



JOINT WMO/IOC TECHNICAL COMMISSION FOR
OCEANOGRAPHY AND MARINE METEOROLOGY

FIRST MEETING OF THE JOINT CAGM-JCOMM TASK TEAM ON WEATHER, CLIMATE AND FISHERIES

Noumea, New Caledonia, 16 February 2013

FINAL REPORT

**FIRST MEETING OF THE
JOINT CAGM-JCOMM TASK TEAM ON
WEATHER, CLIMATE AND FISHERIES**

Noumea, New Caledonia, 16 February 2013

FINAL REPORT

JCOMM Meeting Report No. 110

NOTES

WMO DISCLAIMER

Regulation 43 (WMO-No.15)

Recommendations of working groups shall have no status within the Organization until they have been approved by the responsible constituent body. In the case of joint working groups the recommendations must be concurred with by the presidents of the constituent bodies concerned before being submitted to the designated constituent body.

Regulation 44 (WMO-No.15)

In the case of a recommendation made by a working group between sessions of the responsible constituent body, either in a session of a working group or by correspondence, the president of that body may, as an exceptional measure, approve the recommendation on behalf of the constituent body when the matter is, in his opinion, urgent, and does not appear to imply new obligations for Members. He may then submit this recommendation for adoption by the Executive Council or to the President of the Organization for action in accordance with Regulation 9 (5).

© World Meteorological Organization, 2013

The right of publication in print, electronic and any other form and in any language is reserved by WMO. Short extracts from WMO publications may be reproduced without authorization provided that the complete source is clearly indicated. Editorial correspondence and requests to publish, reproduce or translate this publication (articles) in part or in whole should be addressed to:

Chairperson, Publications Board
World Meteorological Organization (WMO)
7 bis, avenue de la Paix
P.O. Box No. 2300
CH-1211 Geneva 2, Switzerland
Publications@wmo.int

Tel.: +41 (0)22 730 84 03
Fax: +41 (0)22 730 80 40
E-mail:

IOC (OF UNESCO) DISCLAIMER

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariats of UNESCO and IOC concerning the legal status of any country or territory, or its authorities, or concerning the delimitation of the frontiers of any country or territory.

CONTENTS

General Summary of the Meeting	1
Annex I List of Participants	9
Annex II Agenda.....	11
Annex III Terms of Reference for the Joint CAgM-JCOMM Task Team on Weather, Climate and Fisheries.....	12
Annex IV Joint CAgM-JCOMM TT-MCR Intersessional Workplan	13
Annex V Acronyms and Other Abbreviations	16

GENERAL SUMMARY OF THE MEETING

1 OPENING SESSION – INTRODUCTION

1.1 The first meeting of the Joint WMO Commission for Agricultural Meteorology (CAgM) and the Joint WMO-IOC Commission for Oceanography and Marine Meteorology (JCOMM) Task Team on Weather, Climate and Fisheries (TT-WCF) was held at the Secretariat of the Pacific Community (SPC) Headquarters in Noumea, New Caledonia on 16 February 2013.

1.2 The TT-WCF was held in conjunction with the 2nd Climate Impacts on Oceanic Top Predators (CLIOTOP) Symposium also held in Noumea, New Caledonia from 11 to 15 February 2013. Several of the TT-WCF members gave presentations at the symposium.

1.3 The meeting was opened by Dr Jim Salinger, Chair of the TT-WCF. Dr Salinger thanked Dr Johann Bell from the SPC for hosting the TT-WCF. There were 13 participants from 8 countries (see [Annex I](#)).

Review of precedent/relevant activities

1.4 CAgM and JCOMM established the joint Task Team, with the primary objective of developing tools for use by the Pacific Island Countries and Territories (PICTs) to assess the impacts of climate change on their fisheries resources, leading to improved management of these resources. Its primary goal is to assess the likely impacts of climate variability and change on oceanic fisheries (e.g. Pacific tuna).

1.5 Following standard WMO practice, the task team was established to accomplish a specific task, over a limited time period – normally one intersessional period for a technical commission. In this context, the end products of the task team work are to be delivered by 2017 (see Annex 3 for the details).

