

Report of the Advisory Panel on *Marine Birds and Mammals*

Opening

The meeting of the Advisory Panel on *Marine Birds and Mammals* (AP-MBM; under the auspices of BIO Committee) was held from 09:00–12:30 h on October 16, 2011 in Khabarovsk, Russia. The business meeting focused on completion of a new Activity Plan and the associated foci for AP-MBM under FUTURE, including discussion of future workshops and topic sessions in 2012 and 2013.

AGENDA ITEMS 1 AND 2

Call to order and review agenda

Drs. Yutaka Watanuki and Rolf Ream, new Co-Chairs of AP-MBM, called the meeting to order and welcomed members and observers (*AP-MBM Endnote 1*). AP-MBM members representing Canada, Japan, and USA were present. AP-MBM forwarded its request to BIO that all PICES member countries send delegates to PICES Annual Meetings and AP-MBM business meetings, and that China and Korea nominate members to the AP-MBM. Specifically, AP-MBM asked BIO to recommend that an additional member be added to the AP-MBM from Korea. Dr. Seok-Gwan Choi, representing Korea, has been a regular and active observer and participant at past AP-MBM meetings (*e.g.*, at PICES Annual Meetings and ESSAS OSM). The agenda was reviewed and approved (*AP-MBM Endnote 2*).

AGENDA ITEM 3

Reports from members

Dr. Hidehiro Kato (Japan) reported on his activities as the PICES liaison to the International Whaling Commission (IWC; *AP-MBM Endnote 3*). The AP thanked Dr. Kato for his efforts to integrate PICES science in the IWC science-policy arena, and recommends to BIO that Dr. Kato remain as the PICES liaison. The AP also recommended to BIO that PICES support a request to IWC to include a seabird observer in the IWC POWER cruise (see *AP-MBM Endnote 3*). This sighting survey in the North Pacific covers a large geographic area, and will help meet the objectives of the new AP-MBM Activity Plan by providing valuable at-sea distribution data for seabirds. Drs. William Sydeman (USA) and Rob Suryan (USA) will lead efforts to organize activities and obtain support for seabird observer(s) on this cruise should a request be approved by IWC.

AGENDA ITEM 4

Discussions

a. AP-MBM Terms of Reference

In response to the PICES integrative science program, FUTURE, revised Terms of Reference (TOR) for AP-MBM were presented, discussed, amended, adopted, and were submitted to BIO for approval. The revised Terms of Reference are provided (*AP-MBM Endnote 4*).

b. AP-MBM Activity Plan

The AP-MBM Co-Chairs presented a newly developed 3-year Activity Plan for discussion with AP members and observers. This plan of action was developed explicitly to support and promote the goals of FUTURE's Science Plan. During a ½-day Workshop on “*Comparative analyses of marine bird and mammal responses to climate change*” hosted by AP-MBM during the PICES/ICES ESSAS Open Science Meeting (Seattle, USA, May 2011), a number of topics were developed for possible inclusion in the Activity Plan. Potential topics

were circulated to AP-MBM members for ranking, and Spatial Ecology and Conservation was selected as the basis of the new Activity Plan. The primary objectives of AP-MBM under this topic are to:

- i. Synthesize distribution data of MBMs and its temporal change in the North Pacific based on boat-based surveys, remote tracking, and terrestrial surveys).
- ii. Examine the physical and biological factors that correspond to the distribution and abundance of MBM and their ecological/economic (fisheries) hot spots.
- iii. Provide information on important ecological areas in the PICES regions to facilitate understanding and sustainable use of marine resources.

Briefly, during 2012–2014, AP-MBM plans to summarize information on the distribution and movement of multiple species of MBMs that would be useful for identifying important (for productivity, biodiversity, fisheries) and vulnerable (because of climate and anthropogenic impact, including fisheries and pollution) ecological areas in the PICES region. This will help us understand the spatial and temporal dynamics responsible for variable habitat use (*i.e.*, biological hotspots). Knowledge of MBM use of ecological important areas, now and in the future, will contribute to the FUTURE mission of understanding climate change and anthropogenic impacts on marine ecosystems in the PICES region.

