Notwithstanding the above, either Party shall have the right to terminate this Agreement immediately should:

- a) National Oil's mandate to act in the same capacity it had at the Effective Date be changed or impaired, including but not limited to any change in the scope of rights granted by the Government of Kenya to the extent affecting this Agreement; or
- b) WesternGeco's ability to act in the same capacity it had at the Effective Date be changed or impaired; or
- b) Either Party commits a material breach of this Agreement or commits any act constituting Default and fails to remedy the same within the given notice period
- c) A dispute arises in accordance with 8.3 hereunder.

- 2.3 In case of termination in accordance with 2.2;

- (a) If the termination is under Clause 2.2 a), National Oil shall release, defend, indemnify and hold WesternGeco free from any claims resulting from 2.2 a)
- (b) WesternGeco shall immediately relinquish its marketing, brokerage, agency and licensing rights and any other rights created under this agreement.
- (c) WesternGeco shall immediately be ceased of the rights to commercially exploit any survey data produced under this agreement and shall hold any data in their custody in confidence and only be permitted to use the same for their internal use. Any transmission of the said data to any third parties shall only be permitted upon National Oil issuing consent on the same.

ARTICLE 3 –ACQUISITION AND PROCESSING OBLIGATIONS OF WESTERNGECO

- 3.1 The Parties agree that WesternGeco, in addition to its obligations under clause 5, shall:

- a) exclusively acquire, process, reprocess, interpret market, broker and license a new regional 2D Survey and any associated geological and geophysical dataset out in Map 1 of Appendix 1 on behalf of National Oil;
- b) subsequently acquire, process, reprocess, interpret market, broker and license a new regional 3D Survey and any associated geological and geophysical dataset out in Map 2 of Appendix 1 on behalf of National Oil.

- 3.2 Subject to the grant of a non-exclusive exploration permit in accordance with Section 5(2) of the Petroleum (Exploration and Production) Act Cap 308 all equipment temporarily imported into Kenya for exploration purposes is exempt from customs and import duties. WesternGeco shall apply for this exemption and National Oil will assist by obtaining relevant letters in support of the exemption. In the event that WesternGeco is not granted such exemption, any customs duties and import/export taxes incurred by WesternGeco shall be included in the project cost.

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- 3.3 The Parties agree that the decision to conduct the Survey shall be taken at the sole discretion of WesternGeco and shall depend in part on whether WesternGeco has secured sufficient industry Pre-Commitment for the Survey as set out in Appendix 2. WesternGeco reserves the sole right to reduce, extend or terminate any Survey depending on the level of industry interest in relevant Area of Operations.
- 3.4 The Parties agree that WesternGeco shall select the Survey Data to be processed and where appropriate reprocess; conduct the processing and reprocessing and interpretation and market and License the Survey Data and/ or Data on behalf of National Oil. This activity shall remain under the full control of WesternGeco and all Survey Data and/or Data licensed shall be licensed on a non-exclusive basis under terms and conditions of the MLA and in accordance with WesternGeco's then current licensing rates.
- 3.5 All practices and processes used by WesternGeco shall meet generally accepted seismic industry standards. All Survey Data will be processed by WesternGeco at its facilities or at facilities designated by WesternGeco, including, but not limited to, on board the seismic vessels and at other WesternGeco processing centers as appropriate. The Parties agree that some data processing may be carried out at National Oil's data processing facility to be established in Nairobi as described in Article 5.1 (c). However, such processing shall be done parallel with the processing carried out at the facilities or at facilities designated by WesternGeco. The Parties further understand and agree that time is of the essence and that any delay in processing or delivering the Survey Data may cause WesternGeco to be in breach of contract with Licensees.
- 3.6 WesternGeco, as an independent contractor, shall be solely responsible for the manner and conduct of all operations in connection with the Survey including the processing and reprocessing of any data pursuant to this Agreement. WesternGeco shall have complete and exclusive supervision, direction and control of WesternGeco's equipment, personnel and labour.
- 3.7 Subject to clause 4.3 below, WesternGeco shall obtain at its own cost from the appropriate authorities all necessary permits, authorisations and licences required to be obtained by WesternGeco under Applicable Law for the performance of the Acquisition Work, including where applicable:
- (a) Those import and export approvals and other permits required to use WesternGeco's equipment, including but not limited to seismic vessel, acquisition equipment in the Area of Operations; and
 - (b) All visas, passport, work permits, exit and re-entry permits and all other governmental authorisations or documentation required in connection with the entry, presence, employment and/or exit of WesternGeco Group personnel in the Area of Operations.

National Oil shall provide all necessary assistance to enable WesternGeco to obtain any such permit or licence.

National Oil undertakes, that it shall not use the environmental permit obtained by WesternGeco for the Acquisition Work in conjunction with or for the benefit of Third Parties, including but not limited to competitors of WesternGeco.

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- 3.8 To the extent Acquisition Work is rendered in an area requiring access, ingress or egress across waters subject to the claimed exclusive jurisdiction of a state other than Kenya, National Oil shall assist WesternGeco in its efforts to obtain the required rights of access, ingress and egress to the Area of Operations. National Oil shall advise WesternGeco of any limitations or restrictions affecting access, ingress and egress to the Area of Operations that they are aware of and WesternGeco shall abide by such limitations or restrictions. If WesternGeco enters or operates within such areas, it shall be deemed to be in accordance with the work scope under this Agreement. If the right of access, ingress or egress into such waters is denied by any state claiming jurisdiction, the Parties shall without undue delay meet in good faith to agree a course of action mitigating such denial, including but not limited to release of the property and personnel of WesternGeco and that of its contractors and Survey Data.

ARTICLE 4 – DATA LICENSING

- 4.1 National Oil shall use its best endeavours to influence the organisation, conduct, and promotion of competitive licensing rounds for any blocks which are open or become open in the Survey area prior to issuing licenses to explore for and produce oil and gas in those blocks after completion of WesternGeco's acquisition of the Survey Data under this Agreement. The licensing rounds shall include all then open acreage of the Survey.
- 4.2 Licensing of the Survey Data for any blocks applied for shall be a requirement to qualify as a bidder for those blocks in the licensing round.
- 4.3 In the event a Block, in which the Survey Data has been acquired by WesternGeco, is awarded by direct award by the Government of Kenya, rather than as the result of a licensing round, the awarded Third Party entity shall be required to license the Survey Data from WesternGeco under the fee structure and terms for late commitment to the project.

ARTICLE 5 - PROVISION OF OTHER SERVICES BY WESTERNGECO

- 5.1 In addition to the services set out in Clause 3 of this Agreement, WesternGeco shall provide the following services to National Oil:
- a) undertake a Geology and Interpretation Collaboration within Kenya and build a regional understanding of Kenya offshore including Petroleum Systems modelling which may be conducted outside Kenya and to identify specific areas for a new 3D acquisition survey as set out in Appendix 3 of this Agreement;
 - b) set up a new National Data Centre with associated support, as set out in Appendix 4;
 - c) provide a new Data Processing Centre initially comprised of WesternGeco's proprietary Omega seismic processing system and conduct initial training, as set out in Appendix 5;
 - d) provide a Collaboration and Visualisation Centre, as set out in Appendix 6.
- 5.2 WesternGeco's contributions to the projects listed above shall, subject to mutual agreement be limited to the amounts set out in the respective Appendices. Should National Oil wish to

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increase the investment for a project, such increase shall be met by WesternGeco, but shall always be recovered from National Oil's share of future revenues generated from licensing of geological and geophysical data to third parties subject to the availability of sufficient funding.

In the event the Survey is terminated early, WesternGeco's contributions to provide the services set out in clause 5.1(a) shall be limited to the revenue shares due to National Oil. Any contributions made to National Oil which are in excess of the relevant revenue share due to National Oil shall be reimbursed to WesternGeco.

ARTICLE 6 - DATA OWNERSHIP

6.1 National Oil, as a State Corporation incorporated under the Companies Act [Cap 486] and engaged in the business of importation, purchase, storage, marketing, selling and distribution of petroleum products and other ancillary business as well as the performance of agency services on behalf of the Government of Kenya for the co-ordination of petroleum resources exploration in Kenya grants to WesternGeco the exclusive rights to act as an exclusive agent and facilitator with view to acquire, process, reprocess, interpret, market, promote and sell licenses for use of the Survey Data. National Oil further warrants that such right have not been granted, is not held, nor shall it be granted to any Third Party throughout the duration of this Agreement and any extension thereof. It is recognised that the data is owned by the Government of Kenya and managed by National Oil acting on behalf of the Government of Kenya.

6.2 Once the processing of the Survey Data is completed by WesternGeco or its Affiliates, WesternGeco will deliver to National Oil one copy of the stack and final migrated sections of the Survey Data, along with navigation information and base maps for National Oil's exclusive and internal use. National Oil, hereby expressly agrees and accepts that any material provided by WesternGeco under this clause 6.2 shall not be copied, shown, distributed or provided by National Oil to any Third Party and shall be treated as strictly confidential for the term of this Agreement and any extension thereof.

After the expiry of the term of the Agreement as defined in Article 2.1, WesternGeco shall deliver to National Oil all outstanding records of the Survey Data, excluding therefrom any of WesternGeco Developed Technology or Raw Sensor Measurements.

6.3 National Oil and WesternGeco agree that all Survey Data acquired and obtained under the terms of this Agreement is intended for their sole and exclusive use, shall be kept and remain confidential at all times and shall not be divulged, transferred, sold or otherwise disposed of without the prior written consent of the other Party, except as specifically provided for in this Agreement.

6.4 WesternGeco will be the exclusive licensor of all Survey Data and Data obtained pursuant to this Agreement during the full term of this Agreement and any extension thereto. After the expiry of this Agreement, WesternGeco will retain a non-exclusive license to use the Survey Data for its own internal and non commercial purposes in the event WesternGeco undertakes future Survey planning offshore Kenya.

6.6 All sales of licenses for use of Survey Data and/ or Data to Licensees will state that the information is confidential and, WesternGeco has the exclusive rights to market the Survey Data and/ or Data.

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All Survey Data and/or Data shall be marked "**Confidential - Owned by the Republic of Kenya, Produced by WesternGeco and Managed by National Oil Corporation of Kenya on behalf of the Republic of Kenya.**" or equivalent language

- 6.7 For avoidance of doubt, should WesternGeco or the Licensee elect to create Derivative Products, these Derivative Products shall be owned by either WesternGeco or Licensee as the case may be, but shall be subject to all terms of confidentiality and restrictions upon use, disclosure and transfer as is provided herein for the original Survey Data.
- 6.8 While performing the Survey, WesternGeco may utilise expertise, know-how and other intellectual capital (including intellectual property) and develop additional expertise, know-how and other intellectual capital (including intellectual property) which are WesternGeco's exclusive property and which WesternGeco may freely utilize in providing services for its other customers. Except where expressly and specifically indicated in writing, and in exchange for appropriate agreed payment, WesternGeco does not develop any intellectual property for ownership by National Oil, WesternGeco retains sole ownership of any such intellectual capital (including intellectual property) created by WesternGeco during the course of acquiring the Survey Data. WesternGeco grants no title or license or right to National Oil or the Republic of Kenya to use WesternGeco's intellectual capital (including intellectual property and WesternGeco Developed Technology).

ARTICLE 7 - REPORTING

- 7.1 WesternGeco shall provide National Oil with monthly acquisition and processing operational status reports for the Survey, as well as a final acquisition survey report within 45 days of completion of the Survey. Once the Survey is completed, WesternGeco shall, at the end of each quarter submit a statement of the marketing activities, if any, and Survey Data and/ or Data licensing activity, if any, to National Oil.
- 7.2 National Oil may query any reports submitted to it within a period of thirty (30) days upon submission inquiry of which shall be raised formally and a response given/due within fourteen (14) days from the date of acknowledgment of receipt. Parties shall endeavor to resolve any disputes arising there from amicably within a period of thirty (30) days before opting to explore any other alternative dispute resolution mechanism.

ARTICLE 8- TERMS OF MARKETING OF SURVEY DATA/ DATA/ REVENUE SHARING

- 8.1 All licensing of the Survey Data and/ or Data shall be undertaken in the name of WesternGeco, on behalf of National Oil. If an interested Third Party contacts National Oil directly with a request to purchase a license to the Survey Data and/ or Data, National Oil will direct the Third Party to WesternGeco.
- 8.2 WesternGeco shall be responsible for the marketing of the Survey Data and/ or Data and shall decide on the best method to get interest. Such marketing services shall be reported to National Oil under the terms of Article 7.1.
- 8.3 In the event that a dispute arises in connection with the geographical boundaries of the Area of Operations, as detailed in Appendix I, which dispute affects the performance by WesternGeco of its obligations under this Agreement thereto, the Parties shall meet to reach a mutually agreeable resolution of the dispute. Should the Parties to the dispute fail to reach a mutually agreeable resolution within ninety (90) days and WesternGeco is prevented from acquiring, processing and/or reprocessing, or marketing the Survey Data and/ or Data

as a result of the dispute, WesternGeco reserves the right to terminate Agreement early without any further liabilities to it.

ARTICLE 9 - FINANCIAL ARRANGEMENTS

- 9.1 The Parties agree that WesternGeco shall be remunerated in full for the provision of services listed in Appendices 3-6 at the rates mentioned in the relevant appendices. Such remuneration shall be in the form of service credits, which shall be set off against the revenue share earned by National Oil. For the avoidance of doubt, subject to the provisions of sub-article 9.3.6 below, the National Oil's revenue share shall be only transferred after WesternGeco has been paid in full for all costs set out in Appendices 3-6.
- 9.2 All acquisition, processing, reprocessing and interpretation costs will be paid for by WesternGeco.
- 9.3 All licensing of the Survey Data and/ or Data shall be in US Dollars. No Survey Data and/ or Data will be licensed on credit terms unless otherwise agreed in writing by WesternGeco.
- 9.3.1 License pricing will be established to maximize sales for the mutual benefit of National Oil and WesternGeco. Nevertheless, the pricing will be the sole responsibility of WesternGeco.
- 9.3.2 National Oil and WesternGeco shall share the revenue received on sales of licenses to the Survey Data and/ or Data as set out in Appendix 2 of this Agreement.
- 9.3.3 WesternGeco has in place robust accounting systems to track revenues and costs associated with this project and to allow auditing as required by National Oil. National Oil may query any audit reports submitted to it within a period of thirty (30) days upon submission of which inquiry shall be raised formally and a response shall be required to be submitted within fourteen (14) days from the date of acknowledgment. Parties shall endeavor to resolve any disputes arising therefrom amicably within a period of thirty (30) days before opting to explore any other alternative dispute resolution mechanism.
- 9.3.4 License sales will be considered completed only when WesternGeco's bank account specifically for this project has been credited by the Licensee(s). The amounts received, less any tax withholding by Licensees, shall be held by WesternGeco to the credit of National Oil. WesternGeco shall invoice National Oil for its revenue share from each data license as compensation for services provided to National Oil. The amount on WesternGeco's invoices shall be offset against any amounts held by WesternGeco to the credit of National Oil. WesternGeco shall transfer to National Oil the balance of amounts held by WesternGeco to the credit of National Oil (less any tax withholding by Licensees, and the value of WesternGeco's invoices for services provided) on a quarterly basis, in United States Dollars, to the account designated by National Oil on receipt of the letter "Request of Transfer of Funds" from National Oil, as set out in Appendix 8.
- 9.3.5 WesternGeco shall provide the services and activities covered by the scope of this Agreement to National Oil. National Oil warrants and represents that it is a Petroleum Company as defined in the Ninth Schedule of the Kenya Income Tax Act. Therefore the Parties agree that the services performed by WesternGeco shall be subject to Income Tax in Kenya based on Part III of the Ninth Schedule of the Income Tax Act.
- 9.3.6 WesternGeco shall remit to National Oil an amount equivalent to five and six

hundred and twenty five percent (i.e. 5.625%) of WesternGeco's invoices in respect of the withholding tax to be deducted by National Oil from WesternGeco's invoices. Such amounts shall be remitted to National Oil by WesternGeco within seven (7) working days of receiving credit from Licensees.

- 9.3.7 National Oil, shall remit the amounts received from WesternGeco, as specified in sub-article 9.3.6 above, to the Kenya Revenue Authority (KRA) within twenty (20) days following the month in which credit is received from WesternGeco. In addition, National Oil shall provide to WesternGeco a Tax Certificate to evidence the amount of withholding tax remitted to KRA and with WesternGeco as beneficiary. National Oil shall indemnify and protect WesternGeco from and against any tax assessed by KRA (including any penalty and interest charges) due to National Oil's non compliance with the provisions of this sub-article 9.3.7. National Oil represent and warrants that the Services covered by the scope of this Agreement falls within the First Schedule of the Value Added Tax Act No. 35 of 2013. Therefore, WesternGeco will establish its invoices without VAT.

ARTICLE 10 -INDEMNITY

- 10.1 Subject to clause 3.8 of this Agreement, WesternGeco hereby agrees to indemnify and hold National Oil harmless from any loss, expense or liability (including reasonable attorney's fees and related legal expenses), arising out of any claim for damage to WesternGeco's property and/or injuries to or death of WesternGeco's employees, subcontractors and agents under this Agreement, regardless of whether any such loss, liability, injury or death may be caused by negligence, and/or by breach of duty (statutory or otherwise) of National Oil.
- 10.2 National Oil hereby agrees to indemnify and hold WesternGeco harmless from any loss, expense or liability (including reasonable attorney's fees and related legal expenses), arising out of any claim for loss or loss or damage to National Oil's property and/or injuries to or death of National Oil's employees, subcontractors and agents under this Agreement, regardless of whether any such loss, liability, injury or death, may be caused by negligence, and/or by breach of duty (statutory or otherwise) of WesternGeco.
- 10.3 Either Party agrees to indemnify and hold the other Party harmless from any loss, expense or liability (including reasonable attorney's fees and related legal expenses), arising out of any claim presented by third parties for personal injuries or death, or property loss or damage irrespective of the negligence, or breach of duty (statutory or otherwise) of the Party causing the injury, death, or property damage upon which the claim is based.
- 10.4 Subject to clause 3.8 of this Agreement, WesternGeco shall release, defend, indemnify and hold harmless National Oil from any and all claims related to surface pollution (including control and removal thereof) emanating from WesternGeco vessels whilst under its sole custody and control and during the time WesternGeco is engaged in acquiring the Survey .
- 10.5 WesternGeco's sole liability for loss, destruction or damage to the Survey Data or Data while in WesternGeco's possession, shall be limited to, at WesternGeco's election either:
- (i) Re-shooting that portion of the Survey sufficient to reacquire the lost, destroyed or damaged Survey Data (provided WesternGeco has not demobilised from the Area of Operations) or
 - (ii) If the lost, destroyed or damaged Survey Data may be reasonably corrected through reprocessing, recopying, reformatting or reconstituting the Survey Data.

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- 10.6 National Oil and WesternGeco shall not be liable for any special, indirect punitive, incidental or consequential damages (whether or not foreseeable at the date of this Agreement), including, without limitation, loss of profits, loss of production or business interruptions which result in any manner, directly or indirectly, from the performance of this Agreement regardless of the negligence in any form or breach of duty (statutory or otherwise) of any of the Parties.
- 10.7 The indemnities given under the provisions of this Agreement shall extend to the Parties' parent, subsidiary and affiliated companies, their subcontractors and their respective owners, shareholders, joint venturers, directors, officers and employees. In the event that this Agreement is subject to indemnity limitations imposed by any applicable laws, and so long as such limitations are in force, then it is agreed that the above obligations to indemnify are limited to the extent allowed by law.

ARTICLE 11 – WARRANTY

- 11.1 WesternGeco warrants that the Survey Data and the Data will comply with the material aspects of the specifications and other technical requirements of this Agreement and in accordance with industry standards, until demobilisation from the Area of Operations for the Survey Data; and for a period of thirty (30) days after completion of the processing of the Survey Data, for the Data. **WESTERNGECO MAKES NO OTHER WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ANY SURVEY, SURVEY DATA, DATA, SERVICES, TAPES, OR REPORTS, AND DENIES AND NEGATES ANY SUCH WARRANTIES OR REPRESENTATIONS.**
- 11.2 Any interpretation of the Survey Data and/ or Data (whether made directly from geophysical or seismic data provided to or by WesternGeco, or by data processing or otherwise) or interpretation of test or other data, and any recommendations or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional geophysicists or analysts may differ. **ACCORDINGLY, WESTERNGECO AND NATIONAL OIL CANNOT AND DO NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION, RECOMMENDATION OR RESERVOIR DESCRIPTION. UNDER NO CIRCUMSTANCES SHOULD ANY SUCH INTERPRETATION, RECOMMENDATION OR RESERVOIR DESCRIPTION BE RELIED UPON AS THE SOLE BASIS FOR ANY DRILLING, PRODUCTION OR FINANCIAL DECISION OR ANY PROCEDURE TO BE PERFORMED BY THIRD PARTIES.**

ARTICLE 12 – ANTI-CORRUPTION

- 12.1 No officer, employee or agent of either Party shall request, accept or pay, directly or indirectly, any commissions or fees, or grant any rebates to any officer, employee or agent of the other Party, nor favor, or be favored by, any officer, agent or employee of the other Party with gifts or entertainment of significant or substantial cost or value, nor enter into any

business arrangements with employees or officers of the other Party, except as representatives of the Parties respectively.

- 12.2 The Parties shall notify each other promptly of any violation of this Clause 12.
- 12.3 The Parties may audit each other's records relating to this Agreement in the event that such Party reasonably suspects that there has not been compliance with this Clause 12.
- 12.4 Neither Contractor, its Affiliates nor any of their respective personnel will make, directly or indirectly, any offer, payment, gift, promise to pay or authorize any payment of money or anything of value, directly or indirectly, to or for the use or benefit of any official or employee of any Kenyan governmental entity or instrumentality thereof, including any employee of a state-owned company such as National Oil or a national oil and gas company, or to or for the use or benefit of any political party, official or candidate unless such offer, payment, gift, promise or authorisation is lawful under the written laws and regulations of Kenya.

ARTICLE 13—CONFIDENTIALITY

- 13.1 Any and all information furnished by WesternGeco to National Oil, whether in writing or orally, including but not limited to geophysical data, geological data, maps, charts, business plans, financial information, know-how and trade secrets, costing or pricing policies and marketing plans (hereinafter "WesternGeco Confidential Material") shall be confidential and shall be kept and maintained by the National Oil under appropriate safeguards.
- 13.2 National Oil agrees that all WesternGeco Confidential Material will remain WesternGeco's sole property and will not be disclosed to others or used by National Oil for any purpose other than for the performance of this Agreement by National Oil and shall not be used in any manner that is adverse or detrimental to WesternGeco. National Oil further agrees that all WesternGeco Confidential Material in tangible and electronic form (including but not limited to reports, drawings, plans and specifications) shall be returned to WesternGeco upon request.
- 13.3 WesternGeco agrees that all confidential information received from National Oil (hereinafter "National Oil Confidential Information") shall remain National Oil's sole property and will not be disclosed to others or used by WesternGeco for any purpose other than for National Oil's benefit. WesternGeco further agrees that all National Oil Confidential Information in tangible and electronic form (including but not limited to reports, drawings, plans and specifications) shall be returned to National Oil upon request.
- 13.4 The confidentiality obligations shall remain in force during the term of this Agreement, and extend for a further two (2) years from the date of termination or expiry of the Agreement, as the case may be.

ARTICLE 14 – REPRESENTATIVES AND NOTICES

- 14.1 In order to provide for the management and organisation of all matters related to the fulfillment of the present Agreement, the Parties shall appoint authorised representatives to assist to the fulfillment of this Agreement.

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14.2 All notices permitted or required under this agreement shall be sent as follows:

- a. **National Oil Corporation of Kenya**
 AON Minet House
 Mamlaka Road
 Off Nyerere Road
 Postal Address
 P.O. Box 58567
 Nairobi 00200
 Kenya
- b. **Schlumberger Offshore Services Ltd Kenya Branch**
 West End Towers, 1st Floor
 Muthangari Drive, Off Waiyaki Way, Westlands
 Nairobi Kenya
 Postal address:
 P. O. Box 46979-00100
 Nairobi
 With copy to
 Postal address:
 Schlumberger House, Buckingham Gate
 Gatwick Airport, West Sussex, RH6 0NZ
 United Kingdom

All notices, with the exception below, shall be deemed duly delivered to the Parties under this Agreement if such notices are delivered in English via registered mail, hand delivery or electronic transmission, including fax transmission, provided that confirmation of such transmission is received.

However, all notices relating to transfer of funds, or any other directive, relating to National Oil's revenue share shall be delivered to WesternGeco in English via registered mail and shall bear National Oil's official stamp and the signature of the authorising officer and in the form set out in Appendix 8.

ARTICLE 15 – GOVERNING LAW AND DISPUTE RESOLUTION

15.1 This Agreement is made in English and is governed by and construed in accordance with the laws of the Republic of Kenya.

15.2 For any dispute arising out of or in connection with the Agreement, including any question of existence, validity or termination, National Oil and WesternGeco shall first make every effort to reach an amicable settlement by direct negotiation.

15.3 Amicable Settlement

15.3.1 The Parties hereto shall endeavor to amicably and mutually settle any disputes which may arise in connection with this Agreement or interpretation thereof and for that purpose each Party shall select a representative, who shall discuss the matter in dispute and make all reasonable efforts to reach an agreement.

15.3.2 If no agreement is reached under Article 15.3.1 within 30 days of receipt of the letter of dispute, the dispute shall be referred to the Managing Directors or equivalent level of Executive Management of WesternGeco and National Oil.

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15.4. Arbitration

15.4.1. Selection of Arbitrators. In the event that any dispute has not been resolved by the procedures referred to in Article 15.3, then any such dispute, shall be finally and exclusively resolved by arbitration. Each dispute submitted by a Party to arbitration shall be heard by a sole arbitrator or an arbitration panel composed of three arbitrators, in accordance with the following provisions:

15.4.2.1. Where the dispute concerns a technical matter, the Parties shall agree to appoint a sole arbitrator or, failing agreement on the identity of such sole arbitrator within thirty (30) days after receipt by the other Party of the proposal of a name for such an appointment by the Party who initiated the proceedings, either Party may apply to the Chairman for the time being of the Chartered Institute of Arbitrators [Kenya Branch] for a list of not fewer than five nominees and, on receipt of such list, the Parties shall alternately strike names therefrom, and the last remaining nominee on the list shall be the sole arbitrator for the matter in dispute. If the last remaining nominee has not been determined in this manner within sixty (60) days of the date of the list, Chairman for the time being of the Chartered Institute of Arbitrators [Kenya Branch] shall appoint a sole arbitrator for the matter in dispute.

15.4.2.2 Where the dispute concerns a technical matter, National Oil and the WesternGeco shall each appoint one arbitrator, and these two arbitrators shall jointly appoint a third arbitrator, who shall chair the arbitration panel. If the arbitrators named by the Parties do not succeed in appointing a third arbitrator within thirty (30) days after the latter of the two arbitrators named by the Parties has been appointed, the third arbitrator shall, at the request of either Party, be appointed by the Chairman for the time being of the Chartered Institute of Arbitrators [Kenya Branch].

15.4.2.3 If one Party fails to appoint its arbitrator within thirty (30) days after the other Party has appointed its arbitrator, the Party which has named an arbitrator may apply to the Chairman for the time being of the Chartered Institute of Arbitrators [Kenya Branch] to appoint a sole arbitrator for the matter in dispute, and the arbitrator appointed pursuant to such application shall be the sole arbitrator for that dispute.

15.4.2. Rules of Procedure. Except as stated herein, arbitration proceedings shall be conducted in accordance with the rules of procedure for arbitration in the Arbitration Act of 1995 or any subsequent amendment to the Act as in force on the date of this Agreement.

15.4.3 Substitute Arbitrators. If for any reason an arbitrator is unable to perform his function, a substitute shall be appointed in the same manner as the original arbitrator.

15.4.4 Qualifications of Arbitrators. The sole arbitrator or the third arbitrator appointed pursuant to Clause 15.4.2.1 and 15.4.2.3 above shall be an internationally recognised legal or technical expert with extensive experience in relation to the matter in dispute.

15.4.5 Miscellaneous. In any arbitration proceeding hereunder, the arbitration shall take place in Nairobi and the language of the proceedings shall be English. The decision of the sole arbitrator or of a majority of the arbitrators (or of the third arbitrator if there is no such majority) shall be final and binding upon the parties to the fullest

extent permissible by law and shall be enforceable in any court of competent jurisdiction, and the Parties hereby waive any objections to or claims of immunity in respect of such enforcement.

ARTICLE 16 – GENERAL

- 16.1 The Parties will each keep confidential any and all information furnished to it by the other in connection with this Agreement that is identified as confidential or proprietary, except to the extent any such information may be generally available to the public or other third parties, and each Party will instruct their respective officers, employees and other representatives having access to such information of such obligation of confidentiality. Subject to the above, WesternGeco will have no obligation to disclose to National Oil or any other person or entity the substance of any know-how, equations, formulae, procedures, WesternGeco Developed Technology or other information that WesternGeco considers to be proprietary to it and which WesternGeco has used or may have used in connection with the Survey. In the event such information is disclosed to National Oil, National Oil shall treat the same in the strictest confidence in terms of international procedures for the control of proprietary information, and shall not use nor disclose such information to any third party.
- 16.2 All taxes incurred by WesternGeco in its country of incorporation or registration, including stamp duty, and taxes related to the acquisition, processing and marketing of the Survey Data under this Agreement shall be borne by and be the responsibility of WesternGeco. However, in the event that WesternGeco is required to pay any taxes (including but not limited to corporate taxes, property taxes, turnover or sales taxes, withholding taxes, consumption taxes, stamp taxes) outside of its country of incorporation or registration as a result of the services provided pursuant to this Agreement, such taxes shall represent part of the costs of providing the services to be reimbursed and recovered by WesternGeco from license revenues.
- 16.3 Neither Party shall be deemed to be in default of their obligations whilst performance thereof is prevented or delayed by circumstances beyond their reasonable control, including but not limited to floods, fire, earthquakes, and other acts of Nature, as well as military actions and other acts of government, riot, war, strikes, insurrection, civil disturbance or any other circumstances that are beyond the reasonable control of the Parties. Payment obligations due hereunder shall not be subject to force majeure relief.
- 16.4 The rights and obligations under this Agreement may not be assigned in whole or in part by either Party without the written consent of the other Party. Such written consent shall not be unreasonably withheld. WesternGeco may, however, without the consent of National Oil, assign any part of the scope of Work, including but not limited to related services pursuant to clause 5 of this Agreement, to its Affiliates.
- 16.5 WesternGeco is an independent contractor, and shall in its sole discretion choose the means and manner of performance of the services and obligations specified in this Agreement. Nothing in this Agreement shall be construed as creating an employer-employee, agency, partnership, joint venture, trust, or other relationship between WesternGeco and National Oil. Neither Party shall have any authority, express or implied, to enter into any contracts, obligations, or commitments in behalf of or binding on the other Party.
- 16.6 This Agreement constitutes the entire agreement between WesternGeco and National Oil, and supersedes all prior communications, representations, and agreements, either oral or written, with respect to the subject matter hereof.



- 16.7 Should any provision of this Agreement, or a portion thereof, be unenforceable or in conflict with governing national, state, province, or local laws, then the validity of the remaining provisions, and portions thereof, shall not be affected by such unenforceability or conflict, and this Agreement shall be construed as if such provisions, or portion thereof, were not contained herein. Failure of National Oil or WesternGeco to enforce any of the terms and conditions of this Agreement shall not prevent a subsequent enforcement of such terms and conditions or be deemed a waiver of any subsequent breach.

WESTERNGECO
NATIONAL OIL

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APPENDIX I – Acquisition and Processing of Survey Data

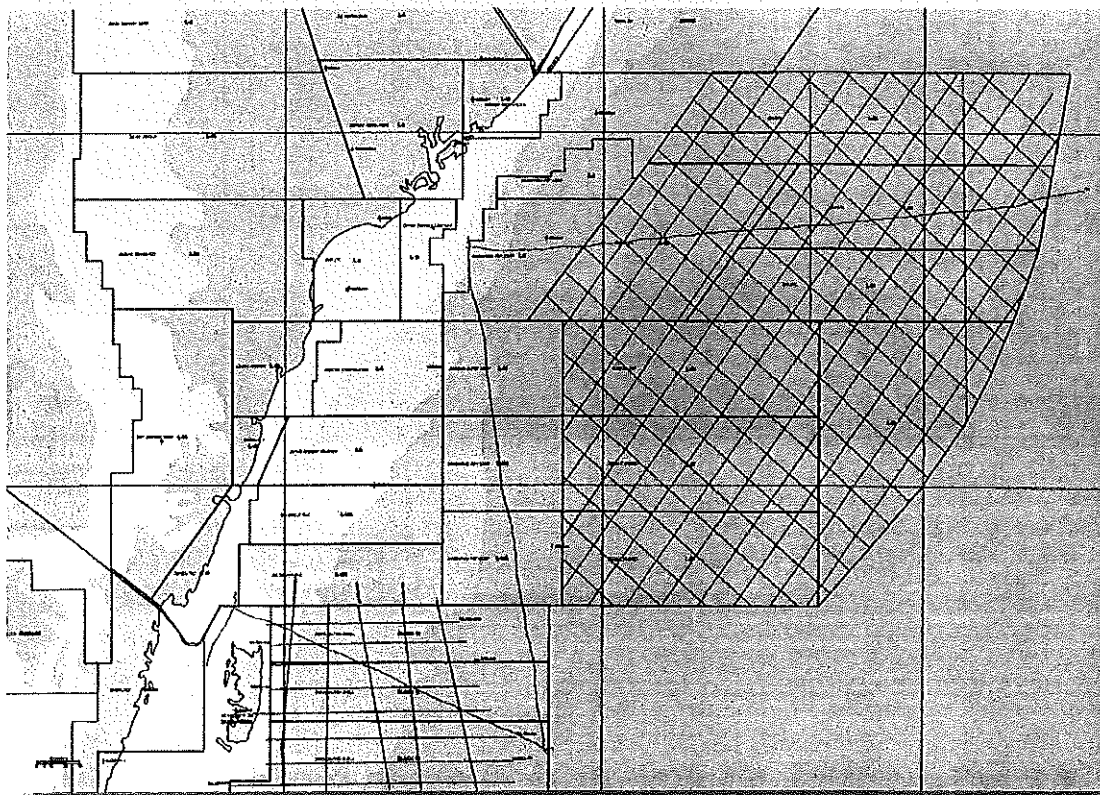
1.1 ACQUISITION AREA

WesternGeco will acquire, process, reprocess and market a non-exclusive Survey in the areas outlined in Map 1 and 2, and using the parameters detailed in this Appendix. Should any part of the Survey be awarded for oil and gas exploration, development or production prior to acquisition of the Survey Data.

MAP 1 - Reviewed and approved by National Oil

Proposed (20km x 20km) 2D survey grid ~ 9,371 line kilometers 2D acquisition and underlying 3D exclusivity area

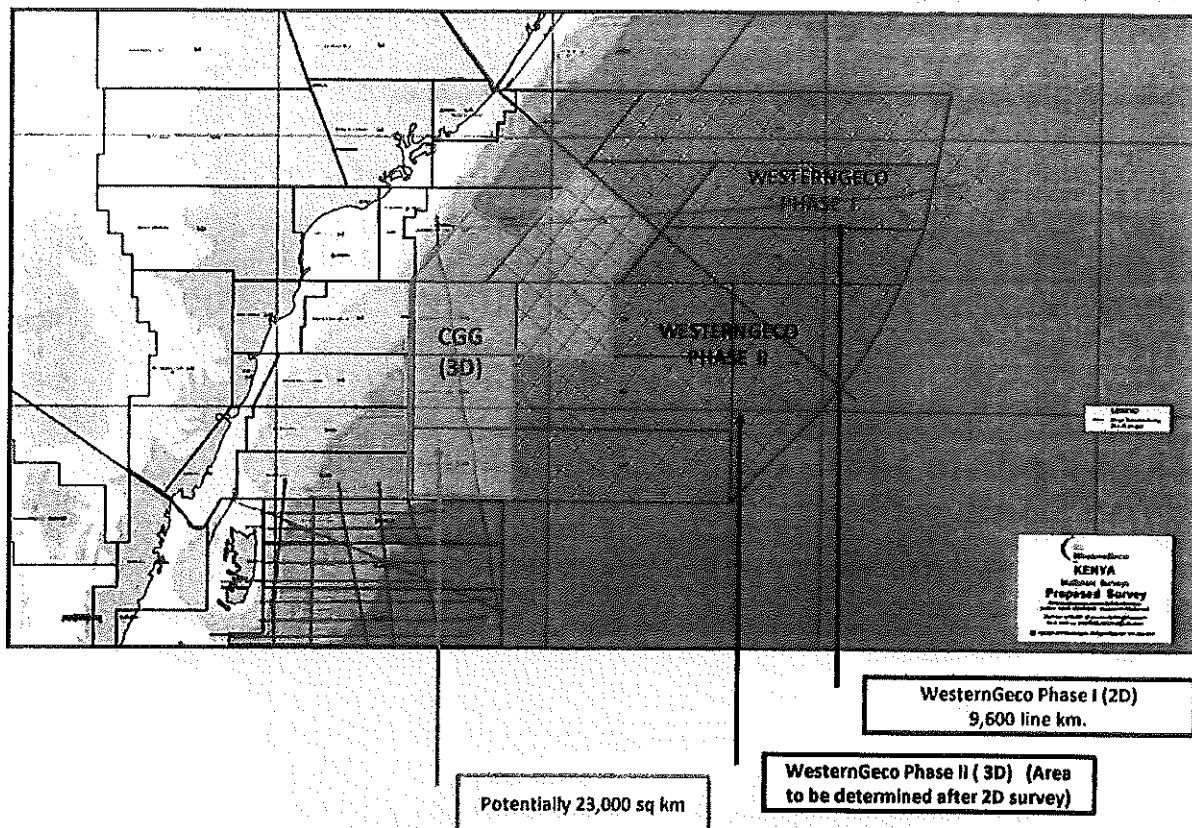
* Survey Grid is subject to amendment by pre-committing companies



Map 2 - Reviewed and approved by National Oil

Proposed (20km x 20km) 2D survey grid ~ 9,400 line kilometers 2D acquisition and underlying 3D exclusivity area, showing 3D that may be acquired by CGG for Anadarko and Total

* Survey Grid is subject to amendment by pre-committing companies



WesternGeco understands and agrees that CGG may be awarded a MC3D seismic acquisition contract by Anadarko and Total over the area set out in Map 2 of Appendix 1. Subject to the award of such contract to CGG and notwithstanding clauses 1.3 and 3.1(b) of the Agreement, and unless agreed otherwise with National Oil, WesternGeco agrees not to carry out any 3D seismic acquisition in the western portion of Block L25 set out in Map 2 until the 1st of September 2014.

In the event CGG is not awarded a MC3D seismic acquisition contract by Anadarko and Total or CGG has not completed the seismic acquisition over the area of Block L25 set out in Map 2 by the 1st of September 2014, WesternGeco's exclusive rights shall extend to the remaining area of Block L 25.

For sake of clarity, WesternGeco's exclusive right of acquiring a 2D seismic acquisition over the area set out in Map 1 of this Appendix shall not be affected by the award of a 3D

seismic acquisition contract to CGG.