1.6 The ongoing joint efforts by metocean and fishery communities have made the discussion on climate information that are required for effective fisheries management, through the International Workshop on Climate and Oceanic Fisheries (October 2011, Rarotonga, Cook Islands). The Task Team had an ad hoc meeting during the Workshop to finalize its Terms of Reference, membership and to identify main issues to be dealt in near term.

1.7 The CLIOTOP (Climate Impacts on Oceanic Top Predators) Symposium (Noumea, 11-15 February 2013) provided a forum within which the work begun at the Rarotonga Workshop could be extended, to assess the likely impacts of climate variability and change on oceanic fisheries (e.g. Pacific tuna), with a particular focus on Pacific Island Countries and Territories (PICTs). The Symposium largely exceeded expectations: It provided an excellent synthesis of current knowledge, based generally on individual research efforts, of the physical factors influencing oceanic fish stock abundance, breeding, and migratory patterns, including in particular climate variability and change. While such knowledge is qualitatively well established, there are as yet few quantitative data on which to make predictions or even develop management tools. The same can be said to a certain extent for the marine atmosphere and ocean climate data sets. The symposium thus established the limits to current knowledge, as well as a pathway to addressing these. For CAgM and JCOMM, it also established a clear role in synthesising current knowledge, and in laying the foundations for effective management tools for the PICs, through their joint Task Team.

2 APPROVAL OF THE AGENDA AND ANY MODIFICATIONS

2.1 The agenda was introduced by Dr Salinger and was approved by the meeting (see [Annex II](#)).

3 SHORT PRESENTATIONS ON ORGANIZATIONS ARE INVOLVED IN FISHERIES

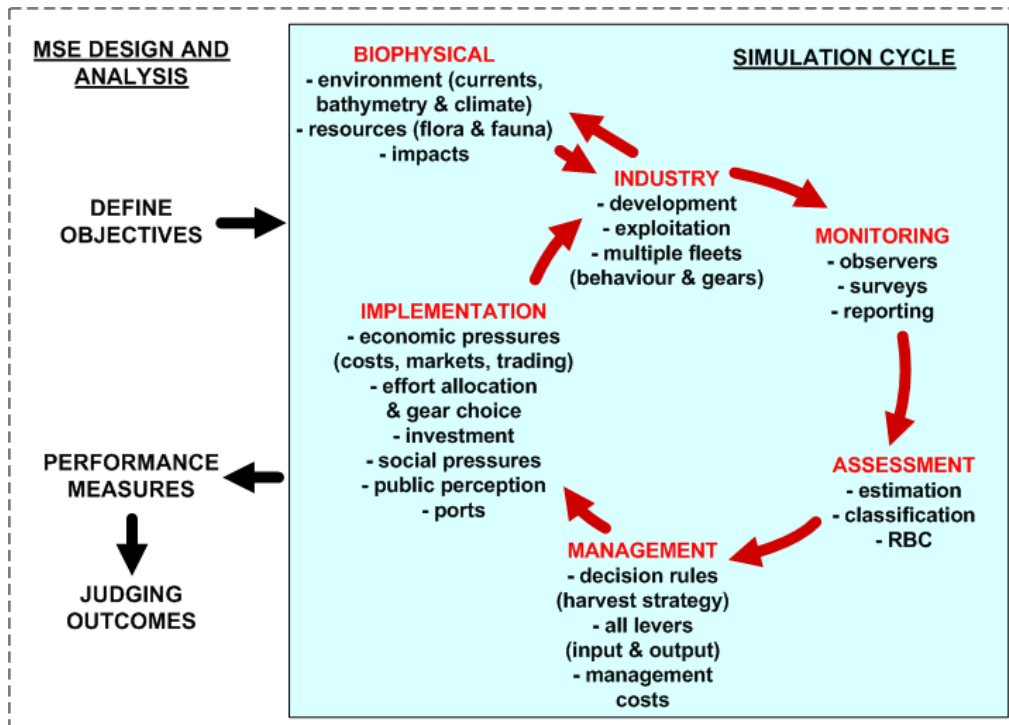
Presentations

3.1 Boram Lee and Robert Stefanski: WMO – Switzerland

- Overview of WMO Agricultural Meteorology Programme (AMP) / CAgM, Marine Meteorology and Oceanography Programme (MMOP) / JCOMM, and the Global Framework for Climate Services (GFCS).
- Example of Roving Seminar could be used for the fisheries community.
- Illustration of how JCOMM/MMOP contributes to GFCS based on core competencies, aiming to societal benefits for ocean and coastal communities.
- Notion on the expected results of the Task Team's work, to GFCS implementation