The AP reiterated its primary mission to provide advice to the PICES community about the role of marine birds and mammals in North Pacific marine ecosystems. Secondly, the AP exists to ensure that seabirds and marine mammals are included in all PICES-related ecosystem research, including forecasting, and outreach and communications. The new Activity Plan was approved by the AP-MBM (*AP-MBM Endnote 5*).

c. Introduction of Topic Session S2 at PICES-2011

Dr. Rob Suryan (USA) introduced the upcoming BIO/POC Topic Session (S2) entitled “*Mechanisms of physical-biological coupling forcing biological “hotspots”*”, to be held October 18, 2011. This is a joint theme session of PICES/ICES that was proposed by AP-MBM. The session will examine the physical and biological oceanographic factors that correspond to ecological or economic “hotspots” in the North Pacific and North Atlantic and their marginal seas. Dr. Kaoru Hattori presented a preview of her presentation to the AP on her research on Steller sea lions. Takashi Yamamoto (Japan) also presented a preview of his presentation on seabird “hotspots in Japan.

A report summarizing the presentations and conclusions was prepared by the co-convenors following the session, and is included in the Sessions Summary section of the 2011 PICES Annual Report at http://www.pices.int/publications/annual_reports/Ann_Rpt_11/2011-Session-sum.pdf.

d. Review of topic session proposal for PICES-2012

AP-MBM discussed a proposed topic session (*AP-MBM Endnote 6*) which was submitted to BIO earlier this year for inclusion in the PICES 2012 Annual Meeting in Hiroshima, Japan. The proposal is titled, “*Spatial patterns of anthropogenic stressors: predators as sentinels of marine ecosystem health*”, and was developed explicitly to address the theme description (*Effects of natural and anthropogenic stressors in the North Pacific ecosystems: Scientific challenges and possible solutions*) for the PICES Annual Meeting. AP-MBM members, Dr. Peter Ross (Canada) and Dr. Yutaka Watanuki (Japan), would serve as co-convenors of this topic session if approved by BIO and Science Board.

e. Potential inter-session workshop

To enhance the science needed to address our selected focal area of Spatial Ecology and Conservation, AP-MBM members and observers discussed the value of a 2-day inter-session technical workshop on methodology (including modeling, analysis) to derive “hotspots” of seabird and marine mammal aggregations or diversity. This workshop would emphasize methods to synthesize disparate bird and mammal distribution and abundance data (*e.g.*, how to combine tracking and shipboard observations) and key product development, such as the making of an Atlas (potentially entitled “*Hotspots of Marine Birds and Mammals in the North*

Pacific”) of important and vulnerable areas based on these distributional data. This could be a key product of new AP-MBM activities.

f. Possible topic sessions for PICES-2013

Potential workshop/topic sessions for 2013 PICES Annual Meeting in Canada were discussed. A topic session on modeling change in the distribution and range of marine birds and mammals relative to climate change and isothermal displacements and other anthropogenic stressors was selected for development; Dr. Sydeman (USA) will take the lead in preparing a blurb on this potential topic.

g. Proposal for a Study Group

Due to advances in knowledge on the distribution, abundance, and food habits of marine birds and mammals, there was interest in updating PICES Scientific Report No. 14 (2000), *Predation by marine birds and mammals in the subarctic North Pacific Ocean*. Additionally, there has been an increased interest in the roles of large predatory fish in the World’s oceans. The utility and feasibility of an updated report that also incorporates information on prey consumption by large predatory fish, was discussed by AP-MBM. A potential Study Group was proposed (*AP-MBM Endnote 7*) to further address these topics, along with possible participants, and required resources. The proposed 1-year Study Group, co-chaired by Drs. George Hunt and Hidehiro Kato, would:

- 1) Assess the feasibility of conducting a full update of PICES Scientific Publication 14 with the addition of information on prey consumption by large predatory fish;
- 2) Identify potential candidates from PICES member countries with the required expertise;
- 3) Assess the financial and temporal resources necessary to complete such an update;
- 4) Provide, by the 2014 PICES Annual Meeting, a report to the BIO Committee and AP-MBM detailing the above findings of the Study Group.

(The proposal for new Study Group was later changed to a workshop proposal for PICES-2012 on the same theme according to Science Board suggestion.)