DATA ACQUISITION PARAMETERS:

Streamer	1 x 10,000m Q Solid
Streamer Depth	8m to 35m Linear ObliQ
Trace interval	3.125m single sensor
Record length	12 secs
Near offset	125m
Source	Single 5085 cu.in Delta3
Source Depth	6 – 9 – 6 metres
SP interval	25m
Gravity and Magnetics	Included

PROPOSED PROCESSING PARAMETERS:

Read SS raw (3200 channels)
 Nav Merge (PI90 including water depths) @ 2ms
 Trace Edit and QC.
 Enhanced DGF
 Trace decimation to 6.25m
 CMS (shape recorded wavelet to average CMS target signature).
 Resample 2ms to 4ms
 Tau P linear noise attenuation IF NEEDED
 Cascaded AAA
 Single Streamer Deghosting
 Receiver Motion Correction (average boat speed per sail line used)
 Trace decimation to 12.5m Group Interval
 Zero phasing (operator derived from average CMS target)
 2D Surface Multiple Prediction (SMP) using GSMP algorithm
 Trace decimation to 25m Group Interval
 Velocity Analysis at 2km interval.
 Inverse Q compensation (Phase Only).
 WLS Radon Demultiple.
 Diffracted Multiple attenuation (PRIMAL)
 Residual bubble pulse attenuation (if required)
 Time variant filter.
 FXY decon on offset planes (if required).
 Isotropic Kirchhoff PreSTM using 2km smooth velocity field.
 Migration Velocity analysis iteration 1 – 2km interval.
 Isotropic Kirchhoff PreSTM with smoothed 2km migration velocity field.
 Migration Velocity analysis iteration 2 – 1km VP and 2km interval eta.
 Full Kirchhoff Anisotropic PreSTM.
 Post Migration WLS Radon Demultiple
 Dense Spatially Continuous Velocity Analysis (SCVA)
 Full offset and AVO angle stack
 Inverse Q compensation (amplitude only)
 Gun and cable static correction
 Time Variant Filter

The processes/algorithms proposed in the above sequence have been chosen in the light of WesternGeco's extensive experience in East Africa. However, the final processes and parameters chosen will be subject to testing and the response of the Survey Data. WesternGeco reserves the right to make the necessary decisions to adjust or modify the

sequence for optimal results and fulfill the survey objectives.

Security during acquisition

From the Effective Date and throughout the term of the Acquisition Work, WesternGeco shall supply, in a permanent and continuous manner, if required, Security.

National Oil acknowledges that Security levels in or near the Survey Area/Country of Operation may be dynamic and shall be revised or reviewed by WesternGeco as circumstances dictate and based on significant political events or any other events that change the overall Security level within the Survey Area/ Country of Operation during the term of this Agreement. For the avoidance of doubt, any costs whatsoever and howsoever associated with ensuring adequate Security for WesternGeco personnel and equipment, shall be added to the Survey costs. "Security" shall mean a condition that results from the establishment and maintenance of protective measures that ensure a state of inviolability from hostile acts or influences. These hostile acts or influences shall include, but not necessarily be limited to, any acts or actions of a civil or criminal nature such as terrorism, murder, assault, mugging, theft, blackmail, extortion, threats of any nature, car high-jacking, kidnapping, piracy, civil insurrection or civil war occurring in or in proximity to the Survey Area/ Country of Operation, and shall further include specific safety risks such as unexploded ordnance, chemical, biological or radioactive contamination.

APPENDIX 2 – Licensing Fees and Revenue Share

1.0 Service Credit for Provision of Services

- 1.1 The revenue share to be paid to National Oil shall be made after WesternGeco has recovered all costs incurred in the provision of services, as set out in Appendices 3 to 6. The items included in the cost recovery for this project shall include but not be limited to costs associated with mobilisation, data acquisition, data processing, survey security, interpretation, marketing and training of National Oil staff. The final amount will be calculated on completion of data acquisition.

Any additional services, requested by National Oil and which are not included in this Agreement or any increase in the level of investment made by WesternGeco hereunder, shall be billed to National Oil accordingly. Payment of such services shall be set off from National Oil's revenue share.

For the avoidance of doubt, such additional services shall always be subject to the availability of sufficient funding.

2.0 Licensing Fees

- 2.1 In order to encourage companies into early participation in the Survey, there will be a reduction in the basic license fee for those companies pre-committing before a specified date.
- 2.2 The basic license fees are for a single company licensing the Survey Data, and if a bona fide bidding group licenses the Survey Data, an escalation factor of 50% per additional partner will apply in addition to the basic license fee.
- 2.3 Reproduction of tape datasets or seismic sections will be in addition to the basic licensing fees and will be quoted at WesternGeco's standard rates for the products required.

3.0 Survey Costs

Survey Volume:	9,400 Km approx.
New Acquisition and Processing:	2,000 US\$/Km
Total Survey Costs: (Cost x I)	18,800.00 USDollars

The Survey shall be acquired if WesternGeco has secured sufficient industry Pre-Commitment. For the 2D acquisition, sufficient industry Pre-Commitment is defined as 35% of the total Survey cost as defined above.

4.0 Licensing Revenue Share

4.1 New Survey Revenue Share

Revenue derived from or associated with the purchase by oil companies or groups of oil companies of licenses to the Survey Data shall be divided between National Oil and WesternGeco in accordance with the following revenue sharing schedule and only after the costs incurred by WesternGeco in accordance with Appendices 3-6 are fully recovered:

<u>Tier</u>	<u>US \$</u>	<u>WesternGeco%</u>	<u>National Oil%</u>
First	\$1 to COST x1	90	10
Second	>COSTx1 to COSTx2	67	33
Third	>COSTx2	50	50

Where first Tier represents license revenue from; US \$1 up to and including one times the cost of the Survey (COST);

Where second Tier represents license revenue from; greater than one time COST to twotimes Survey COST; and

Where third Tier represents license revenue from; greater than twotimes Survey COST.

4.2 **Reprocessing Revenue Share**

Where the Parties agree to reprocess the Survey Data, such reprocessing shall be undertaken at National Oil's data processing centre which will be established in Nairobi, subject to the availability of processing capacity. The costs of reprocessing the Data and associated marketing costs of the reprocessed data, Reprocessing Costs ("RC"), shall be agreed by the Parties and revenue derived from or associated with the purchase by oil companies or groups of oil companies of licenses to the reprocessed Survey Data shall be divided between National Oil and WesternGeco in accordance with each Party's investment in the RC.

4.3 Each Party shall receive 100% of the revenues from tape copying and reproduction carried out at their respective processing centres.

4.4 The Survey Cost recovery and revenue share configuration shall strictly relate to the volume of Survey Data and Data actually collected and/or reprocessed. The above income share is based on the approximate number of kilometers proposed for both new acquisition and processing in addition to reprocessed Public Domain Data. Adjustments will be made after completion of the Survey.

APPENDIX 3 – Geology and Interpretation Collaboration

INTERPRETATION

WesternGeco will undertake an interpretation of the 2D seismic data. The proposed interpretation scheme is likely to follow the work flow detailed below, although may be subject to variation as the data analysis progresses.

- A full structural and stratigraphic interpretation of legacy 2D/3D and newly acquired 2D/3D data on a Petrel platform, which will include:
 - Load all regional satellite gravity and magnetic data and integrate with seismic
 - Digitize all well data, create synthetics and calibrate to seismic
 - Create tectonic maps, isopach maps, isochron maps
 - Use seismic attributes to determine sand and shale fairways
 - Use attributes to identify DHI's
- Horizon and fault interpretation and mapping of multiclient 2D surveys
- Seismic stratigraphic interpretation, seismic attributes analysis and integration with AVO results
- Create a Depth Structural Framework model of the Kenya offshore basin (using the MWI - modelling while interpreting approach)
- Undertake gravity and magnetic modelling to pick basement

In conjunction with the interpretation work, WesternGeco will undertake training in Nairobi on Petrel for two technical staff from National Oil and two from the Ministry of Energy and then build on this with progress meetings in UK to review the data and interpretation results.

INVERSION

WesternGeco will also create Seismic AVO attributes to include:

- AVO intercept (P) and gradient (G) stacks
- Intercept and gradient stacks are qualitatively used to indicate fluid and lithology anomalies.
- P*G stacks
- This combination of intercept and gradient stacks is a good gas indicator. Gas is the only fluid that will show a positive anomaly on the P*G stack.
- Normal Incidence (NI) x Poisson's Ratio Contrast (PRC) stacks
- NI*PRC stacks are used for reconnaissance AVO. They allow the interpretation of potential hydrocarbon filled sands in the reservoir.
- Fluid stacks
- Projection stacks are produced to highlight the differences between fluid and lithology, to help identify hydrocarbon plays

In conjunction with the inversion work, WesternGeco will undertake training in Nairobi on the relevant Petrel modules for two technical staff from National Oil and two from the Ministry of Energy and then build on this with progress meetings in UK to review the data and inversion results.

PETROLEUM SYSTEMS MODELLING

- The available data is to be integrated into an initial data model that includes the key elements of the petroleum system. Together with National Oil a review of all available data is to be made in order to possibly expand the existing data base.
- With this data model, an initial assessment of potential kitchen areas and hydrocarbon generation timing, as well as of potential regional petroleum migration directions and drainage areas and their evolution through geologic time is to be made. The 3D PSM will provide key information needed to more completely understand the petroleum

system(s) in the study area and will be fully scalable from basin to high-resolution prospect scale analyses.

- A clear focus will be made on the hydrocarbon quality prediction, i.e. delineate areas that are more likely to be gas- or oil-prone.

In conjunction with the Petroleum Systems Modelling, WesternGeco will undertake Petromod software training in Nairobi for 1 week for two technical staff, one from National Oil and one from the Ministry of Energy and then build on this with progress meetings and practical sessions using Kenyan data in Schlumberger's Centre of Excellence for Petroleum Systems Modelling in Aachen, Germany.

This phase is included in the Project Cost as quoted in Appendix 2.

APPENDIX 4 – Provision of National Data Centre

National Data Center Scope Overview

The Schlumberger NDC Solution comprises ProSourceDataStore software, server infrastructure and implementation project, plus the provision of additional discretionary data management services. Schlumberger's NDC solution for National Oil utilizes the same proven technology and service capability that delivers NDC solutions to a global client base. The proposed National Oil solution would be the same technical solution in terms of functionality and capability as that deployed for the UK. The UK NDC solution is now seen as the industry leader in terms of NDC capability.

Schlumberger ProSource application is sustained by an extensive and long-term development road map. The technology stack proposed for National Oil has been in place for the UKCS NDR for the CDA Well DataStore since June 2006 and has been extremely well received by the industry and fully embraced by the user community. The unique self-service and automated workflow features have contributed towards a significant member and data growth. Kenya NDC users will utilise the DataStore collection with entitled access dependent upon their role.

Some of the key features of Schlumberger's solution are identified below:

- online portal to facilitate improved access and download of all data
- access to a single unified well, seismic, cultural and geographical data store of Kenya's E&P assets
- business process automation for data submissions and data release
- optimal tool to promote increased data completeness and improved data quality
- open systems technology and data standards
- direct delivery of interpretation ready project data
- enhance application and data security that can restrict visibility and access to data according to data release or data entitlement

The benefits delivered include increased productivity for an already limited, time constrained resource base and rapid access to quality assured Kenyan E&P data. We also anticipate a quicker response to interest in licensing for clients resulting in faster decision making, and subsequent auditable regulatory compliance.

The implementation project has been scoped to deliver a fully configured system within five months.

The implementation project is designed to deliver the following benefits:

- Knowledge transfer and building local capability within National Oil
- Provide a sustainable long term solution
- A foundation from which to offer expanded NDC services in the future
- Ensure the preservation of the existing National Oil data assets
- Develop online enabled workflows to be made available to National Oil and the operators as required

The implementation project includes the first year's software maintenance and support for five concurrent users. After the first 12 months, application and associated support services are charged through a monthly service charge related to the number of concurrent users and the

ProSourceDataStore domain modules utilized. Additional discretionary Data management services will be charged according to published day rates at the date such services are requested.

Published day rates for Data Management Services (valid for October, 2013) are as follows:	
Expertise Level	Rates
1	\$1,850
2	\$2,150
3	\$2,350
4	\$3,250
5	\$4,100

The National Data Center is intended as a foundation which could be extended in the future with the phased implementation of new functionality and services, subject to the availability of funding.

ProSourceDataStore Application

The ProSourceDataStore solution utilises Schlumberger's ProSource software suite to manage and store E&P data together with a web enabled browser based user interface.

ProSourceSuite

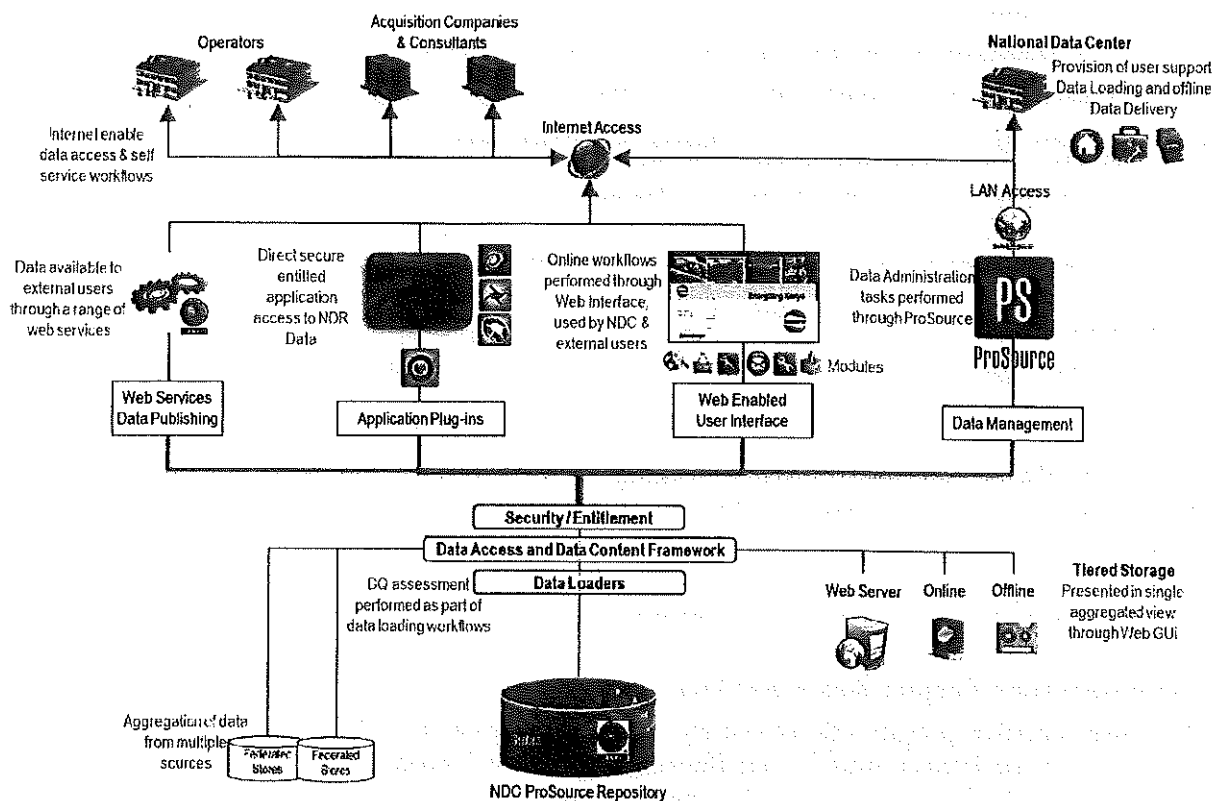
The ProSource suite comprises an Oracle database, ESRI ArcGIS software and ProSource data management application. There are no geographical constraints on the data stored and national, regional or global datasets can be managed. The base ProSourceDataStore database configurations provide storage for a wide range of E&P data types including:

- Well Data,
- Seismic Data,
- Physical Data Catalogues
- GIS information

For all data types Meta information can be stored in the Seabed database along with storage of Original format information including Well Logs, Seismic trace, Seismic navigation data, data files and documents.

Web Enabled User Interface

The ProSourceDataStore Web user interface consists of a number of *iTab* modules; the modules may be specifically configured during the initial implementation phase to incorporate client specific business rules and data requirements. The ProSource Data Store interface enables self-service management of Digital Documents, Data Files, Data Catalogues, Well Information and Seismic information via a LAN or Internet connections. Data entitlements allow the application to be made available to internal National Oil users or external users as required.



There are three ProSourceDataStore domain modules

- **Archive**

The base Archive functionality includes forms, data tree and GIS search and display capability. All data is available to download through excel/ascii export or download of data files through the Shopping basket functionality. GIS capability is available to visualize the data. Document data and report files can be uploaded and viewed through the web enabled user interface.

ProSourceDataStore/Tab Modules

- My Wells
- My Seismic
- Licences
- Data Entitlements
- Data Inventory and Completeness
- Data Feedback
- Shopping Basket
- Data Transmittals
- Data Ordering
- User Management

Well Log data and Seismic trace data is held only as data catalogs, associated to the well or seismic survey with reference to the physical media. The Well and seismic data files are not scanned and loaded to the Seabed database.

- **Well Log data**

Well Log data provides incremental functionality in addition to the base Archive capability. It can be utilized separately to or in conjunction with the Seismic Data functionality.

The Well Log Data functionality enables the storage of well log data at the curve level. A Well log viewer is available in the interface to visualize the data.

This functionality is delivered in the initial National Oil NDC implementation.

- **Seismic Data**

Seismic Data provides incremental functionality in addition to the base Archive capability. It can be utilized separately to or in conjunction with the Well Log data functionality.

The Seismic Data functionality enables the storage of Field, Pre and Post Stack Seismic trace data. Data can be held online, near-line or offline as required. SEG-Y viewing capability is available and data can be displayed spatially on the GIS application.

This functionality is delivered in the initial National Oil NDC implementation.

Implementation Project Scope and Deliverables

The implementation project will include the following activities and deliverable. Each item will be fully scoped in the Project Initiation and Planning stage and will be described in the Project Initiation Document. It is estimated that the implementation project will be delivered in a five month period.

Stage 1 - Project Initiation and Planning

- **Data assessment and data preparation**

A data assessment and review will be undertaken for all in scope data items. Data mapping will be produced to enable migration scripts and processes will be produced to perform the data migration.

- **Project scoping and project planning**

Project Initiation Document will be produced that will include, a project plan, project scope and deliverables, project risks, communication plan, data security and acceptance plan.

Stage 2 - Infrastructure Commissioning

The National Oil NDC application will be supplied on a single preconfigured server. The procurement, set-up and configuration location of the server will be mutually agreed to during the Project Initiation and Planning stage. The server will be sized initially to support up to 20 concurrent users. Further expansion would be possible with upgrades to the infrastructure.

The server is supplied with the following licences to deliver the required NDC functionality: OS licences, Oracle licences, VMware licence and all SIS ProSource licences. As detailed in Section 3, a service charge covering maintenance and support for the software components is included for the first year. The service charge for subsequent years is provided on a per user model and is detailed in the Summary Schedule.

It is assumed that the ESRI ArcGIS Server component will utilise the existing National Oil ESRI licence.

Prior to the availability of the production infrastructure a UK hosted version of the application will be made available. This system will allow National Oil users to access the workflows and familiarise themselves with the functionality. This infrastructure will be available throughout the implementation project as a separate test environment.

Stage 3 - Knowledge Transfer

This phase will ensure that National Oil staff receive training in the use of the system and also in best practices for the management and organisation data within the system. A total of 40 days for training and knowledge transfer will be provided in National Oil's offices in Nairobi. The user and support documentation including documented work instructions will allow National Oil to support and manage the system when the system becomes operational at the completion of the implementation project. The key deliverables of the stage will be:

- **National Oil user training and user documentation**
The user training and documentation will be tailored to the National Oil environment and will be a combination of individual training and group training sessions. The training will be scheduled throughout the implementation project.
- **System Administration training and documentation**
The system administration training and documentation will cover the HW and SW environment as deployed in National Oil. It will cover the software components that comprise the solution including ProSource, Oracle and ESRI. The training will be scheduled after the infrastructure has been deployed within the National Oil offices.
- **Documented support process and work instructions for the key workflows**
- **Data Standards, Business Rules and Regulations**

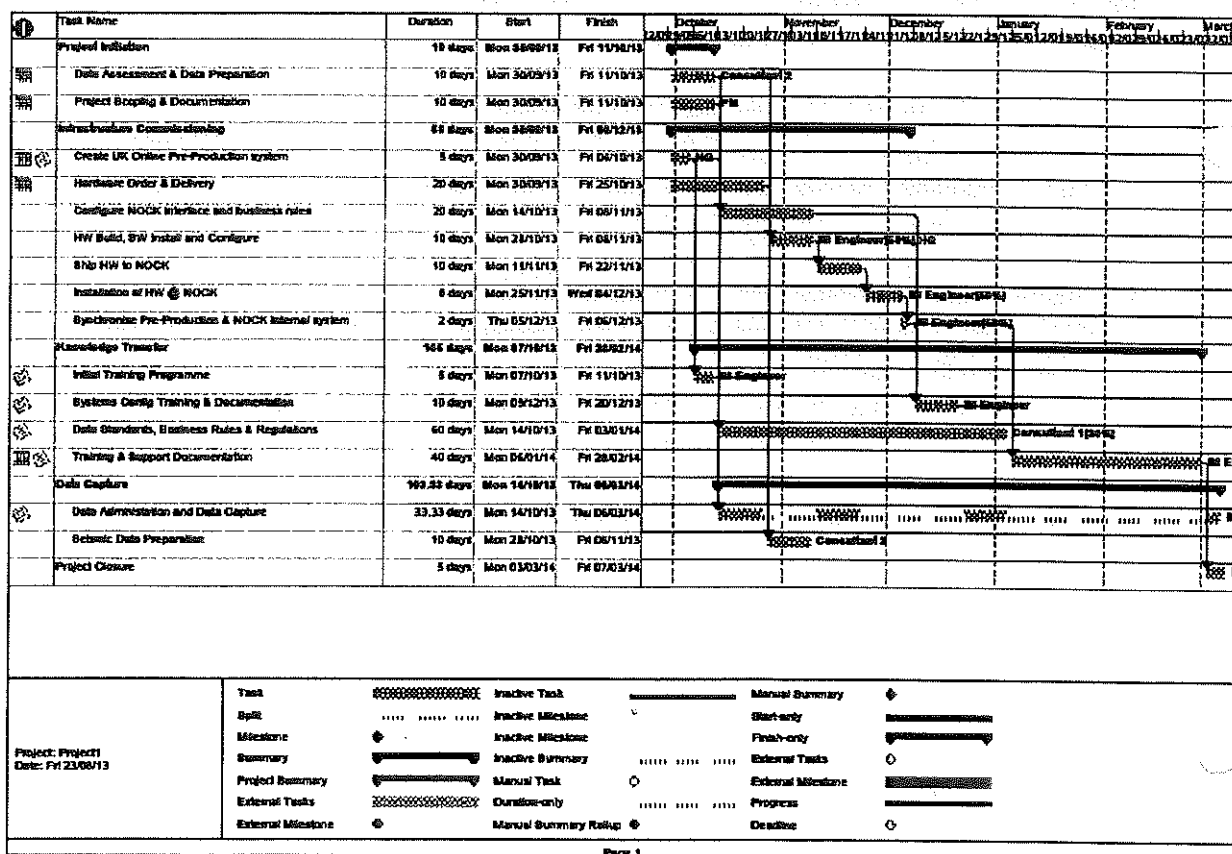
In addition to the training and knowledge transfer, consultancy will also be provided to help National Oil define and publish data standards and a framework for operator and licensee interaction with the Kenya NDC comprises Petroleum regulations and published processes and best practices that are consistent with the published Petroleum regulations.

A total of 20 days consultancy will be provided. A detailed plan for the scope and deliverables will be agreed with National Oil during the project planning and Initiation phase. Scheduling of the activities will be agreed with National Oil and can be delivered throughout the implementation project.

Stage 4 - Data Capture

- **Data Administration and Data capture**
- **Seismic Data Preparation**
- **Load all initial data types (including defined loading process for each of the data types)**
 - **Well Header**
 - Well Log data
 - Documents, reports and data files, held as scanned images or original format files

- Seismic Data
 - Survey Header
 - Seismic navigation data to enable spatial analysis and display of the data
 - Seismic Data catalogue for data products and trace data stored on tape media
 - Documents, reports and data files, held as scanned images or original format files
- Licence Information
 - Licence header, Licence equity and Licence history
 - Licence coordinates would be loaded to enable GIS display of the data
- Documents and reports
 - Reports and documents associated to basins, fields and licences
- GIS Information and cultural data
- Data entitlements



Costs

Implementation

The Schlumberger NDC implementation project comprises, ProSourceDataStore software, server infrastructure and implementation effort.

The implementation project includes the first year's software maintenance and support for five concurrent users. After the first 12 months, application and associated support services are charged through a monthly service charge related to the number of concurrent users and the ProSourceDataStore domain modules utilized.

BA

The annual service charge provides a cost effective alternative to a software purchase and annual maintenance model. The service charge also provides support and maintenance for the National Oil specific configuration and ensures its compatibility with future SIS software releases. The service charge entitles National Oil to gain access to new functionality that is developed for the domain modules utilized.

Description	Total
Implementation Project	\$ 525,000

This cost includes the provision of the server and associated licenses as described under Stage 2. If a suitable server and associated licenses can be provided by National Oil under a separate procurement process consistent with the time frame for construction of the NDC, these costs will be reduced appropriately.

Service Charges

The monthly service charges relate to the maximum number of concurrent users with access to the ProSourceDataStore web enabled interface. A minimum price of 5 users applies in the banding of choice. The customer can purchase any amount of additional users up to a maximum of 40 concurrent users with 1 months' notice and similarly reduce the number of users with the same notice. It is not possible to reduce the number of users below the minimum 5 user threshold.

It is also not possible to mix the bandings such that a customer has 5 Archive users and 1 Archive and Logs. All users must be in the banding that contains the increased functionality.

The first year service charge for 5 users with archive and log access is included within the implementation project.

Description	Total Per User
Archive only	\$ 8,100
Archive and Logs	\$ 13,500
Archive and Seismic	\$ 13,500
Enterprise solution (Logs and Seismic)	\$ 18,900

Table 1. Annual Per User Charge

Contract Termination

ProSource stores the data in an open, standards based solution which where required stores data in original data formats. If at any time following the first year after implementation National Oil wish to terminate the ongoing support for the National Data Center Schlumberger shall provide the data in optimal data formats to facilitate the transition to the replacement solution. Schlumberger will provide:

- Database exports of the tables used to hold data for the Customer ProSourceDataStore

- If applicable, copies of the Digital Document data, Tape Image Files, Seismic Trace data and Seismic navigation written to a disk device, and a translation spreadsheet to cross reference the database export and the data provided on the disk device.

This work will be undertaken on the same basis as the Discretionary Data Management Services using the valid Manpower Rates at the time of the termination.

Terms and Conditions of Software, Hardware and Services

The National Data Center (NDC) software and related services proposed shall be governed by the Terms and Conditions in the National Oil Corporation Kenya and Schlumberger Master Agreement OSJ035, dated 10 August 2013 and valid until 10 August 2016.

APPENDIX 5 – Provision of Data Processing Centre

Seismic Data Processing Technology Transfer Program

The seismic data processing technology transfer program includes training services, software and hardware products. This is to enable National Oil to develop local expertise in seismic data processing and to gain access to the latest software/hardware technology in the industry. The scope of work presented here is considered as an initial design with options for future expandability.

I. Processing System Overview

The processing system is inclusive of hardware equipment and software licenses to enable the National Oil seismic processing team to handle 2D/3D seismic processing in the time domain. This system is an initial design of a high end processing centre with scalable and expandable options to serve a larger community of end users, bigger volumes of data and further computation power in future.

The following assumptions have been made:

1. The initial design of hardware/software (system) would serve 1 to 4 concurrent users undertaking 2D/3D Time Processing with computation power up to 60 CPU cores.
2. The system will be located in a computer room at National Oil's centre with reasonably controlled room temperature and stable electricity supply, accessible to end users via the National Oil IT network.
3. The processing end users will have their standard computers to connect to the system through the National Oil internal network and therefore standard computers are NOT included in this scope of work. If National Oil require additional standard computers these items can be procured locally and will be at National Oil's cost.

Omega Software

The Omega seismic processing system is unequalled in the industry. No other software package offers the breadth and depth of capabilities for solving today's geophysical challenges. Omega is flexible, offers a scalable system that allows for processing and imaging on a single workstation or massive compute clusters, from a single 2D line to an immense 3D seismic survey.

Omega accurately and efficiently processes:

- Land, Marine and transition zone data
- Time and Depth data
- 2D, 3D and 4D surveys
- Isotropic & Anisotropic (TTI and VTI) velocity fields
- Multicomponent Data
- Reservoir to basin-scale projects

The software is divided into modules to meet the differing needs of all companies and individuals: Foundation, Time, Depth, Advanced, and a Developers Kit. Within these Modules will be different Applications, System Codes, and Seismic Function Modules (SFM's)

Foundation Module

The basic QA/QC package includes all Omega infrastructure components and desktop applications plus algorithms for input/output and basic QC and analysis.

Time Module

A versatile package built on top of the foundation package. Includes a wide array of geophysical algorithms that allow for signal processing, geometry, statics, velocity analysis and picking, demultiple

work, multicomponent processing and time migrations. Time package allows for pre- and post-stack 2D and 3D migrations, including Kirchhoff, Finite Difference and Stolt algorithms.

Omega Hardware

National Oil will be provided with the best possible Omega SPS user experience. WesternGeco will thoroughly test various hardware components for compatibility with Omega to determine the best options for use in an Omega Seismic Processing System.

Size of system	1 rack	120 x 60 x 200 cm (dxwxh)
Weight of system	1000kg	max
Environment conditions	Floor load	710kg/sqm max
Electricity supply	4 x 16Amp	single phase from separate power breakers

Omega software maintenance

Support for Omega seismic data-processing software is available online to customers via the Schlumberger Support Portal.

The Portal is a single online location for all petrotechnical user support needs. It provides access to assisted support resources and such self-help resources as technical documentation and discussion forums.

The software customers have access to

- release documents: installation guides, release notes, release announcements
- technical documents: quick reference guides, newsletter articles, knowledge-based articles
- workflows: Omega software seismic processing workflows
- software downloads: patches
- community resources: events, discussion forums
- new content alerts: RSS feeds, news alert subscriptions, forum subscriptions.

The Support Portal provides rapid access to expert answers 24/7.

The Schlumberger Support Portal is available at <https://support.slb.com>.

2. Processing Training Overview

The proposed training program is designed to provide an introduction to basic processing and acquisition and Omega fundamental, 3D time processing and IT administration.

This scope of work makes the following assumptions:

1. The end users are graduates or have a relevant background in geophysics and WesternGeco will provide 5 day theoretical and 10 day practical courses in 2D and 3D Marine Time Processing in Nairobi.
2. The National Oil IT team are reasonably experienced in Linux and Oracle and WesternGeco will provide a 5 day Omega admin course in Nairobi.
3. National Oil will provide computers and screens in proximity to and networked with the co-located processing system for a maximum of 4 attendees in each session for the above courses.
4. The course will be taught in English and all course materials will be in the English language.
5. Course notes in English will be provided. All the courses are copyrighted and duplication of course material is forbidden without written permission from Schlumberger.
6. All transportation and living costs (hotel, meals, laundry, transportation costs, etc) for the instructors will be the Schlumberger responsibility.
7. Meals and Transportation for Participants: All transportation and living costs (flights, hotel, meals, laundry, airport transportation costs, etc.) for the participants will be the responsibility of NOCK.
8. WesternGeco will ensure that all programs and work sessions are performed in a safe and secure manner, with all Safety and Security aspects taken into consideration when the participants are under the responsibility of WesternGeco. However all indemnities will be the responsibility of NOCK.

Initial Workshop

A one day scoping and high level planning exercise in the form of a workshop will be held. The purpose of this Workshop is to bring together National Oil and WesternGeco stakeholders in a group exercise to achieve the following:

- Assess the current state, opportunity, and risks
- Capture challenges, priorities and constraints which will have an impact on scope, project schedule and what opportunities are realistically achievable
- Plan the rollout on paper
- Conclude and set out next steps

Proposed Training Courses

Course 1: Fundamentals of Seismic Acquisition and Processing

Duration: 5 Days

Location: Nairobi

Day 1

- Introduction - Interpreting Seismic Data – Issues & Concerns
- Basic Concepts of Seismic Surveying
- Seismic Wave Propagation - Refraction, Diffraction, Reflection and seismic velocities
- Seismic Reflection Principles
- Properties of seismic waveforms

Day 2

- Seismic Reflection Principles - Properties of Seismic waveforms and traces - Vertical resolution - Lateral resolution Amplitude effects

- Field Data Acquisition Principles - Types of Seismic Data Acquisition – Marine – Land – Borehole – OBC – TimeLapse – Signal and Noise – Field Array Design
- Day 3**
- Land Acquisition Systems and Operations - Sources – Sensors – Recording the Data
 - Marine Acquisition Systems and Operations - Overall Layout – Sources – Receivers – Environmental considerations.
- Day 4**
- Signal Analysis - Aliasing , both spatial and temporal - Convolution, correlation and autocorrelation - Fourier analysis - Frequency / Wavenumber – FK transform - Radon transform
 - Data Conditioning
 - Near-Surface Distortion Correction
 - Wavelet Shaping
 - Noise Attenuation
 - Multiple Attenuation
 - Regularization
- Day 5**
- Imaging
 - Velocity Model Estimation
 - Imaging Methods
 - Prestack Amplitude Analysis
 - Survey Design Objectives and Considerations – CMP – 3D Surveying – Survey Calculations –Migration – Artifacts and Footprints

Course 2: Fundamentals of Omega

Prerequisites:

No previous processing knowledge is required.

The course covers a few simple geophysical concepts but focuses mainly on the use of the Omega Desktop.

Duration: 5 Days

Location: Nairobi

Learning Objective:

At the end of this class, students will have the necessary knowledge to be able to use the Omega Desktop applications to create a project and run a range of workflows, from data input and QC, data analysis and production processing. This includes:

- Create an Omega project
- Manage & organise seismic data and meta-data
- Submit jobs
- Monitor jobs
- Create and run basic seismic processing flows
- View and analyse seismic data
- Manage system resources

This course, when taken in conjunction with the applicable Practical processing class, will position the student to be able to undertake processing projects as member of a production processing team.

Course 3: Practical Time Processing Marine

Prerequisites:

An understanding of the concepts underlying seismic data processing and common data processing challenges. Students without any prior knowledge of Omega must have taken the Fundamentals of Omega class before enrolling for this class.

Duration: 10 Days

Location: Nairobi

Learning Objective:

At the end of this class students will be have the skills needed to be a contributing member of a production processing team. These skills will cover common workflows involved in processing a 3D dataset from raw data to a final time image:

- Perform parameter testing from example flows
- Convert and execute as production flows
- Create and pick velocity analyses
- Identify and carry out appropriate QC

Course 4: Omega IT On-the-job Course**Prerequisites:**

Students should be experienced with the linux operating system and be able to run command line functions.

Duration: 5 Days**Location: Nairobi****Learning objectives:**

At the end of the course students will understand and be able to undertake the following:

- Installation, update, or removal of Omega versions and services
- The components of an Omega installation and how they relate to each other
- The routine tasks carried out by Omega administrators

3. Costs

Processing System

Item	Hardware Equipment	Software Licenses
1	Omega Cluster Module server	8 Core Server Infrastructure
2	Omega Project Module server	8 Core Server Infrastructure
3	Omega Disk server	6 Core Server Infrastructure
4	30Tb disk (external enclosure)	N/A
5	Omega Tape server (with fibre card)	6 Core Server Infrastructure
6	Tape drive 3592 TD (includes chassis)	N/A
7	Rack / PDU	N/A
8	Network	N/A
9	3 Omega Batch Processing Nodes	60 Core Time Batch Processing
10	HW Not included (locally procured if needed)	4 User Interactive Processing

Item	Net Price
Omega software licenses purchase price	\$130,914
Omega hardware equipment purchase price	\$90,510
Omega software licenses annual maintenance	\$26,183
TOTAL	\$247,607

Processing Training

Item	Course	Theme	# Days	# Attendees	Price
1	Seismic Acquisition and Processing	Theoretical	5	up to 15	\$ 38,000
2	Omega Fundamental	Software Practical	5	4	\$ 15,000
3	Omega Marine Time Processing	Software Practical	10	4	\$ 30,000
4	Omega Admin Course	IT Practical	5	4	\$ 15,000
TOTAL - Training Courses					\$ 98,000

4. General

Delivery time

The system will be delivered 3 months from receiving written authorisation from National Oil.

Delivery term

Prices exclude shipping charges. Products will be shipped FOB point of origin. Title to Products will pass to National Oil in the country of origin. Shipping charges and cost of procuring insurance, will be recharged to National Oil's account. National Oil will assume all risks of loss upon WesternGeco's delivery to the carrier.

Training Cancellation Fees

Once the course has been confirmed by written instruction, should National Oil cancel the session, there will be no cancellation fees as long as the cancellation notice is more than 30 days prior to the start date of the program. National Oil shall pay the below fees for cancellations if less than 30 days' notice:

50% of the fee if a class/workshop is cancelled with 8 - 30 calendar days' notice before the scheduled start date of the class/workshop

100% of the fee if a class/workshop is cancelled with 7 calendar days or less notice before the scheduled start date of the class/workshop

In the event of a cancellation with less than 30 days' notice, National Oil will also be responsible for any non-refundable travel expenses incurred by WesternGeco.

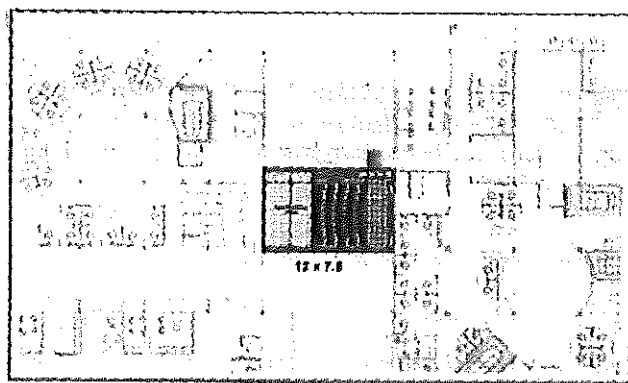
Terms and Conditions for Software, Hardware, Services and Training

The Seismic Data Processing Technology Transfer Program hardware, software and related services proposed shall be governed by the Terms and Conditions in the National Oil Corporation Kenya and Schlumberger Master Agreement OSJ035, dated 10 August 2013 and valid until 10 August 2016

APPENDIX 6 – Collaboration and Visualisation Centre

Project Description and Background

National Oil is constructing a brand new National Data Centre in Nairobi consisting of Core storage and viewing, planned laboratories for interpretation and analyzing. On the First Floor will be a large Visualization Centre, seen as one of the main hub/attractions of the Petroleum Centre. Schlumberger will design and equip the Visualization Centre and take full advantage of the space available, using the latest technology available to best match National Oil's requirements and needs.



During the planning stage of Building construction an area had been allocated for the Visualization centre, currently shown on the plan above but National Oil do have an option to include the adjacent area labeled as "Processing Office Area" as well.

This would result in a total floor space should measure 12 x 7.5 metres and would open up opportunities for rear projection.

The ultimate Visualization Centre requirements are as follows:

- Regional centre of excellence
- Facilitate cross departmental activities
- Improve geological data quality
- Enabler for better decisions to be made collectively and faster
- Increase productivity for exploration and drilling.
- Collaborative working capacity of 8 – 10 participants
- Large audience capacity between 30 – 40 people
- Operate more as a state of the art Collaborative Work Environment (CWE).
- Real-Time monitoring capability is to be considered.
- 3D Stereo capability

It will be an invaluable asset and allow larger groups to perform Sedimentary Basin evaluation, Geochemical Analysis and promote NOCK's status to leverage Petro Technical Services expertise in the region.

WesternGeco have undertaken a site visit to the New National Oil Data Centre Building in Nairobi and following this visit will present to National Oil a series of options with associated costs for the Visualisation Centre for National Oil to decide on the level of investment and degree of sophistication that is required. It is intended that the options presented will be scalable so that the Visualisation Centre can be expanded as additional funds become available and requirements change. The likely cost of the initial visualisation centre is estimated to be in the range US\$800,000 to US\$1 million.

Details of the preferred design elected by National Oil will be added as an Appendix to this contract once the options have been reviewed and a decision has been made.

APPENDIX7 – Master License Agreement

The Master License Agreement governing any licenses to the Data shall be in a similar form to the IAGC Master Geophysical Non-Exclusive Data-Use License, which can be downloaded at:

<http://www.iagc.org/files/2181>

APPENDIX 8 -Request to Transfer funds**Sample letter**

On National Oil Letterhead

To:
Schlumberger Oilfield Services Limited
Postal address:
c/o Schlumberger House
Buckingham Gate
Gatwick Airport
West Sussex
RH6 0NZ
UK

Dear Sirs

Subject: Agreement dated _____

National Oil acknowledges receipt of your fax/letter dated _____ relating to the revenue share of funds derived from the licensing of seismic data offshore Kenya as governed by the above agreement (s).