3.2 Anne Hollowed: National Marine Fisheries Service, NOAA - USA

- Goals: to measure, understand and predict the impacts of climate variability and change on marine ecosystems
- Ecosystem approach to management (Magnuson Stevens Sustainable Fisheries Act / National Standard Guidelines)
 - o Science based decision making
 - o (example) Climate effects to stock distribution, etc. – for pollock fishing, need monthly climate forecasting for fishing seasons
- Coupled regional ocean ecosystem models (<http://atlantis.cmar.csiro.au>)
- Opportunities for collaboration:
 - o Short-term climate outlook (monthly-6 months)
 - o Improved ocean observations: air-sea interactions
 - o Comparative studies of ocean system response
 - o Improved communication/interaction



3.3 Andrew Nkansah: Ghana Met Service

- Majority use canoes/small boats (majority of # of vessels, 70% of production)
- Problem of small scale fisheries: exposure to wind storms; how to locate fish (confined to the coastal region)
- Collaboration with marine fisheries research department, ministry of food and agriculture
- MESA (Monitoring of environment and security in Africa): African Union initiative, 2013-2018. Regional Implementation Center (RIC) in MAFS of Univ. of Ghana
- NEPAD as regional coordination mechanism?
- To do: to explorer potential cooperation with related/ongoing projects

3.4 Scott Woodruff: NOAA - USA

JCOMM's contributions to the TT work

- ICOADS (<http://icoads.noaa.gov>): largest available historical dataset for marine climatological info
- Most "wanted" parameters for fishery community: Wind speed, SLP, SST (need "direct" info to the coastal areas – gap in satellite information)
- Historical data rescue and exchange provides important benefits
- Potential deliverables: JCOMM activities (ETs, ODP, WIS; ICOADS and its Value-Added Database (IVAD: <http://icoads.noaa.gov/ivad/>), data rescue and

analysis), potential enhancement of JCOMM assistance for interdisciplinary / biological observations data management?

- Ship report collections/data management
- Marine Climate Data System (MCDS) to streamline DM efforts, link with WIS
- Marine climatology workshops: CLIMAR (next in spring/summer 2014, Asheville, NC, USA; <http://www.marineclimatology.net/web/>) and the International Workshop on Advances in the Use of Historical Marine Climate Data (MARCDAT)

(idea) possibility to increase delayed mode weather/climate observations from fishing vessels?

3.5 Ed Harrison: NOAA - USA

- NOAA Pacific Marine Environmental Lab, aiming to sustainable fisheries / understanding and predicting climate variability and change
- PMEL Ocean Acidification Program: repeated coastal surveys to understand region-specific behaviours and issues; long-term carbon moorings (TAO-TRITONS, OceanSITES, coastal)
- ECO-FOCI (joint NOAA/PMEL and NOAA/Alaska fisheries research), focus on gulf of Alaska, Bering sea, Arctic (Chukchi Sea)
Making data accessible to community
- Question: how to make direct link with fisheries management from observing programmes?
A case study (generalize, down to fishery management)
- Need to understand/monitor salinity (e.g. anchovies) for coastal fishing...
- PH impact to fisheries? → need further study

3.6 Miquel Niquen: IMARPE - Peru

- (Peruvian sea) impact of environmental changes to fisheries
- Peruvian sea: highly variable (seasonal, annual to inter-annual)
- Fishery monitoring system (daily publication: www.imarpe.gob.pe)
- Proposing: equipping commercial fishing vessels with thermosalinographs; reinforcing observers on board (with oceanographic equipment); approach from species (Peruvian anchovy)
- Conventional climate outlook doesn't work well to predict the fish stock... El Nino/La Nina doesn't lead same responses for fisheries... Need MONTHLY climate outlook/advisory

