



Department of
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Ms Maria Vamvakinou, MP
Chair, House of Representatives Standing Committee on Industry, Science and Innovation
House of Representatives
PO Box 6021
Parliament House
CANBERRA ACT 2600

Dear Ms Vamvakinou

**DEPARTMENT OF ENVIRONMENT AND CONSERVATION SUBMISSION ON THE
INQUIRY INTO LONG-TERM METEOROLOGICAL FORECASTING IN AUSTRALIA**

I refer to your letter of 19 March 2009 addressed to the Premier of Western Australia in which you invited the WA Government to make a submission to the inquiry into long-term meteorological forecasting in Australia being conducted by the House of Representatives Standing Committee on Industry, Science and Innovation.

As well as providing comments, I would be keen for representatives of the Department of Environment and Conservation (DEC) to meet with the committee.

Please find attached DEC's submission. I trust that these comments are helpful in the identification of improvements in the provision of long-term meteorological forecasting in Western Australia and throughout Australia.

I look forward to the opportunity for formal discussions at some stage during the review process. If further clarification on any elements of this submission is required or you wish to arrange a meeting, please contact Peter Dans (fire management) or Steve Waller (climate change) on (08) 9442 0328; email peter.dans@dec.wa.gov.au or (08) 6467 5541; email steve.waller@dec.wa.gov.au respectively.

Yours sincerely

Keiran McNamara
DIRECTOR GENERAL

18 May 2009

Encl.

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**House of Representatives Standing Committee
on Industry, Science and Innovation
Inquiry into Long-Term Meteorological Forecasting**

**Submission of the WA Department of Environment and
Conservation**

The Department of Environment and Conservation (DEC) has a close and effective working relationship with the Bureau of Meteorology's Perth regional office. DEC relies on the Bureau for all of its fire weather forecasting, smoke trajectory modelling and climatology information. DEC also uses the Bureau to provide forecast records, observation records and professional documents for legal proceedings and operational requirements.

DEC also has a coordinating role with respect to climate change policy and strategy across the WA Government through its Office of Climate Change. In addition, DEC administers the Indian Ocean Climate Initiative (IOCI) research program on behalf of the WA Government and has been closely involved with the Bureau of Meteorology (BoM) in regard to IOCI Stage 3 (IOCI3).

The following points are responses to the Terms of Inquiry of relevance to DEC:

The efficacy of current climate modelling methods and techniques and long-term meteorological prediction systems

DEC supports the vision of BoM being the national lead agency for provision of high standard weather and climate services to government, industry and community with a strong focus on delivery of services for public good (including prescribed fire, bushfire and severe weather).

BoM has a key role to play in undertaking research into climate change and variability which is an issue of national and global importance. DEC requires high quality information on climate scenarios to enable strategic decision making on a range of issues including the conservation of biodiversity and fire management, including risk management and the interaction of fire and biota. The possible increased frequency of extreme weather events, declining rainfall in south-west WA and the trend of changing climatic conditions in the tropical north-west and the arid zone are issues of particular concern that need to be better understood.

IOCI is a core climate science partnership between the WA Government, BoM and Commonwealth Scientific and Industrial Research Organisation (CSIRO). The first two stages of IOCI were completed in late 2005 and were largely responsible for highlighting the 15 to 20 percent decrease in rainfall in south-west WA and the associated 50 percent decrease in stream flow into water storage dams. This recognition led to accelerated adaptive measures, including the construction of additional desalination capacity for the Perth metropolitan area

and has placed WA in an advanced position with respect to other jurisdictions regarding water supply in the face of a drying climate.

In addition, knowledge gained from IOCI Stages 1 and 2 has contributed to management of climate adaptation in the agriculture, biodiversity and emergency management sectors and has supported better understanding of the implications of climate change for health, tourism and potentially other affected sectors.

In Stages 1 and 2 of IOCI, research with an aim to improve statistical seasonal forecasting for winter rainfall in south-west WA formed one of the three themes. It was hoped that progress could be made by better understanding the relationship between variability in the Indian Ocean and rainfall in the south-west. There was limited success, and under Stage 3, a specific theme on this issue has not been defined.

The IOCI3 agreement was signed by the WA Government, BoM and CSIRO in March 2008. The \$4 million four-year research program of IOCI3 will enable 'downscaling' of the large global atmospheric circulation models used by the CSIRO and BoM which have coarse resolutions of approximately 200 x 200 km² to a finer scale of approximately 25 x 25 km² or smaller. Such downscaling will result in climate predictions that are substantially more useful for adaptation planning and decision-making at a regional and sub-regional level.

However the emphasis of IOCI3 is now in the north-west of WA, conducting climate research of critical importance to the key State export infrastructure located in that region. This includes the formation and prediction of tropical cyclones under different global warming scenarios and understanding whether current trend of higher rainfall in the northern tropics is likely to persist over time.

Projects and subprojects in IOCI3 that have relevance to long-range meteorological forecasting include:

- *Project 1.3: Quantification of the Limits of Seasonal Predictability of WA Rainfall and Surface Temperature* which will determine how much predictive skill can theoretically be expected from statistical or dynamic seasonal forecasts of surface climate in Western Australia.
- *Project 2.2: Tropical Cyclones in the North-West* which will increase our knowledge on the impact of climate change on tropical cyclones in north-west WA and will develop a statistical forecast model for tropical cyclone activity along the WA coastline that has a two-week lead time.
- *Project 2.4: Physical-Statistical Modelling of Extreme Events in the North-West* which will develop and implement a statistical model for the intensity-frequency-duration characteristics of extreme temperature events and evaluate the potential for forecast skill at seasonal time scales.