You are kindly requested to transfer the sum of US \$ to National Oil's nominated account as follows:

Bank Name :
Branch:
Branch Code:
Account Name;
Account Number:
Swift Code:

Please advise of the value date when the transfer is complete.

Yours faithfully,

For National Oil Corporation of Kenya

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS:

That the Company, **SCHLUMBERGER OFFSHORE SERVICES LIMITED**, a corporation organized and existing under and by virtue of the laws of British Virgin Islands, having its registered office at Craigmuir Chambers, PO Box 71, Road Town, Tortola, BVI (the "Company"), has made, constituted and appointed, and by these presents does make, constitute and appoint - **Mrs. Efundoyin Adetayo AKINYANJU** - a Nigerian citizen holder of a passport #A03462398 valid from 19 DEC 11 to 18 DEC 16, to be agent and attorney-in-fact of the Corporation within and throughout, and hereby expressly limited to **KENYA** for the purposes and with the powers herein set forth as follows:

1. To direct, conduct, manage and superintend the business and affairs of the undersigned.
2. To open one or more bank deposit accounts in any bank or banks; to deposit any and all sums of money which may now or hereafter be the property of the undersigned in any such account or accounts, and in any amounts which he may consider necessary and convenient to conduct the business of the undersigned; to make, sign and deliver cheques and drafts and other orders for the payment of money drawn upon or made payable by or at such bank or banks, or drafts against such account, whether drawn to the individual order or tendered in payment of individual obligations of said attorney or otherwise; to accept any and all drafts, bills of exchange or other orders for the payment of money at any time drawn upon the undersigned, making the same payable at such bank or banks or otherwise directing the payment thereof by any such bank or banks; and to endorse and deliver for deposit, withdrawal or collection by any such bank or banks or otherwise any and all cheques, drafts, promissory notes, certificates of deposit or other orders or instructions for the payment of money.
3. From time to time to appoint and employ any and all such servants, agents and employees for carrying on the business of the undersigned as said attorney, in his discretion, may think necessary or proper and at such rate or rates of remuneration and upon such terms as said attorney may think reasonable; to fix and limit the respective duties and authorities of said servants, agents and employees; to establish and alter rules and regulations for the control thereof; and to dismiss or suspend any of such employees for such cause or reason as said attorney may, in his sole and absolute discretion, think sufficient, with or without assigning any cause or reason, and either absolutely or for such period or periods as he may think proper, all subject to compliance by said attorney with the provisions of any applicable labour laws of the said Country.
4. To ask, demand, sue for, recover, receive and give acquittances for any and all moneys, debts, claims, interests and demands which are or may hereafter become due and payable to the undersigned in any capacity, whether from any government, political, public or civil body, company or corporation, public or private, of any description, or any person or persons and howsoever arising.
5. In the name of the undersigned to commence, prosecute, enforce or defend, answer and appear in any action, suit or legal proceeding in any of the courts of the said Country; to file all kinds of appeals and other recourses; to submit to arbitrators and umpires; to accept service of process thereunder; to employ attorneys and counsel to represent the undersigned in any of such proceedings; to discontinue any such action or proceeding; to submit to judgment thereunder or compromise thereof.

6. To transmit offers, bids and acceptances by the undersigned to any government, political, public or civil body, company or corporation, public or private, of any description, or any person or persons.
7. To carry on any and all negotiations and business and commercial transactions on behalf of the undersigned in the said Country with any government, political, public or civil body, company or corporation, public or private, or any person or persons concerning the sale of the products or services of the undersigned, or the purchase or sale of equipment, materials or supplies incidental thereto, to execute and deliver on behalf of the undersigned all necessary documents, contracts, indentures and other instruments, and to take any and all action in connection therewith necessary or proper to the consummation of any such transaction.
8. To rent or lease office space or any kind of property or facilities necessary to the activities of the undersigned in said Country and to acquire furniture or equipment necessary for said activities and dispose of such acquisitions as are deemed to be no longer needed.
9. To appear on behalf of the undersigned before any governmental body or official and to execute before it or him any declaration, statement or other instrument required for the conclusion or consummation of any transaction in the said Country which such attorney is authorized herein to consummate on behalf of the undersigned including, without limitation, the registration of the undersigned in said Country, and to take whatever steps may be required to comply with the requirements of the laws of said Country that may exist covering the qualifications of foreign corporations in said Country.
10. To effect, from time to time, fire or other insurance upon the property or interests of the undersigned as such attorney may deem necessary and, in case of loss, to file proofs thereof and to collect or receive any sum or sums which may be due to the undersigned.

And, generally, to do all things necessary and proper to be done in and about the premises as fully and to all intents and purposes as the undersigned would or could do if itself present, with power of substitution for periods not exceeding three (3) months in duration; hereby agreeing at all times to ratify and confirm all that said attorney or his substitute may cause to be done by virtue thereof.

This Power of Attorney is effective from today's date and ratifies all actions taken by the above named attorney since August 1st, 2012, on behalf of the Corporation within the above described matters. Unless earlier canceled or revoked, this Power of Attorney will expire two years (2 years) after the date on which it was granted.

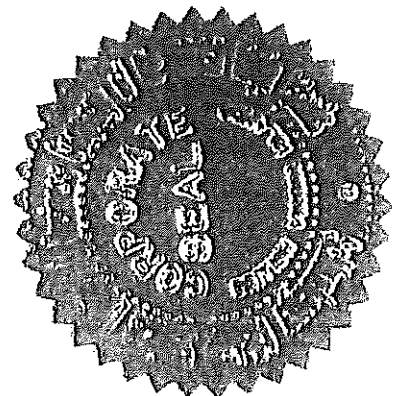
IN WITNESS WHEREOF, the undersigned has caused this instrument to be executed by its authorized attorney-in-fact and its corporate seal to be hereunto affixed this 13th day of September, 2012.

SCHLUMBERGER OFFSHORE SERVICES LIMITED



By: Ivana Vuckovic

Its: Assistant Secretary and Attorney-in-fact

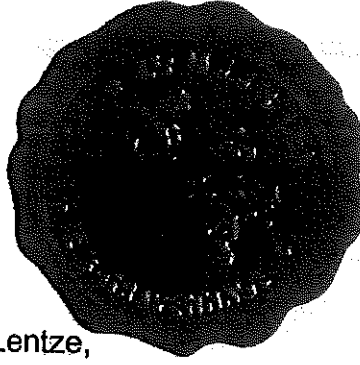


Seen for legalization the signature of:

Ivana Vuckovic

by me, Mr Michaël John José Reinier Lentze,
Llm, civil law notary, residing at The Hague
(The Netherlands),

on this day of: 2012 - 09 - 20



[Handwritten signature]

Legalisation

Seen for legalisation of the signature of
mr. M.J.J.R. Lentze

By me, deputy president of the Regional Court
of Justice at 's-Gravenhage,

[Handwritten signature]

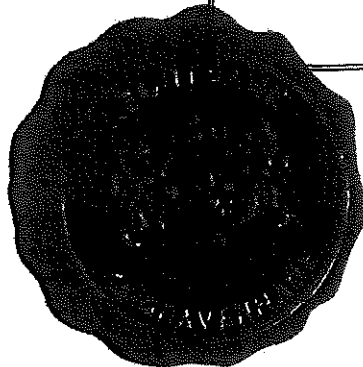
mr. R.C. de Lange-Tegelaar

Date: 21 september 2012

No.: 2012-2151/8

Gezien voor legalisatie van de handtekening van
mr. R.C. de Lange-Tegelaar
wnd. President van de Rechtbank te Den Haag
's-Gravenhage
De Minister van Veiligheid en Justitie
namens de Minister.
Hoofd van de directie Bedrijfsvoering en ondersteuning
Bestuursdepartement
voor deze:

24 SEP 2012



Minister van Justitie en Veiligheid

Gezien voor legalisatie: de handtekening
van de Minister van Justitie en Veiligheid
namens de Minister

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Annex 4

Kenyan Marine & Fisheries Research Institute RV Mtafiti Report, Annex 1
(24 November-18 December 2016)

Kenya Marine and Fisheries Research Institute

SAILING ORDERS

FOR

RV MTAFITI

**Survey Name: RV Mtafiti Territorial Seas and North Kenya Banks Fisheries
Hydro-Acoustics Survey**

SURVEY DATE: **START DATE:** **24th November 2016**

END DATE: **18th December 2016**



Prepared by

Edward N. Kimani, J. Kamau, C. Magori H. Ong'anda, N. Ngisiang'e, S. Mwakiti, A.

Kimeli, D. Odongo, E. Okuku, S. Musinzi, G. Okemwa

Kenya Marine and Fisheries Research Institute

P. O. Box 81651 Mombasa, Kenya

Mombasa, November 2016

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1. CRUISE DESCRIPTION

Survey	Activity	Days	Start date	End date
Survey Code: RVM01_112016	<ul style="list-style-type: none"> Equipment calibration and testing Environment and hydrographic research Deep Bottom Fisheries (drop line and hand line) 	25	24/11/16	18/12/16

2. RV MTAFITI RESEARCH

No.	Field	Name	Affiliation & Nationality	Gender
1	Cruise Chief Scientist	Dr Edward Kimani	KMFRI	M
2	Chemical Oceanography	Dr. Joseph Kamau.	KMFRI	M
3	Physical Oceanography	Dr Charles Magori	KMFRI	M
4	Biological Oceanography	Dr. James Mwaluma.	KMFRI	M
5	Acoustic survey scientist (Calibration, Data collection and processing)	Harrison Ong'anda	KMFRI	M
6	Chemical Oceanography	Dr Eric Okuku	KMFRI	M
7	Fisheries Scientist	Gladys Okemwa	KMFRI	F
8	Fisheries Scientist (Data & Statistics)	Stephen Mwakiti	KMFRI	M
9	Vessel Logistics (cruise logistics)	Dickson Odongo.	KMFRI	M
10	Acoustics survey expert	Chrispin Nyamweya	KMFRI	M
11	Acoustic survey scientist (Calibration, Data collection and processing)	Amon Kimeli	KMFRI	M
12	Acoustic survey scientist (Calibration, Data collection and processing)	Noah Ngisiange	KMFRI	M
13	Biological Oceanography Technician	Joseph Kilonzo.	KMFRI	M
14	Biological Oceanography Technician	James Kilonzi	KMFRI	M
15	Fisheries Longline Technician	Ben Ogola	KMFRI	M
16	Instrumentation Technician	Samuel Ndirangu.	KMFRI	M
17	Intern (Calibration, Data collection and processing)	Samantha Musinzi	KMFRI	F
18	Chemical and oceanography	Oliver Ochola	KMFRI	M
19	Chemical and oceanography	Charles Mito	KMFRI	M

3. LAND BASED OFFICIAL CONTACT

Name	AFFILIATION	RESPONSIBILITY
Dr Renison Ruwa	KMFRI	Cruise Focal Point
Mr Morris Munene	KMFRI	Public Relations

4. LIST OF ABBREVIATIONS

CTD	Conductivity Temperature and Depth
EACC	East Africa Coastal Currents
EEZ	Exclusive Economic Zone
IUU	Illegal Unregulated and Unreported Fishing
KCDP	Kenya Coast Development Project
KMFRI	Kenyan Marine Fisheries Research Institute
NKB	Northern Kenya Banks
NMK	National Museums of Kenya
ORI	Oceanographic Research Institute, South Africa
RMRS CC	Regional Maritime Rescue and Security Coordination Centre
SDF	State Department of Fisheries
SWIOFP	South West Indian Ocean Fisheries Project
VLIZ	Flanders Marine Institute, Belgium

5. RATIONALE

5.1 Summary

This plan lays out the research activities to be carried out during the RV Mtafiti cruise Block 1 in the northern bank of Kenyan waters and Territorial Seas to be conducted between 24th November and 18th December 2016, including the objectives, Standard Operating procedures and estimated budget. The cruise coded named "RVM01_112016" is to be undertaken within the territorial water as well as the EEZ to collect samples as well as data during 25 day duration. The cruise will be conducted with funding from the Kenya Government through Kenya marine and Fisheries Research Institute. The aim of the cruise is to complement the strategic objective of KMFRI and also the Kenya National Oceans and Fisheries Policy (2008) objectives. The fisheries survey will include testing of drop lines targeting deep water demersal fish species within the continental slope up to 600m depth and. The survey will start at off Shimoni and embark on the Shallow Water eco-sounder track line up to an area off Kiunga. This will be followed by the Block 1 deep water track line spanning the entire Kenya' EEZ. Scientists and technical staff from KMFRI will participate in the survey, while the Kenya Navy personnel will be responsible for logistics and safety of the vessel during the survey. This plan provides

the general objectives, scope of the RV Mtafiti Pre-deployment and Research Equipment Calibration.

5.2 RV Mtafiti

The RV Mtafiti, formerly known RV Zeeleeuw, was donated to KMFRI within collaboration between Flanders Marine Institute (VLIZ) and Kenya Marine and Fisheries Research Institute (KMFRI). It was owned by the Flemish Government of Belgium and used by the VLIZ to conduct research in the North Sea. RV Mtafiti is a 55.6m long vessel with a beam of 9.0m, draught of 3.65m, installed power of 1192kw, 2 engines of 750.080A, maximum speed of 14.5 knots and can carry a crew of 47. It is capable of undertaking physical, chemical, geological and biological oceanography and fisheries surveys. The vessel has two research laboratories: a biological and fisheries laboratory and an oceanography and chemical research laboratory. The estimated cost of a cruise per day is about KES. 1,240,000. A minimum cruise at sea is 17 days but the vessel is able to stay at sea for some months, if it can be replenished with fuel and food rations at sea.

6.4 Research Aims and Objectives

The marine environment supports diverse living resources and vast economic as well as social wellbeing of mankind, mainly fisheries and regulation of global climate. The shift to the blue economy supports this and the acquisition RV Mtafiti will go a long way in valorizing the Kenyan Blue economy. In Kenya, fishery production is concentrated within shallow inshore areas due to the limitation of fishing gears and vessels. Deep water fish demersal stocks as well as pelagic stocks are less well known and hardly exploited. Deep water demersal stocks can only be accessed using deep water fishing gears such as drop lines and traps, while open water pelagic stocks are fished with long lines or seines. In the past, surveys have been conducted to evaluate the fisheries resources within regional initiatives. During the gap analysis study conducted under SWIOFP Component 3 (demersal fisheries resources) in 2009 a number of demersal fish species and relevant fisheries were identified and a priority list of surveys and of target species was developed. This includes a range of acoustic and dropline surveys to be conducted on the Kenyan EEZ. Research strategy of RV Mtafiti covers four main thematic areas with specific objectives as follows.

- I. Continental slope drop line demersal fishery exploratory survey
- II. Pelagic long line fishery assessment
- III. Physical oceanographic survey (CDT, bathymetric and sediment sampling)
- IV. Chemical oceanography nutrient profiling in the water column and sediments
- V. Biological oceanographic survey (plankton and sediment fauna sampling)
- VI. Marine biodiversity (marine mammals, sea birds and turtles)

5.4 Kenya Marine Fishery and Environment and Oceanographic Conditions

The maritime zones of Kenya include the internal waters, territorial sea, contiguous zone, Exclusive Economic Zone (EEZ), continental shelf, and archipelagic waters. As a maritime state, Kenya has proclaimed the 200 nautical miles (nm) EEZ as provided for by UNCLOS and has an ocean area of about 142,000 km² as per the 200 nm EEZ limit (Fig. 1). Kenya has further applied for an extra 150 nm EEZ extension for exploitation of bottom ocean bed resources an additional 103,000 km². This makes a total ocean area of 245,000 km² which is 42% of her total land area making Kenya a significant maritime state. The marine environment is characterised by the movement of the Inter-Tropical Convergence Zone (ITCZ) which is driven by the seasonal monsoon winds.

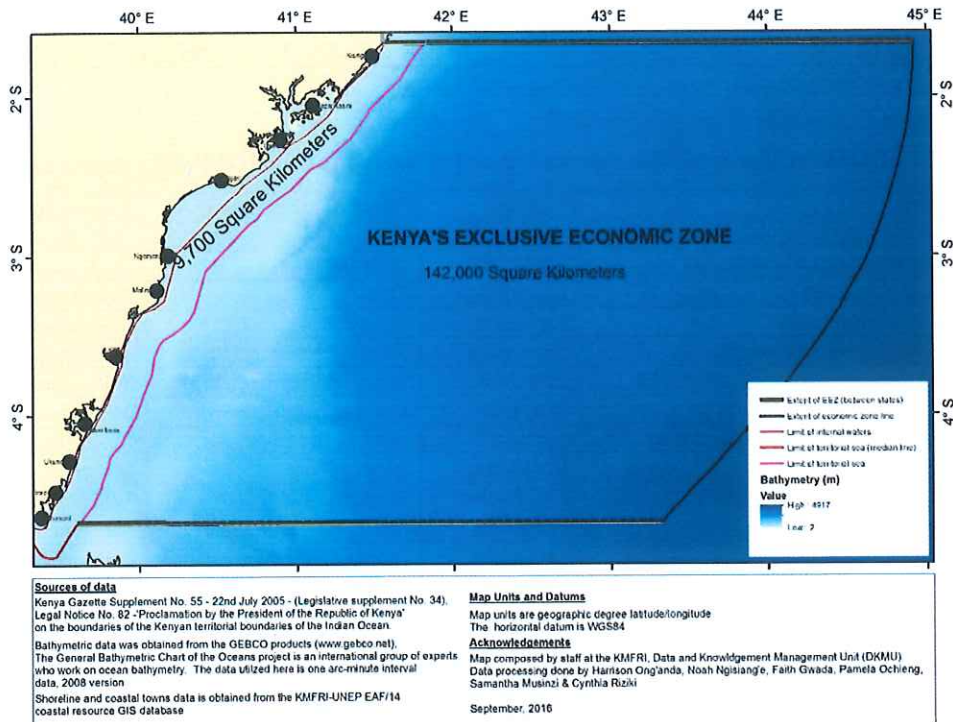


Figure 1: Map showing the delineation of the Kenyan territorial water

During the North East Monsoon (NEM), between November and March, the northward flowing East African Coastal Current meets the southward flowing Somali current to form the eastward flowing Equatorial Counter Current. During this season, the ocean waters in near-shore areas have higher salinities than SEM due of low precipitation and reduced river discharge compared to the SEM period. The Kenyan coast is characterized by a shallow lagoon protected by a fringing reef 1-3km offshore. The rock and coral bearing seabed, a narrow continental shelf and sheltered Islands and bays habitats accommodate a high diversity of demersal marine fish species including those identified as priority under the KCDP Scale Intensity Consequence Analysis (SICA) process. No acoustic and dropline survey has been conducted in this area, where a large part of demersal stocks may be found at offshore reefs and the continental slope more, than 300m. There is, therefore, limited information on deep slope demersal fish resources distribution and species assemblage in areas beyond 100m depth.

The species that occur in the slope habitats that are likely to be captured by drop line gear belongs to three 3 main taxa: snappers, groupers and emperors. The table below details the priority listing. The Priority 1 list species are likely to dominate drop line catches for the main taxa and will be preferentially sampled. Main depth stratum was assigned based on published information relating to stratification and/or local knowledge (shallow = 40-100 m; intermediate = 100-250 m; deep = 250-600 m).

Table 1 – List of priority demersal fish species identified during the SWIOFP data gap analysis.

FAO	Species	Family	Main depth stratum	Importance
Priority 1 List				
PFM	<i>Pristipomoides filamentosus</i>	Lutjanidae	Intermediate	Widespread
ETC	<i>Etelis coruscans</i>	Lutjanidae	Deep	Widespread
ETA	<i>Etelis carbunculus</i>	Lutjanidae	Deep	Widespread
EFH	<i>Epinephelus chlorostigma</i>	Serranidae	Shallow/intermediate	Widespread
LHN	<i>Lethrinus nebulosus</i>	Lethrinidae	Shallow/intermediate	Widespread
PLY ¹	<i>Polysteganus baisacci</i>	Sparidae	Intermediate/deep	Mauritius
SBU	<i>Polysteganus coeruleopunctatus</i>	Sparidae	Shallow/intermediate	Mozambique
LWZ	<i>Pristipomoides zonatus</i>	Lutjanidae	Intermediate	Widespread
LRI	<i>Pristipomoides multidentis</i>	Lutjanidae	Intermediate	Widespread
LUB	<i>Lutjanus sebae</i>	Lutjanidae	Shallow/intermediate	Widespread
EEP	<i>Epinephelus morrhua</i>	Serranidae	Intermediate/deep	Widespread
YTL	<i>Seriola rivoliana</i>	Carangidae	Intermediate	Widespread
LJB	<i>Lutjanus bohar</i>	Lutjanidae	Shallow/intermediate	Widespread
LZJ	<i>Lutjanus sanguineus</i>	Lutjanidae	Shallow/intermediate	Widespread
AVR	<i>Aprion virescens</i>	Lutjanidae	Shallow/intermediate	Widespread
ARQ	<i>Aphareus rutilans</i>	Lutjanidae	Intermediate/deep	Widespread
GMW	<i>Gymnocranius grandoculis</i>	Lethrinidae	Shallow/intermediate	Widespread

The pelagic fishery resources are mainly exploited by a fleet of purse seiners and long liners from Distant Fishing Nations including the EU, Mainly Spain and France, and the Far East, mainly Taiwan, China and Japan. This fleets target tuna species within the EEZ by paying for an annual fishing licence. The licence obliges the fishers to provide catch data by producing log-books to the government. However, the data provided by the fishers is scanty and provides little biological information. On the other hand, the coastal tuna, small and medium pelagic stocks are targeted by small scale fishers using long line and ring nets within the territorial waters. The small scale tuna fishery is estimated to and between 300 and 500mt annually (SDF fish landing statistics). Little information on the status of the stocks of the pelagic fishery exists to provide a scientific basis for management. Table 2 shows a list of the commercial pelagic species and depth range.

Table 2. Priority coastal and marine pelagic species

FAO	Common name	Species name	Main depth stratum	Importance
SKJ	Skipjack tuna	<i>Katsuwonus pelamis</i>	Top 50m	Economic and game fish
YFT	Yellowfin tuna	<i>Thunnus albacares</i>	Top 100m	Economic and cultural
BET	Bigeye tuna	<i>Thunnus obesus</i>	Top 250m	Economic and cultural
ALB	Albacore tuna	<i>Thunnus alalunga</i>	Top 200m	Economic and cultural
PBF	Pacific bluefin tuna	<i>Thunnus orientalis</i>	Top 550m	Economic and cultural
SBF	Southern bluefin tuna	<i>Thunnus maccoyii</i>	Top 1000m	Economic and cultural
LOT	Longtail tuna	<i>Thunnus tonggol</i>	Top 380m	Economic and cultural
KAW	Kawakawa	<i>Euthynnus affinis</i>	Top 50m	Economic and cultural
T	Bullet tuna	<i>Auxis rochei</i>	Top 50m	Economic and cultural
FRI	Frigate tuna	<i>Auxis thazard</i>	Top 200m	Economic and cultural

Marine mammal, sea birds and turtles species that form a significant component of the extensive biological marine environment are widely distributed in the South Western Indian Ocean region (SWIO) and are highly migratory. They are exposed to many threats from human activities, such as entanglement or capture by fishing gears, direct exploitation, habitat

degradation, chemical and acoustic pollution, ship strikes as well as ecosystem degradation. Captures as fisheries by-catch has been recorded throughout the region. Indo-Pacific humpback, bottlenose and spinner dolphins are the most affected species. Permanent populations of inshore dolphins and migrating humpback whales can assist local communities to develop tourism through whale-watching. However, little is known about their ecology, spatial distribution, stock identity and abundance patterns.

The hydrography of the ocean is extremely important to maintaining of great variety of flora and fauna on the continental shelf, as well as understanding flow dynamics induced by NKBs. Ekman flow may mean the continuous replenishment of the deep and intermediate depth waters on shelf regime, the dissolved oxygen in this waters would soon be used up by aquatic plants and animals and decaying material. If this were to happen, most life on under water banks such as NKB would eventually disappear. On energetic flow over the banks during this time may influence the southward movement of commercial fishery into Kenya waters from the Somali coast as well as determine whether the surface water moves offshore to create Equatorial Counter Current (ECC) or subducted of the Somali Current.

Nutrients in the water column are major drivers of the productivity of the oceanic waters. Within the region nutrient budgets are influenced by the input from the margins and the prevailing hydrodynamics. There are four oceanic currents influencing the Kenya coast. These are the South Equatorial Current, the East African Coastal Currents (EACC), the Equatorial Counter Currents (ECC) and the Somali Currents (SC). The net onshore currents result in the sinking of surface waters along most of the Kenyan coast. The exception is near Kiunga where some mild up-welling occurs during the Northeast Monsoon.

During the Southeast Monsoon winds, the EACC joins up with Somali currents beyond Malindi and flow northwards right to the horn of Africa. However in the Northeast Monsoon, the EACC only reaches as far north as Malindi or Lamu, where it meets the opposing Somali Current. The meeting of the EACC and the Somali Currents causes upwelling which is thought to be responsible for high fisheries productivity in Northern Kenya coast. Profiling nutrient levels spatially and in the water column will provide insight on upwelling sites. The bottom topography will inform whether the upwelling is due to sea mounts.

6. AIMS AND OBJECTIVES

6.1 Aims and Objectives of the cruise

The objective of surveys are:

- Estimate the biomass and determine the spatial and temporal distribution patterns of fish in the Kenyan EEZ.
- Provide data on bathymetry and seabed morphology
- Correlation of oceanographic (physical and biological) characteristics with fish distribution.

6.2 Specific Objectives of the cruise

The cruise will provide an opportunity to conduct a shake-down of the RV Mtafiti by conducting the first survey in Kenya. The general aim of this survey is to provide information on continental slope demersal fish resources distribution and species assemblage in depths beyond 200m depth and determine the biomass of pelagic fish resources in the Kenya EEZ

and the status of their stocks as well as collect data and samples to describe the biological and physical oceanography of the marine environment during the survey.

- I. Conduct a hydroacoustic survey to determine the biomass and spatial distribution of fish in the northern bank block 1 of Kenyan territorial waters.
- II. Deploy handline and dropline in selected station in block 1 northern bank to determine the fish species composition and distribution.
- III. To determine the primary productivity characteristics of the Kenyan waters using CTD and plankton net.
- IV. To assess the occurrence of marine mammals, sea birds and turtles

The specific activities during the survey shall include but not limited to:

- Log the Activity code, serial n^o, station, date, start time, start GPS position, end time, and end GPS position for each activity conducted during the survey (in port or at anchor, steaming “night” and “day”, drop line/hand line event);
- Record standard environmental information before the deployment of drop lines/handline at each fishing station;
- Complete 6 fishing stations during daylight hours, each station being composed of a CTD cast and 6 dropline and 6 handline and 3 sediment grabs;
- Determine the species composition and quantity (total weight and numbers/species) of species caught in each dropline/handline;
- Collect biological data per species (length(s), weight(s), sex, maturity, stomach fullness and stomach contents);
- Describe occurrence of sea turtle, sea-bird and cetacean interactions with the fishing gear during setting and hauling;
- At each station collect water samples in the water column at 50m interval, determine the nutrient content and measure the physicochemical parameters.
- Collect suspended sediment samples determine nutrient content and approximate the sediment labile nutrient pool. This will be performed by fractionating the sediment and obtaining the clay fraction then determine its nutrient content.
- To conduct zooplankton (including the fish larvae) to determine the abundance for vertical and spatial distribution will be sampled using multi-net 200µm and 500µm bongo net for fish larvae on the oceanic surface.
- To conduct phytoplankton’s hauls to determine the composition and abundance. Waters samples will be sieved using 100µm sieve. Preservation will then be done using 70% alcohol for further taxonomic identification.

7.2 Expected deliverables

The expected deliverables for research will include:

1. Cruise summary report within 1 month of the survey (Chief Scientist);
2. Effort, catch, biological and environmental data captured onto paper datasheets and excel database;
3. Biological samples collected as outlined in the activity section;
4. Frozen or chemically preserved whole specimen samples as required;
5. Marine mammals, sea-birds and turtles occurrence report;
6. Acoustic data;
7. Fish biomass/densities;
8. Bathymetry maps;
9. Productivity maps as informed by nutrients levels and plankton densities;
10. Technical report of the cruise.

8. GENERAL CRUISE PLAN

8.1 Logistics

The cruise shall be conducted for a total of 25 days between 24th November and 18th December 2016 including the totality of survey time from the moment the vessel leaves the Kenya Navy port till the moment it returns. All materials, equipment and supplies will be loaded to the vessel on or before the 24th November 2016. The RV Mtafiti will depart from its home port at Mombasa, Kenya on the morning of 24th November 2016 and will arrive in Shimoni-Kwale to begin the Echosounder calibration and subsequent data collection until the 18th December 2016.

8.2 Requirements for Research

The primary requirement for the survey is research equipment to assess the physical environment, collect and store water and biological samples, and deploy and retrieve fishing gears and the designated stations. Table 3 list the basic equipment that will be tested and used during the survey.

Table 3. The research equipment to be used and tested during the cruise.

Gear	Data/Samples
Sediment grab	Collect sediment samples
Niskin Bottles	Nutrient samples
Plankton net	Plankton samples
Drop lines & handlines	Fish samples
Hand held GPS	Geographical Location

The Niskin Bottle will be the main instruments for collecting environmental data for this proposed cruise. Vertical salinity and temperature, density ($\sigma\text{-t}$), including oxygen, will be collected at various stations at pre-determined depths. Deep bottom sampling of fish shall be carried out by the drop line and hand line gear, to a maximum of 300 m.

7. SURVEY STRATEGY, STRATIFICATION AND EFFORT ALLOCATION

The cruise is divided into two (2) main components, the shallow water component and the Block 1 deep water component (See Figure xxx). In each of the component the following observations, data and samples will be collected:

- i. Hydroacoustic survey
- ii. Deep water demersal and drop line fishery exploratory survey
- iii. Physical Chemical profile
- iv. Biological oceanography survey
- v. Sediment samples
- vi. Marine biodiversity (marine mammals, sea birds and turtles)

The shallow water acoustic tracklines and sampling stations are shown in Figure 2. There will be one sampling station each within the segments of Lamu, Malindi, Mombasa, Kilifi and Kwale. In the EEZ, oceanographic sampling stations will correspond with 6 stations selected for the bottom depth fish sampling. The track lines for the deep water component Block 1 is shown in Figure 3.

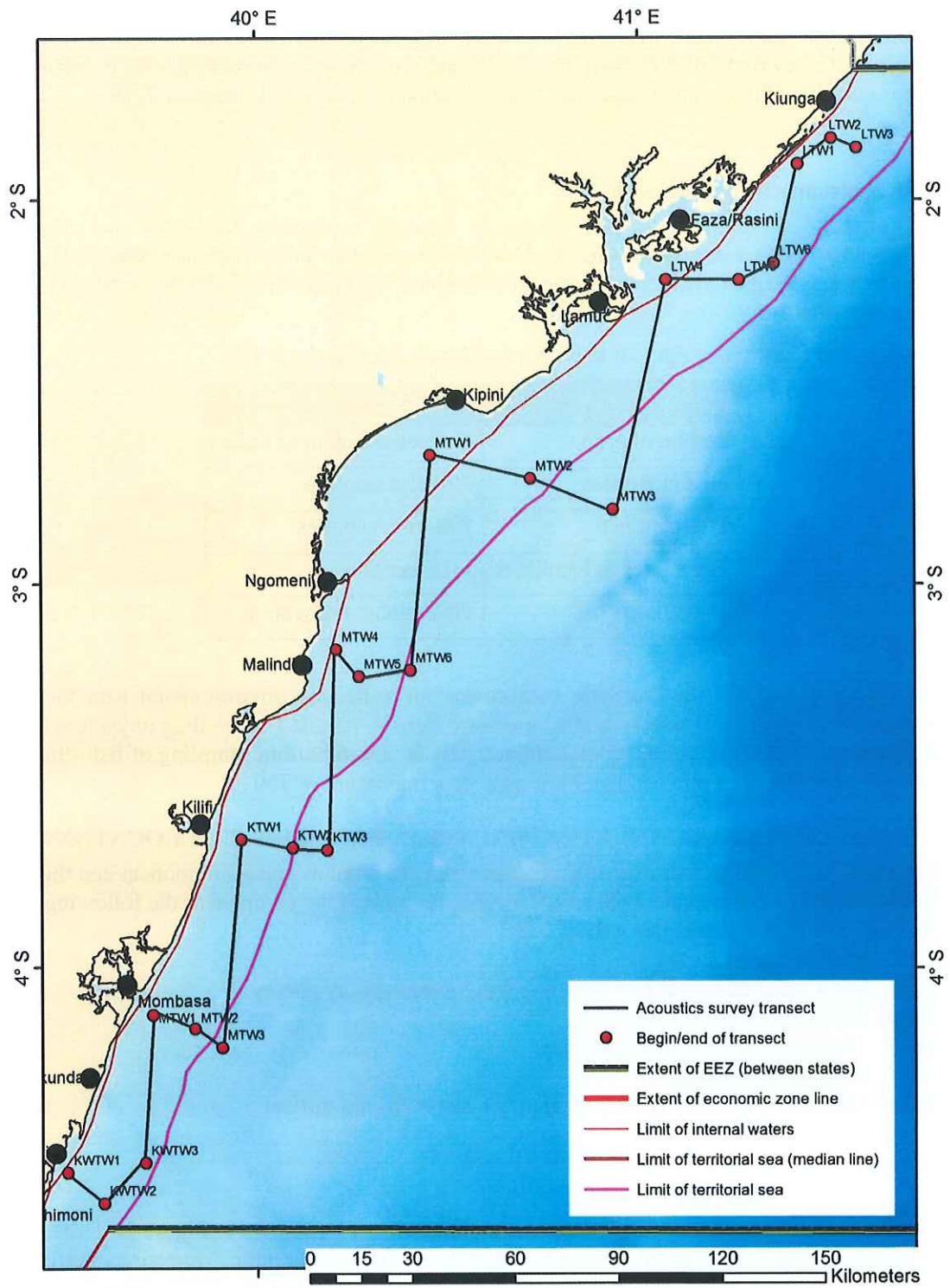


Figure 2. Map showing the track line of the hydro-acoustics survey of the shallow water component of the expedition

Table 4 shows the coordinates of the proposed sampling stations in the territorial waters as well as the EEZ off Lamu, Malindi, Kilifi, Mombasa and Kwale.

Table 4. The coordinates and labels of the designated RV Mtafiti Research Station in the Territorial Water (TW)

	Territorial Water Stations		
	Station	Long	Latitude
LAMU	LTW1	41.416	-1.907
	LTW2	41.504	-1.8406
	LTW3	41.569	-1.865
	LTW4	41.071	-2.21
	LTW5	41.262	-2.21
	LTW6	41.353	-2.167
MALINDI	MTW1	40.455	-2.667
	MTW2	40.718	-2.727
	MTW3	40.934	-2.807
	MTW4	40.207	-3.173
	MTW5	40.266	-3.243
	MTW6	40.401	-3.227
KILIFI	KTW1	39.959	-3.668
	KTW2	40.093	-3.69
	KTW3	40.183	-3.695
MOMBASA	MTW1	39.728	-4.125
	MTW2	39.838	-4.16
	MTW3	39.908	-4.21
KWALE	KWTW1	39.503	-4.535
	KWTW2	39.598	-4.615
	KWTW3	39.708	-4.51

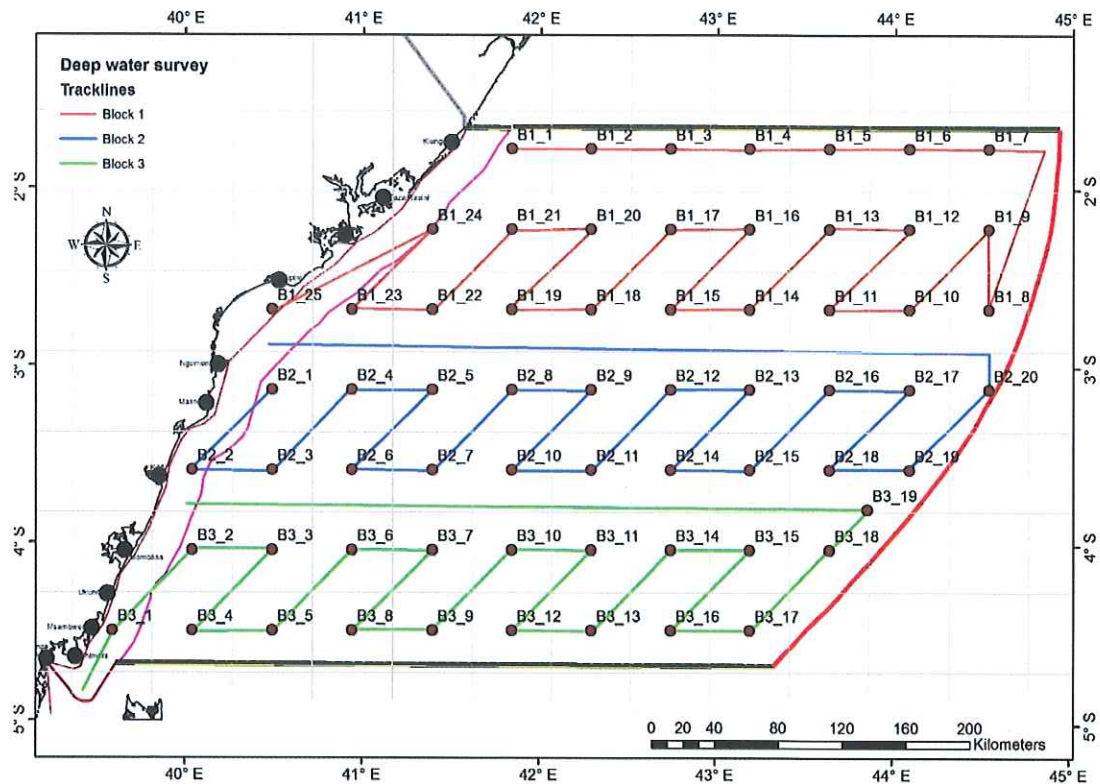


Figure 3. Map showing the track line of the hydro-acoustics survey of the deep water component of the expedition

8.1 Daily activity plan and transect coordinates

The final decision on the daily survey route (s) and timing regarding the operation will be agreed between the Cruise Commander, Research team leader Unit Leaders and Master / Mate (as appropriate) to make optimum use of sea time.

Table 5 shows the daily activities of the 25 day cruise. During the first day the vessel will be loaded with supplies and embankment of Research Scientists. The personnel will settle in the vessel, secure the gear and equipment and sailing will commence before mid-night on the first days.

The Ship will cruise to Shimoni channel on day 1 and drop anchor by 12pm. Calibration work on the Echosounder acoustics device will commence. It is estimated that the calibration work will take 2 days.

The vessel will embark on the 1st component of the survey i.e Shallow Water. Immediately this is concluded, the survey will embark on the Block 1 (EEZ) survey.