3.7 Chang-ik Zhang: Pukyung National University – Republic of Korea

- Korean fisheries (coastal, open ocean) takes major portion of global fish production: about 25% of global production out of NW Pacific region in 2009. 50% of catch over the Pacific (N and S)
- International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean, of which Korea is a member – see <http://isc.ac.affrc.go.jp/>
- Changes in fishing grounds due to environmental change
- Impact of climate change on fish and fishery: limited understanding
- IFRAME modelling approach (management tool) – see Hollowed et al. 2001

3.8 Karen Evans: CSIRO Marine & Atmospheric Research - Australia

- Within CSIRO there are two research flagships of relevance: “wealth from oceans” and “climate adaptation”. These provide the support for fisheries management and climate adaptation (through research)
- Focus, design and use of fisheries assessment models varies *extensively* depending on
 - o Processes being investigated
 - o Problems being tackled
 - o Data availability (and quality)
 - o Location of fishery
- Environmental variables are generally not included in stock assessment models, but may be included to varying degrees in population/distribution/ecosystem models ← issue.
- Economically and from a management perspective, shorter-term impacts of over-fishing, inter-annual distributional shifts and increasing demands on resources associated with population growth more important than long-term impacts of climate change
 - o Higher priority for shorter-term prediction of variability
 - o Effective management results in healthy stocks which are more resilient to adaptation requirements under longer term change
 - o Impact of extreme environmental/weather events emphasizing environmental impact on fish/fisheries ?need for climate prediction for risk management

3.9 Some points discussed during the presentation

- “Targeted forecast” for fishery community:
 - o What will the fishing conditions going to be, in 6 months from now? (for fisheries management purpose)
 - o What will be the weather /sea states for today/tomorrow? (higher frequency warnings/information for safety)
- Relevant time scales for decision making
 - o **Seasonal forecasting (weeks to months) as a stepping stone, underpinned by real-time monitoring: working with BOM**
e.g. POAMA model (<http://poama.bom.gov.au/marine-mw/>)

- Communication/advisory (see *Hobday, A. J. & Alpine, J. E. (2005) Communicating Meteorological and Oceanographic Information to Pacific Island Marine Stakeholders. Final Report to AMSAT, Canberra, Australia*)
 - o **Not only providing collected data, but also considering the mode of delivery (e.g. mobile networks?)**
 - o Need consideration on two-way Conversation: use of fishing ships to gather climate information
 - o Education (Australian example – again, need precise reference)
- A suggestion: to consider an approach from “users” (approach from stock) for seasonal forecasts: tuna, salmon, prawn, coral reef management
- Ocean observations for improving fisheries and ecosystems services
 - o Australia: 3 long term (>50yr) sampling stations for coastal/biological environments, now supplemented by a further six stations which have been in operation since 2008 (<http://imos.org/au/anmn.html>)
 - o IMOS(integrated marine observing systems: <http://www.imos.org.au>
→ ADON (Australian Ocean Data Network: <http://portal.aodn.org.au/aodn/>)

4 REVIEW OF TERMS OF REFERENCE (TOR)

4.1 The TT members, led by Dr Salinger, reviewed and modified the TORs for the TT-WCF that were developed at the International Workshop on Climate and Oceanic Fisheries held in Rarotonga, Cook Islands from 3 to 5 October 2011. The revised ToR is reproduced as *Annex III*.

4.2 There were several comments made on the final revised TORs. It was noted that for TOR (b) that the term “oceanic and coastal fisheries management organizations” would include Regional Fisheries Management Organizations (RFMOs). There are more than 20 RFMOs, which are interacting with the FAO. The WMO Secretariat will discuss with FAO the future involvement of RFMOs with the TT-WCF. Possible FAO contact persons are Cassandra DeYoung (Cassandra.DeYoung@fao.org) and David Brown (David.Brown@fao.org).

4.3 It was noted for TOR (c) that Expected Output could include the following:

- Synthesis Publication (Brochure / WMO Joint Technical Note?)
- Outreach/support sharing information (i.e. IMBER Open Science Meeting in 2014, Theme C: higher trophic level processes and dynamics – see: <http://www.imber.info/index.php/Meetings/IMBER-OSC-2014/Sessions-Workshops>)

4.4 These outputs could be linked with relevant activities/workshops of ICES/PICES (focus on Northern Atlantic and North Pacific) and to contribute to global assessment. For example, the International Conference on Fisheries and Aquatic Sciences, to be held in Brazil in 2015, as discussed by Dr Hollowed.