AP-MBM Endnote 1

AP-MBM participation list

Members

Seok-Gwan Choi (on behalf of Korea)
Kaoru Hattori (Japan)
Hidehiro Kato (Japan)
Rolf Ream (USA, Co-Chairman)
Peter Ross (Canada)
William Sydeman (USA)
Yutaka Watanuki (Japan, Co-Chairman)

Observers

George Hunt (USA)
Taro Ichii (Japan)
Robert Suryan (USA)
Atsushi Tsuda (Japan)
Takashi Yamamoto (Japan)

AP-MBM Endnote 2

AP-MBM meeting agenda

1. Call to Order – Review Agenda (modify as needed)
2. Introductions - meeting participants, new members of PICES community
3. Reports from members
4. Discussions
 - a. Review AP-MBM Terms of Reference
 - b. Review AP Activity Plan, Spatial Ecology and Conservation
 - c. Introduction of Topic Session S2 at PICES-2011
 - d. Review 2012 workshop/topic session proposal and identify possible participants and speakers
 - e. Long term strategic plan; link with FUTURE, other committees, potential workshop, topic session
 - f. Discuss and identify possible PICES-2013 proposal topics and the leaders
 - g. Proposal for a Study Group
5. Wrap-up

AP-MBM Endnote 3

Report of PICES Liaison to International Whaling Commission

PICES Observer Report on the 63rd IWC Scientific Committee Meeting

Hidehiro Kato

Tokyo University of Marine Science and Technology, Tokyo 104-8477, Japan

The 63rd scientific committee meeting (SC) of the International Whaling Commission (IWC) was held at Tromsø, Norway from May 30 to June 11, 2011. A total of 187 scientists, including 118 from 25 contracting governments, 42 invited experts, 8 observers from 4 international organizations (ACCOBAMS, IUCN, NAMMCO and PICES), 15 local scientists and 4 others participated this year annual meeting. PICES was especially welcomed by the IWC/SC. For the management of cetacean stocks, which is most important task for the committee, the SC explored improvement of management methods for cetacean stocks after the enforcement of the commercial whaling moratorium in 1985, and had already agreed with the scientific basis of RMP (Revised Management Procedure) in 1996 through long time endeavors by many scientists. The IWC/SC is continuing work on checking its performance and implementation trial of the RMP for the stocks after the completion of comprehensive assessments on respective large cetacean stocks.

This year following topics were noted:

1. RMP implementation

For the RMP implementation, the IWC/SC has focused on western North Pacific Bryde's whale, North Pacific common minke whale, North Atlantic fin whale and North Atlantic common minke whale stocks, and the SC continued to precede their protocol based on the agreed process. In the North Pacific region, it was agreed by the SC that the implementation review, which is the most advanced stage, would be started in 2012 for western North Pacific Bryde's whales and it is also expected to go for implementation review for North Pacific minke whales in the near future.

2. Comprehensive assessment

Under the comprehensive assessment (CA), this year the IWC/SC continued reviewing the stock status of southern blue and humpback whales in the southern hemisphere and right whales, including northern and southern hemisphere populations. Among them, the humpback whale CA is in the most advanced stage and it is expected to be completed by 2013. The CA for the Antarctic minke whales has well developed assessments this year, with a focus on comparison of population abundance and its trend between different stock assessment models (The OK and The SPLINTER); the differences between two estimators has decreased and their population status differed by local regions.

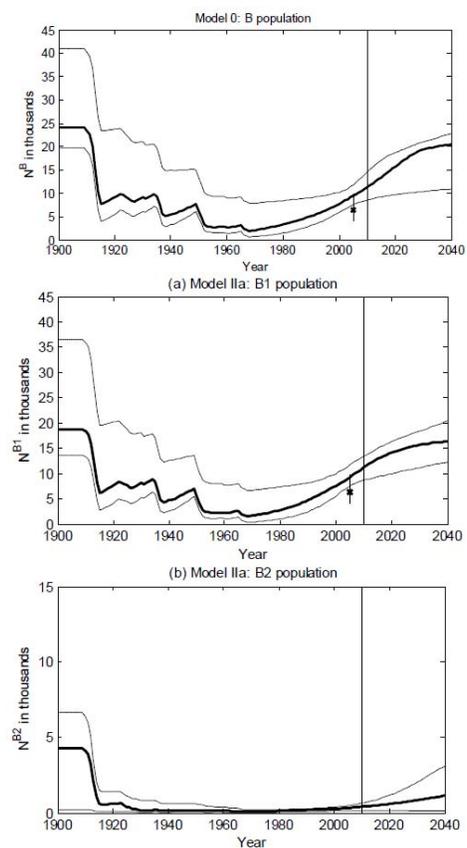


Fig. 4. Median trajectory (solid line) and 90% probability interval (long dashed lines) for the Model 0 reference case (top) and IIa reference case (B1 stock: middle, B2 stock, bottom). The trajectories to the right of the vertical dashed line are projections into the future under the assumption of zero catch. A MARK generated sighting-resighting abundance estimate (x) and 95% confidence interval (vertical line) for Gabon is presented for comparison. See SC/63/Rep6 for details.