Table 5. The cruise daily activity schedule

Day	Activity	Remark/Output
1	Boarding the vessel by 9am. Safety procedures, secure equipment settle in vessel Sailing to Shimoni Channel	Supplies, equipment and personnel on vessel
2	Calibration of the Acoustics echosounder	
3	Calibration of the Acoustics echosounder and testing	Calibrated equipment
4	Start of the Shallow Water component of the survey	Acoustics data Samples – KWTW2, MTW2, KTW2
5	Survey and sampling continue	Acoustics data Samples – MTW5, MTW2
6	Final day of Component 1 survey	Acoustics data Samples – LTW5, LTW2
7	Dropline sampling, water samples and sediment grab at B1_1	Dropline data, water samples and sediment samples
8	Acoustics survey B1_1 to B1_2	Acoustics data
9	Dropline sampling, water samples and sediment grab at B1_2	Dropline data, water samples and sediment samples
10	Acoustics survey	Acoustics data
11	Acoustics survey (upto B1_7)	Acoustics data
12	Acoustics survey B1_7 to B1_10	Acoustics data
13	Acoustics survey B1_10 to B1_14	Acoustics data
14	Acoustics survey B1_14 to B1_17	Acoustics data
15	Dropline sampling, water samples and sediment grab at B1_17	Dropline data, water samples and sediment samples
16	Acoustics survey B1_17 to B1_18	
17	Dropline sampling, water samples and sediment grab at B1_18	Dropline data, water samples and sediment samples
18	Acoustics survey B1_18 to B1_21	Acoustics data
19	Dropline sampling, water samples and sediment grab at B1_21	Dropline data, water samples and sediment samples
20	Acoustics survey B1_21 to B1_22	Acoustics data
21	Dropline sampling, water samples and sediment grab at B1_22	Dropline data, water samples and sediment samples
22	Acoustics survey B1_22 to B1_25	Acoustics data

23	Sailing to Kilifi	
24	Re-calibration	
25	Recalibration	Calibration results for the 3 frequencies
26	Sailing to Mombasa	End of the expedition

9. RESEARCH ACTIVITIES

9.1 Pre-Cruise checks

- The research team leader will ensure that all research equipment and materials are included, are functional and appropriate release authority acquired before the cruise
- Any damage to equipment during the survey must be reported upon return.

9.4 Sampling regime

Acoustics survey will be carried out during day and night.

During each day light period, 6 drop lines will be sampled within the selected drop line station. The following activities should take place at each of the drop line station:

- One Niskin bottle sampling will be done at each fishing station
- Three replicate drop lines will be deployed and retrieved at each station following the fishing protocol,
- One sediment grab sampling at each drop line station will be taken following the grab sediment protocol
- One plankton net sample will be collected each station following the plankton sampling protocol
- The biodiversity observations will be made and data recorded in each station
- Note that these transects will be adjusted to ensure that the vessel is on station for the start of the next day' sampling.

9.7 Fish Sampling Design

Droplines should be constructed according to the specifications in Appendix A. A **dropline set** consists of three individual lines that have been laid close together (within a few hundred metres); a single drop line within a set is termed a **haul**. The effectiveness of different hook sizes and bait types should be included in the sampling design. To address this requirement each of the three drop line hauls within a set will be composed totally of hooks of one of the three hook sizes. To simplify the comparisons over bait, the chosen bait types will be changed daily. Each dropline set will be preceded by a **Niskin bottle** cast. The following activities will be done to prepare the drop line for sampling:

1. Six hours before fishing, sufficient bait for all planned sampling within the next 24 hours must be taken out of the deep freeze and allowed to thaw in boxes on deck. Effectively this means that the bait should be taken from the deep freeze at 11pm for fishing the following day.
2. First thing in the morning all hooks in a set of three drop lines or long line will be baited.

3. At the end of each working day all hooks should be cleaned.

It is intended that the programme each day will include 6 dropline sets in the deep water Block 1 survey, each with different hook sizes (10, 12 and 13) and one set to be made within each depth stratum in the territorial waters zone.

Table 5 shows the sequence of events at each station. Before fishing Niskin bottle cast will be done. Although the individual hauls should be as close together as possible, the Master of the Vessel in consultation with the Dropline Expert will have the final say on locations so that the wind and local current are taken into account during deployment such that speedy and effective recovery of the lines can be made. When the third dropline of a set has been deployed the vessel will move to recover the first line. The assistance of the scientific team in identifying the marker buoys will facilitate this process. The plankton tows will be made after the fishing operation is completed.

An idealised plan for a dropline station, on completion of a Niskin cast, is shown in Table 4.

Time	Cumulative time	Activity
0	0	Arrive at station and vessel stationary
20	40	Niskin bottle haul
30	70	Sediment grab haul
60	130	Drop line deployment
60	190	Drop line retrieval
80	270	Zooplankton/phytoplankton haul

Table 6. Gear deployment strategy for one station

9.8 Hauling and handling the catch

As the marker buoy, floats and mainline come onboard they should be carefully stowed such that they can be redeployed quickly. While the terminal line is being hauled one of the scientific team should note the number along the line of the hooks that have caught fish. A note should also be made of the number of hooks that have no bait. Notes should be made regarding all fish that fall off the hooks without being brought onboard. All elasmobranchs, providing they appear likely to survive, will be identified, measured and released as quickly as possible.

10. BUDGET

10.2 The estimated costs for the research cruise

The estimated costs for the research cruise are shown in Table 7.

Table 7. The estimated costs for RV Mtafiti Territorial Seas and North Kenya Banks Fisheries Hydro-Acoustics Survey November 2016

Cost Item	# of People	Unit	# of units	Unit rate (in KES)	Costs (in KES)
1.0 Human Resources					
i) Vessel Crew Allowance	26	Per Day	25	-	5,200,000.00

ii) SDF and KMFRI Officers Allowance	19	Per Day	25	-	5,320,000.00
Subtotal Allowances.					10,520,000
2.0 Support and Logistics.					
i) Fuel, Lubes,					30,000,000
ii) Consumables and Rations.					5,000,000
Subtotal Support and Logistics.					35,000,000
Subtotal Interagency Patrol Planning Meeting (Briefing and Debriefing Sessions).					450,000
Grand Total.					45,970,000.00

11. BUDGET JUSTIFICATION

The budget estimates are based the average daily allowance for 19 members research teams and 26 members of crew. The vessel fuel and other consumables for the days of the survey are based on the estimated agreed on by the Kenya Navy who have the experience of running the vessel and the budget team at KMFRI. A cost to facilitate the interagency debriefing meeting is also included in the budget. A cost to facilitate a one day debriefing meeting is also included in the budget. During this meeting, the performance of the vessel and equipment as well as the time allocation to each activity will be assessed and reported. Based on this report, all the activities to be conducted in each station as well as the details of the human and technical capacity required will be completed.

12. SURVEY PROTOCOLS

12.2 Standard Operating Procedure for Research

12.2.1 Research station

Each fishing station will consist of a Niskin Bottle cast, dropline, a plankton net haul, a grab sample where in stations less that 600m as well as biodiversity observations. Environmental data will be collected at each fishing station, before setting droplines. A Niskin Bottle will be casted to collect profiles of ocean environment data..

12.2.3 Benthic sampling

Biological sampling will involve the collection of benthic and plankton samples. Benthic samples (both sediment cores and benthos) will be deployed using a benthic grab attached to a winch behind the vessel. The grab will be deployed after verification of the bottom depth and contours which will be recorded. The grab will be lowered using a graduated rope (1 meter intervals) to the bottom of the seabed where the depth will be recorded. The collected sample will be hauled to the surface using a winch. At the surface, benthic infauna will be collected by coring using large (6.4 cm diameter) and small cores (3.4 cm) to a depth of about 10 cm of the collected mud. 3-replicates of each size of corer will be done per station. The cored samples will be sieved with a 0.5 mm mesh sieve and animals retained on the sieve will be immediately fixed in 5% formalin and placed in labelled sampled bottles for laboratory analysis. 3-replicate sediment cores for sediment analysis will be collected and placed in plastic bags (zip lock) labelled, and stored in deepfreeze for further analysis.

Sediment samples will be collected for nutrients and grain size analysis and organic matter, the sample will be collected using a 5cm core. The collected core samples will be sectioned 2cm, 4cm, and the remaining at 8cm interval and placed in zip bags. The samples for grain size analysis will be wet fractionated except the top 2 cm segment that will be dried then dry fractionated and the clay fraction analysed for nutrients. Samples for nutrient analysis will be extracted using KCl and thereafter analysed for nitrates, ammonia, phosphates and silicates.

The benthic sampling will be carried out mainly in the shallow shore stations due to a limitation in sampling gear for deep water stations.

12.2.4 Plankton sampling protocol

Collection of plankton will be done after the benthic samples have been collected mainly during the day. The plankton sampling will involve the collection of both phytoplankton and zooplankton/fish larvae and will follow the following protocol.

12.2.5 Zooplankton and fish larvae samples

The zooplankton net (500um mesh size) will be fastened with a flowmeter prior to sampling. The flowmeter numbers will be recorded on a notebook, before the procedure. The plankton net then be lowered slowly behind the vessel and towed behind the ship at constant speed of between 1-1.5 knots for a period of about 20 minutes. Time will be noted when the net has been lowered After towing the net will be retrieved and hoisted upwards and flushed with a hose (with seawater) in such a manner that the plankton are collected at the bottom of the net pot. The flowmeter readings after the tow will be recorded in the notebook. The net pot will be opened and the plankton transferred into labelled sample bottles using a sieve and buckets. The samples will be preserved using 5% formaldehyde buffered in seawater and stored. Replicate samples (3) will be collected per station if time allows. The plankton net and flowmeter will then be cleaned thoroughly using freshwater in readiness for the next tow

12.2.6 Phytoplankton samples

Phytoplankton samples will be collected using a 20um mesh size plankton net, which will be towed from the side of the vessel. The net will be lowered and towed at 1-1.5 knots for a period of 5 minutes. Collected samples will stored in 5% formaldehyde buffered in seawater and transferred to labelled samples using a sieve. Three replicate samples will be collected time allowing. The following datasheet will be used for recording the operations

Activity code:	Date:	Tow number:
Area:	Transect:	Station number
Position:	Time start:	Flow meter start:
Speed:	Time stop:	Flowmeter stop:

12.2.7 Fishing operation

The 3 operational lines each equipped with a different hook size are prepared and baited according to the specifications in Appendix 1. After collecting of water samples the vessel moves back onto the position of the fishing station.

The data recorder uses ADL Form 3 to note the general data: date; fishing station number (unique event number allocated under ADL Form 2); their name; target depth contour and gear details (bait type, hook size, number of hooks – will be 45- and length of line).

On release of the bottom weight, the data recorder notes the date, GPS position, time (GMT) and the actual depth when the weight is released, again using ADL Form 3.

On hauling, the data recorder notes the date, GPS position, time (GMT) and the actual depth on hauling when the line is taken on-board and the weight is of the bottom. When the line is fully on-board, the data recorder, using ADL Form 3, makes note if the gear is fully intact (i.e. no breakages in mainline or terminal rig), estimates the length of line retrieved if there are breakages, records the no. of hooks lost and checks if any PETs have been caught / entangled on the gear.

Fishing technicians remove (unhook) all of the catch from the line and place the fish in one of the 6 catch bins (A to F) as specified by the data recorder. The data recorder will note Catch Bin used to accommodate catch for each dropline on ADL Form 3.

12.2.8 Fish biological Sampling

Before starting sampling, data recorder records their name, survey code, catch bin code and target depth contour in ADL Form 4.

NOTE: Catch bin code is a composite of the Fishing Station, Dropline No. and the Catch Bin letter.

Fishing station N° 22

Dropline rig N° DL10

Catch Bin Code = 22/DL10/E

Catch placed in bin E

Sampling can be performed in either of 2 periods, or a combination thereof; (i) In the period between hauling of each dropline rig at a fishing station. There will be 15 - 20 minutes before the next rig starts to arrive on the deck, so small catches (e.g. <10 fish can generally be processed in that time); (ii) In the period between fishing stations.

After completing a fishing station, fishing technicians will prepare the lines (replace lost hooks and baiting) for the next fishing station. The remaining of the scientific crew will assist with processing of the catch, and the recording of the data on paper and digital form.

Upon arrival of the catch bins to the sampling area, scientific crew will sample the catch following the sampling protocols detailed below.

12.2.9 Catch, species composition and biological data collection

Catch, species composition and biological data collection are recorded on ADL Form 4 and based on total enumeration for each fishing station, i.e. there is no sub-sampling.

Step	Description
1	Record catch bin from where you remove the fish to be sampled in ADL Form 4;
2	Identified fish to species. Any species that cannot be identified should be photographed, and identified with an unknown species code (ex: UNKspp1). Biological data is to be collected and entered on ADL Form 4 and photos logged in

	ADL Form 8. Specimen should be fully labelled then be preserved for further identification on lab.
3	Measure fish for standard length (SL) and total length (TL) in mm using a fish measuring board
4	Weight fish for total weight, gutted weight in air and gutted weight in water using an electronic or a mechanical balance.
5	Sex and stage the gonad using macroscopic index stage scale provided in Appendix 3
6	Evaluate fish stomach fullness and general taxa contents using instruction given on ADL Form 4.

12.2.11 Otolith sampling

Step 2	30 otoliths pairs (left and right) to be collected per 2cm size class for each of the following priority species for the whole cruise area (with length and sex data).		
	The otoliths are dissected, dried with tissue and placed in the paper envelopes provided. The envelopes are labelled using the same coding system as for genetics.		
	FAO	Species	Family
	Priority 1		
	PFM	<i>Pristipomoides filamentosus</i>	Lutjanidae
	ETC	<i>Etelis coruscans</i>	Lutjanidae
	ETA	<i>Etelis carbunculus</i>	Lutjanidae
	EFH	<i>Epinephelus chlorostigma</i>	Serranidae
	LHN	<i>Lethrinus nebulosus</i>	Lethrinidae
	PLY²	<i>Polysteganus baisacci</i>	Sparidae
	SBU	<i>Polysteganus coeruleopunctatus</i>	Sparidae
	Priority 2		
	LWZ	<i>Pristipomoides zonatus</i>	Lutjanidae
	LRI	<i>Pristipomoides multidens</i>	Lutjanidae
	LUB	<i>Lutjanus sebae</i>	Lutjanidae
	EEP	<i>Epinephelus morrhua</i>	Serranidae
	YTL	<i>Seriola rivoliana</i>	Carangidae
	Priority 3		
	LJB	<i>Lutjanus bohar</i>	Lutjanidae
	LZJ	<i>Lutjanus sanguineus</i>	Lutjanidae
AVR	<i>Aprion virescens</i>	Lutjanidae	
ARQ	<i>Aphareus rutilans</i>	Lutjanidae	
GMW	<i>Gymnocranius grandoculis</i>	Lethrinidae	

Step 3	All specimens sampled for otoliths are to be photographed for ID confirmation; Photographs to be numbered to correspond with the otolith samples and logged in ADL Form 5.
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Whole specimen collection

Step 1	Whole specimens of 1 st priority species to be collected labelled and preserved in 5% formalin and lodged at the National Museum for curation.
Step 2	Photographs of each voucher specimen to be taken and stored by the fisheries team leader, photographs to be logged in ADL Form 8.

12.2.13 Biodiversity

Survey biodiversity studies and sampling will focus on by-catch, and a daily log must be kept of marine mammal and sea birds sightings and counts.

Sea Turtles (if caught and bought on-board)

Stage	Description
Step 1	Place sea turtle in the shadow and if possible inside of a car tire (prevents sea turtle from moving and reducing risk of injuries to the turtle and yourself).
Step 2	Collect the following information and register it in the sea turtles form: <ul style="list-style-type: none"> • Date and position of the capture and of release (appendix A) • Species (appendix B); • Sex (appendix B); • Check if the turtle is tagged and record tags numbers; • Note the circumstances of the capture and free the turtle from the gear, if needed; • Note the condition of the turtle and proceed to its resuscitation, if needed (appendix B)
Step 3	Using a tape measure, measure turtles for carapace curved length (CCL). Placing the tape measure at nuchal scute (the junction of skin and scute should be used as the anterior point) and extending it to the posterior-most tip of the last marginal scute (supra-caudal or post central). <div style="text-align: center;">  </div>
Step 4	Photograph the whole animal and zoom in on: 1) the carapace and plastron; 2) the top of the head (from the top); 3) the head right and left profile; 4) unusual marks and scar. Number all the photos taken and catalogue each photo with the following information: species, sex, length.

Step 5	<p>Collect genetic samples from all sea turtles found to be sent to IFREMER;</p> <p>Collect a small sample (0.5cm) of the soft tissues located between the scales of the posterior or anterior fins, using the same material and protocol as for the collection of crustacean genetic samples.</p>
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Marine mammals and Seabirds interactions

Stage	Description
Step 1	<p>One surveyor will be responsible for the recording of marine mammal and seabird's interactions with fishing activities.</p> <p>Surveyor will survey dropline operations from a high point on the boat.</p> <p>Surveyor will record any cetacean or seabird interaction with the vessel during shooting, hauling of the dropline and during the discarding of the catch (if any).</p>
Step 2	<p>Surveyor will record during each survey period the following information (in the effort sheet provided):</p> <ul style="list-style-type: none"> ○ Date (dd;mm;yy); ○ Time (hh;mm); ○ Position (latitude and longitude); ○ Environmental data as per requested.
Step 3	<ul style="list-style-type: none"> - For each sighting surveyor will record in the sighting sheet provided: <ul style="list-style-type: none"> ○ Time; ○ Position (latitude and longitude); ○ Species³; ○ Number (minimum, maximal and best estimate); ○ Distance (in meters); - Behaviour (travelling, resting, feeding/foraging, milling, unknown) - Don't hesitate to add comments and to take photos for species ID confirmation.

Sharks interactions

Record any sharks interactions (or not) associated with the fishing operation. Thus document absence or presence (and behaviour) of sharks when deploying, lifting each dropline, and/or discarding the catch. Also record if there's any depredation.

13. GENERAL

13.1 Data and samples

- All data and samples collected during the cruise are the property of the KMFRI;
- Under no circumstances are any samples to be taken off the vessel until the ship reaches its final destination (Mombasa, Kenya);

13.2 Handling of survey data and samples

- Data to be recorded in hard copy first on sampling sheets provided by KMFRI and/or individual researchers;
- Biological and environmental data to be captured onto excel
- KMFRI to be provided with all the data collected during the survey.
- Samples are to be allocated as per established in table 5. If any extra samples are collected during the cruise they should be entered in sailing orders sample table.
- A spread-sheet detailing all samples collected during the survey (station, number and species), samples final destination, samples purpose, person or institution responsible for its storage and/or processing is to be forward to Chief Scientist not later than 7 days after the cruise.
- Trip report to be drafted by Cruise leader and submitted to the Director within 1 month of survey end.
- Technical Survey Report with survey plan, methods, data and samples collected to be drafted by Cruise leader, and submitted to the Director within 3 month of survey end.

13.3 Sample labelling system

All biological samples are to be labelled as follow:

- o Voyage: **XXXXXXXX**
- o Date: [dd/mm/yy]
- o Event No.:
- o Species name (if known): [FAO 3 letters code]
- o Fish No.

All samples collected in the context of a scientific cooperation are to be labelled as follow:

- o Voyage: **XXXXXXXXXXXX**
- o Cooperation project: [3 letter code, see table 6]
- o Date: [dd/mm/yy]
- o Event No.:
- o Species name: [FAO 3 letters code]
- o Fish No.

13.4 Samples destination

Preservation method	Species	N° to collect	Location to be sent/stored
96% alcohol (genetics)	<i>Priority Spp</i>	30/spp	
Dry (otoliths)	<i>Priority Spp.</i>	As per requested	
96% alcohol (identification)	Fish sp.	N/A	

13.5 Personnel organization

The duties and responsibilities of the following key team leaders are provided as follows.

National MCS Commander

National Commander is the Director of Fisheries who has overall supervisory role and must be consulted as appropriate.

Cruise leader (CL)

In charge of communications with the RV Captain and country authorities; to establish link between the Captain, the Acoustic Expert and the scientific crew. Goal is to optimise survey by relying on existing fisher and scientific expertise, and to follow up on all sampling activities conducted during the survey. To ensure that samples are correctly collected, preserved, labelled and stored. He is in charge of distribution of samples to final destinations. To supply Logistic Coordinator with list of the samples collected during the survey in Excel format and drafting survey reports.

Issues resulting from conflict between FV crew and scientific crew to be resolved between CL and FV Captain.

13.6 Cooperation, training and capacity building

An important component of this survey is to provide training and research opportunities to students and scientists from the partner countries. Building capacity and the development of new knowledge will be combined by providing technical assistance in ship-based sampling to better understand ecosystem composition and functioning, assessing the primary biological and ecological interactions in the food web and the direct interactions brought about by the fisheries in the ecosystem.

13.7 Waste Management

Waste management on-board should follow MARPOL Convention regulations (see Appendix B: MARPOL Convention Annex V on waste management). All chemical waste (chemicals from the laboratories must be stored in separate containers (preferably glass) and correctly labelled with the chemical name and the word WASTE. Under no circumstances may the following take place:

- Dumping chemical waste down the drain or over the side
- Mixing of chemical waste (only one chemical per bottle allowed)

Note: It is the Cruise Leader responsibility to ensure the following with regard to hazardous materials:

- MSDS sheets are to be furnished for each hazardous material (3 copies)
- All hazardous material users are to be trained in their use
- Personal Protective Equipment (PPE) are to be provided to the users
- Emergency spill kits must accompany any hazardous material brought aboard

13.8 Code of Conduct, Safety Awareness & Safety at Sea

SWIOFP survey cruises Code of Conduct and Safety at Sea and Safety Awareness Rules are detailed in appendix C, D & E. This rules and regulations apply to all scientific personnel embarked on a SWIOFP survey cruise, please follow them carefully.

Note:

- ⇒ *Failure to comply with code of conduct will result in you not being allowed to embark with another survey cruise.*

14. APPENDIX

Appendix A: Dropline Gear Specifications

Droplines are often referred to as vertical longline. The dropline specifications recommended for these surveys are taken from the Seychelles model, which was modified from dropline gear developed in the Pacific for targeting deep slope snappers and groupers.

A description of the standardised dropline gear for use on all KMFRI surveys is set out below

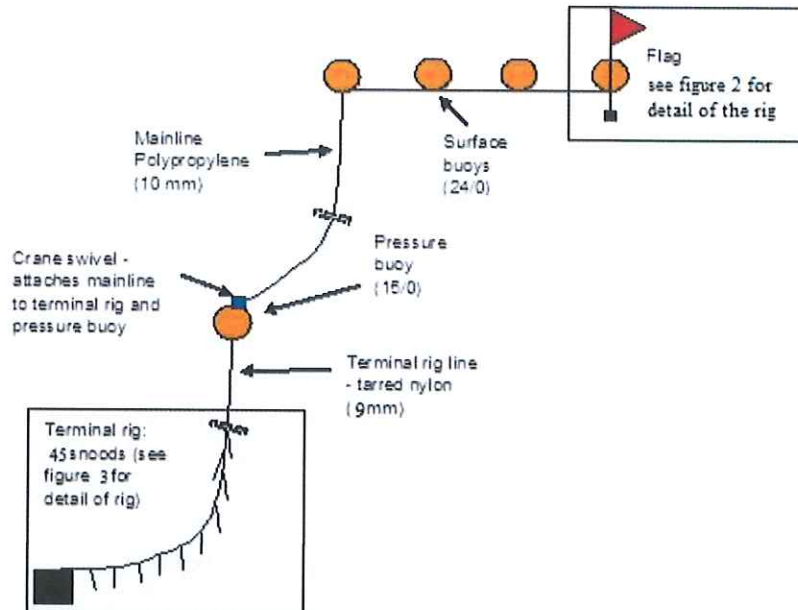


Figure 1: Schematic of a dropline illustrating primary gear specifications.

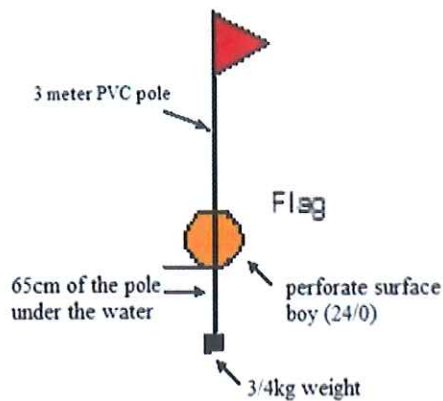
The gear, shown in Figure 1, has three main components:

1. Marker buoy (4 buoys: 24/0) and flagged surface line
2. mainline to which are attached surface and pressure buoys
3. weighted terminal rig (Figure 1).

A crane swivel connects the terminal rig to the mainline, where a pressure buoy (15/0) is mounted to maintain the terminal rig in the water column. The length of the mainline is adjusted for depth, whereby 30% extra line is added for the targeted depth to compensate for current drag on the line, after accounting for the length of the terminal rig (30 m).

1. Marker buoy.

The setup is shown in the Figure 2.



Flagged unit consists of a 3m PVC pole, installed on a perforate surface boy (65cm of the pole should be under water) carrying a conspicuously coloured flag at the top and, to keep it upright in the water, a 3 - 4kg weight at the bottom (figure 2).

Figure 2. The main line

This is constructed from 200m lengths of 10mm polypropylene. At the surface end the first 200 m length has 3 or 4 buoys (24/0) at 8 metre intervals from the marker buoy. At the lower end is attached a single pressure buoy (15/0). A second 200m length is attached at the pressure buoy and further 200m lengths if required due to the depth of the water.

The total length of the mainline is adjusted for the depth of fishing so as to ensure that the terminal rig weight is on the bottom and that there is sufficient slack in the mainline to ensure that the surface floats do not sink.

Mainline length =

- Top mainline 175m (200m minus buoyed component)
- 2nd mainline 200m
- 3rd mainline 100m.
- Terminal line length (45m)

It is important to make a careful estimate of the length of mainline that is required for each deployment. This is to ensure that there is sufficient line to take the terminal to the bottom but not so much slack in the line that the terminal line might deviate markedly from the vertical. The length of mainline required should be estimated from the water depth, an allowance for currents and wind effects. Example calculations are shown in Table 1.

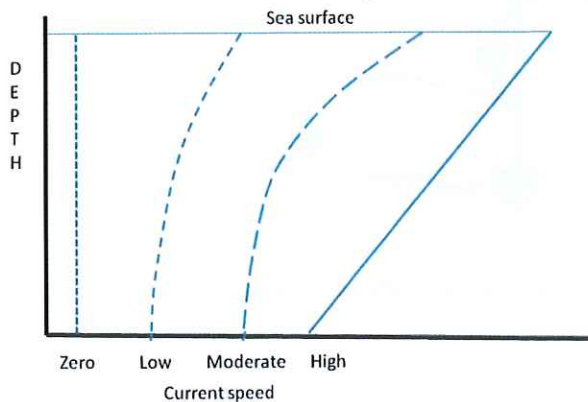


Figure 3. Approximate theoretical shape of the mainline under different conditions of current and depth.

Depth Stratum	Max Depth (m)	Terminal rig length (m)	Top (m)	1 st (m)	2 nd (m)	Total effective length of Main and Terminal lines (m)	Depth Allowance (10% depth) (m)	Line required: (Max Depth + Depth allowance) (m)
1	200	45	175			220 (175+45)	20	220 =200+20
2	300	45	175	200		420 (175+200+45)	30	330 =300+30
3	425	45	175	200	100	520 (175+200+100+45)	40	470 =425+42.5

Table 1- Example calculations

2. Terminal rig.

The terminal rig line (Fig 4) is constructed from tarred nylon rope (9 mm) to the end of which is attached a 10-12 kg weight (eg condemned anchor chain). There are 45 snoods composed of (30cm long) monofilament (1.8 mm) lines that are set at 45 cm intervals along the terminal rig (figure 4). Snoods are attached to the terminal rig line using crane swivels (8/0; 50 kg tested), that are prevented from slipping down the line by the introduction of figure of eight knots either side of the swivel. Snoods end in tuna circle hook (Mustad). At intervals of every 15 snoods on the terminal rig line, crane swivels (9/0) are placed to allow for rotation of the line.

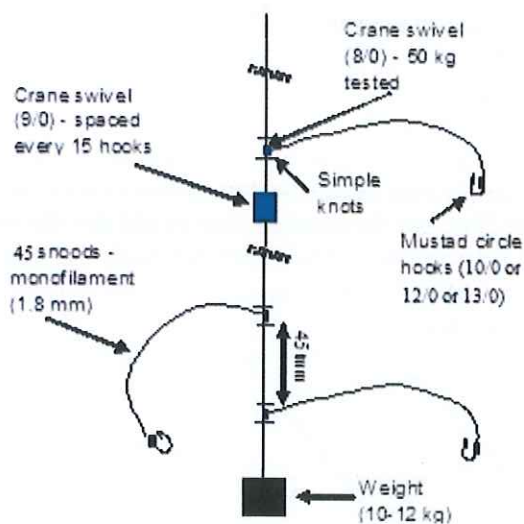


Figure 4: Schematic and details of the dropline terminal rig.

Appendix B. Long line gear specifications

Longlining is a passive fishing technique making use of lines with baited hooks to attract and catch fish. Pelagic longline system are also termed as drifting longlines because the gear is not anchored and typically drifts with the ocean currents while fishing.

Pelagic longlines target fish at or near the surface such as tuna, swordfish and some shark species as well as a range of other oceanic species. The depth that hooks are set often influences the catch and some of the larger industrial longliners can set their hooks down to 300m targeting larger mature individuals of species such as yellowfin, bigeye and southern bluefin (termed deepwater or mid-water longlining).

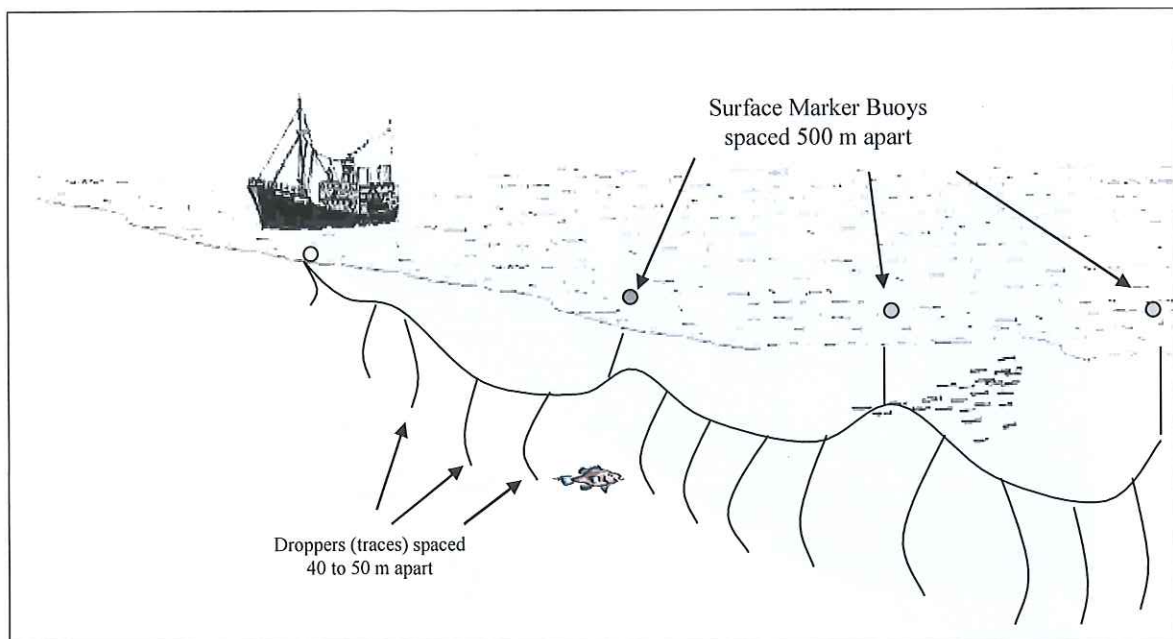


Figure 5. Long line gear for fisheries

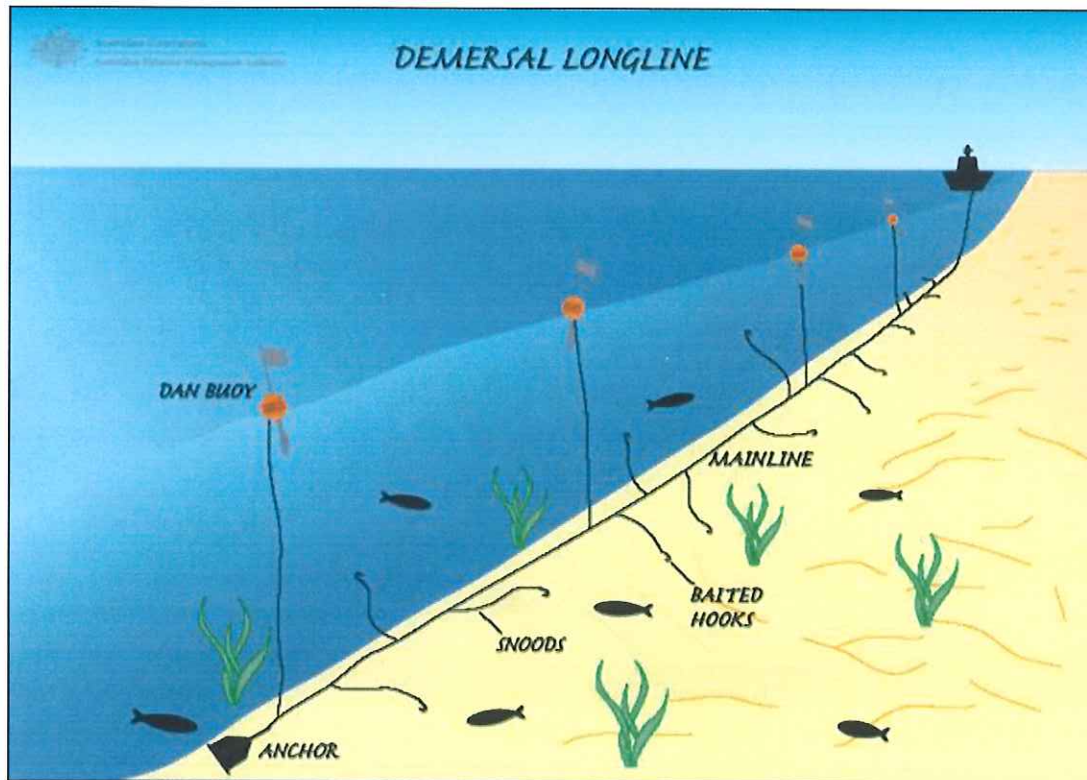
Similar to other hook and line methods, demersal longlining is a passive fishing technique making use of baited hooks to attract and catch fish. Demersal longlines are weighted and set onto or close to the seabed and are anchored at each end.

The lengths of demersal longlines can vary greatly. Inshore artisanal longlines may have only a few hundred hooks and extend less than one kilometre. Larger commercial longliners can set lines over 30 km long with more than 30000 hooks in depths over 2000m.

A number of variations exist in demersal longline design, including single lines, double lines, trot lines and vertical drop lines. A single line system consists of a single mainline with snood spaces at short intervals of 1 to 2 meters apart along its length. The line can be made up out of rope or cord that is normally negatively buoyant. Weights may be attached at intervals along its length to increase its sink rate and hold the line onto the seabed. Modern single line systems have a lead core integrated into the mainline to increase its weight, called integrated weighted lines (or IW lines). The advantage of a single line system is that it can be automated and

together with automatic baiting machines a large number of hooks can be set and hauled in comparison to other systems and these can be operated with fewer crew.

The disadvantage of single lines is that they are restricted to relatively flat or soft grounds. If the line gets fouled and breaks along its length the only recourse is to haul from its opposite end. Should the line foul again, there is a danger of the gear being lost.



Appendix C: Data sheets to be used during survey

ADL FORM 1: VESSEL & GEAR DETAILS <i>(to be completed before departing port for survey)</i>			
Recorder Name:		Vessel Name:	
Survey Code:		Nationality:	
VESSEL DETAILS			
LOA (m)		Average Speed (knots)	
Breadth (m)		Main engine (type)	
Draft (m)		Engine power/RPM	
GRT (tons)		Range (km and days)	
Radar type		Scientific Echo sounder 1	EK60/38kHz
GPS type/plotter		Scientific Echo sounder 2	EK60/70kHz
Communication type(s)		Hydraulic line hauler specs.	

No. of berths		Scientific crew N° and nationality			
Crew no.					

GEAR DETAILS				
Serial N°	Hook Model	Hook size	No. of snoods per rig	Depth rating
DL10	Mustad tuna circle hook	10/0	45	40-600
DL12	Mustad tuna circle hook	12/0	45	
DL13	Mustad tuna circle hook	13/0	45	

BAIT DETAILS			
Bait Type	Species	FAO code	Weight (kg)
Squid			
Fish			

FORM 3	Dropline Fishing Station Log
Recorder Name:	Event Number: DL
Survey Code: MRT2012C315	Date: / / 2012 Form No:

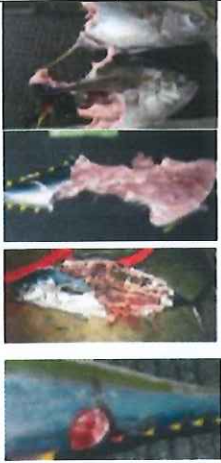
SETTING												
Flag Colour Time Weight dropped Latitude (deg S) Longitude (deg E) Depth (m) Wind direction (dir) Wind speed (Beaufort) Current Speed (kn) Current direction (deg) Hook Size Bait	1		2		3							
HAULING												
Time Buoy lifted Latitude (deg S) Longitude (deg E) Depth (m) Fishing interactions PET Section of Line Hooks with NO bait (N) Hooks missing (N) Fish landed (N) Fish lost or returned (N) Fish predated (N) Fishing interactions PET Comments												
	Yes No		Yes No		Yes No		Yes No		Yes No			
	Top Mid Bot			Top Mid Bot			Top Mid Bot			Top Mid Bot		
	Yes No		Yes No		Yes No		Yes No		Yes No			

FORM 7: DEPREDATION

This form is to be completed for each depredation event.

1. Observer Name:		3. Vessel name:	
2. Trip N°:		4. Vessel Reg. No.:	

Event N°.	Spp Code	7. NUMBER OF FISH MAULED PER TYPE OF DEPREDATION (√)								8.TOTAL
		MM	SHA	SQU	IBR	MM IBR	SHA IBR	SQU IBR	UKN	



Predation by marine mammals (MM): Identified by bite marks of irregular contours often accompanied by long pieces of skin and tendons; often only the head or mouth parts remain attached to the hook, being usually the result of a single bite; The fish looks crushed and shredded; Damage usually recorded to several fish in a single set.

Predation by large sharks (SHA): Identified by clean bite marks with few if any large piece of flesh attached, shark bite marks are more like cuts and lacerations than perforations, the cut of each tooth is sometimes visible on the surface of the wound, abrasion and superficial cuts often the result of several bites.

Predation by squid (SQU): identified by injuries of irregular sizes and irregular edges, with significant traces of suction on the skin at the wound edge and the fish's body; Fish vertebrae and column, when visible, are pretty clean. Injuries provoked by squid predation can be found any were on the fish body.

Depredation by *Isistius brasiliensis* (IBR: cookie shark): Identified by circular or oval injuries with sharp edges and a very concave shape. Injuries can be located anywhere on the body but most often on its lower part.

Double depredation: *Isistius brasiliensis* + another spp.