4.5 It was stressed for TOR (c) and (d) should avoid duplicating work. These TORs could be focused on to contribute to the work of other competent programmes/organizations (e.g. ICES, PICES, CLIOTOP, PACCSAP).

4.6 It was noted that TOR (f) could recommend the National Meteorological and Hydrological Services (NMHSs) to more closely link to / establish collaborative mechanism

with coastal zone management / fishery management community and to advise and work with agrometeorological advisors of NMHSs to produce bulletins/advisories.

5 AGREEMENT ON END PRODUCTS OF TASK TEAM WORK

5.1 The Team noted that the work of the Task Team would constitute a contribution to the GFCS through building a mechanism to enhance understanding and capabilities in the PICTs in marine climatology/oceanography and their impacts on ocean fisheries, and eventually enhancing international coordination of the collection/processing/delivery of marine and ocean information as well as the climate products, through:

- international coordination of the collection and processing of marine and ocean data
- coordination for preparation and delivery to users of marine and ocean climate products and services,
- assistance to RFMOs and fisheries managers to better use climate information

5.2 In this context, the proposed end products of the Task Team work, to be delivered during the Technical Commissions' intersessional period, are as follows:

- (i) The current data collected and archived in the system coordinated by JCOMM on the marine atmosphere and ocean, and in particular assessing how these data meet current needs in the sustainable management of oceanic fisheries, upon the future consideration of management tools to incorporate environmental data; and could be used to develop specific climate services for fisheries within the context of the Global Framework for Climate Services (GFCS); an adjunct to this will be to assist fisheries to make and report relevant marine atmosphere and ocean data into the WMO Information System – led by metocean experts /JCOMM;
- (ii) The impacts of climate, climate variability and climate change on fisheries; e.g. as a literature review of current understanding of the impacts within the Pacific region (given that there is already a lot of literature out there and work done already to bring that knowledge together – led by fisheries experts/CAgM;
- (iii) Risk assessment or management evaluation tools incorporating climate variability and change for the sustainable management of fisheries – led by fisheries experts/CAgM.

6 DEVELOPMENT OF AN ACTION PLAN FOR THE TASK TEAM

6.1 The tasks to develop the end products and assessments were assigned to specific Task Team members, with some interim reporting to be prepared for the next sessions of CAgM and JCOMM management in late 2014. The detailed work plan is given in [Annex IV](#).

6.2 The following is a summary of the deliverables:

- TT-WCF interim report will be needed before the next sessions of the respective WMO Commissions, CAGM-16 March 2014, and JCOMM/MAN in 2015;
- special edition of Climatic Change (under way);

- Synthesis report / policy brief: (building on AR5) with emphasis on comparative impact / relevant importance of climate information on the status of the stock (with focus on climate variability's side) – tools, management responses, etc.
→ preliminary draft for synthesis report by CAgM session (2014), to be finalized before 2015 Brazil meeting
- Session in the fisheries workshop (Brazil, 2015) on “impact / relevant of climate information on the status of the stock” (global assessment)
- “flagship story” on impact on climate information (e.g. Peruvian anchovy and El Nino impact), by supporting a case study need for ‘re-packaging’ available information for users
- Possibilities of a “roving seminar” type training (e.g. Ghana or Pacific Islands). Need information in advance on the delivery method, communication, scope, etc. (possibly as a recommendation to CAgM and JCOMM)

7 RECOMMENDATION TO JCOMM AND CAgM

7.1 The TT-WCF all agreed that the Task Team was worthwhile. They recommended that since the Task Team only officially started to work after the JCOMM session in May 2012 that the 16th Session of CAgM in 2014 re-establish the TT-WCF with the revised TORs as developed during this meeting.

8 GENERAL

8.1 The meeting agreed that the agenda items 5 to 9 were discussed during the presentations of the TT-WCF members.

9 OTHER MATTERS

9.1 Dr Salinger thanked all of the participants for attending the meeting and closed the meeting.

10 CLOSING

10.1 The first meeting of the CAgM-JCOMM Task Team on Weather, Climate and Fisheries (TT-WCF) closed at 1800 hours on Saturday 16 February 2013.