Management of aboriginal and subsistence whaling

The IWC/SC has managed ongoing aboriginal and subsistence whaling using the AWMP (Aboriginal and subsistence whaling management scheme) which includes bowhead whale stocks in the Arctic region, fin whale, minke whale and humpback whale stocks of western Greenland, humpback whale off St. Vincent and the Grenadines, and Eastern stock of gray whales of Chukoto. Through examinations of updated scientific information, the SC concluded that the present catch levels for these respective stocks would not harm the stocks.

3. Western gray whales

The western gray whale is noted as a highly depleted stock, with a population size around 120 individuals. The IWC/SC received a very interesting report that a Russian-US research team, in cooperation with the IWC/SC, tried satellite tracking on a large male in the Summer of 2010. Of particular note was that the animal crossed the Okhotsk Sea and southern parts of Bering Sea, and consequently reached the West Coast of North America.

4. Environment issues

For environment issues around cetacean stock managements, the IWC/SC has two working groups (E, Environmental concern; EM, ecosystem modeling), and a number of matters related to environmental factors that affect cetaceans were discussed. This year progress on the following issues were reviewed in the E Working Group:

- 1) Status of the cetacean Environment Report (SOCER),
- 2) Update on POLLUTION 2000+ Phase II,
- 3) Cetacean emerging and resurging disease (CERD),
- 4) Review new information on anthropogenic sound,
- 5) Review progress on work from the 2nd Climate Change Workshop (January 2010, Arctic and other seas) and Workshop on Small Cetaceans and Climate Change (November 2010).

For ecosystem modeling, the EM Working Group dedicated its time to three general tasks:

- 1) Review recent work in ecosystem modeling,
- 2) Discuss how ecosystem models can be used in the work of the Committee,
- 3) Review issues relating to ecosystem modeling.

Under item (1), ecosystem modeling in the North Pacific was reviewed by an invited US modeling scientist. He noted particularly (a) advances in statistical fitting procedures using Ecosim models; and (b) recent developments in end-to-end ecosystem models, focusing on biological models built within the Regional Oceanographic Models (ROMS) framework. The SC welcomed his review.

5. North Pacific Sighting survey cruise (IWC/POWER cruise)

It was agreed the comprehensive cetacean sighting survey project would commence in summer 2010 under cooperation between Japan, Republic of Korea and United States under the auspices of the IWC. The project includes line transect sighting for estimating population abundance, biopsy skin-sampling, and photo ID for stock structure on major large cetaceans. It was also agreed for the years 2011 onwards, that the project will be conducted by the IWC/SC directly as its own middle- to long-term research project. The project was renamed as "Pacific Ocean Whale and Ecosystem Research (POWER)" project this year. It was reported that the 2010 POWER cruise was successfully conducted; it was particularly noted that there were a considerable number of biopsy and photo ID samples from humpback, fin and blue whales in addition to many sighting of sei whales. Survey area has been agreed upon for 2010 to 2012, as shown in the figure below, and the survey in future years will be conducted in lower latitudes between 40°N to 30°N east of 160°E.

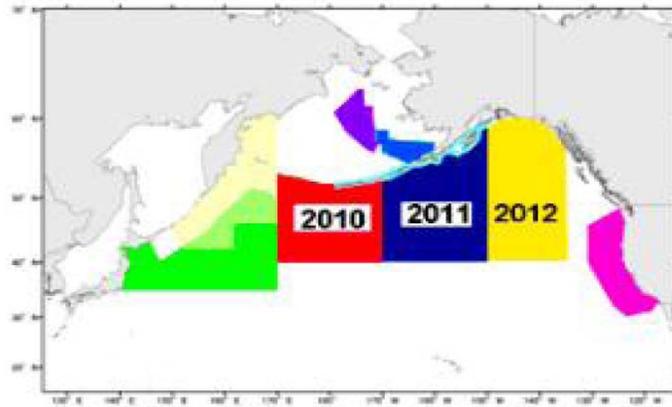


Fig. 5. Recent surveys in the North Pacific. The 2010 and 2011 IWC/Japan Joint Cetacean Sighting Survey research areas are shown in red and dark blue, respectively and the proposed area for 2012 is in yellow. These areas have not been surveyed previously. Other coloured areas represent surveys conducted in the North Pacific in relatively recent years: in 1999 (purple) and 2000 (blue) by Moore *et al.* (2002), in 2001-2003 (sky blue) by Zerbini *et al.* (2006), in 2001 and 2005 (pink) by Barlow and Forney (2007), in 2005 (light yellow) by Miyashita (2006). Sighting surveys have been conducted in the green area since 1994 as a part of JARPN II (Pastene *et al.*, 2009).