ADL Forms Codes

Form 2

ACTIVITY CODE			
PO	In port or at anchor	AT	Acoustic transect
SD	Steaming (on passage) during the day	AD	Acoustic drift station
SN	Steaming (on passage) during the night	NM	Acoustic noise measurement
DL	Set of three droplines	CT	CTD cast

Form 4

SEX CODE	
M	Male
F	Female
I	Immature / Inactive
U	Undetermined

MATURITY STAGE	
I	Immature
II	Inactive
III	Active
IV	Running / ripe
V	Spent

STOMACH FULLNESS	
0	Empty
1	1/4 full
2	Half full
3	3/4 full
4	Full
5	Distended
U	Undetermined

STOMACH CONTENTS	
FI	Fish
JF	Jelly fish
CR	Crustaceans
OT	Other (detail)
U	Undetermined

Form 5

TYPE OF OBSERVATION	
S	Systematic
C	Casual

CODE SHIPS ACTIVITY			
DIS	Discarding	SHO	Shooting
DRI	Drifting	STE	Steaming
HAU	Hauling	OTH	Other (describe)

CODE FISHERIES INTERACTION			
HA	Eating from the haul	FD	Catch depredation
DI	Eating from vessel discards	NO	None
BD	Bait depredation	UK	Unknown

Form 6

CODE INCIDENTAL TAKE	
UK	Unknown
OT	Other describe in comments
HB	Hooked, beak, bill or mouth
HI	Hooke, ingested
HH	Hooked, head
HF	Hooked on the flipper, fins or wings
HC	Hooked carapace
HO	Hooked other
EN	Entangled
EF	Entangled with FAD
WP	Caught on the warps
TR	Caught in the trawl
GF	Entangled in ghost fishing gear

CODE FATE	
RET	Retained
UNK	Unknown
DC0	Discard reason unknown
DC1	Discard, dead, undersize
DC2	Discard, dead, depredated
DC3	Discard, dead, no commercial value
DC4	discard, dead, finned
DC5	Discard, dead
A0	Released- Alive conditions not determined
A1	Alive and in good health condition (hook removed)
A2	Alive, minor injuries / stressed high probability of survival
A3	Alive, life threatening injuries unlikely to survive (hook not removed)

Appendix D: Biodiversity protocols

Figure 1 – Sea Turtles species ID

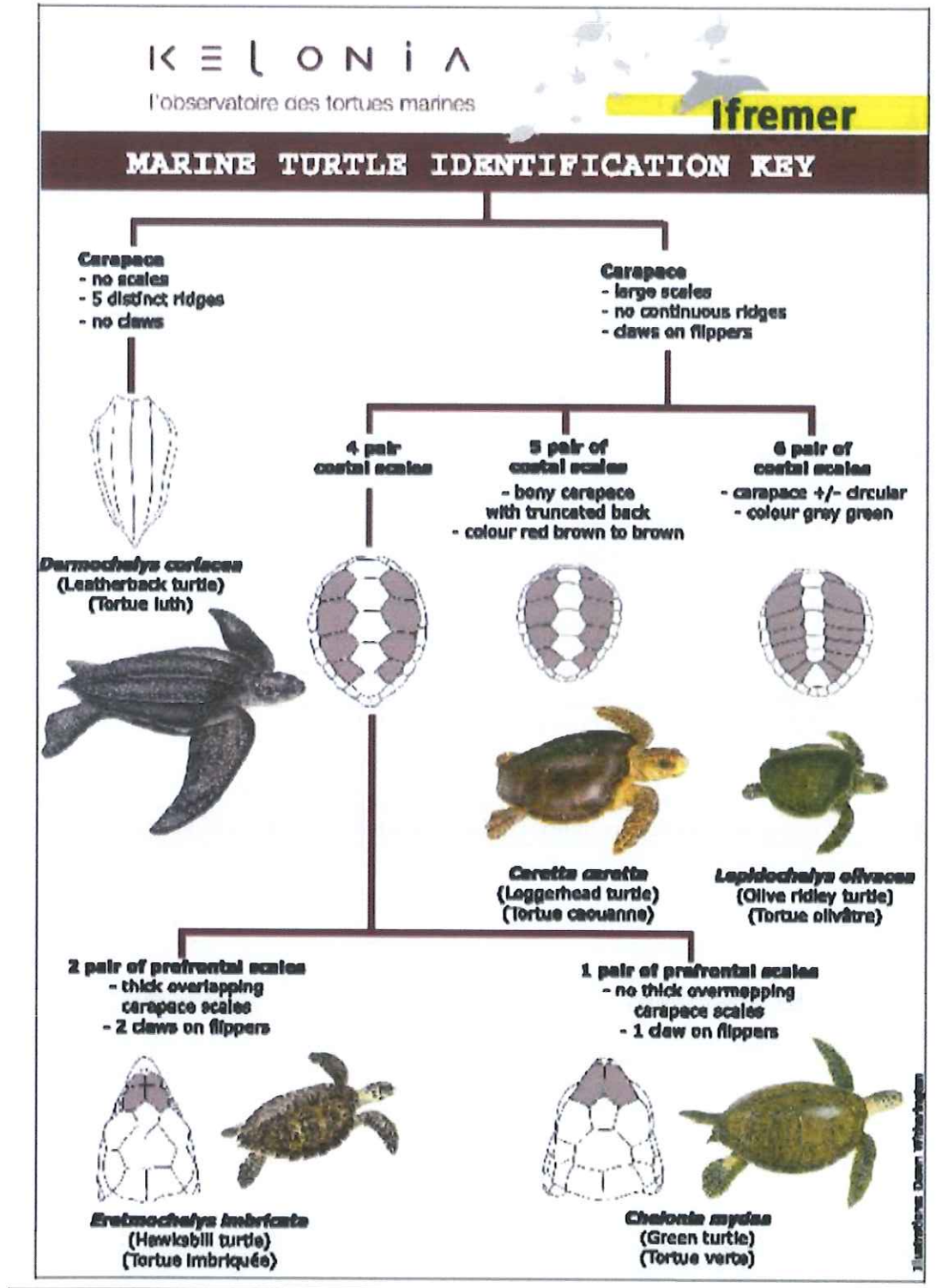
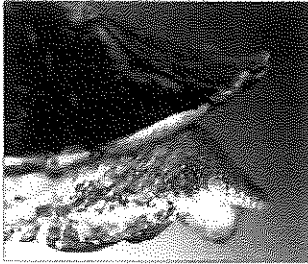
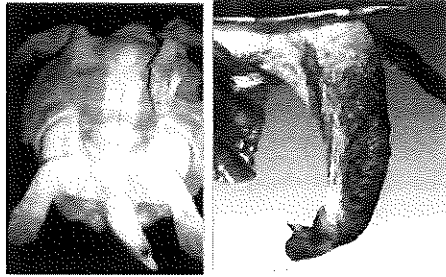


Figure 2 – Sea Turtles sex ID



Adult females differ little in external morphology from large, immature males. Typically, females have a short tail and the cloacal opening (vent) is located roughly half way between the tip of the tail and the plastron anal scute. The picture of an adult female Kemp's ridley shows the short tail and cloaca located proximally - these are characteristics of females and immature males.



Adult males are characterized by a long tail with the cloacal opening near the tip, and strongly curved claws on the second digit.

Tail and penis of a Kemp's Ridley, the long tail and distally positioned vent are distinctive of adult male turtles.

Figure 3 – Sea turtle resuscitation methods

Acupuncture Protocol for Sea Turtle Resuscitation 2006

Dr. Steve Canton, Biologist, Acupuncturist and Phillip Rogers D.V.M., MRCVS, Veterinary Acupuncturist

A turtle found stranded or caught in a net may appear to be dead, in a coma, or in shock; having lost or suppressed reflexes and showing no signs of breathing.

Most turtles caught by shrimp trawlers, under conditions of forced submergence, are not drowned but in a coma (ref.1, *The Decline of the Sea Turtle*, 1990. A 1989 study by NMFS of 7 research projects spanning 12 years during which 4,397 turtles were caught in trawler nets found that for most low times, there were more comatose than dead turtles.)

Although a comatose turtle may revive on its own after several hours on dry land, the fate of a comatose turtle directly returned to the sea is unknown. It is reasonable to assume that they will die (Kemmerer 1989). Applying the Acupuncture Protocol for Sea Turtle Resuscitation should revive the turtle in 30 seconds to 10 minutes, depending on the circumstances of the individual trauma.

The acupuncture points recommended here have been used to resuscitate humans and animals in acute emergencies including shock, coma, cardiac arrest, asphyxia, respiratory failure, and drowning. (ref. 2, *Emergency Acupoint Renzhong (GV26)*, A bibliography and review from textbook sources, Phillip Rogers, D.V.M., MRCVS, and Roman Skarda D.V.M.)

Please report all intervention outcomes to:

Turtle Emergency Resuscitation Trial at www.casatoruga.org
 Dr. Steve Canton/Turtle Rescue Ops, energetic@centurytel.net
 Karen Comstock/Executive Director, turtles@casatoruga.org

Or send to:

Casa Tortuga Inc., P. O. Box 60, Port Aransas TX 78373

Acupuncture Protocol for Sea Turtle Resuscitation

If the turtle appears to be in shock, coma, respiratory and/or cardiac arrest, appears drowned or has been pronounced clinically dead, use this procedure.

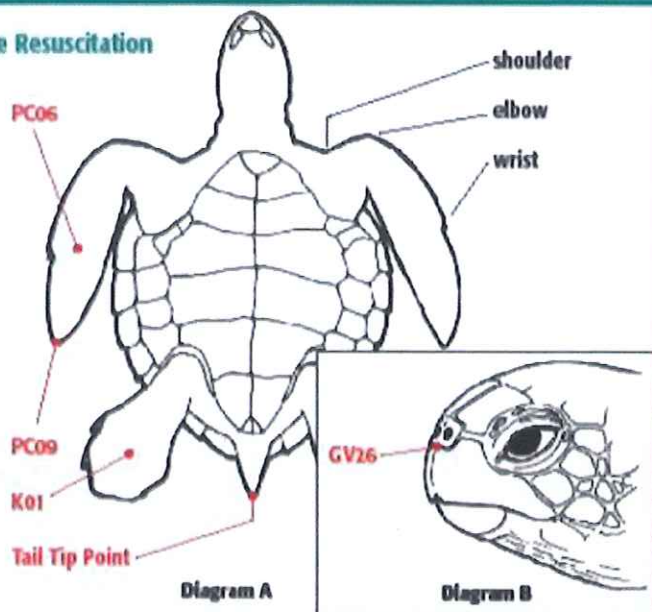
All needle insertions are perpendicular to the surface and applied bilaterally.

1. Insert a needle (acupuncture needle, sewing needle, straightened fish hook, or other sharp implement) 1/4 to 1/8 inch into point GV26 shown in Diagram B. Stimulate the point by rotating the needle vigorously for 30 seconds.

2. Insert a needle (or other sharp implement) into the Tail Tip point shown in Diagram A and stimulate vigorously for 30 seconds.

If the turtle appears revived, stop stimulating the points and remove the needles from the GV26 and Tail Tip points after 10 minutes.

3. If vital signs do not return within 30 seconds, leave the needles inserted at GV26 and Tail Tip, but add needles bilaterally at cardioactive points, such as PC06 or PC09, and continue vigorous twirling/"sparrow-pecking" stimulation intermittently for up to 30 minutes.



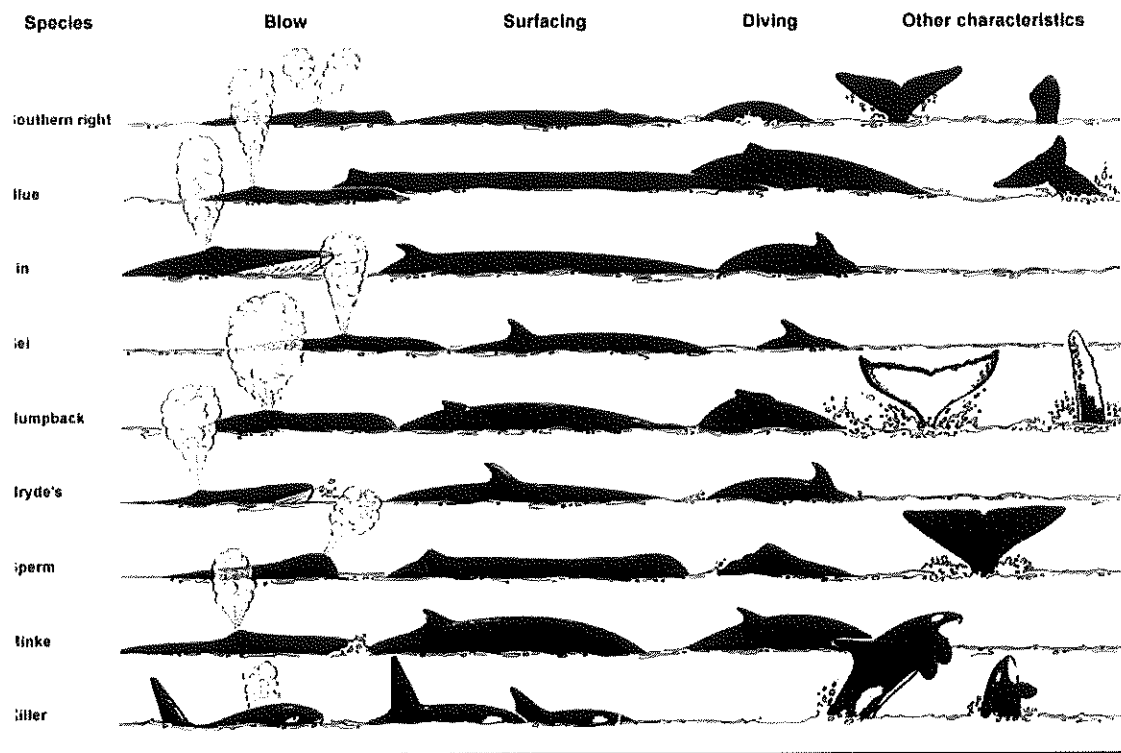
Recommended Acupuncture Points for Resuscitation Trial

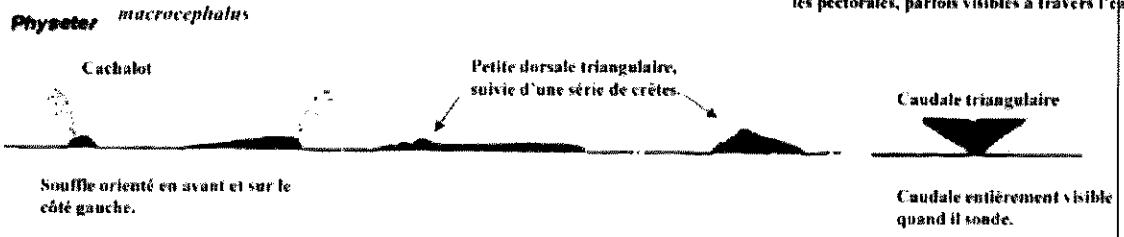
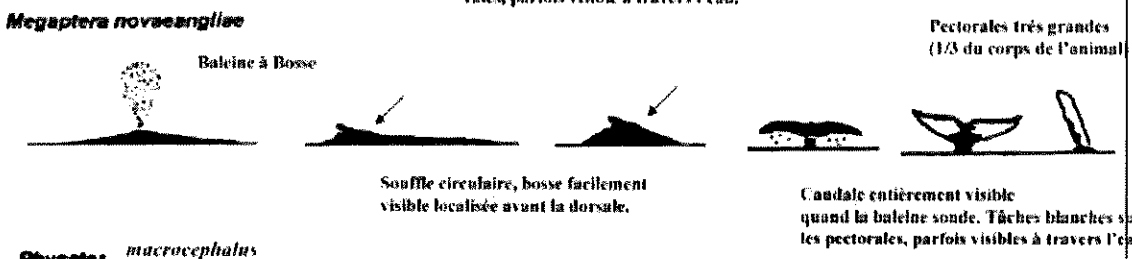
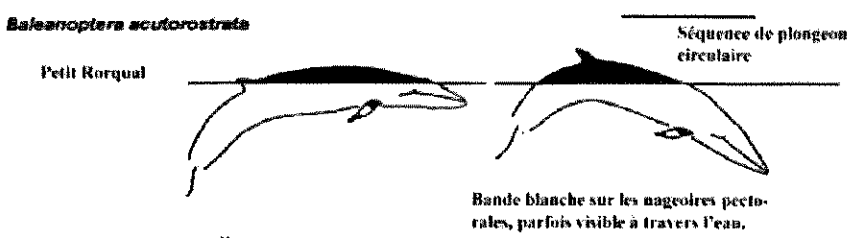
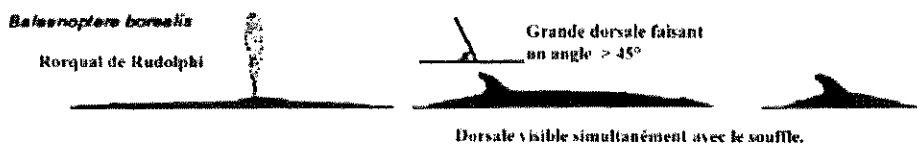
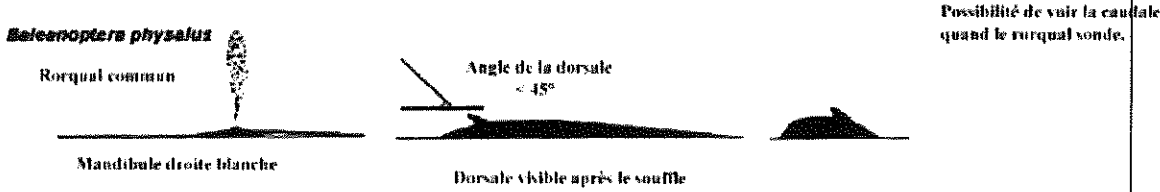
(All needle insertions are perpendicular to the surface and applied bilaterally.)

1. **GV26** center of the horizontal line joining the lower edge of the nostrils
2. **Tail Tip** point underside of the tip of the tail
3. **PC09** tip of both front flippers
4. **PC06** underside of both front flippers 1/6 distance between elbow and wrist (midline between radius and ulna)
5. **K01** middle of the underside of both rear flippers (alternate point for consideration in drowning)



Figure 4 – Large whales dive blow, surfacing and dive sequences





Appendix E: Environmental conditions

Force	Name	Wind Speed (Knots)	Wave Height (Meters)	Visible Sea State
0	Calm	0 to 1	0	Sea like a mirror
1	Light Air	1 to 3	0.1 to 0.2	Ripples with appearance of scales: no foam crests: sea still has glassy appearance.
2	Light breeze	4 to 6	0.3 to 0.5	Small wavelets: crests have glassy appearance but do not break.
3	Gentle breeze	7 to 10	0.6 to 1.0	Large wavelets: crests begin to break: few scattered white horses.
4	Moderate breeze	11 to 16	1.5	Small waves, becoming longer: fairly frequent white horses.
5	Fresh breeze	17 to 21	2.0	Moderate waves, longer form: many white horses and scattered spray.
6	Strong breeze	22 to 27	3.5	Large waves forming, white foam crests extensive everywhere and spray.
7	Moderate gale	28 to 33	5.0	Sea starts to heap up and white foam breaking waves begin to be blown in streaks: spindrift begins to be seen.
8	Fresh gale	34 to 40	7.5	Moderately high waves of greater length, edges of crests break into spindrift: foam blown into well-marked streaks.
9	Strong gale	41 to 47	9.5	High waves; dense streaks of foam; sea begins to roll; spray begins to affect visibility.
10	Whole gale	48 to 55	12.0	Very high waves with overhanging crests; sea surface takes on white appearance as foam in great patches is blown in very dense streaks; rolling sea and visibility reduced.
11	Storm	56 to 64	15.0	Exceptionally high waves; sea covered with long white patches of foam. Small and medium sized vessels lost to view between waves. Visibility further reduced.
12	Hurricane	64 +	15 +	Air filled with foam and spray; sea completely white with driving spray; visibility greatly reduced.

Appendix F: Fish Generic Maturity Stage Index

Generic maturity staging indices are not ideal as macroscopic criteria often do not encompass the variation in appearance of ovaries or testis across taxa. Due to uncertainty in species composition at most selected survey locations, and the fact that species-specific macroscopic indices are not available for many of the deep slope species targeted by the surveys, a generic index is used for the initial surveys. Subsequent surveys may warrant dedicated studies of reproductive biology for the principal species, or adoption of specific criteria for certain species if available in the literature.

Macroscopic Criteria for Staging Gonads

Immature Individuals

I Immature.

Sex indistinguishable. Small, strand-like and compact tissue running length of abdominal cavity. Oocytes or sperm indiscernible. Pink or cream in colour. Difficult to distinguish between immature and inactive males or females*.

Females

II Mature inactive female.

Ovary small but rounded, less strand-like in appearance. Gonad wall thickened, grayish in colour. Oocytes small and not clearly discernible. Similar in appearance to mature, inactive males.

III Mature active female.

Large increase in size of ovaries with thinning or transparent gonad wall and rounded structure; large, tightly-packed vitellogenic oocytes visible through gonad wall. Granular texture when cut.

IV Running ripe female.

Greatly enlarged ovary with hydrated oocytes clearly visible through thin, translucent ovary wall. Egg release possible with application of light abdominal pressure.

V Spent.

Ovary still enlarged, thick-walled and flaccid with obvious capillaries. May be purple or dark red in color.

Males

II Mature inactive male.

Not easily distinguishable from inactive females.

III Maturing male.

Testis enlarged and rounded, often grayish in appearance. Generally thin and smooth testicular wall

IV Running ripe male.

Testis large and white in appearance with sperm visible in sinuses. Freely exudes milt with gentle abdominal pressure and on dissection.

V Spent.

Testis prominent and flaccid, sometimes bloody. Traces of sperm may still be present on applying abdominal pressure or on dissection.

*: When not possible to distinguish between immature and inactive males and females, stage should be recorded as '**Undetermined inactive**' (UI)

Appendix G: MARPOL Convention (1973) Annex V – Regulations for the prevention of pollution by garbage from ships; regulation 1, 2 & 3.

**ANNEX V
REGULATIONS FOR THE PREVENTION OF POLLUTION BY GARBAGE
FROM SHIPS**

Regulation 1

Definitions

For the purposes of this Annex:

1) "Garbage" means all kinds of victual, domestic and operational waste excluding fresh fish and parts thereof, generated during the normal operation of the ship and liable to be disposed of continuously or periodically except those substances which are defined or listed in other Annexes to the present Convention.

2) "Nearest land". The term "from the nearest land" means from the baseline from which the territorial sea of the territory in question is established in accordance with international law except that, for the purposes of the present Convention "from the nearest land" off the north eastern coast of Australia shall mean from a line drawn from a point on the coast of Australia in

latitude 11°00' South, longitude 142°08' East to a point in latitude 10°35' South,
longitude 141°55' East, thence to a point latitude 10°00' South,
longitude 142°00' East, thence to a point latitude 9°10' South,
longitude 143°52' East, thence to a point latitude 9°00' South,
longitude 144°30' East, thence to a point latitude 13°00' South,
longitude 144°00' East, thence to a point latitude 15°00' South,
longitude 146°00' East, thence to a point latitude 18°00' South,
longitude 147°00' East, thence to a point latitude 21°00' South,

longitude 153°00' East, thence to a point on the coast of Australia in latitude 24°42' South, longitude 153°15' East.

- 3) "Special area" means a sea area where for recognized technical reasons in relation to its oceanographical and ecological condition and to the particular character of its traffic the adoption of special mandatory methods for the prevention of sea pollution by garbage is required. Special areas shall include those listed in Regulation 5 of this Annex.

Regulation 2

Application

The provisions of this Annex shall apply to all ships.

Regulation 3

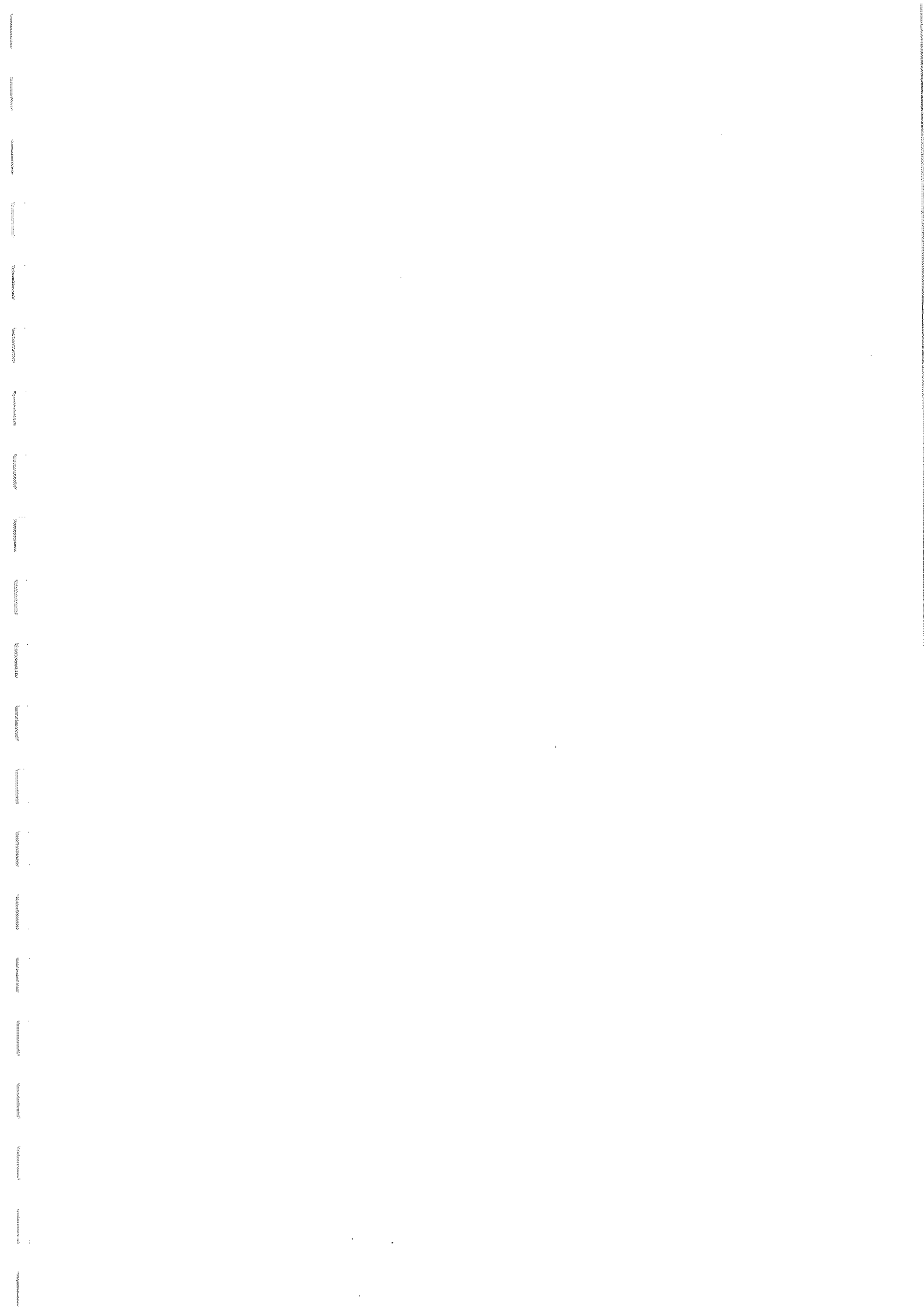
Disposal of garbage outside special areas

- 1) Subject to the provisions of Regulations 4, 5 and 6 of this Annex:
- (a) the disposal into the sea of all plastics, including but not limited to synthetic ropes, synthetic fishing nets and plastic garbage bags is prohibited;
 - (b) the disposal into the sea of the following garbage shall be made as far as practicable from the nearest land but in any case is prohibited if the distance from the nearest land is less than:
 - (i) 25 nautical miles for dunnage, lining and packing materials this will float;
 - (ii) 12 nautical miles for food wastes and all other garbage including paper products, rags, glass, metal, bottles, crockery and similar refuse;
 - (c) disposal into the sea of garbage specified in sub-paragraph (b)(ii) of this Regulation may be permitted when it has passed through a comminuter or grinder and made as far as practicable from the nearest land but in any case is prohibited if the distance from the nearest land is less than 3 nautical miles. Such comminuted or ground garbage shall be capable of passing through a screen with openings no greater than 25 millimetres.
- 2) When the garbage is mixed with other discharges having different disposal or discharge requirements the more stringent requirements shall apply.

Appendix H: Conduct onboard

1. Scientific personnel shall comply with requirements established in the laws and regulations of the FV flag State;
2. Scientific personnel shall respect the hierarchy and general rules of behaviour, which apply to all vessel personnel;
3. All scientific personnel is under the authority of the Captain regarding vessel operations (sailing, docking, fishing) and safety at sea;
4. All scientific personnel is under the authority of the Chief Scientist regarding scientific work and operations;
5. Scientific personnel has no authority to direct any of the vessels operational activities, nor has any authority over the vessels personnel;
6. No working clothes are allowed in the accommodation or in the mess room. It is normal practice to change into clean clothes before going to the mess;
7. Mealtimes should be strictly adhered to. Scientific work should be adapted in order to adhere the best as possible to vessel mealtimes. If for any reason scientific personnel is not able to meet these times, CS or CL must be make arrangements with the cook;
8. Scientific personnel living and working areas must be kept clean and tidy.
9. Smoking is not allowed in any enclosed area.
10. All gear and equipment must be kept clean and secured when not in use.
11. Scientific personnel must be aware and sensitive to the cultural practices of other members onboard. Cultural awareness include:
 - Manners of approach and address to FV officers, crew and fellow colleagues;
 - Awareness of eating customs;
 - Awareness and respect of religious practices;
 - Awareness of ablution and sanitary customs.
12. Scientific personnel individual practices (including religious practices) should not interfere with scientific work and schedule onboard.
13. Adequate washing and shower facilities are available on all vessels. In tropical conditions it may be necessary to change your clothes daily. Enquire as to the washing and drying facilities onboard and make use of these. Washing clothes and hanging them out to dry in your cabin is not hygienic. Washing and hanging clothes up in the showers or bathrooms may also be offensive to others.
14. Sea sickness usually occurs in the first 12 to 24 hours after sailing and can also be weather dependant. Should symptoms persist for longer than 24 hours together with vomiting, be aware of dehydration and drink sufficient water to replenish lost fluids. Methods to prevent or alleviate sea sickness are:
 - Avoiding alcohol and fatty and spicy foods, try eating dry crackers or plain toast or cereals;
 - Drinking plain bottled water or natural low acid juices with a low sugar content;
 - Avoiding citrus juices, milk and coffee;

- Avoiding confined spaces and remaining in fresh air (breathe deeply);
- Focusing on the horizon (helps to stabilize the visual conflict in the brain);



Annex 5

**Kenyan Marine & Fisheries Research Institute RV Mtafiti Cruise Technical
Report, Annex 2 (6-21 February 2017)**



KENYA MARINE AND FISHERIES RESEARCH INSTITUTE



OCEAN AND COASTAL SYSTEMS RESEARCH DIVISION

Fish Biomass and the Environment of Kenya's Exclusive Economic Zone (EEZ) Off
Kilifi County (Block 2)

RV MTAFTI Cruise Technical Report

Cruise Dates: 6th – 21st February 2017.

Cruise Number: RVM/02/2017



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Mombasa, March 2017

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DOCUMENT CERTIFICATION

Certification by Assistant Director Marine and Coastal Fisheries Research:

I hereby certify that this report has been done under my supervision and submitted to the Director.

Signature _____ Date: _____

Name _____

Certification by the Director, Kenya Marine and Fisheries Research Institute:

I hereby acknowledge receipt of this report.

Signature _____ Date: _____

Name _____

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LIST OF ACRONYMS AND ABBREVIATIONS

CPUE	The nominal catch rate
dB	Decibels
DO	Dissolved oxygen
EACC	East Africa Coastal Current
ECC	Equatorial Counter Current
EEZ	Exclusive Economic Zone
FOS	Foot of slope at its base
GAM	Generalized additive model
GEBCO	General Bathymetry Chart of the Ocean
H'	Shannon Weaver diversity
ITCZ	Inter-Tropical Convergence Zone
MBES	Multi-beam echo sounder
Mt	Metric tonne
NEM	Northeast monsoon
NGDC	National Geophysical Data Center
nm	Nautical miles
NO ₃	Nitrate
NOAA	National Oceanic and Atmospheric Administration
POC	Particulate organic carbon
SC	Somali Current
SEM	Southeast monsoon
Si(OH) ₄	Silicate
TS	Target strength
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
WIO	Western Indian Ocean

EXECUTIVE SUMMARY

The acquisition of RV Mtafiti has enabled Kenya Marine and Fisheries Research Institute (KMFRI) and by extension Kenya venture into deep sea surveys. Kenya aims to collect data and information on the marine environment and the resources therein to support exploitation and management planning. To achieve this goal, and other regional and international obligations KMFRI has planned extensive surveys using RV Mtafiti during the next few years. To effectively cover the EEZ, four survey blocks were identified as follows:

- 1) Territorial waters from Vanga in the South to Lamu in the North.
- 2) Block 1 off Lamu county
- 3) Block 2 off Kilifi county
- 4) Block 3 off Kwale county

The plan envisages surveying the above identified blocks during both the Northeast Monsoon (NEM) and Southeast Monsoon (SEM) seasons during the year. This is because the monsoon climate variability controls the currents and subsequently the marine productivity and fish abundance. This report provides the results of the survey conducted in Block 2 off Kilifi County on the 6th – 21st of February 2017. The outputs from the survey provide an indicator of productivity and estimates of fish biomass, sea bottom morphology and biodiversity hotspots in the EEZ. Understanding the seasonal variations in occurrence will be important to obtain a more comprehensive picture.

The fish biomass estimates of the surveyed block were estimated at 745,590 tons. Overall the fish biomass was highest in shallow water less than 100m deep with low biomass in deep waters greater than 350m.

The extrapolated bathymetry surface generated is highly indicative due to the wide spacing of data points and cruise tracks. The surveyed water depths (bathymetry) ranged between as low as 90m to 4400m deep. A few unique bathymetric features were observed among them seamounts (some as high as 250m) and deep-sea canyons/trenches (some as deep as 500m). There is therefore a need to further survey these features especially with full sea floor coverage techniques e.g. multibeam echo sounder (MBES) to ascertain their orientation and lateral extents. This information subsequently assists in determining the processes and geological evolution of the Kenyan Ocean basin.

Key words: Kenya EEZ, hydro acoustics, fish biomass, bathymetry, nutrients, productivity

1.0 INTRODUCTION

Kenya has access to extensive marine resources provided for by international laws that govern maritime zones. As a maritime state, Kenya has proclaimed the 200 nautical miles (nm) EEZ as provided for by United Nations Convention on Law of the Sea (UNCLOS) and has an ocean area of about 142,000 km² as per the 200 nm Exclusive Economic Zone (EEZ limit). Kenya has further applied for an extra 150 nm EEZ extension for exploitation of ocean bottom resources, extending the coverage by an additional 103,000 km². This makes a total ocean area of 245,000 km² which is 42% of her total land area (580, 370 km²) making Kenya a significant maritime state. The ocean is becoming a new focal point in the discourse on growth and sustainable development, both at national and international levels.

The marine environment in Kenya is determined by the movement of the Inter Tropical Convergence Zone which drives ocean currents, winds and other climatic factors. There are four oceanic currents influencing Kenya's coastal waters, namely the East African Coastal Current (EACC), the Somali Current (SC), the Southern Equatorial Current (SEC) and the Equatorial Counter Current (ECC) (UNEP, 1998). When it reaches the African coast at Cape Delgado, the SEC diverges into two currents—the Mozambique Current, which flows southwards, and EACC, which flows northward (UNEP, 1998; Obura, 2001). The Somali Current and Monsoon winds both influence the distance the EACC travels up the East African coast. During the South-East Monsoon (April to October), the EACC joins the Somali Current beyond Malindi and flows northwards to the Horn of Africa. However, during the North-East Monsoon (November to March), the EACC meets the opposing Somali Current off the northern part of the Kenya coast and flows eastwards forming the East Africa Counter Current. The meeting of the two currents causes upwelling drives an upwelling which is responsible for the high productivity in the northern Kenyan coast (UNEP, 1998).

Kenya's pelagic fishery resources are mainly exploited by a fleet of purse seiners and long liners from Distant Fishing Nations (DFN) including the European Union (EU), mainly Spain and France, and the Far East, mainly Taiwan, China and Japan. This fleets target tuna species within the EEZ by paying for an annual fishing licence. The licence obliges the fishers to provide catch data by producing log-books to the government. However, the data provided by the fishers is scanty and unreliable.

On the other hand, the coastal tuna, small and medium pelagic stocks are targeted by small scale fishers using long line and ring nets within the territorial waters. The small-scale tuna fishery is estimated to and between 300 and 500 mT annually according to the State Department of

Fisheries (SDF) fish landing statistics. In Kenya, fishery production is concentrated within shallow inshore areas due to the limitation of fishing gears and vessels. Deep water fish demersal stocks as well as pelagic stocks are less well known and hardly exploited. Little information on the status of the stocks of the pelagic fishery exists to provide a scientific basis for management.

Deep water demersal stocks can only be accessed using deep water fishing gears such as drop lines and traps, while open water pelagic stocks are fished with long lines, seines or midwater trawl nets. In the past, surveys have been conducted to evaluate the fisheries resources within regional initiatives. During the gap analysis study conducted under South Western Indian Ocean Fisheries Project (SWIOFP) Component 3 (demersal fisheries resources) in 2009 a few demersal fish species and relevant fisheries were identified and a priority list of surveys and of target species was developed. This includes a range of acoustic and dropline surveys to be conducted on the Kenyan EEZ.

The acquisition of RV Mtafiti has provided KMFRI a platform to conduct oceanographic research within Kenya's territorial waters and EEZ. The foremost objective in utilizing this platform is to determine the location of fishery stocks and assess their abundance. Towards this end the management of this resource will require information on the drivers of this resource which is mainly the oceanic productivity. Kenya Marine and Fisheries Research Institute scientists have deliberately focused the preliminary RV Mtafiti cruises to address the two main objectives. The initial focus was to locate the maximum productivity depth at various localities by determining chlorophyll, dissolved oxygen (DO) and particulate organic carbon (POC) concentrations. Nutrient concentrations were also determined to provide insights on upwelling systems and the factors limiting productivity. Further biogeochemical studies will be conducted on the obtained data to further understand the process governing productivity. The productivity data will be interrogated with fishery data to provide insight on the limitation and drivers of fishery within our marine waters. The most prominent types of microplastics (MPs) identified in the marine environment include spheres, pellets, irregular fragments and fibres of which can be classified as primary (e.g., pellets and abrasive scrubbers used in cosmetics and granules used for air blasting) or secondary (breakdown of larger plastic items) MPs via multiple pathways, such as water and wastewater being discharged into the sea or through the degradation of MPs marine debris. MPs marine debris is transported to the sea from landfills or recycling points because of adverse weather conditions and/or the direct dumping of MPs into the sea (Zhao, *et. al.*, 2014; C. Alomar, *et. al.*, 2016).

MPs can be ingested by a wide range of marine organisms such as filter-feeders or higher-level predators, and negative impacts of MPs at the base of the marine food chain are likely (Kang, *et. al.*, 2015). For instance, ingested plastic debris negatively affects seabirds and other marine wildlife in several ways, including direct effects such as nutritional deprivation and physical

damage to the digestive tract (Atoll, *et. al.*, 2016). The great concerns about MPs in the marine environment are the association with toxic chemicals and subsequent exposure, thus acting as potential vectors for the transfer of these chemicals to the multiple kinds of organisms that ingest the debris. Plastic debris can concentrate hydrophobic organic pollutants such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) 18 and DDTs, increasing their concentration even up to the order of 10⁶. Plastic debris could also accumulate metals from the surrounding environment and the accumulation has been demonstrated by laboratory experiments and environmental monitoring. However, data on the content of metals accumulation by MPs in the actual environment is very limited (Retama, *et. al.*, 2016; Wang, *et. al.*, 2016).

Seabirds, marine mammals and sea turtles are an important component of biodiversity in marine ecosystems balancing food web dynamics and facilitating nutrient cycling. Due to their highly migratory nature, they are at high risk of mortality due to interactions with fishing gears. The Kenya coast is known to support various species of migratory seabirds and marine mammals common to the Western Indian Ocean (WIO) region. Surveys of seabirds and marine mammals are being carried as part of the RV Mtafiti cruises to obtain baseline information on their occurrence, distribution and species composition within territorial and EEZ waters. Such information is important in identifying priority biodiversity hotspots. This report presents the results of the first survey of territorial waters conducted in December 2016 during the northeast monsoon (NEM) season.

1.1 Seasonality in East Africa's Coastal Waters

1.1.1 Monsoons

Seasonality is a major factor affecting annual patterns of physical, chemical and biological processes along the East African coast. Seasonal patterns are dictated by the behaviour of the Inter-Tropical Convergence Zone (ITCZ) which creates 2 distinct seasons observed over the equatorial eastern Africa region. These are the northeast (NEM) and southeast monsoons (SEM). During the SEM, oceanographic parameters are characterized by cool water, a deep thermocline, high water-column mixing and wave energy, fast currents and low salinity. These parameters are reversed during the NE monsoon.

1.1.2 Coastal Currents and Water Masses

Ocean currents and tides are important features that strongly influence the distribution of marine organisms and the availability of nutrients. The dominant major currents prevailing in the coastal waters of East Africa are the East Africa Coastal Current (EACC), the Somali Current (SC) and the Equatorial Counter Current (ECC). The East African Coastal Current flows northward throughout the year. The EACC is strongest in the southern monsoon (April–October) with an

average speed of about 2 m/s and occasionally reaching 3.5 m/s and weaker during the northern monsoon (November–March), with an average speed of less than 0.5 m/s.