LIST OF PARTICIPANTS

TASK TEAM MEMBERS

Dr Jim SALINGER (Task Team Chair)
School of Environment
University of Auckland
AUCKLAND
New Zealand
Email: jimboe.salinger@gmail.com

Dr Karen EVANS
CSIRO Marine & Atmospheric Research
GPO Box 1538,
Hobart
Australia 7001
Email : Karen.Evans@csiro.au

Dr D.E. HARRISON
NOAA Pacific Marine Environmental
Laboratory (PMEL)
SEATTLE
United States of America
Email: D.E.Harrison@noaa.gov

Dr Anne HOLLOWED
Senior Scientist
Leader Status of Stocks & Multispecies
Assessment Program
National Marine Fisheries Service
Alaska Fisheries Science Center
7600 Sand Point Way NE
Seattle, WA 98115
Email: anne.hollowed@noaa.gov

Mr Andrew NKANSAH
Ghana Meteorological Agency
P.O.Box LG 87
LEGON
Ghana
Tel: +233 (030) 701 2525 (Office)
Fax: +233 (021) 511 981
Email: a.nkansah@meteo.gov.gh

Mr Miquel NIQUEN
Instituto del Mar del Perú (IMARPE)
LIMA
Peru
Email: mniquen@imarpe.gob.pe

Mr Scott WOODRUFF
Cooperative Institute for Research in
Environmental Sciences (CIRES)
National Oceanographic and Atmospheric
Administration (NOAA)
National Climatic Data Center
325 Broadway
BOULDER 80305
USA
Tel: +1 303 497-6747
Fax: +1 303 497-6513
Email: scott.d.woodruff@noaa.gov

Dr Chang-ik ZHANG
Director and Professor
Institute of Fisheries Science
Pukyong National University
BUSAN
Republic of Korea
Email: cizhang@pknu.ac.kr

INVITED EXPERTS

Dr Peter DEXTER
International Oceans Policy Advisor
Bureau of Meteorology
GPO Box 1289,
MELBOURNE VIC 3001
Australia
Tel: + 61(0)3 9669 4870
Fax: +61(0)3 9669 4725
Email: p.dexter@bom.gov.au

Dr Johann BELL
Principal Fisheries Scientist - Climate
Change
Fisheries, Aquaculture and Marine
Ecosystems Division
Secretariat of the Pacific Community
B.P. D5
98848
Noumea Cedex
New Caledonia
Tel: +687 26 20 00
Fax: +687 263 818
Email: johannb@spc.int

Dr Alistair HOBDAV
Principal Research Scientist & Stream
Leader
Marine Climate Impacts and Adaptation
CSIRO Climate Adaptation Flagship
Hobart, Tasmania
Australia
Email: Alistair.Hobday@csiro.au

WMO SECRETARIAT

Dr Boram LEE
Scientific Officer, WDS/MMO
World Meteorological Organization
7bis, Avenue de la Paix, CP 2300
CH-1211 Geneve 2
Switzerland
Tel: +41 22 730 8273
Fax: +41 22 730 8128
Email: blee@wmo.int

Mr Robert STEFANSKI
Chief, Agricultural Meteorology Division
Climate Prediction and Adaptation Branch
Climate and Water Department
World Meteorological Organization
7bis Avenue de la Paix, Case postale
2300
CH-1211 GENEVA 2
Switzerland
Tel: +4122 730 8305
Fax: +4122 730 8042
Email: rstefanski@wmo.int

TASK TEAM MEMBERS NOT IN ATTENDANCE

Dr Keith BRANDER
Senior Research Scientist
DTU Aqua - Danish Institute of Aquatic
Resources, Technical University
of Denmark, Charlottenlund Slot,
DK-2920

Charlottenlund
Denmark
Phone: +45 35 88 34 37
mobil: +45 23 29 68 35
Fax: +45 33 96 33 33
E-mail: kbr@aqu.dtu.dk

AGENDA

(as agreed at the meeting, 13 February 2013, Noumea, New Caledonia)