- *Project 3.2: Climate Extremes: Potential Forecast Skill and Climate Change Scenarios* for the south-west which will assess potential forecast skill for rainfall extremes at seasonal timescales.

BoM plays a key role in research through the Centre for Australian Weather and Climate Research and through institutions such as Cooperative Research Centres (CRCs). BoM is an active and valuable contributor to the Bushfire CRC, and contributes to a number of projects on fire weather, grass curing and smoke management that are of considerable interest to land managers and fire authorities.

Innovation in long-term meteorological forecasting methods and technology

In WA, the use of prescribed fire is fundamental to the State's bushfire mitigation strategy and the conservation of its unique biota. To facilitate the program and to limit impacts on communities, DEC and other agencies require accurate and reliable smoke trajectory models that incorporate real time weather and fire data. There is an ongoing need to maintain the research effort in this area.

BoM also plays an important role in risk profiling including prescribed fire, wildfire, pollution, tsunami and terrorism events. DEC would like to see this capacity enhanced.

In WA, BoM currently has limited capacity to provide for and deliver fire weather training programs to emergency services groups. It is also understood that there may be insufficient internal training capacity for BoM forecasters.

Tropical cyclone forecasting is of significance to the operations of oil and gas and mining industries in northern WA. Project 2.2 of IOCI3 on tropical cyclone forecasting with a 2-week lead-time is an innovative approach in meteorological forecasting for tropical cyclones. The improvements that will be made under IOCI3 will help develop a robust statistical guidance for this highly economically important measure. Improved forecasting lead-time is also important for planning emergency service resources.

The impact of accurate measurement of inter-seasonal climate variability on decision-making processes for agricultural production and other sectors such as tourism

In a State as large and diverse and as sparsely populated as WA, BoM will continue to play a key role in providing and maintaining the existing network of weather observation sites. BoM must be adequately resourced and supported with trained staff to undertake this work. The current observation network is fundamentally inadequate for existing requirements and leaves a number of communities and large areas of remote Western Australia with no detailed forecasting capacity.

Through IOCI3 Project 1.4: *Regionally Specific Climate Data and Monitoring for the North-West and South-West to Support the Understanding of Past, Present and Future Climate*, the WA Government is supporting the improvement of data quality and observation stations across WA, in particular in our data sparse north-west.

There is no shared lightning detection network in Western Australia. DEC believes that BoM should be resourced to provide a lightning detection network and capacity to provide a public map of the data for use by emergency services and land managers.

DEC also requests that BoM be funded and resourced to provide more frequent radiosonde balloon flights to improve the frequency of sampling the low level winds and air moisture for bushfire weather forecasting in the more densely populated areas of the south-west. Routine radiosonde observations in this area are currently limited to Perth and Albany and DEC has identified the need for an additional facility in the south-west (eg. Bunbury or Manjimup).

BoM radar coverage in WA needs to be increased and improved to include Doppler capacity that can monitor wind changes and boundaries. Large sections of the State are not covered at this stage.

DEC would also support an increase in the number of weather datum buoys to assist in the provision of forecasts for its marine park and other marine operations.

As previously stated, the study regions for IOCI3 are characterised by diverse climates and often sparse meteorological networks. Significant effort is required to develop datasets that can form a sound basis for analyses of observations (e.g. trend and change point detection), model validation and downscaling.

An important quality of climate change relevant datasets is the need to carefully homogenise records to remove non-climate inhomogeneities. Particularly in the north-west, there are major ongoing deficiencies and gaps in the available high-quality datasets. Currently there are few high-quality daily rainfall datasets for the north-western half of WA. The enhancement and development of these datasets is a major logistical and scientific undertaking, particularly for intensive studies such as IOCI3.

Improving both the spatial coverage of datasets and removing errors in those datasets will allow a more reliable assessment of climate variability, particularly in data-sparse regions, such as the north-west. Project 1.4 in IOCI3 will particularly help to achieve this.

Potential benefits and applications for emergency response to natural disasters, such as bushfire, flood, cyclone, hail, and tsunami, in Australia and in neighbouring countries

BoM provides essential information for fire services and land management agencies involved in bushfire management. This contribution is made at a range of geographic and time scales and includes climate and seasonal outlooks, bushfire outlooks with real time relevance, daily weather forecasting, and spot forecasting to meet specific needs.

These services are equally important for managing planned fire use and for dealing with unplanned fire events. There is a growing need and demand for medium term predictive products that can provide guidance to fire managers over a 7-10 day outlook period.

In WA there are strong links between the regional BoM office in Perth, DEC and the Fire and Emergency Services Authority. This localised relationship is deemed essential in maintaining effective working relationships with BoM. BoM is currently responsive to agency needs although not always adequately resourced to meet them.

Tropical cyclone forecasting is of significance to the operations of oil and gas and mining industries in northern WA. Improved forecasting lead-time is also important for planning emergency service resources. The work under Project 2.2: *Tropical Cyclones in the North-West* of IOCI3, which will provide a 2-week forecasting lead time, is important for emergency planning response.

Summary

Long-term meteorological forecasting plays an essential part in DEC's responsibilities for fire management and climate change. Services provided and research undertaken by BoM play an important role in the assessment of current and future risks to WA's biodiversity, communities and infrastructure. DEC has a strong relationship with BoM in relation to fire management and its partnership in the IOCI3 research program. The IOCI3 research program plays a key role in understanding the impacts of climate change in WA.

There is a need to increase observations in a State as large as WA. Current weather observation networks, such as for rainfall, lightning and the upper atmosphere, are insufficient for purposes of fire management and research into future climate scenarios for WA. DEC supports increasing the coverage of the weather observation network in WA and the resources within BoM to deliver fire weather training programs to emergency services groups.

Department of Environment and Conservation

18 May 2009