On the other hand, Somali current is a typical seasonally reversing current with the current flowing northward during the southeast monsoon at a maximum speed of about 2m/s. (Shallow et al., 1991). During the northeast monsoon, the Somali current flows southward at a speed of 1.5 - 2 m/s. The reversed Somali Current meets the EACC at latitude 2.25°S to form the eastward flowing Equatorial Counter Current which flows as an undercurrent. The width of EACC is 160-200km with its maximum depth at about 400 m.

Three main water masses have been identified off the Kenyan coast. Firstly, surface water (depth < 100 m) brought to the west from the Bay of Bengal and the eastern Indian Ocean are by the South Equatorial current. It is characterized by a temperature of 22–30 °C and salinity of less than 35.4‰. The second is the high salinity water found at a depth of 150–250 m. This is thought to originate from the Arabian Sea and/or the subtropical surface waters. The third is the Indian Ocean Central water, which is found at 250–500 m depth and has temperature of below 18 °C.

1.1.3 Sea Surface Temperature

Sea surface temperatures exhibit seasonality that is influenced by changes in the water masses of the Indian Ocean and by climate factors. During the Southeast monsoon, the South Equatorial current brings water of relatively low temperatures from the Pacific Ocean, while during the Northeast monsoon; the South Equatorial current draws water of high temperatures from the same. These changes are in turn reflected in the temperatures of the East African Coastal current. The sea surface temperature along the coastal waters of East Africa within the latitude band 0–10° varies from the highest of 28–30 °C, occurring in March and April, to the lowest sea surface temperature of 24 °C, in August and September.

The sea surface temperature of the coastal waters of Kenya averages at 27 °C but may reach 25 °C during July to September and rise to 28 to 29 °C in shallow areas during January to March. The depth of the upper mixed layer varies from 20 m (March and November) to 100 m (June/July), due to the seasonal variations of the wind speed and direction. Temperature variations, particularly offshore, are mainly diurnal as they are controlled by day heating by solar radiation and night cooling. In the near-shore waters, the temperatures are semidiurnal due to effect of the tides.

1.2 Research Aims and Objectives

The general aim of this survey is to provide information on the biomass of demersal fish resources distribution with Kenya's territorial and EEZ waters and describe the biological and physical oceanography of the environment. The specific objectives are as follows:

1. Estimate the standing biomass of fishery resources and determine spatial and temporal patterns of variation;
2. Determine spatial and temporal patterns of distribution and abundance of plankton (phytoplankton and zooplankton) and identify potential fish breeding/ foraging areas
3. Develop temperature, salinity, conductivity and nutrient profiles to correlate with biological features (fish and plankton densities)
4. Determination of occurrence, composition and distribution of Microplastics (MPs) in seawater, sediments and biota, as well as their ecotoxicological effects.
5. To conduct bathymetry surveys and map critical sites that may support fisheries
6. Map the occurrence of marine mammals, sea birds and sea turtles as indicators of productivity, and identify hotspot/sensitive areas of fishery interactions

1.3 Expected Specific Deliverables

The expected deliverables from the RVM043_2017 survey included:

1. Estimates of the fish biomass and the spatial and temporal distribution patterns off Kilifi County;
2. Marine productivity through the distribution and abundance of plankton, associate fish larvae and fish biomass from hydro acoustics estimates;
3. To assess the presence, distribution and composition of MPs in Kenya's Exclusive Economic Zone (EEZ), territorial and near shore waters
4. The spatial distribution of nutrients and physic-chemical parameters on the surface and within the vertical water column;
5. Maps of the occurrence of marine mammals, sea birds and sea turtles.
6. Bathymetry maps and highlights of critical sea morphological sites;

2.0 METHODOLOGY

2.1 Study Area

This survey was carried out in Block 2 off Kilifi County as described above (See Figure 1 below). and was conducted between the 6th – 21st of February 2017.

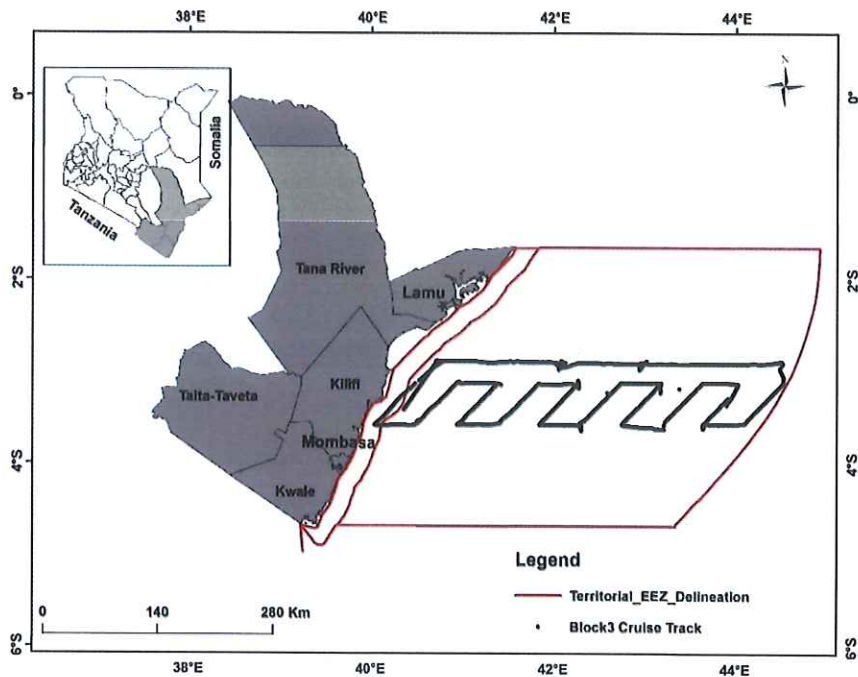


Figure 1: Showing Block 2 cruise track off Kilifi County that was covered during the RVM03_2017 RV Mtafiti Cruise.

This survey block has a proximity to the Ungwana Bay and two main rivers draining to the Indian Ocean namely the R. Tana to the north and R. Sabaki to the south. The two rivers deliver huge amounts of sediments to the bay and could subsequently influence the productivity and morphology of the sea floor.

2.2 Sampling strategy

Of the four blocks identified to cover the Kenyan EEZ, this survey entailed the survey of the central Block 2 off Kilifi county and Ungwana Bay. A combination of zig-zag transects and parallel-perpendicular design was employed (See Figure 1, 2) as the previous survey i.e. RVM01_2016 covering territorial waters and Block 2 (northern section off Lamu). This was to ensure efficient use of time and resources in coverage of the survey block as compared to either parallel or random transects. Additionally, 21 sampling stations were designated (Figure 2).

The survey plan envisaged the coverage of the survey blocks during both the NEM and SEM season during the first year to build up an overall picture of the time and effort required to collect adequate and representative data and samples for various thematic areas.

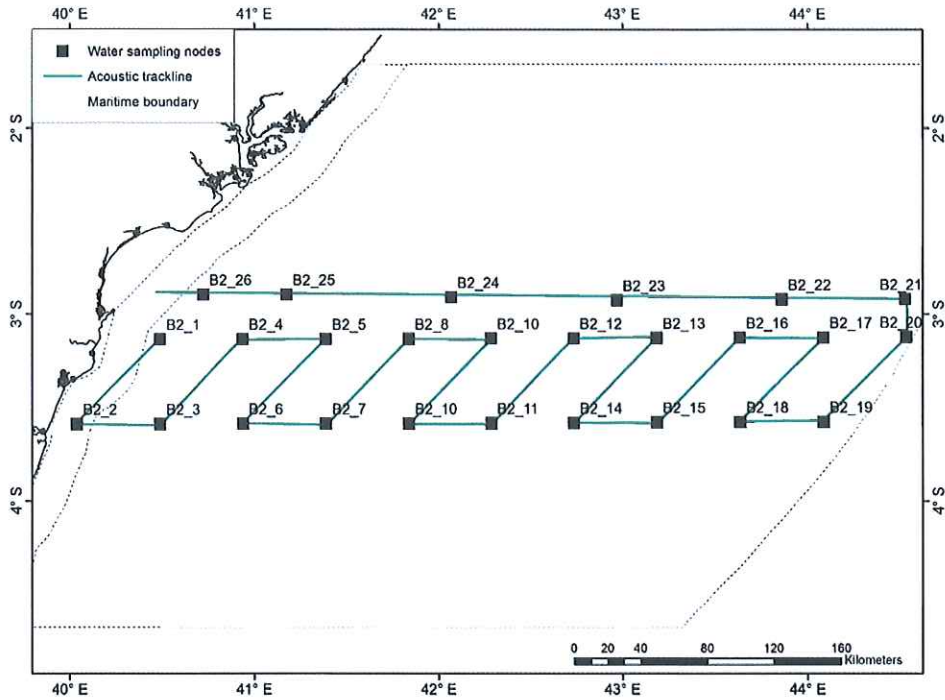


Figure 2: Showing Block 2 Survey track with associated water quality sampling stations.

2.2.1 Fish Acoustics Sampling

Hydro acoustic data was collected using a SIMRAD EK60 split beam echo-sounder mounted on the hull of RV Mtafiti. Data was collected continuously for both day and night. Calibration of the instrument was carried as per the user's manual and manufacturer's recommendation for optimal performance of the echosounder. However, during post processing data collected during transit, drifting and water sampling was excluded in the final estimation of fish biomass.

Acoustics is based on the sonar equation:

$$EL = SL - 2TL + TS$$

Where, EL= Echo Level, SL = Source Level (at the transducer), TL = Transmission Loss (due to geometrical spreading and absorption and multiplied by two to cater for the two-way travel time) and TS = Target Strength (of sea bottom or Fish). The terms in the sonar equation describes the path from the generation of the transmitted pulse (SL), the propagation to the pulse (TL),

how much signal is reflected/scattered off the target in the direction of the receiver (TS), the propagation back toward the receiver (TL again), ultimately resulting in how large of an acoustic wave we observe (EL). Fish identification was obtained by analyzing the target strengths which may vary with fish size, species and depth.

$$TS=20 \log L(\text{cm})-67.4 \text{ (physoclist)}$$

$$TS=20 \log L(\text{cm})-71.9 \text{ (physostome)}$$

$$TS=20 \log L(\text{cm})-87.5 \text{ (no swimbladder)}$$

Where, TS = Target strength and L = Length of fish (from Length-Weight Relationship equation $Wt = aL^b$). Bottom detection techniques within the *EchoView v7.1* software was used to extract bathymetry from the sounder detected bottom. The maximum target strengths (TS) set is -70 dB and this covers all targets in the water column however during post processing, the fish densities are extracted using TS of between -30 and -55 dB.

There are two types of swim bladders, the physostomous and physoclistous. The physostomous swim bladder remains connected to the gut of the fish allowing the fish to control the amount of gas in the swim bladder. Fish with this type of swim bladder are usually found in shallow water. They will expel bubbles as they swim closer to the surface of the water and then they will swallow air at the surface before diving back down into the water. The physoclistous swim bladder is the condition in bony fish in which there is no connection or duct between the swim bladder and the intestinal tract. These fish can regulate gas exchange in their swim bladder through special tissues or glands. This condition is found among the 'higher' bony fish (e.g. the perch-like fish, Perciformes e.g. all teleosts above salmonids. Yasuma, *et. al.*, 2010 reported theoretical values of the target strength (TS) of four myctophid fish (lanternfish) (*Ceratoscopelus warmingii*, *Myctophum asperum*, *Diaphus garmani*, and *Diaphus chrysorhynchus*) based on morphometry of the swimbladder. The TS range of these species ranged between -87.2 and 67.7 dB, although the ranges of some of these lanternfish species could overlap between swimbladdered and swimbladderless fish. According to Yasuma, *et. al.*, 2010, fish with inflated swimbladders have TS values that are relatively low (less than -67 dB, reduced TS_{cm}), while the

TS_{cm} of a swimbladderless pelagic fish range from -90 to -80 dB. Nakken and Olsen, 1977 calculated the TS of several species including fish and prawns at different frequency levels according to length. The TS ranges at 38 kHz of some of the fish were -38.6 to -40.3 dB (Mackerel), -34 (Horse mackerel), -32 (Haddock and blue whiting), -35.4 to -32.3 dB (Whiting) and -22.8 dB (spiny dogfish).

2.2.2 Bathymetry Sampling

Bottom detection techniques within the *EchoView v.7.1* software was used to extract bathymetry from the sounder detected bottom raw data and other softwares i.e. QGIS v. 2.18.4 was used to generate terrain surface representative of the bathymetry (geomorphology) of the survey area.

2.2.3 Nutrients and physicochemical parameters

Vertical water samples were collected at 20m interval using an Niskin sampler. Water sampling in the territorial zone were collected at the maximum possible depth reach, ranged between 60 m to 300 m. The EEZ water sampling was conducted at maximum depths of 560m in the deep sections and the depths adjusted appropriately in the shallower near shore stations. Physicochemical parameters were measured on board RV Mtafiti, temperature; salinity and pH were measured using a meter. Dissolved oxygen was determined onboard through the Winkler method, particulate organic carbon (POC) and Chlorophyll samples were filtered on board. Nutrient samples were analysed in the laboratory using a four-channel auto-analyser, POC samples were analysed through the chromic acid method, and chlorophyll samples were analysed by spectrophotometric method after acetone extraction.

2.2.4 Plankton and Zooplankton sampling

Surface (5m) phytoplankton samples were collected immediately after the zooplankton samples were collected. Twenty litres of the water were sieved through 20 μ m mesh-size plankton net and concentrated to 100 ml. The samples were transferred in sample bottles, labelled with date, sampling station and immediately preserved in Lugol's solution and transported to the laboratory for identification and enumeration.



Figure 3:Deployment of the plankton net

Zooplankton samples were collected by towing horizontally a zooplankton net of 500 μm mesh size net fastened with a General Oceanic's flow meter on the mouth of the net. Deployment of the net was done on the side of the ship using winch (Figure 3). Towing was conducted at constant speed of between 0.5-1.8 knots for a period of about 20-30 minutes. Collected samples were labelled and preserved using 5% formaldehyde buffered in seawater and stored. Replicate sampling was not done due to time constraints at each station. During this cruise, another bongo net was used with mouth diameter of 0.58 m to replace the one lost in the previous cruise (territorial waters cruise). Effort was made at collecting samples in the territorial waters previously missed in Lamu and Malindi Ungwana area. After each sampling ship position was obtained from the captain together with all the other data like speed and logged into an event log form (see Table 1). Samples were collected during both day and night depending on the time we reached the station.

2.2.5 Microplastics

Sampling for microplastics (MPs) was carried out during the neap tide regime in the northeast monsoon (NEM) season concurrent with oceanographic and hydroacoustics sampling on board RV Mtafiti. A total of 11 stations were sampled for MPs (see Table 1 and Figure 4 below). The EEZ was considered to be pristine, since MPs are cannot be seen by naked eyes, probably because they were occurring in trace amounts, hence required filtering of large volumes of water. Bulk seawater sampling technique was then done using a 15L stainless steel bucket to repeatedly collect water (120L) at approximately > 60cm depth below surface waters and sieved directly through a 250 μm mesh size sieve (Hidalgo-Ruz, *et. al.*, 2012) and concentrated into glass sample jars using 70% ethanol as a preservative and transported to the laboratory for further processing and analysis (Kang, *et. al.*, 2015) as shown on plate 1.

Table 1: Block 2 stations sampled with GPS coordinates and environmental variables recorded

Station	GPS coordinates		Season	Wind		Tide	Surface Salinity (%)	Surface pH	SST (°C)
	Latitude	Longitude		Direction	Speed				
Shimoni	04 ^o 39.15S	039 ^o 22.14E	NEM/Dry	NE to SW	5 knots	Neap	32.4	8.18	28.5
B2_26	02 ^o 53.898S	040 ^o 42.950E					32.2	8.06	27.4
B2_24	02 ^o 54.024S	042 ^o 5.508E					32.9	8.07	26.3
B2_21	02 ^o 55.527S	044 ^o 31.298E					33.2	8.09	27.2
B2_18	03 ^o 34.349S	043 ^o 39.724E					33.6	7.79	26.5
B2_15	03 ^o 33.640S	043 ^o 12.606E					33.3	8.19	26.4
B2_11	03 ^o 34.301S	042 ^o 17.432E					33.5	8.13	27.1
B2_9	03 ^o 6.471S	042 ^o 15.966E					33.4	8.02	26.5
B2_5	03 ^o 8.362S	041 ^o 23.047S					33.2	8.07	27.5
B2_4	03 ^o 7.558S	040 ^o 57.523E					33.2	8.09	28.3
B2_3	03 ^o 34.237S	040 ^o 29.458E					33.3	8.04	28.7
B2_1	03 ^o 8.191S	040 ^o 29.331E					33.3	8.15	28.1



Plate 1: Bulk surface seawater sampling for MPs

The samples were filtered directly (Kang, *et. al.*, 2012) using Whatman® glass microfiber filters, Grade GF/F- diam. 47 mm and air dried in a laminar flow hood (Crichton, *et. al.* 2017) and stored in petri dishes until analysis. The dried filters were visually inspected under a dissecting microscope (WILD HEEBRUGG, M3C Switzerland) at x25 magnification; counted, photographed and categorized according to shape, colour and size measured using ocular gratule lense (Crichton, *et.al.*, 2017; Peng, *et. al.*, 2017; Young and Elliot, 2016 and Kovac Virsek, *et. al.*, 2016). Percentages of the total plastic collected were calculated for each color and size fraction and used in comparison analyses (Young and Elliot, 2016). During identification, the natural materials

remaining at the picking stage such as grass sheaths, pine needles, diatom tests, and salt crystals may be mistaken for microplastics. This problem is solved by dragging the forceps across the particles. If they powder or fall apart, then the pieces are not plastic materials. If the particles retain their shape, then they are properly identified as microplastics (Masura, *et. al.*, 2015 and Peng, *et. al.*, 2017). The abundance of microplastics is commonly indicated as numerical or mass concentration: (1) for the sea surface layer as number or weight of items per area, (2) for the water column as number or weight of items per volume (Duis and Coors, 2016), where option 2 can help understand regional or temporal trends and make comparisons among sampling sites as well comparing the amount of microplastic across samples (Masura, *et. al.*, 2015). Therefore, option 2 was chosen to calculate the abundance of microplastics.

2.2.6 Sea bird, marine mammal and sea turtle observations

Incidental observations of seabirds, marine mammals and sea turtles were made from the deck of RV Mtafiti during day time (6am to 6pm). Using 8 x 40 or 10 x 50 binoculars and two observers. The 'snapshot' procedure (Wilhelm *et. al.*, 2008) which is based on periodic instantaneous counts was used. The observers scanned approximately 300m wide band along the side of the vessel during successive 30-minute intervals while the vessel was moving. For each sighting, the GPS location (latitude & longitude) of seabirds, marine mammals and turtles, as well as the behaviour (flying, feeding etc.) was recorded on a form and subsequently transferred to the daily event log for the cruise. Details on the time, heading, speed, and weather conditions were also co-recorded.

3.0 RESULTS AND DISCUSSION

3.1 Fish biomass estimates

Acoustic estimates show varied spatial fish densities and biomass distribution in different regions of the Kenyan EEZ. Processed estimates from this survey shows that Block3 of the Kenya EEZ have about 745,970 tons of fish respectively (See Table xx below). Most fish were concentrated in the upper layer (0-100 m) of the water column with this layer contributing a total fish biomass of 67%. Coincidentally, the surface layer is the most accessible given the existing fishing technologies. Unlike Block 1 (off Lamu) where the subsurface layer (100-350 m) was occupied by 9% of fish in the water column, Block 2's subsurface layer contained 33% of the fish. It is worth noting that the two blocks were surveyed in different periods, a possible explanation of the variations in the vertical distribution of fish in the water column. Only 0.01 % were found beyond the 350m depth (Table 2).

Table 2: Fish densities and corresponding biomass in Blocks 3 of the Kenyan EEZ

Site	Depth [m]	Average densities [tons/km ²]	Area [km ²]	Biomass [tons]
Block 2	0-100	10.548	47,258.02	498,470
	100-350	5.237	47,258.02	247,473
	350-1000	0.000569	47258.02	26.9
Total				745,970

In the 0-100 m range, fish were distributed through the sampled section of the EEZ (Figure 5). The highest densities of fish (> 5 tons/km²) were observed far offshore towards the end of the EEZ. This especially so in Block 2 where the high densities extend to the middle section of the surveyed area. In Block 2, densities of 10 – 15 tons/km² were observed in nearshore waters adjacent to Lamu. Generally, fish densities in the surface layer were relatively higher in Block 2 than in Block1.

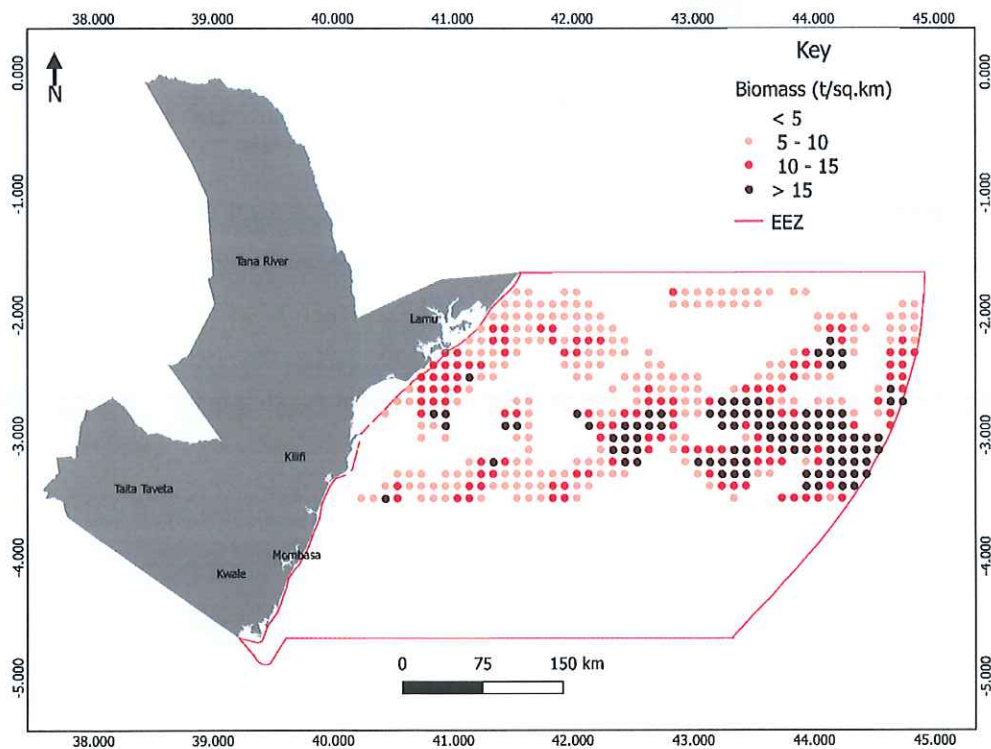


Figure 4: Spatial distribution of fish biomass within the 0-100 m depth of the Kenyan EEZ

Figure 5 shows the spatial distribution of fish in the subsurface layer (100-350 m). Only areas far offshore towards the end of the EEZ in Block 2 recorded fish densities of more than 15 tons/km². Most of the surveyed recorded densities of less than 5 tons/km².

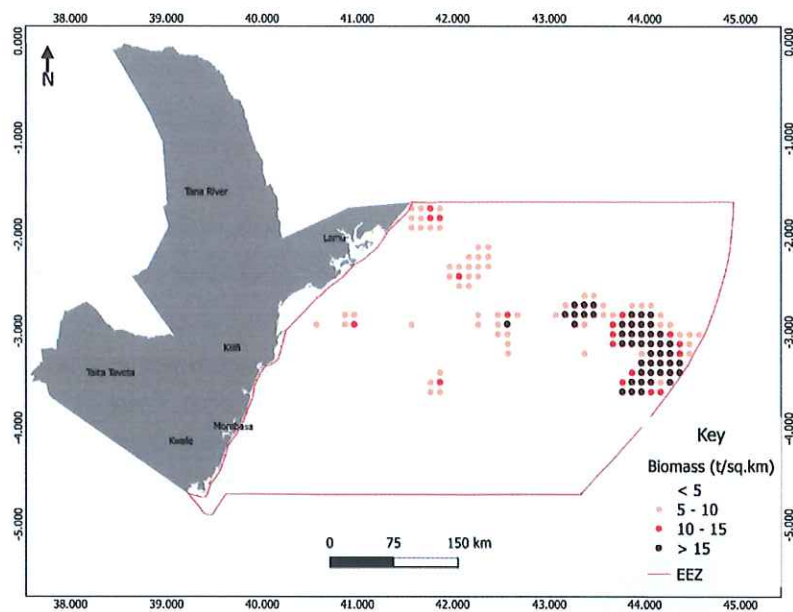


Figure 5: Spatial distribution of fish biomass within the 100-350 m depth of the Kenyan EEZ

Figure 6 shows the spatial distribution of fish in the subsurface layer (350-1000 m). This water depth section recorded fish densities of mostly less than 2 t/sq.km. However, this is expected due to the sheer water depths associated that fish survival for most species is not possible.

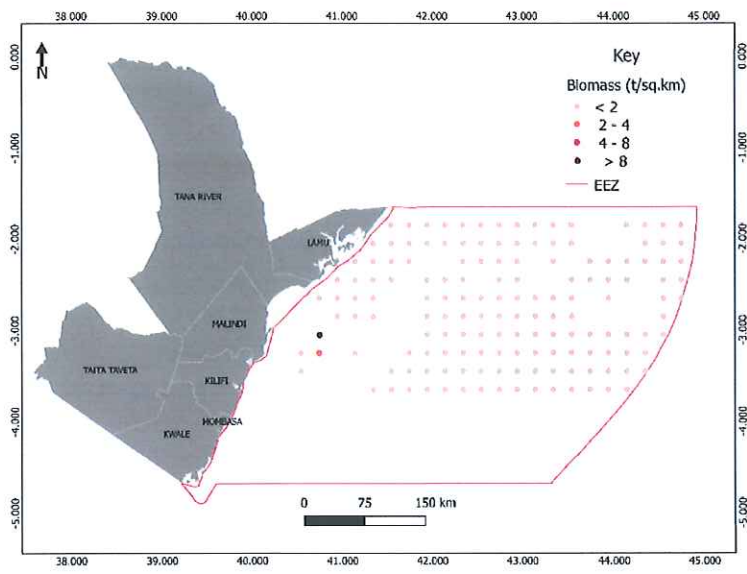


Figure 6: Spatial distribution of fish biomass within the 100-350 m depth of the Kenyan EEZ

3.2 Bathymetry

The maximum water depth surveyed was slightly below 4,000 m. The extracted water depths were used to generate by interpolation a representative bathymetry of the survey area (see Figure 7). Raw data was processed to generate bathymetry depths in *.xyz file format. The generated *.xyz files were run in GIS software (QGIS v2.18.4) to create a digital terrain model of the sea floor. Further generation of the contour lines was done to show the depth transition from shallow to deep water. The minimum depth was ~90 m while the maximum depth of the surveyed blocks was 4400 m.

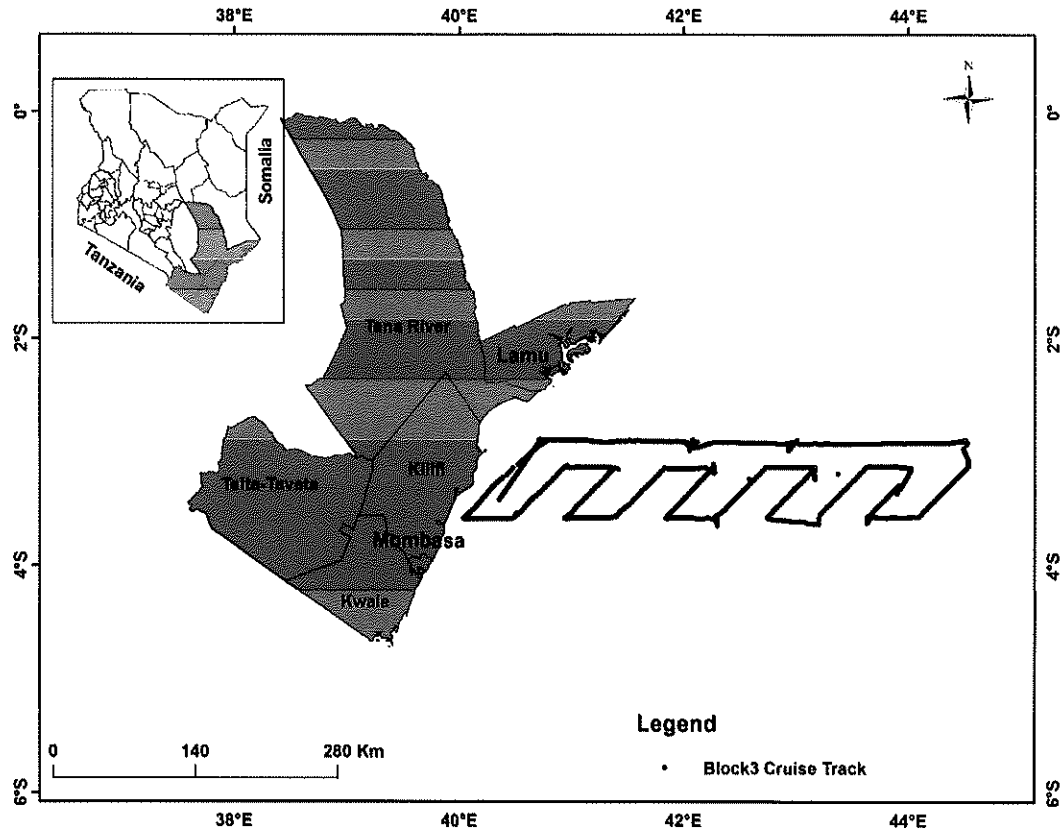


Figure 7: Bathymetric data points along the transects surveyed off Lamu

The generated bathymetry (Figure 8) is indicative because of the wide spacing of cruise tracks and therefore large grid was used to extrapolate. It cannot therefore be used for navigational purposes. However, the singlebeam bathymetry data points can be shared with other government agencies including the hydrographic office to aid in the update of Kenyan navigational charts. The data can also be shared with global data repositories including the NOAA's National Geophysical Data Center (NGDC) and General Bathymetry Chart of the Ocean (GEBCO).

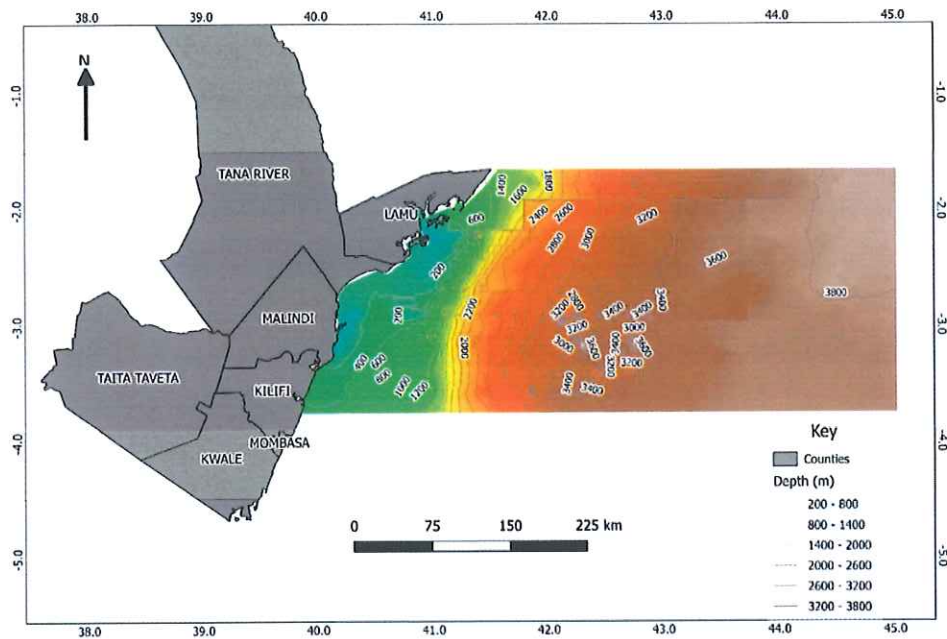


Figure 8: Showing the derived bathymetry with associated depth contours of the study area (Block 2) combined with data from Block 1 (off Lamu).

3.3 Unique Bathymetric features

There were interesting geomorphological features noted in the echograms as shown in Figure 9 below with their corresponding geolocations. Submarine canyons are major geologic features of continental margins that link the upper continental shelf to the abyssal plain. These unique features give an indication of geological history of an area. The cliffs and canyons could be attributed to ancient river undercutting and turbidity flow (submarine landslides) caused by deep sea earthquakes or gravity flows. Most submarine canyons and fans are located near the mouth of large rivers because the rivers provide large amount of sediment needed to generate turbidity currents, which also explains where does the sand from the river travel after it reach the mouth of a river. Steeper slopes are an indication of vertical paleo-displacements of the oceanic crusts. Seamounts and canyons are important for many disciplines such as geology, oceanography, biology, ecology, and possibly the economy (considering future harnessing of the blue economy). They act among many things as aggregators of fish and therefore their mapping is vital.

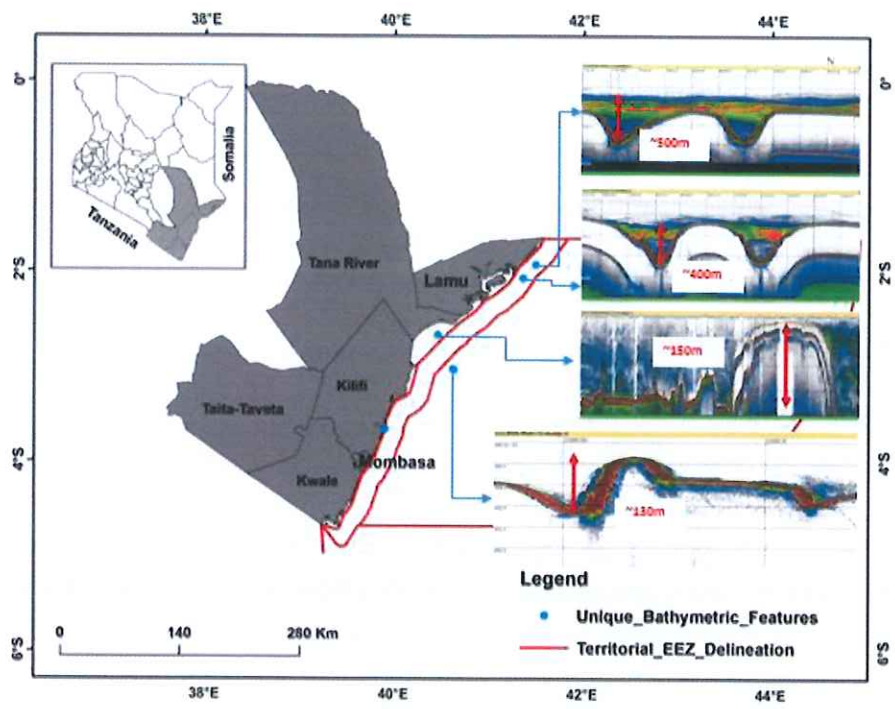


Figure 9: Map showing the location and echogram associated with noted unique bathymetric features.

They could therefore be attributed to scouring by high speed currents during flood and ebb tidal exchange for the creeks (Kilifi and Lamu) and river undercutting and sediment deposition of rivers (Tana). The features were deep canyons going up to 600m deep and seamounts going up to 250m high. Seamounts and canyons are important for many disciplines such as geology, oceanography, biology, ecology, and possibly the economy (considering future harnessing of the Blue economy). They act among many things as aggregators of fish and therefore their mapping is vital.

3.4 Nutrients and physicochemical parameters

The mid-section Block 2 EEZ sampling spanned from a longitude of about 40.6°E to 45°E at the outer edge of the Kenyan EEZ (See Figure 1). Water samples were collected at maximum depths of 260m in the surveyed Block 2 at vertical profile intervals of 20m. Temperature, dissolved oxygen (DO), pH and salinity of the sampled water was measured in situ, while samples were collected for nutrients, particulate organic matter (POC) and chlorophyll onward determination in the laboratory. The analysed data is presented in ocean data view software (*ODV v. 4.7.10*) as spatial surface plots and spatial vertical profile plots.

3.4.1 Physicochemical parameters

Dissolved oxygen surface distribution along Block 2 is presented in Figure 10, dissolved oxygen is an important parameter in a water body an indicator of productivity. High DO levels were registered in Block 2 the levels were significantly higher than those observed in Block 1. The outer and mid sections of Block 2 registered low temperature fronts indicative of cool dense waters flow from the bottom to the surface. These observations combined with the observed high salinities are indicative of upwelling. There seems to be an upwelling front at the area between 44°E and 45°E spanning to 3°S, there may be a system located outside the EEZ contributing to these phenomena. Further research is required to establish this.

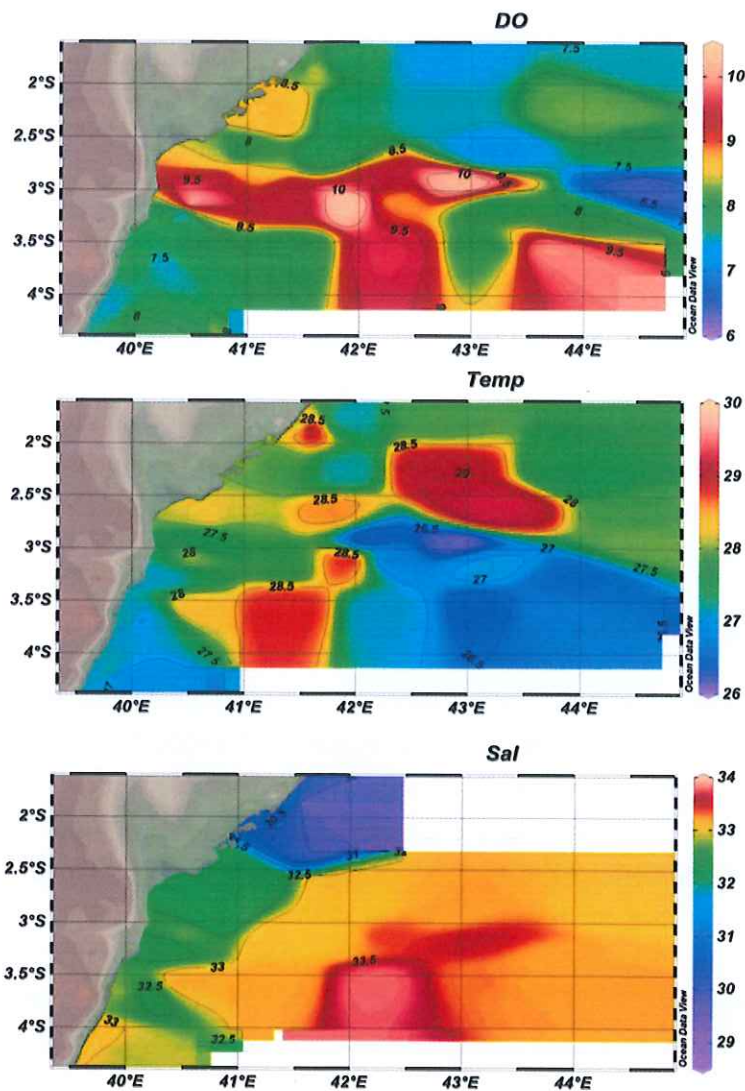


Figure 10: Surface dissolved oxygen distribution along the EEZ

3.4.2 Nutrients distribution

The productivity of a system is driven by chlorophyll and enhanced by nutrients levels, the observed data at Block 2 further collaborates with the observed deductions on physicochemical parameters indicating upwelling systems in these regions. The chlorophyll-a levels were significantly higher than those observed in Block 1 (Figure 11).