1. Introduction.
2. Approval of the agenda and any modifications.
3. Short presentations on organizations are involved in fisheries.
4. Review of terms of reference.
5. Review of the current data collection by JCOMM on marine meteorology, to assess how these data meet the current needs of the sustainable management in fisheries; encourage and assist fisheries vessels to make and report relevant marine meteorological and ocean observations to the WMO system; and, as appropriate, work with other JCOMM expert teams to develop climate services for fisheries based on the available marine climate data.
6. Review and evaluation of the effects of climate and climate variability on seasonal to decadal time scales on fisheries.
7. Evaluation and documentation currently available information on the impacts of climate change on fisheries.
8. Identification of risk assessment or management evaluation tools that incorporate climate variability in order to improve the sustainable management of fisheries.
9. Review of the effects of agricultural practices on coastal fisheries
10. Agreement on end products of TT work
11. Development of an action plan for the task team
12. Recommendations to JCOMM and CAgM
13. General.
14. Other matters.

Working hours: 9 am to 12.30 pm

Lunch: 12.30 – 1.30 pm

1.30 pm until finished

Anne Hollowed joined the meeting by Skype 10 am (3 pm Friday PST) until 12.30 pm

TERMS OF REFERENCE

(Reviewed & agreed at the 1st Task Team meeting,
13 February 2013, Noumea, New Caledonia)

- (a) To review the current data collection by JCOMM and others, to assess how these data meet the current needs of the ecosystem-approach to management in fisheries; as appropriate, work with other JCOMM expert teams to develop climate services for fisheries based on the available marine climate data;
 - (b) To encourage oceanic and coastal fisheries management organizations to inform their members about the advantages of making and reporting relevant marine meteorological and ocean observations to the various WMO/IOC observation and information systems;
 - (c) To contribute to the understanding of the effects of climate and climate variability on seasonal to decadal time scales on fisheries and marine aquaculture;
 - (d) To contribute to the understanding of the impacts of climate change on fisheries and marine aquaculture;
 - (e) To identify risk assessment or management evaluation tools that incorporate climate variability in order to improve the ecosystem-approach to management of fisheries;
 - (f) To identify how weather and climate tools can inform integrated coastal zone management relevant to coastal fisheries and marine aquaculture;
 - (g) To submit reports, including recommendations on follow-up actions, in accordance with timetables agreed by Management Committees of CAgM and JCOMM.
-

Joint CAgM-JCOMM TT-MCR Intersessional Workplan

Ref.	Workplan	When	contributing members / action by	Milestone / Deliverable
ToR(a)	<p>To explore currently available marine meteorological and oceanographic data coordinated by JCOMM, and make recommendations for future improvement</p> <ul style="list-style-type: none"> • Seek ways to facilitate met./ocean. observations from fishing fleets • Development of basic TT website (perhaps linked with existing ones) bringing together selected climate, weather & fisheries links <ul style="list-style-type: none"> - JCOMM activities: Expert Teams, WIS, Ocean Data Portal, etc. - ICOADS/IVAD (http://icoads.noaa.gov; http://icoads.noaa.gov/ivad/) - Data rescue (e.g.: http://www.met-acre.org; http://www.nodc.noaa.gov/General/NODC-dataexch/NODC-godar.html) - Analyses (e.g.: http://www.metoffice.gov.uk/hadobs/) - Reanalyses (http://reanalysis.org) - Fisheries catch data: http://www.fao.org/fishery/en, etc.? - Biological/ecological data (?) 	Continuous 2015	S.Woodruff E.Harrison A.Hollowed K.Evans	<p>4th JCOMM Workshop on Advances in Marine Climatology (CLIMAR-4), Asheville, NC, USA, Spring/summer 2014</p> <p>International Workshop on Advances in the Use of Historical Marine Climate Data (MARCDAT): TBD, ~2016</p>
ToR(b)	<p>To interact with oceanic/coastal fisheries management organizations to advocate the advantages to participate in metocean observations</p> <ul style="list-style-type: none"> • To discuss with FAO for communication with RFMO (Regional Fisheries Management Organizations), as well as for linkage with Global Partnership for climate and agriculture 	Continuous ASAP	A.Nkansah M.Niquen A.Hollowed K.Brandner(?) S.Woodruff WMO Secretariat P.Dexter	