6. Other issues

The IWC/SC also covers relevant issues on small cetaceans, whale watching, by-catch, humane-deduced mortality, *etc.* as in other previous years.

7. Next year's meeting

The next annual meeting of the IWC/SC will be held at Panama City, Panama during two weeks in mid June 2012. The IWC meeting will be also held at Panama City in mid July 2012.

AP-MBM Endnote 4

Terms of Reference (revised 2011.10.10)

1. Provide information and scientific expertise to BIO and the FUTURE Program, and, when necessary, to other scientific and technical committees with regard to the biology and ecological roles of marine mammals and seabirds in the PICES region.
2. Identify important problems, scientific questions, and knowledge gaps for understanding the impacts of climate change and anthropogenic factors on MBMs in ecosystems of the PICES region through Workshops, Theme Sessions and Science Reports.
3. Assemble information on the status and key demographic parameters of marine mammals and seabirds and contribute to the Status Reports.
4. Improve collaborative, interdisciplinary research with marine mammal and seabird researchers and the PICES scientific community.

AP-MBM Activity Plan, 2012–2014
revised 2011.10.11

Co-Chairs: Rolf Ream (USA), Yutaka Watanuki (Japan)

Marine birds and mammals (MBMs) are: 1) highly mobile and their movement and distribution are easily observed from above the sea; 2) important marine top predators that consume substantial amounts of forage prey; and 3) susceptible to the changes in marine food web structure and productivity, and to a variety of anthropogenic impacts, so they are believed to be sentinels of ecosystem health. Incorporating these characteristics of MBMs, and the objectives of FUTURE, we propose Spatial Ecology and Conservation as the topic of priority for AP-MBM 2012–2014 activities. Terms of reference are revised accordingly (see *AP-MBM Endnote 4*).

Here we 1) describe the rationale of this topic, 2) summarize related past activities, and 3) describe potential activities or products to be accomplished by AP-MBM.

Topic summary (2012-2014): Spatial Ecology and Conservation

Leaders: Rolf Ream (USA), Yutaka Watanuki (Japan), Robert Suryan (USA, non-member),

Rationale

Marine birds and mammals (MBMs) are not distributed evenly and aggregate at various temporal and spatial scales due to physical forces, biochemical factors, patchiness of their prey, behavioral and social factors, and the spatial dynamics of marine ecosystems. Thus coupling their distribution at sea with physical and biological factors is a subject of great interest and importance (Coyle *et al.* 1992, Hunt *et al.* 1993, and many others).

Research on the distribution and movement of MBMs in marine ecosystems can be relatively easy to accomplish and provides useful information for marine spatial planning and management (LME, IBA, IEA, and MPA; Hyrenback *et al.* 2000, Louzao *et al.* 2009, Worm *et al.* 2003, Hooker 2008). Additionally, identification of biological hot spots, where abundance and/or biodiversity is high, and elucidating the mechanisms, through the combination of biological (movement of MBMs and primary production) and physical information, that are responsible for establishing and maintaining (spatial and temporal stability/frequency) the hotspots, is critical for fisheries and conservation of MBMs.

Related past activities of MBM-AP

BIO (AP-MBM) co-sponsored the topic session titled, “*Hot spots and their use by migratory species and top predators in the North Pacific*” at the PICES Annual Meeting in 2004. The related papers were subsequently published in Deep Sea Research II (2006). BIO (AP-MBM) and POC co-sponsored the topic session titled, “*Mechanisms of physical-biological coupling forcing biological hotspots*” at PICES-2011. Due to advancements in tracking techniques, studies on the movements of MBMs and the factors affecting their distributions have progressed substantially (Pinaud *et al.* 2005, and many others). At-sea bird and mammal census data are also accumulated and analyzed with the aid of new spatial statistics (Louzao *et al.* 2009 for an example).