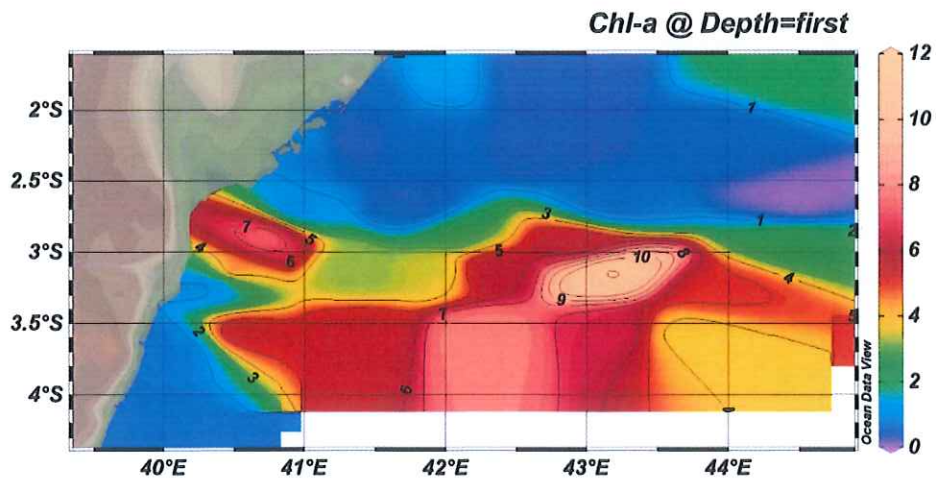


Figure 11: Surface chlorophyll-a distribution along the EEZ

The nutrients surface distribution was also significantly enhanced in Block 2 as compared to the upper Block 1. Nitrate levels (Figure 12) were quite high and seemed to emanate from the area around 44°E and 45°E spanning between 3.4°S and 2.7°S. The productivity of our EEZ in this block relative to nitrates seem to be driven by a system outside the limits of Kenya's EEZ.

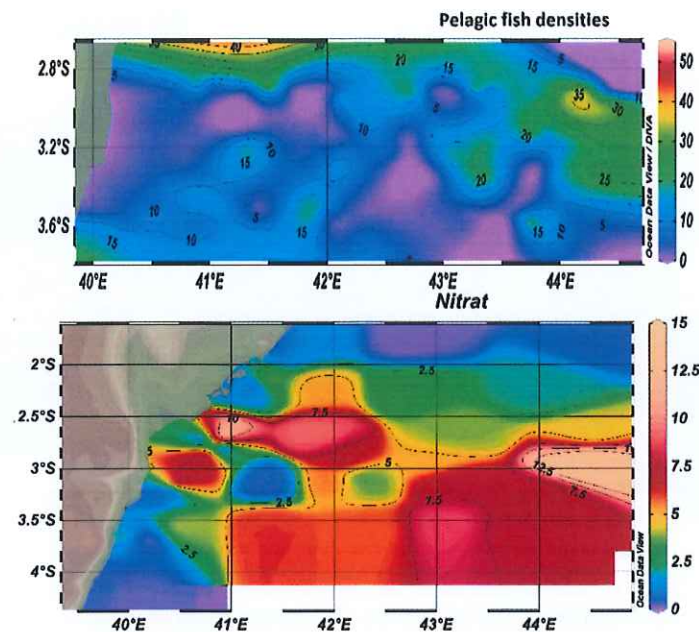


Figure 12: Surface nitrate distribution along the EEZ in relation to pelagic fish densities

The difference between available silicate [Si(OH)_4] and nitrate [NO^{-3}], has been used as a tracer of the return path of deep waters upwelled in the Southern Ocean into the thermoclines of

ocean systems (Sarmiento *et. al.*, 2004). These difference between available silicate [$\text{Si}(\text{OH})_4$] and nitrate [NO^{-3}] is denoted Si^* in the current study and is used as a proxy to determine upwelling regions. Figure 12 provides a spatial distribution of Si^* in Block 2, the observed data indicates an upwelling region around 43.5°E and 45°E spanning between 3°S and 3.5°S . The region associated with upwelling corresponds to the same region associated with high nitrate levels.

The pelagic fish densities correlated well with nitrate distribution, nitrates have been attributed to productivity. Broecker and Peng, (1982) reported that primary production is almost certainly limited by the supply of nutrients, especially N (nitrate) and P (phosphate), to the euphotic layer. Globally, nitrogen and phosphorus are the two elements that potentially limit the biologically mediated assimilation of carbon in the oceans by photoautotrophs. Consequently, a major part of primary production is considered to be supported by upwelling of deep waters rich in N and P. It is suggested that a limiting factor controlling primary production in the subtropical and tropical oceans is inorganic nitrogen (Falkowski, 1997; Capone *et. al.*, 1997).

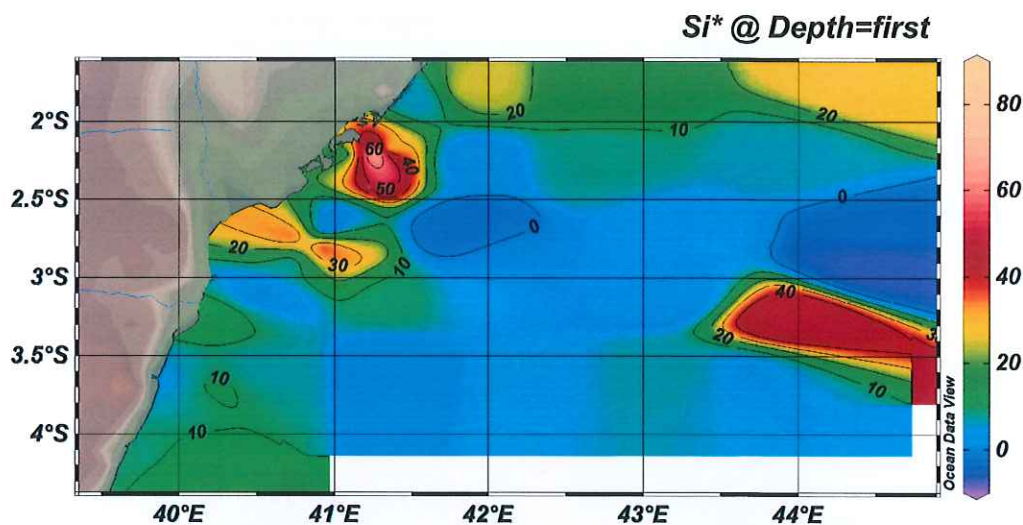


Figure 13: Surface nitrate distribution along the EEZ

The spatial distribution of phosphate and ammonia in Block 2 follow the same pattern as that of Si^* indicating same production source (Figure 14).

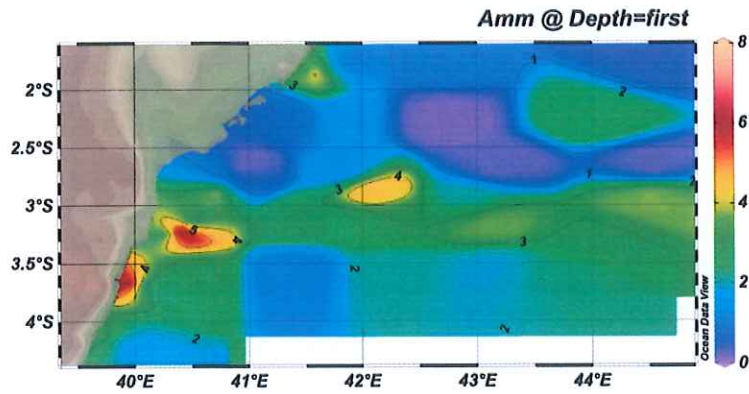


Figure 14: Surface Ammonia distribution along the EEZ

A comparison of the pelagic fish densities and phosphate distribution within Block 2 revealed a strong correlation. High fish densities were observed in the same region where high phosphate levels were obtained (Figure 15). The region around 40.5°E to 41.5°E spanning to 2.5°S and 2.8°S as well as around 43.5°E and 45°E spanning between 2.8°S and 3.5°S, were associated with high fish densities and high phosphate levels. Among nutrients i.e., nitrate, phosphate and silicate—inorganic phosphorus has been traditionally considered to be a basic limiting factor for oceanic primary production, since nitrogen could be provided via nitrogen fixation by oceanic bacteria under aerobic conditions (Broecker and Peng, 1982).

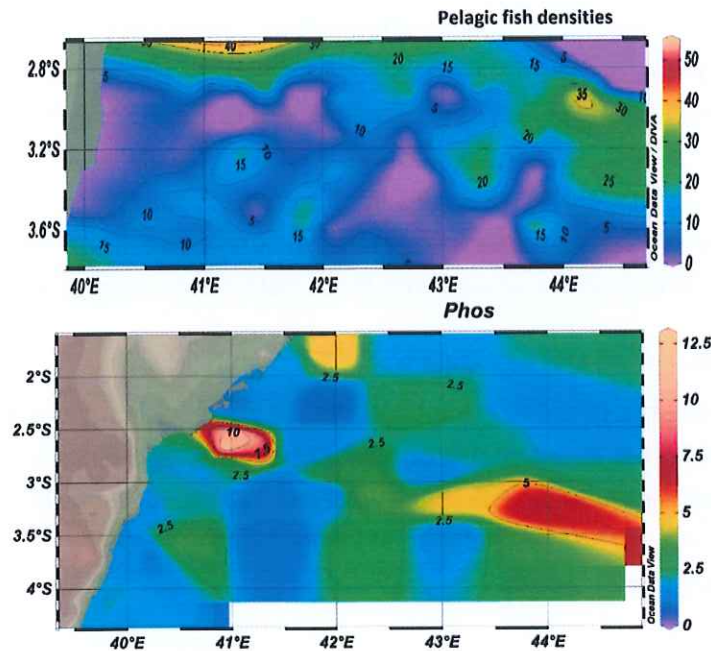


Figure 15: Surface phosphate distribution along the EEZ in relation to pelagic fish densities

3.5 Microplastics

3.5.1 Environmental variables

Environmental variables recorded during the cruise are given in Table 1. The record shows that wind was predominantly blowing from NE to SW with a speed of 5 knots throughout the cruise. Surface salinity levels ranged between 32.2‰ and 33.6‰; SST, 26.3 – 28.7°C and pH, 7.89 – 8.19. Correlation analyses at ($p < 0.05$) were conducted to determine whether environmental variables influenced microplastic abundance. Overall, there were no statistically significant correlations between microplastic abundance and: chlorophyll, salinity, dissolved oxygen and wind speed. However, there was a statistically significant good negative correlation between microplastic abundance and: sub-surface water temperature (Spearman's rank correlation, $r = -0.67$, p value = 0.025). Similar observations were made by Kanhai, *et. al.* 2016 when studying microplastic abundance, distribution and composition along a latitudinal gradient in the Atlantic Ocean. However, they developed a generalized additive model (GAM) to further determine the influence of environmental variables on microplastic abundance and confirmed that latitude, longitude, water temperature, wind direction, wind speed and salinity were the six variables found to have a significant effect on the abundance of microplastics in the Atlantic Ocean.

3.5.2 Quality control

Microplastics were not found in the (i) air contamination controls set up during sample collection ($n=3$), (ii) method blanks set up during vacuum filtration of distilled water ($n=3$), and (iii) air contamination controls set up during visual identification ($n=24$). This indicates that microplastics were not introduced into the samples either because of airborne contamination or because of contamination during the vacuum filtration process. Airborne contamination by microplastics during the filtration of each sample was prevented using wooden cover over the stainless-steel sieve. These results agreed with those obtained by Kanhai, *et. al.*, 2016.

3.5.3 Microplastic abundance and distribution

A total of 222 microplastic particles were confirmed in the mid-section of Kenya's EEZ (Block 2 off Kilifi County) during the northeast monsoon (NEM) season. Microplastics were detected in all samples, at an average abundance of 0.17 particles per 120 mL of water. MPs abundance ranged from 0.03 to 0.30 particles/120mL as shown in Figure 16, with majority of sampling sites having below 0.15 particles/120mL.

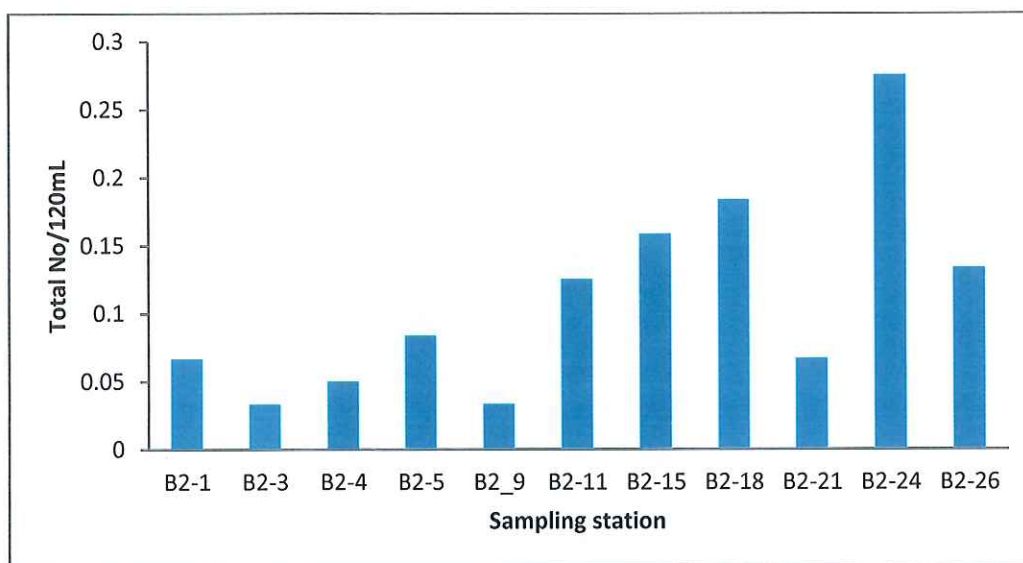


Figure 16: Microplastic abundance in Kenya's EEZ during North East Monsoon (NEM)

However, B2_15, B2_18 and B2_24 sites of Kilifi and Ngomeni exceeded that, recording 0.16, 0.18 and 0.30 particles/120mL respectively. The results in this study were compared with those found by Kang, *et. al.*, 2015 around the southeastern coast of Korea and found that our results were higher.

3.5.4 Morphological and physical characterization of microplastics

3.5.4.1 Characterization by shape and size

Microplastics were confirmed and categorized into four; filaments, fragments, granules and forms (Figure 17). Filaments and fragments were distributed across all sampling sites, with filaments being the majority at 84%, followed by fragments = foams, 7% and lastly granules, 2% (Figure 17).

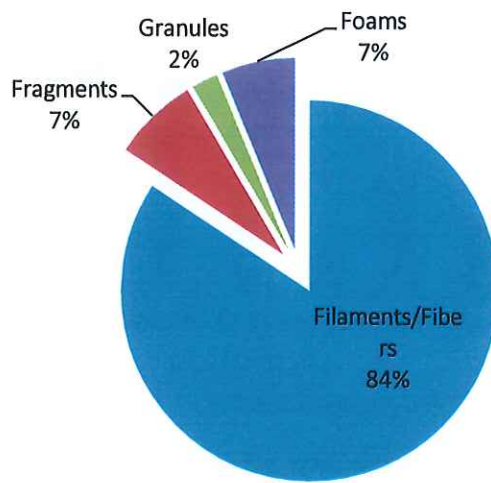


Figure 17: Percentage composition of categories of confirmed microplastics

Filaments were found at all sampling sites, followed by fragments, granules and foams in that order, which is in agreement with the report by Duis and Coors, *et. al.*, 2016 that these are the most common particles found in aquatic environments (Figure 18). Some of the photographs taken of confirmed microplastics are shown in Plate 2.

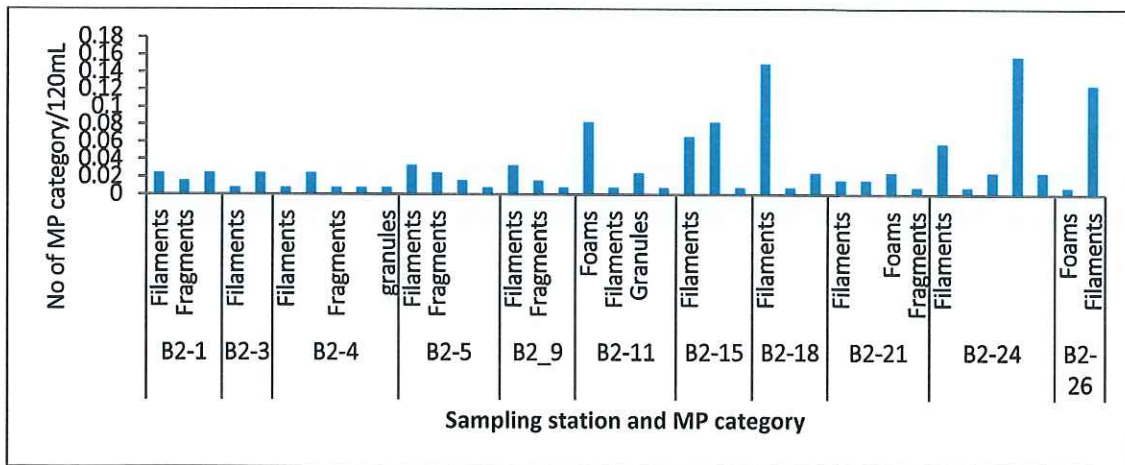


Figure 18: Microplastic categories identified at each sampling site during NEM

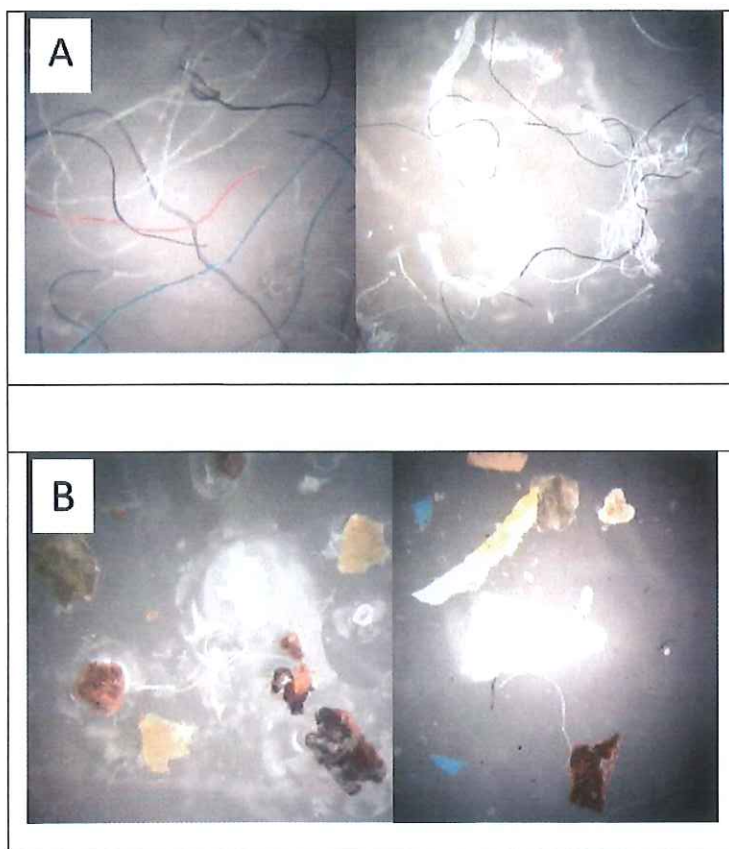


Plate 2:Microplastics identified in Kenya's EEZ water: (A) microplastic filaments from B2_24 and B2_15; (B) microplastic fragments found at B2_21 and B2_11

The dominant size confirmed was in the range of 0.7 – 1.0mm (57%), followed by 1.1 – 1.5 mm (31%) and lastly 1.5 – 1.9 mm and 2.0 – 2.5 mm (6%) (see Figure 19).

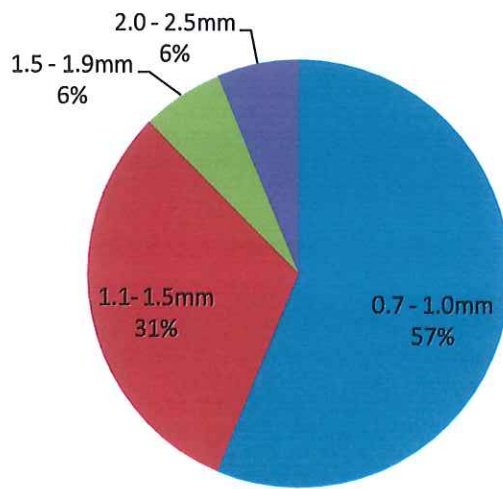


Figure 19: Size categories of confirmed microplastics in Kenya's EEZ

3.5.4.1 Characterization by color

Characterizing each category of microplastic by colour showed that filaments were characterized by higher abundance of varying colours compared to the categories as shown in Figure 20, with white being the most predominant. Similar observations were made by Cincinelli, *et. al.*, 2017.

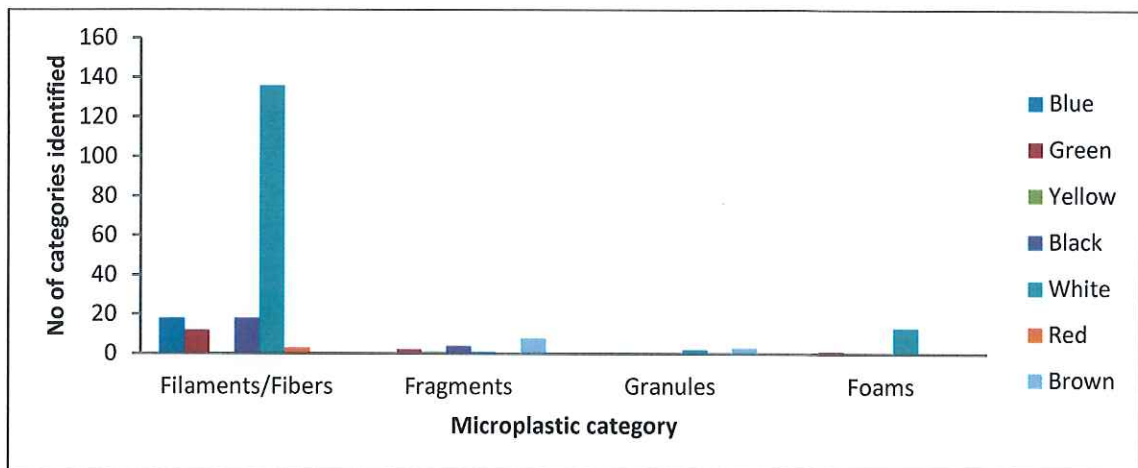


Figure 20: Showing the colour distributions of microplastic categories

In totality, 73% of the microplastics confirmed were white, 10% were black and blue in equal measure, and 6% green (See Figure 21).

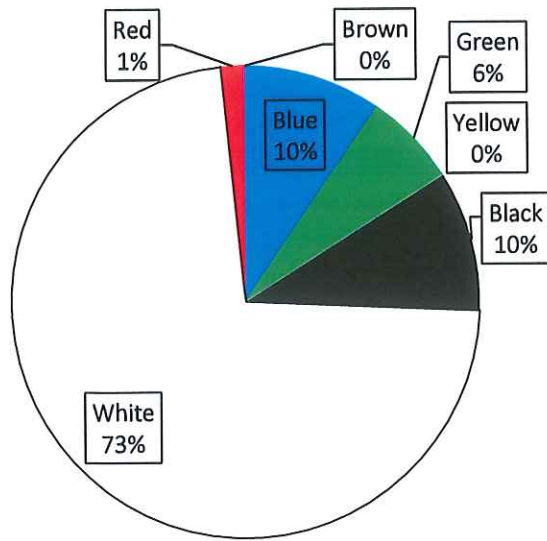


Figure 21: Colours of confirmed microplastics in Kenya's EEZ

3.5.5 Discussion

The predominance of fibrous microplastics noted in this study was consistent with similar previous findings in both surface and sub-surface waters, while noting that fibres as a category of microplastics are generally more discernible than other categories of microplastics. Fragments, for example, have a higher chance of being disregarded due to their similarity in appearance to natural materials, suggesting the presence of an 'operator selection bias' towards fibrous microplastics (Kanhai, *et. al.*, 2016). The higher percentage of fibers may result from abrasion and/or weathering of larger plastic items transported over large distances by prevailing water mass currents, or derived from local vessel activities (transport, fishing) (Cincinelli, *et. al.*, 2017). Fibres generally vary greatly in colour due to their parent materials (Cincinelli, *et. al.*, 2017), however in this study white (73%) was the predominant colour, an indication that that the source polymer type is likely to be polyethylene (Rodriguez-Seijo and Pereira, 2017).

3.5.6 Conclusion

This study has provided the first evidence of the presence of microplastics in Kenya's marine environment, with overall microplastics abundance of 0.17 particles per 120 mL of water in the mid-section of Kenya's EEZ off Kilifi during NEM season, which was higher compared to a similar work done around the southeastern coast of Korea. Filaments/fibres (84%) were the predominant microplastic category, thus proving important information on the abundance and categories of microplastics that marine biota is exposed to in marine environment.

3.5.7 Challenge/s

NEM season was not fully covered, therefore, the great convert is that it will be impossible to explain the spatiotemporal distributions of microplastics if seasonal variations are not taken into account.

3.6 Ocean productivity

3.6.1 Phytoplankton distribution

A total of 15 replicate samples were collected during this cruise. Dominant species are listed below per station in Figure 21.

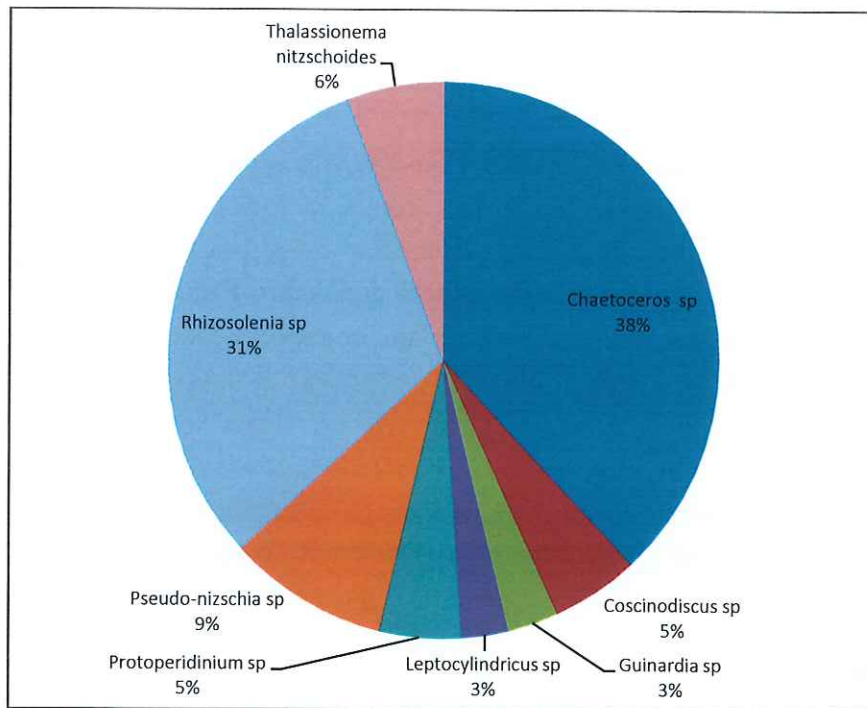


Figure 22: Composition of dominant phytoplankton species during the Block 2 cruise

Dominant phytoplankton species during the Block 2 cruise was the Diatom *Chaetoceros* sp, *Rhizosolenia* sp, and *Pseudo-nitzschia* sp (Figure 22). These species were the most dominant at all sites sampled. Other common species at all sites were *Thalassionema nitzschooides*, *Coscinodiscus* sp. and *Protoperidinium* sp.

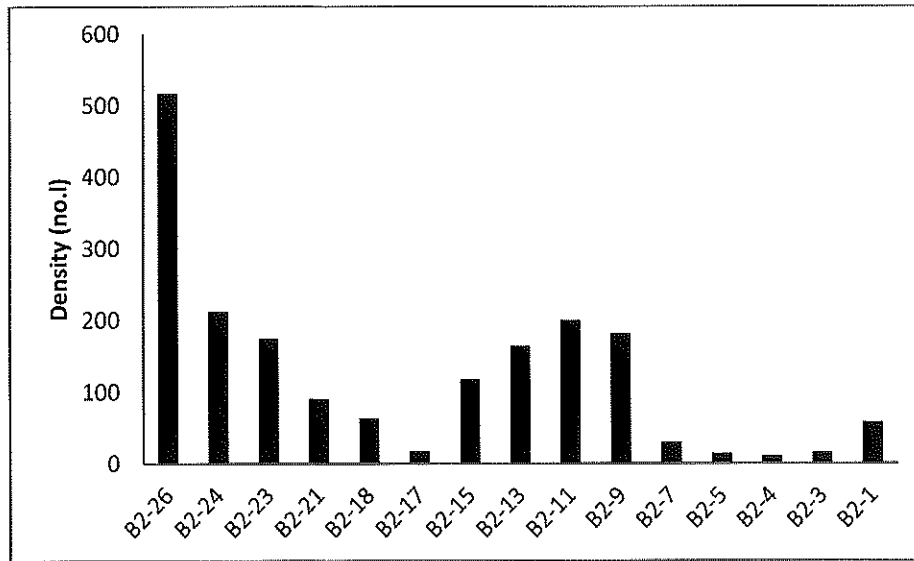


Figure 23: Density (no./l) of phytoplankton species all stations sampled during the Block 2 cruise

Highest phytoplankton density was found distributed in B2-26 and progressively declined to B2 - 17 before increasing to B2-11. Generally higher phytoplankton density was associated with higher amounts of nutrients at B2 -26. High abundance at B2-26 was caused by a bloom of *Chaetoceros* sp. (Figure 23).

3.6.2 Zooplankton distribution

Copepods dominated the zooplankton catch at all sites and contributed over 90% of contribution of zooplankton. Dominant zooplankton was Chaetognatha followed by *Oncaea* sp (Cyclopoid copepod), *Paracalanus* sp (Calanoid copepod) and *Eucalanus* sp (Calanoid copepod). Other dominant species were Oikopleura (Appendicularia), *Centropages* sp. (Calanoid copepod) and *Tortanus* sp. (Calanoid copepod) (Figure 24)



Figure 27:A dolphin swimming next to RV Matfiti

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Annex 6

Letter from the Kenyan Marine & Fisheries Research Institute to the
Attorney-General (18 July 2018)

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CONFIDENTIAL

Ref. KMF/CON/AD/3 VOL.X/16

Date: 18th July 2018

The Attorney General

Office of the Attorney General & Department of Justice
Sheria House, Harambee Avenue,
P.O. Box 40112-00100

NAIROBI



**RE: MAPS SHOWING EQUIDISTANT MARITIME BOUNDARY IN KENYA'S
TERRITORIAL SEA PUBLICISED BY KENYA MARINE AND FISHERIES
RESEARCH INSTITUTE (KMFRI)**

Reference is made to your letter Ref: AG/CONF/19/153/3 dated 12th July 2018 over above named subject. KMFRI wishes to state as follows;

i. Circumstances of the publication

KMFRI has established that the maps in question were linked to the KMFRI website through the Integrated Coastal Biodiversity Information Management Systems (ICBIMS). ICBIMS was a product developed through a consultancy within the Kenya Coastal Development Project (KCDP), which was a multi-sectoral development project that closed in June 2017 and was financed by the World Bank and the Global Environment Facility. The project was hosted by KMFRI and implemented by seven Government Agencies.

The system (ICBIMS) developed was focused on georeferenced biodiversity data and how this data can be shared through a platform for sharing and publishing geospatial data and contents regarding biodiversity of Kenyan Coastal Regions. The ICBIMS platform is a client server web application based on open source technologies, structured as a Geospatial Content Management System (GeoCMS), a system where managed contents can have a position to be displayed on an interactive map.

ICBIMS is single entry point for data and information on biodiversity of the Kenyan coast. The content of this database includes georeferenced data on coastal and marine biodiversity such as coral reefs, seagrasses, mangroves distribution and also fisheries related data resources. KMFRI and other partners were only responsible for uploading the georeferenced data. The data is located in our server based in KMFRI for illustrations and research with main focus being georeferenced data on the resources located along the coastlines.

To view this data, a user can choose to use any background map including OpenStreetMap, Bing map, Google map or no background. The portal got its background map from OpenStreetMap, www.openstreetmap.org.

OpenStreetMap is a free, editable map background of the whole world that is being built by volunteers largely from scratch and released with an open-content license. The *OpenStreetMap* project is dedicated to encouraging the growth, development and distribution of free geospatial data and to providing geospatial data for anyone to use and share. Whereas different background maps can be used, some of them, like the *OpenStreetMap* in this case, might not represent the true boundary positions since they are not vetted and hence cannot be used as an authority.

ii. KMFRI position on usage of maps on the ICBIMS platform

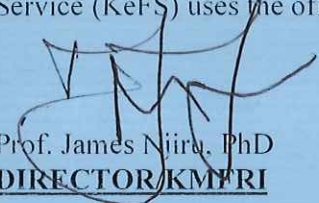
KMFRI wishes to reiterate that the data and maps on the ICBIMS platform were used are purely for research and illustrative purposes only.

All the maps of Kenya linked to the KMFRI website on this platform have been expunged from KMFRI's local and remote server. In future, KMFRI shall seek advice and authority from the Kenya International Boundaries Office and any other relevant authority before using any base map for illustration or other related purposes


iii. Additional information

This is to confirm that maps issued by KMFRI in its research and reporting is consistent with the circular issued by the Public Service Ref. OP.CAB.54/1A dated 5th June 2015 that communicated the official map of Kenya. In line with this position, KMFRI has a research vessel, RV Mtafiti that has carried out various cruises in research on various issues in our exclusive economic zone. During the planning and operationalization of these research expeditions, the Kenyan waters covered are as per the circular as is evident in the contents of sailing orders for RV Mtafiti 2016 (Annex 1 pages 4, 9 and 11) and the subsequent RV Mtafiti Cruise Technical report (Annex 2 pages 6, 7,13,14,15, 17 and 18).

To further demonstrate this the Vessel Monitoring System (VMS) that was established through KCDP project with World Bank-GOK financing and managed through the Kenya Fisheries Service (KeFS) uses the official map in its operations and reporting (Annex 3).


Prof. James Njiru, PhD
DIRECTOR/KMFRI

cc. **Solicitor General,**
Office of the Attorney General & Department of Justice
Sheria House, Harambee Avenue,
P.O. Box 40112-00100
NAIROBI

Ms. Juster Nkoroi 
Kenya International Boundaries Office,
P.O. Box 62345-00200,
NAIROBI

Annex 7

Letter from Lieutenant Colonel Muhia of the Kenyan Navy to Juster Nkoroi,
Head of Kenya International Boundaries Office (23 August 2018)

Phone: 041-2317550
Fax: 041-2317413
Email: moc@mod.go.ke



Kenya Navy Headquarters
P.O. Box 95350
MOMBASA

KN/56/Ops/Trg

23 August 2018

Ms. Juster Nkoroi, EBS
Head, Kenya International Boundaries Office,
The Presidency
KICC
Nairobi.

Dear Madam,

MARITIME BOUNDARY DISPUTE WITH SOMALIA

This is to confirm to you that the undersigned has been shown Figure R 2.1 of the reply of Somalia. However, Kenya Navy has no knowledge of the source of the map in Figure R 2.1. (Fig R 2.1 attached)

Kenya Navy operates two boats in Kismayu port in support of AMISOM operations. AMISOM troops are supplied through Kismayu port thus the boats provide security for the ships while they are entering harbour and while docking. Initially, Kismayu was under Sector 2 manned by Kenya Defence Forces before being expanded and named Sector 6 under Multi-National Forces comprising of Burundi, Ethiopia, Djibouti and Kenyan troops.

The Kenya government (Kenya Navy) continues to rely on the 1980 map/chart to define its Northern Command area within its EEZ. New maps/charts will only be produced if the boundary changes or takes a new form. (See attached 1980 Map/chart)

To the best knowledge of Kenya Navy, there has never been defined maritime sectors for AMISOM. What exists are sectors on land that have troops tasked to be in charge and resources provided.

Yours faithfully,

G MUHIA

Lieutenant Colonel
for Head of Evidence Gathering Team
Ministry of Defence

ETHIOPIA

SECRET

NAVAL COMMAND AREAS
OF
RESPONSIBILITY

SOMALIA

KENYA

12 N.M. FROM BASE LINE

200 NM

MANDA

NORTHERN COMMAND AREA

WATERS

E

E

Z

(48,000 SQUARE NAUTICAL MILES)

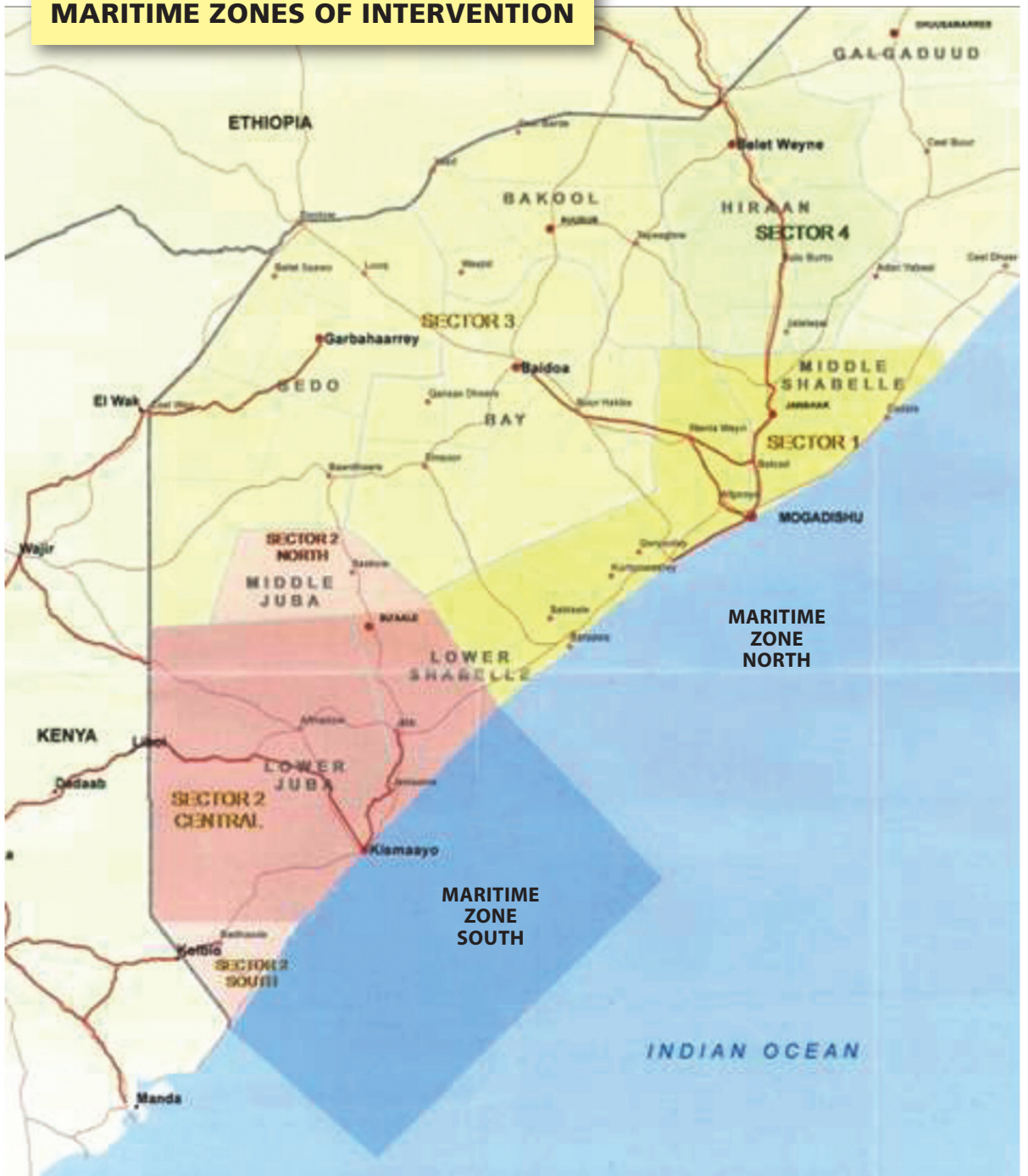
SOUTHERN COMMAND AREA

TERRITORIAL

MOMBASA

TITLE	NAVAL COMMAND AREAS OF RESPONSIBILITY.	
DRG N°	N.CDR. 1/80	
DESIGNED BY	LT. COL. KIBWANA (NAVY COMMANDER)	
DRAWN BY	GAITHO WELLINGTON	DATE 23 5 80
CHECKED BY	<i>[Signature]</i>	DATE 23 5 80
APPROVED BY	<i>[Signature]</i>	DATE 23 5 80
DATE	23 MAY 1980	

**AMISOM:
MARITIME ZONES OF INTERVENTION**



Source: Security Council document S/2012/544, p. 225 (2012).