<p>ToR(c) ToR(d)</p>	<p>To contribute to the understanding of the effects of climate and climate variability on seasonal to decadal time scales, as well as of climate change, on fisheries and marine aquaculture</p> <ul style="list-style-type: none"> • To prepare a synthesis report (building on AR5), with emphasis on comparative impact / relevant importance of climate information on the status of the stock (with focus on climate variability's side) – tools, management responses, etc. • To organize a session in the fisheries workshop (Brazil, 2015) on “impact / relevant of climate information on the status of the stock” (global assessment) • To continue interacting with competent programmes/organizations (e.g. ICES, PICES), in view of contributing to the relevant work • To develop a “flagship story” on impact on climate information (e.g. Peruvian anchovy and El Nino impact), by supporting a case study need for ‘re-packaging’ available information for users 	<p>2015 (by 2014 CAgM session for draft)</p> <p>2015</p> <p>Continuous</p> <p>Continuous</p>	<p>J.Salinger E.Harrison C.Zhang A.Hollowed K.Brandner(?) K.Evans M.Niquen</p> <p>WMO Secretariat J.Bell</p>	<p>JCOMM and CAgM Management Committees in 2014 (for review of synthesis report)</p> <p>Climate and fisheries workshop in Brazil (2015)</p>
<p>ToR(e)</p>	<p>To identify risk assessment or management evaluation tools that incorporate climate variability in order to improve the ecosystem-approach to management of fisheries;</p>	<p>Continuous</p>	<p>J.Salinger C.Zhang A. Hollowed K.Evans</p>	<p>(in line with the preparation of a synthesis report)</p>

ToR(f)	<p>To identify how weather and climate tools can inform integrated coastal zone management relevant to coastal fisheries and marine aquaculture;</p> <ul style="list-style-type: none"> • To explore ways to /prepare recommendation to NMHS to more closely link to / establish collaborative mechanism with coastal zone management / fishery management community (e.g. to advise to Agrometeorological advisors of NMHS to produce bulletin/advisory) • To explore feasibility for a “roving seminar” type training (e.g. Ghana, Peru), through documenting delivery method, communication scope, etc. 	<p>2015</p> <p>ASAP</p>	<p>A. Nkansah</p> <p>WMO Secretariat</p> <p>J.Bell</p>	<p>(in line with the preparation of a synthesis report)</p>
ToR(g)	<p>Reporting to CAgM and JCOMM Management Committees</p>	<p>Regularly</p>	<p>J.Salinger</p> <p>WMO Secretariat</p>	<p>2014 CAgM session</p> <p>2015 JCOMM MAN</p>

ACRONYMS AND OTHER ABBREVIATIONS

ADON	Australian Ocean Data Network
AMP	WMO Agricultural Meteorology Programme
BOM	Bureau of Meteorology (Australia)
CAGM	WMO Commission for Agricultural Meteorology
CLIMAR	Marine surface Climate (JCOMM / community)
CLIOTOP	Climate Impacts on Oceanic Top Predators (project)
FAO	Food and Agriculture Organization (United Nations)
GFCS	Global Framework for Climate Services
ICES	International Council for the Exploration of the Sea
IMPRES	Instituto del Mar del Perú
JCOMM	Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology
MAN	Management Committee (MAN)
MARCDAT	Workshops on Advanced Use of Historical Marine Climate Data
MCDS	Marine Climate Data System (JCOMM)
MMOP	WMO Marine Meteorology and Oceanography Programme
NEPAD	New Partnership for Africa's Development
NMHS	National Meteorological and Hydrological Service (WMO)
NOAA	National Ocean and Atmosphere Administration (USA)
PICs	Pacific Island Countries
PICTs	Pacific Island Countries and Territories
PICES	North Pacific Marine Science Organization
PMEL	Pacific Marine Environmental Laboratory (US/NOAA)
RFMO	Regional Fisheries Management Organization
RIC	Regional Implementation Center
SLP	Sea Level Pressure
SST	Sea Surface Temperature
SPC	Secretariat of the Pacific Community
TT-WCF	Joint CAGM-JCOMM Task Team on Weather, Climate and Fisheries
ToR	Terms of Reference
TT	Task Team