Figure R2.1

Annex 8

Letter from MaryJane Mwangi, CEO of NOCK,
to the Attorney-General of Kenya (11 October 2018)



OUR REF: **NOCK/LG/GEN CORR**
YOUR REF: **AG/CONF/2/C/43**

11th October, 2018

Hon. P. Kihara Kariuki
The Attorney General
Office of the Attorney General and Department of Justice
Sheria House, Harambee Avenue
P. O. Box 40112-00100

“Without Prejudice”

NAIROBI

Dear Sir,

RE: CONTRACTUAL AGREEMENT ENTERED INTO BETWEEN NATIONAL OIL AND WESTERN GECO

Reference is made to yours dated 02nd October, 2018 contents of which have been noted.

We attach herein copies of the requested documents enumerated as item 1 and 4 in your referenced letter;

1. The final contractual agreement between National Oil Corporation and Western Geco.
2. Production Sharing Contract in respect of Block L13

In reference to your inquiries enumerated as item 2 & 3 we wish to respond as follows;

Item 2 on Drilling by Anadarko: Two wells drilled namely Kubwa & Kiboko as follows;

1. Kubwa-I in Block L-07, Lamu Basin, Offshore Kenya

Co-ordinates: Latitude: 2° 37' 54.642828"S; Longitude 41° 35' 16.627560"E

The well was initiated on January 25, 2013 and completed on April 19, 2013 at 2100hrs, drilling to a total depth (TD) of 5,858.6m measured depth (MD).

2. Kiboko-I in Block L-11B, Lamu Basin, Offshore Kenya

Co-ordinates: Latitude: 4° 20' 46.117510"S; Longitude 41° 41' 05.385804"E

The well program was drilled in two phases with the top set initiated January 16 and completed January 25, 2013 at 1200 hrs. The second phase to complete the program was initiated April 19 and completed with the rig being released August 15, 2013 at 1200 hrs.

There is no substantive information regarding the spudding of any drilling in 2015.

Item 3 on Drilling in Block L22: There is no documentation showing that seabed core drilling was done in 2014 by Total E&P.

The documents available are for seabed mapping and geochemical sampling survey offshore Block L22 KENYA during the survey period 23 March – 11 April 2014.

The following is the information within our domain in regards to the questions raised. We hope it is helpful.

Yours faithfully,



MaryJane Mwangi

CHIEF EXECUTIVE OFFICER

Annex 9

Note Verbale from the Ministry of Foreign Affairs of Kenya to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia,
MFA.273/430/001 (26 September 2007)

MFA.273/430/001A

26th September, 2007

The Ambassador
Kenya Embassy
Somalia

**RE: NOTE VERBALE TO THE TRANSITIONAL FEDERAL
GOVERNMENT OF SOMALIA ON DELINEATION OF THE
CONTINENTAL SHELF.**

Forwarded herewith is a note verbale ref MFA.273/430/001A dated 26th September, 2007 together with attachments addressed to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia.

Kindly but urgently, transmit the note to the Ministry of Foreign Affairs of Somalia and facilitate an early response.

D.W. WAMBURA
FOR: PERMANENT SECRETARY

MFA.273/430/001A

The Ministry of Foreign Affairs of the Republic of Kenya presents its compliments to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia and has the honour to inform as follows: -

The Government of the Republic of Kenya has embarked on the delineation of the outer limits of her continental shelf by implementing the provisions of Article 76 of United Nations Convention on the Law of the Sea (UNCLOS).

The Government of the Republic of Kenya wishes to inform the Transitional Federal Government of Somalia that to delineate her extended continental shelf, it has to carry out a survey within the maritime boundaries that are shared between the two countries. The survey is intended to collect, assemble, analyze and document relevant hydrographic, geological and geophysical data in accordance with the provisions outlined in the Technical Guidelines developed by the Commission on the Limits of the Continental Shelf (CLCs) to prove its claim. To do this, a competent contractor will be engaged by the Government of Kenya to carry out the survey data between the months of October 2007 to May 2008.

As the Federal Government may be aware, the CLCs requires that maritime boundaries should be agreed upon between adjacent States as a prerequisite, in order to ensure that its claim on the extended continental shelf as affected by the maritime boundaries may be considered by the Commission. The boundaries between our two countries however have been drawn using the parallel of latitudes, in accordance with Articles 74, 83 of the UNCLOS. UNCLOS adopted the parallel of latitudes as proclaimed by Government of the Republic of Kenya, in 2005.

The Government of the Republic of Kenya therefore, wishes to request the Transitional Federal Government of Somalia, in the spirit of cooperation, mutual respect and friendship that exists between the two countries over, to confirm to the Government of the Republic of Kenya:

1. By a *note verbale*, that the Transitional Federal Government agrees with the way the maritime boundaries between the two countries are drawn and as deposited with the United Nations by the Government of the Republic of Kenya.
2. To note that the Government of the Republic of Kenya shall carry out a survey between the months of October 2007 to May 2008 within the maritime boundaries that are shared between the Government of the Republic of Kenya and the Government of the Federal Republic of Somalia.

In this respect the Ministry has the honour to attach to this note the following:

1. Aide memoire on the delineation of Kenya's extended continental shelf beyond 200m;
2. Maritime boundaries Map of the Government of the Republic of Kenya; and
3. The accompanying coordinates

An early response from the Transitional Federal Government would be highly appreciated

The Ministry of Foreign Affairs of the Republic of Kenya avails itself of this opportunity to renew to the Transitional Federal Government of Somalia the assurances of its highest consideration.

NAIROBI – 26TH September, 2007

**The Ministry of Foreign Affairs of the
Transitional Federal Government of
Somalia
MOGADISHU**

AIDE MEMOIRE ON DELINEATION OF KENYA'S EXTENDED CONTINENTAL SHELF BEYOND 200 MILES

The Ministry of Foreign Affairs of the Government of the Republic of Kenya wishes to notify the Government of the Federal Republic of Somalia that it is undertaking the Delineation of its extended continental shelf beyond 200 nautical miles according to Article 76 of the United Nations Convention on the Law of the Sea (UNCLOS). The Article permits coastal States to delineate their extended jurisdiction over the continental shelf beyond 200 nautical miles up to 350 nautical miles upon submission of scientific evidence that the continental shelf extends to 350 nautical miles.

As you are aware, maritime boundaries should be agreed upon between adjacent States as a prerequisite in order for its claim as affected by the maritime boundaries may be successfully considered by the Commission on the limits of the continental (CLC's). However, the boundaries between our two countries have not been defined.

Towards this end, the Government of the Republic of Kenya has taken steps and has delimited her Territorial Sea and the Exclusive Economic Zone (EEZ) using the method of single maritime boundary of parallel of latitude in line with Articles 74 and 83 of the Convention and international best practices according to the attached maps, charts and coordinates which have been deposited with the United Nations Secretary General published (Bulletin 61).

It is worthy of note that the Government of the Republic of Kenya ratified (UNCLOS) on 2nd March 1989. The Government of Federal Republic of Somalia ratified the same on the 24th July 1989. Both countries are therefore bound by the Convention. Under this Convention, coastal States are required to delimit their maritime zones and post maps and charts with the Secretary General of the United Nations for publications.

In this regard, the Government of the Republic of Kenya has embarked on the delineation of her outer limits of the continental shelf beyond 200 nautical miles by implementing provisions of Article 76 of United Nations Convention on the Law of the Sea. The delineation process is based on a complex set of rules that involve the analysis of the depth and shape of the sea floor, as well as the thickness of the underlying sediments. The proper implementation of this Article requires the collection, assembly, analysis and documentation of relevant hydrographic, geological and geophysical data in accordance with the provisions outlined in the Scientific and Technical Guidelines developed by the Commission on the Limits of the Continental Shelf (CLCS).

The Government of the Republic of Kenya encourages and urges the Government of the Federal Republic of Somalia to embark on the process of delineation of her outer continental shelf with the view to secure her sovereignty over her maritime resources for the people of Federal Republic of Somalia for the future generation and posterity.

To enable the government of the Republic of Kenya to delineate her extended continental shelf, it has to carry out a survey in the maritime boundaries that are shared between the Government of the Republic of Kenya and the Federal Republic of Somalia. To do this, a competent contractor will be engaged to collect requisite data intermittently between the months of October 2007 to June 2008.

The Government of the Republic of Kenya is preparing to undertake a survey between October 2007 and April 2008. The Government of the Republic of Kenya therefore wishes to notify the Government of the Federal Republic of Somalia of this intention. Further, the Government of the Republic of Kenya wishes to inform the Government of the Federal Republic of Somalia that defining maritime boundaries is an important exercise for the purpose of addressing issues of piracy, illegal and unregulated exploitation of fishery and other economic resources, security, dumping of toxic waste, with the view to conserve, manage and protect our maritime environment.

The Federal Government of the Republic of Somalia is encouraged to commence on the delineation of her continental shelf and the Government of the Republic of Kenya wishes to express willingness to assist the Federal Government of the Republic of Somalia jumpstart the process using her current expertise and experience.

The Government of the Republic of Kenya avails itself of this opportunity to renew to the Government of the Federal Republic of Somalia the assurance of its highest consideration.

FIRST SCHEDULE

KENYA'S EEZ COORDINATES

The area of the territorial waters of the Republic of Kenya extends to a point twelve international nautical miles from the straight baseline, hereinafter described as follows:

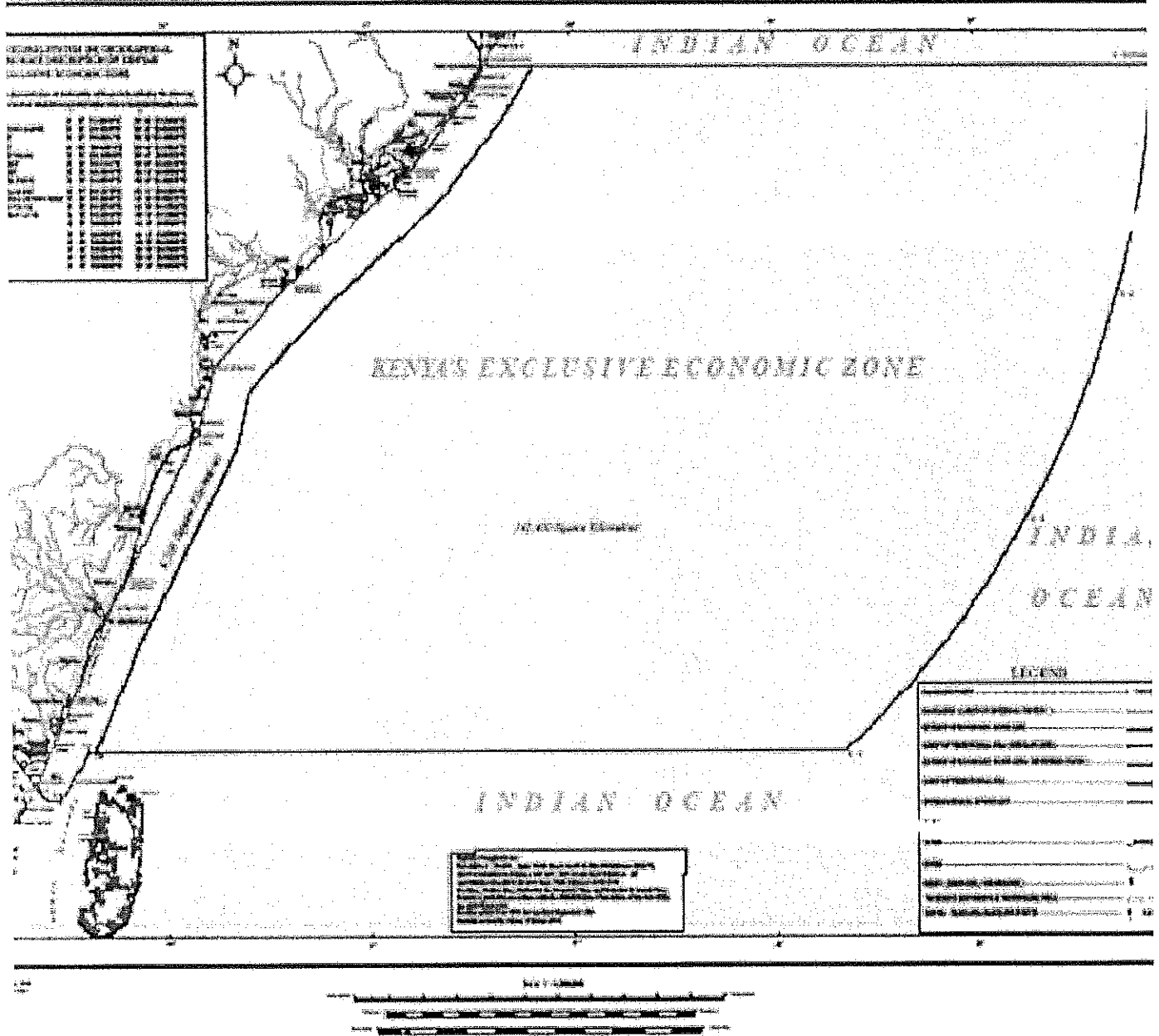
Diua Damasciaca	01° 39' 34.253" S	41° 34' 44.196" E
Kiungamwina Drying Reef	01° 46' 39.558" S	41° 30' 09.022" E
Mwamba Haasani	02° 07' 04.152" S	41° 11' 50.251" E
Mwamba wa Punju	02° 36' 51.853" S	40° 37' 01.061" E
Ras Ngomeni	02° 58' 46.462" S	40° 14' 24.696" E
Leopard Reef	03° 16' 18.111" S	40° 09' 42.261" E
Jumba la Mtwana	03° 56' 23.604" S	39° 47' 18.814" E
Leven Reef	04° 03' 03.430" S	39° 43' 21.759" E
Chale Reef	04° 27' 37.643" S	39° 32' 01.509" E
Mwamba Kitungamwe	04° 48' 25.434" S	39° 21' 32.852" E

SECOND SCHEDULE

The Exclusive Economic Zone of the Republic of Kenya is the area described by the following points and 200 nautical miles wide as measured from the baseline.

T-Diua Damasciaca	01° 39' 34.253" S	41° 49' 09.012" E
E-Diua Damasciaca	01° 39' 34.253" S	44° 54' 47.520" E
E-A	02° 39' 36.000" S	44° 43' 19.092" E
E-B	03° 39' 36.000" S	44° 15' 13.896" E
E-C	04° 40' 53.004" S	43° 20' 36.204" E
T-C	04° 40' 55.004" S	39° 36' 30.240" E
T-B	04° 40' 52.000" S	39° 36' 18.000" E
T-A	04° 49' 56.000" S	39° 20' 58.000" E
B-MK	04° 49' 51.636" S	39° 20' 59.244" E

KENYA TERRITORIAL SEA / EXCLUSIVE ECONOMIC ZONE



Proclaimed Maritime Zone of the Kenya as deposited with the Secretary General of the United Nations

Annex 10

Note Verbale from the Ministry of Foreign Affairs of Kenya to the Ministry
of Foreign Affairs of the United Republic of Tanzania, MFA.273/430/001
(26 September 2007)

MFA.273/430/001A

The Ministry of Foreign Affairs of the Republic of Kenya presents its compliments to the High Commission of the United Republic of Tanzania and has the honour to forward herewith a diplomatic note verbale ref. MFA.273/430/001A dated 26th September, 2007 together with attachments addressed to the Ministry of Foreign Affairs of Tanzania.

The Ministry requests the esteemed High Commission to urgently transmit the note to the Ministry of Foreign Affairs of Tanzania and to facilitate an early response.

The Ministry of Foreign Affairs of the Republic of Kenya avails itself this opportunity to new to the High Commission of the United Republic of Tanzania the assurances of its highest consideration.

NAIROBI 26TH SEPTEMBER, 2007

The High Commissioner
High Commission of Tanzania
NAIROBI

Encl.

MFA.273/430/001A

The Ministry of Foreign Affairs of the Republic of Kenya presents its compliments to the Ministry of Foreign Affairs of the United Republic of Tanzania and has the honour to inform as follows: -

The Government of the Republic of Kenya has embarked on the delineation of the outer limits of her continental shelf by implementing the provisions of Article 76 of United Nations Convention on the Law of the Sea (UNCLOS).

The Government of the Republic of Kenya wishes to inform the Government of the United Republic of Tanzania that in order for Kenya to delineate her extended continental shelf, it has to carry out a survey within the maritime boundaries that are shared between the two countries. The survey is intended to collect, assemble, analyze and document relevant hydrographic, geological and geophysical data in accordance with the provisions outlined in the Technical Guidelines developed by the Commission on the Limits of the Continental Shelf (CLCs) to prove its claim. To do this, a competent contractor will be engaged by the Government of Kenya to carry out the survey data between the months of October 2007 to May 2008.

As the Tanzanian Government may be aware, the CLCs requires that maritime boundaries should be agreed upon between adjacent States as a prerequisite, in order to ensure that its claim on the extended continental shelf as affected by the maritime boundaries may be considered by the Commission. The boundaries between our two countries have been drawn using the parallel of latitudes, in accordance with Articles 74, 83 of the UNCLOS. UNCLOS adopted the parallel of latitudes as proclaimed by Government of the Republic of Kenya, in 2005.

The Government of the Republic of Kenya therefore, wishes to request the Government of Tanzania, in the spirit of cooperation, mutual respect and friendship that exists between the two countries to confirm to the Government of the Republic of Kenya:

1. By a *note verbale*, that the Tanzanian Government agrees with the way the maritime boundaries between the two countries are drawn

and as deposited with the United Nations by the Government of the Republic of Kenya.

2. To note that the Government of the Republic of Kenya will carry out a survey between the months of October 2007 to May 2008 within the maritime boundaries that are shared between the Government of the Republic of Kenya and the Government of the United Republic of Tanzania.

In this respect the Ministry has the honour to attach to this note the following:

1. Aide memoire on the delineation of Kenya's extended continental shelf beyond 200m;
2. Maritime boundaries Map of the Government of the Republic of Kenya; and
3. The accompanying coordinates

An early response from the Government of Tanzania would be highly appreciated

The Ministry of Foreign Affairs of the Republic of Kenya avails itself of this opportunity to renew to the Ministry of Foreign Affairs of the United Republic of Tanzania the assurances of its highest consideration.

NAIROBI – 26TH September, 2007

**The Ministry of Foreign Affairs of the
United Republic of Tanzania
Dar es Salaam
TANZANIA**

AIDE MEMOIRE ON DELINEATION OF KENYA'S EXTENDED CONTINENTAL SHELF BEYOND 200 MILES

The Government of the Republic of Kenya and the Government of the Republic of Tanzania are parties to the United Nations Convention on the Law of the Sea. The Convention requires coastal States to delineate and agree on their respective maritime boundaries covering the Territorial Sea, Exclusive Economic Zone (EEZ) and the Continental Shelf.

The Government of the Republic of Kenya would like to recall the 1976 agreement on the territorial sea boundaries between the Government of the United Republic of Tanzania and the Government of the Republic of Kenya. This agreement was subsequently deposited with the Secretary General of the United Nations for publication. Since this agreement does not cover maritime boundary regarding the EEZ and the Continental Shelf, the two countries need to agree on the rest of the maritime boundary.

Article 76 of the United Nations Convention on the Law of the Sea, avails the opportunity for coastal States to extend their continental shelf beyond the 200 nautical miles up to 350 nautical miles. The Government of the Republic of Kenya has taken steps and has delimited her Territorial Seas and the Exclusive Economic Zones, in accordance with the Convention and international best practices. The Government of the Republic of Kenya used the method of single maritime boundary of parallel of latitudes in line with Articles 74 and 83 of the Convention towards establishing her maritime boundary. This has been finalized and maps, charts and coordinates subsequently were deposited with the United Nations Secretary General and have been published (Bulletin 61).

Article 76 permits coastal States to their jurisdiction over their continental shelf upon submitting scientific evidence that the continental shelf extends to 350 nautical miles. For any coastal State to benefit from the provision of this Article, they have to make a submission of an extended outer continental shelf beyond the 200 nautical miles before May 2009.

In this regard, the Government of the Republic of Kenya has embarked on the delineation of her outer limits of the continental shelf by implementation of the provisions of Article 76 of United Nations Convention on the Law of the Sea. The delineation process is based on a complex set of rules that involve the analysis of the depth and shape of the sea floor, as well as the thickness of the underlying sediments. The proper implementation of this Article requires the collection, assembly, analysis and documentation of relevant hydrographic, geological and geophysical data in accordance with the provisions outlined in the

Technical Guidelines developed by the Commission on the Limits of the Continental Shelf (CLCS).

To enable the government of the republic of Kenya to delineate her extended continental shelf, it has planned to carry out a survey within the maritime boundaries that are shared between the Government of the Republic of Kenya and the Government of the United Republic of Tanzania. To do this, a competent contractor will be engaged to collect requisite data between the months of October 2007 to May 2008. The Government of the Republic of Kenya therefore wishes to notify the Government of the United Republic of Tanzania of this intention.

As you are aware, maritime boundaries should be agreed upon between adjacent States. However, the boundaries within the maritime area of Kenya have been drawn using the parallel of latitudes by the Government of the Republic of Kenya in accordance to Articles 74, 83 of the UNCLOS. This adopted the parallel of latitudes as proclaimed by Government of the Republic of Kenya, in 2005.

Enclosed are:

1. Maritime Map of the Government of the Republic of Kenya;
2. The accompanying Coordinates

The Government of the Republic of Kenya avails itself of this opportunity to renew to the Government of the United Republic of Tanzania the assurance of its highest consideration.

Annex 11

Note Verbale from the Embassy of the Somali Republic in Kenya to the
Embassy of Kenya to Somalia, ESR/4287/V/07 (30 October 2007)

Telephone: 020-2733883
Fax: 020-2733887
When replying please quote

Ref. No. **KES/POL/002A/VOL.III/(16)**
and date



KENYA EMBASSY TO SOMALIA
N.S.S.F. BUILDING
P. O. Box 67454-00200
NAIROBI

....., 20.....

31st October, 2007

The Permanent Secretary,
Ministry of Foreign Affairs,
NAIROBI.



Attn: J. M. Gicheru

DELINEATION OF KENYA'S EXTENDED CONTINENTAL SHELF

We wish to forward herewith for your information Note Ref. No. ESR/4287/V/07 dated 30th October 2007, from Embassy of the Somali Republic in Kenya in response to our two notes forwarding request from the Ministry of Foreign Affairs to carry out the above captioned exercise in Somalia.

Mary-Goretti Ndede (Mrs.)
For: Ambassador

Noted.
Me

October



Embassy of the Somali Republic
Nairobi - Kenya

Re: ESR/4287/V/07

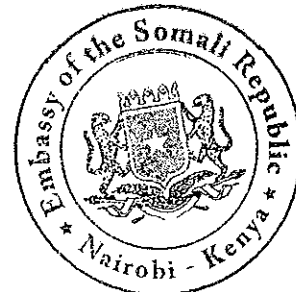
The Embassy of the Somali Republic in Kenya presents its compliments to the Embassy of the Republic of Kenya to Somalia and has the honor to refer to your note Ref. No. KES/POL/002A/VOL.III/(14) dated 25th October 2007 regarding the "DELINEATION OF KENYA'S EXTENDED CONTINENTAL SHELF".

The Embassy of the Somali Republic has the honor to inform your good office that both note verbals have been received at the Embassy and forwarded to the Ministry of Foreign Affairs and International Cooperation of Somalia and we are awaiting a quick response from the Ministry.

The Embassy of the Somali Republic in Kenya avails itself of this opportunity to renew the Embassy of the Republic of Kenya to Somalia the assurance of its highest consideration.

Nairobi, 30th October 2007

The Embassy of the Republic of
Kenya to Somalia
Nairobi



Annex 12

Note Verbale from the Ministry of Foreign Affairs of Kenya to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia,
MFA.273/430/001A (4 July 2008)

Telephone: +254-20-315588
Fax: +254-20-240066/341955/344331
E-mail: communication@mfa.go.ke
Website: www.mfa.go.ke

When replying please quote Ref. No. and date



HARAMBEE AVENUE
P.O. Box 30551-00100
NAIROBI, KENYA.

MINISTRY OF FOREIGN AFFAIRS

Ref No
MFA . 273/430/001A

4th July 2008

The Ambassador
Kenya Embassy to Somalia
NAIROBI



RE: NOTE VERBALE TO THE TRANSITIONAL FEDERAL GOVERNMENT OF SOMALIA ON NO- OBJECTION TO MARITIME BOUNDARIES AS DEPOSITED BY THE GOVERNMENT OF THE REPUBLIC OF KENYA TO THE UNITED NATIONS.

Forwarded herewith is a note verbale ref. MFA 273/430/001A dated 4th July 2008, as a follow-up to one of even reference dated 26th September 2007 addressed to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia.

Kindly but urgently, transmit the note to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia and facilitate an early response.

Kaitikei Rotiken
For: **PERMANENT SECRETARY**

Encl:

f-475

Telephone: 020-2733883/2736390
Fax 020-2733887
When replying please quote



KENYA EMBASSY TO SOMALIA
N.S.S.F. BUILDING
P.O. Box 67454-00200
NAIROBI

Ref. No. **KES/POL/002A**
and date

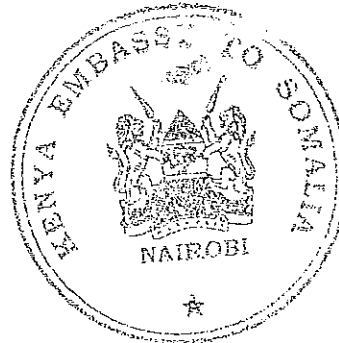
.....,20.....

The Embassy of the Republic of Kenya to Somalia presents its compliments to the Embassy of the Transitional Federal Government of Somalia in Nairobi and has the honour to forward herewith Note Verbale Ref. No. MFA. 273/430/001A dated 4th July, 2008 from the Ministry of Foreign Affairs of the Republic of Kenya, for onward transmission to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia.

The Embassy of the Republic of Kenya to Somalia avails itself of this opportunity to renew to the Embassy of the Transitional Federal Government of Somalia in Nairobi the assurance of its highest consideration.

M. Mwangi

7th July, 2008
NAIROBI



Embassy of the Transitional Federal
Government of Somalia
NAIROBI

Telephone: +254-20-318889
Fax: +254-20-240066/341953/344332
E-mail: communication@mfa.go.ke
Website: www.mfa.go.ke
When replying please quote Ref. No. and date



HARAMBEE AVENUE
P.O. Box 30551-00 00
114 NAIROBI, KENYA

MFA. 273/430/001A MINISTRY OF FOREIGN AFFAIRS

Ref No.

The Ministry of Foreign Affairs of the Republic of Kenya presents its compliments to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia and has the honour to refer to the former's Note Verbale of even reference dated 26th September, 2007.

The United Nations Convention on the Law of the Sea (UNCLOS), to which Kenya became a party in 1984, provides under its Article 76 that all Coastal States can claim up to a maximum of 350 nautical miles extended Continental Shelf beyond the current 200 nautical miles mark. The 200 nautical miles is automatically available to states by virtue of being parties to UNCLOS. The additional area up to a maximum of 150 nautical miles has to be claimed through a rigorous scientific and legal proof to the United Nations Commission on the Limits of the Continental Shelf (CLCS). The deadline for the submission of such a claim to the United Nations is on 13th May 2009. After this date, a state which has not made the submission will forfeit its chance to lay any claim.

Under International Law and practice, maritime boundaries should be agreed upon between adjacent states. However, the boundaries within the maritime area of Kenya have been drawn using the parallel of latitudes by the Government of the Republic of Kenya in accordance to Articles 74; 83 of the UNCLOS. This adopted the parallel of latitudes as proclaimed by the Government of the Republic of Kenya in the year 2005.

The Government of the Republic of Kenya therefore, wishes to request the Transitional Federal Government of Somalia, in the spirit of cooperation, mutual respect and friendship that exists between the two countries, to state its position to the Government of the Republic of Kenya that the Transitional Federal Government of Somalia agrees with the maritime boundaries between the two countries as drawn and deposited with the United Nations by the Government of the Republic of Kenya. The Maritime Map of the Government of the Republic of Kenya and the accompanying coordinates are herein enclosed for ease of reference. An early response from the relevant agency of the Transitional Federal Government would be highly appreciated.

The Ministry of Foreign Affairs of the Republic of Kenya avails itself of this opportunity to renew to the Transitional Federal Government of Somalia the assurances of its highest consideration.

Nairobi, 4th July 2008



The Ministry of Foreign Affairs of the
Transitional Federal Government of
Somalia

MOGADISHU

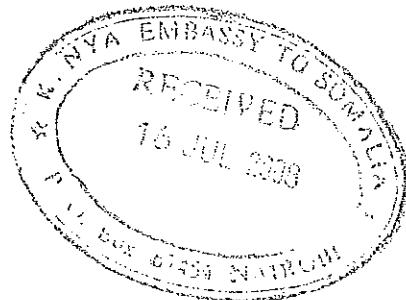
Annex 13

Note Verbale from the Kenya Embassy to Somalia to the Embassy of the Transitional Federal Government of Somalia in Kenya, MFA.273/430/001A
(16 July 2008)

MFA . 273/430/001A

14th July 2008

The Ambassador
Kenya Embassy to Somalia
NAIROBI



**RE: NOTE VERBALE TO THE TRANSITIONAL FEDERAL GOVERNMENT
OF SOMALIA ON NO- OBJECTION TO MARITIME BOUNDARIES AS
DEPOSITED BY THE GOVERNMENT OF THE REPUBLIC OF KENYA TO
THE UNITED NATIONS.**

Forwarded herewith are attachments to the note verbale ref. MFA 273/430/001A dated 4th July 2008, addressed to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia.

Inconvenience caused by the omission is highly regretted.

A handwritten signature in black ink, appearing to read "Kaitikei Rotiken".

Kaitikei Rotiken

For: **PERMANENT SECRETARY**

Encl:

Telephone: 020-2733883/2736390

Fax 020-2733887

When replying please quote

Ref. No. **KES/POL/002A**
and date



Kenya
KENYA EMBASSY TO SOMALIA

N.S.S.E. BUILDING

P.O. Box 67454-00200

NAIROBI



The Embassy of the Republic of Kenya to Somalia presents its compliments to the Embassy of the Transitional Federal Government of Somalia in Nairobi and has the honour to forward herewith attachments to Note Verbale Ref. No. MFA. 273/430/001A dated 4th July, 2008 from the Ministry of Foreign Affairs of the Republic of Kenya to the Ministry of Foreign Affairs of the Transitional Federal Government of Somalia, which were inadvertently omitted.

The Embassy of the Republic of Kenya to Somalia avails itself of this opportunity to renew to the Embassy of the Transitional Federal Government of Somalia in Nairobi the assurance of its highest consideration.

16th July, 2008

NAIROBI



Embassy of the Transitional Federal
Government of Somalia

NAIROBI

FIRST SCHEDULE

KENYA'S EEZ COORDINATES

The area of the territorial waters of the Republic of Kenya extends to a point twelve international nautical miles from the straight baseline, hereinafter described as follows:

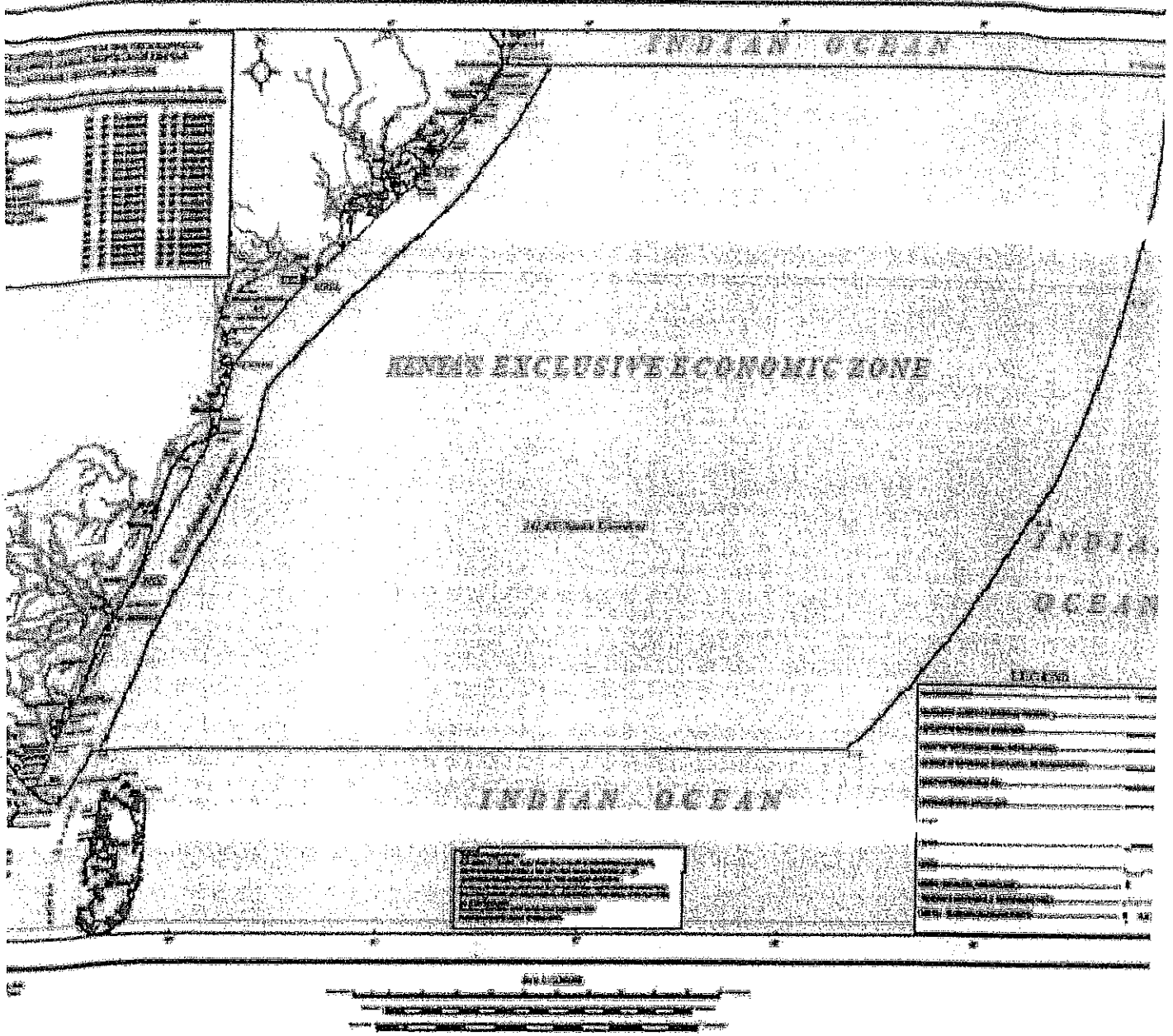
Diuu Damasciaca	01° 39' 34.253" S	41° 34' 44.196" E
Kiungamwina Drying Reef	01° 46' 39.558" S	41° 30' 09.022" E
Mwamba Haasani	02° 07' 04.152" S	41° 11' 50.251" E
Mwamba wa Punju	02° 36' 51.853" S	40° 37' 01.061" E
Ras Ngomeni	02° 58' 46.462" S	40° 14' 24.696" E
Leopard Reef	03° 16' 18.111" S	40° 09' 42.261" E
Jumba la Mtwana	03° 56' 23.604" S	39° 47' 18.814" E
Leven Reef	04° 03' 03.430" S	39° 43' 21.759" E
Chale Reef	04° 27' 37.643" S	39° 32' 01.509" E
Mwamba Kitungamwe	04° 48' 25.434" S	39° 21' 32.852" E

SECOND SCHEDULE

The Exclusive Economic Zone of the Republic of Kenya is the area described by the following points and 200 nautical miles wide as measured from the baseline.

T-Diuu Damasciaca	01° 39' 34.253" S	41° 49' 09.012" E
E-Diuu Damasciaca	01° 39' 34.253" S	44° 54' 47.520" E
E-A	02° 39' 36.000" S	44° 43' 19.092" E
E-B	03° 39' 36.000" S	44° 15' 13.896" E
E-C	04° 40' 53.004" S	43° 20' 36.204" E
T-C	04° 40' 55.004" S	39° 36' 30.240" E
T-B	04° 40' 52.000" S	39° 36' 18.000" E
T-A	04° 49' 56.000" S	39° 20' 58.000" E
B-MK	04° 49' 51.636" S	39° 20' 59.244" E

KENYA TERRITORIAL SEA/ EXCLUSIVE ECONOMIC ZONE



Proclaimed Maritime Zone of the Kenya as deposited with the Secretary General of the United Nations

Annex 14

Certified Translation from Absolute Translations


(15 October 2018)

15 October 2018

To whom it may concern

This is to certify that the translation from Somali to English of the enclosed document has been carried out by experienced translators for and on behalf of Absolute Translations, and is, to the best of their ability, a true and accurate translation.

Yours faithfully



Monika Rosa
Project Manager



If there is no agreement, the **Democratic Republic of Somalia** will adopt that the ocean boundary between the **Democratic Republic of Somalia**, the Republic of Djibouti, and the Republic of Kenya is a straight line that goes towards the sea/ocean, and comes from the land with the boundary described by the maps distributed.

The sea boundary of the Arabian Gulf with regards to The People's Republic of Yemen and Indian Ocean which is about Socotra, if there are conflicting claims between these governments, unless there is an agreement settling the issue, a central line between them at an equal distance measured from the original lines of the sea of each country.

o Dalalkaas.

Haddii uusan jirin Heshiis, Jamhuuriyadda Dimuqradiga Soomaaliya waxay u qaadanaysaa in xadka badda oo ka dhaxeeya Jamhuuriyadda Dimuqradiga Soomaaliya iyo Jamhuuriyadda Kenya uu yahay xariiq toosan oo uu socoto dhinaca badda, kana timid xagga dhulka ee xuduudiisa lagu tilmaamay naqshadaha la faa'fiyey.

Xadka qaybaha badda ee Gacanka Cadmeed oo ku saabsan Jamhuuriyadda Dadka Ee Yemen iyo Badweynta Hindiya oo ku saabsan Sokaatra, haddii xuduuddaas, ay iska kor saaran yihiin dacwooyinka dawladahaas, haddii aysan jirin heshiis waxaa kala saarayaa, xariiq dhexe oo u dhaxeysa ballar isku mid ah marka laga soo qiyaas qaato xariiqaha asaasiga ee Badda dal kasta.

Annex 15

Report from Absolute Translations (26 October 2018)



Report produced on behalf of Absolute Translations

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I refer to the translation of two paragraphs of Somali text, provided by Absolute Translations on 15 October 2018.

1. I have been asked to identify the precise Somali word(s) from the original text that are translated as "'straight line" (first para of translation) and "central line between them at an equal distance" (second para of translation).

The precise Somali words from the original text that are translated as "straight line" are "xariiq toosan". These words are in the first paragraph of the original text. Also, the Somali words from the original text that are translated as "central line between them at an equal distance" are "xariiq dhexe oo u dhaxeysa ballar isku mid ah" in the second paragraph.

2. I have been asked to explain whether or not the word(s) translated as "central line between them at an equal distance" could be translated as "median line" or "equidistance line"

I confirm that the words translated as "a central line between them at an equal distance" could as well be translated as a "median line" or an "equidistance line".

Name of translator: Muhamadekh Haji

Signature of translator: *Muhamadekh H.*

Date of signature: 10/26/18