Activity plan

In three years (2012–2014) AP-MBM will: 1) synthesize distribution data of MBMs (boat-based, tracking, and terrestrial surveys) and its temporal change, 2) examine physical and biological factors that correspond to ecological/economic (fisheries) hot spots, and 3) provide information on important ecological areas in the PICES regions to facilitate sustainable use of marine resources. These efforts will be useful for identifying important (for productivity, biodiversity, fisheries) and vulnerable (because of climate and anthropogenic impact including fisheries and pollution) ecological areas in the PICES region and to help understand the spatial and temporal dynamics responsible for variable habitat use (*i.e.*, biological hotspots). Knowledge of

MBM use of ecologically important areas, now and in the future, will contribute to the FUTURE mission of understanding climate change and anthropogenic impacts on marine ecosystems in the PICES region.

Time schedule

2012: PICES Annual Meeting, Hiroshima, Japan

Business Meeting: ½ day

Proposed topic session: *Spatial patterns of anthropogenic stressors: predators as sentinels of marine ecosystem health* (Convenors: Peter Ross, Yutaka Watanuki)

2013: Potential inter-session workshop (location to be determined)

A 2-day workshop on methodology of data analysis and modeling of at-sea spatial data, and for standardization of mapping efforts. This workshop would emphasize methods to synthesize disparate bird and mammal distribution and abundance data, and to standardize development of key products, such as an atlas of important and vulnerable areas based on their distributional data.

2013: PICES Annual Meeting, Nanaimo, Canada

Business Meeting: ½ day

Potential workshop and topic session: *Modeling changes of distribution and ranges of MBMs in relation to climate change and anthropogenic impact*

2014: PICES meeting.

Business Meeting: ½ day

Potential workshop and topic session: Synthesize the data and make an atlas of important and vulnerable areas using distribution of MBMs. Proceedings and PICES Science Report (Ream, Suryan, Watanuki)

AP-MBM Endnote 6

Proposal for a ½ day BIO Topic Session at PICES-2012 “*Spatial patterns of anthropogenic stressors: Predators as sentinels of marine ecosystem health*”

[later renamed as “*Environmental contaminants in marine ecosystems: Seabirds and marine mammals as sentinels of ecosystem health*”

Coastal developments (urban, industry) and pollutants (heavy metals, POPs, plastics, oil spill, radiation) can have detrimental effects on a variety of marine resources in coastal and offshore areas. It is increasingly important to identify sources, subsequent transport through marine physical systems and resulting spatial patterns of these anthropogenic stressors. Compared to river-lake systems, knowledge of anthropogenic stressors in marine systems is relatively lacking due to difficulties with detection over broad areas and in offshore regions. Because marine organisms, especially top predators (marine mammals and seabirds), bio-magnify these stresses, these organisms can be used as bio-indicators. Their usefulness will be discussed at MEQ Workshop PICES 2011. This session will 1) identify spatial patterns and geographic areas of concern (high concentrations) of anthropogenic stressors (pollutants etc) in the PICES region using bio-indicators, 2) examine mechanisms of transport, and ultimate disposition, of stressors in marine ecosystems, and 3) discuss possible health effects on predators and human consumers. Review papers, case studies, and innovative methods papers on anthropogenic stressors in marine predators are invited, as are papers that distinguish between the effects of natural and anthropogenic stressors. In particular, studies linking predator habitat use with spatial aspects of stressors in the environment and in predators are encouraged. Funding is requested for 1-2 invited speakers.

Sponsoring Committee: BIO (AP-MBM)

Potential Co-sponsors: MEQ, FUTURE, ICES, GESAMP, WG28, Japan Science Promotion Society (grant to Y. Watanuki; funding available for 1–2 scientists to attend)

Convenors: Peter Ross (Canada), Yutaka Watanuki (Japan)

Potential invited speakers: H. Takada (POPs; Japan), A. Watanabe (marine plastics; Japan), J. Elliot (POPs; Canada), G.M. Ylitalo (marine contaminants; USA)

Output: Proceedings or a review paper

AP-MBM Endnote 7

Proposal for a 1-day Workshop at PICES-2012 on “*The feasibility of updating PICES Publication 14 on Prey Consumption by marine birds, marine mammals, with the addition of prey consumption by large predatory fish in the PICES regions*”

[later renamed as “*The feasibility of updating prey consumption by marine birds, marine mammals, and large predatory fish in PICES regions*”]

Sponsoring Committee: BIO (AP-MBM)

Proposed Convenor: George Hunt (USA; not presently a member of AP-MBM), Hirohito Kato (Japan)

Proposed participants: Selected members of AP-MBM-AP, appropriate fish experts

Rationale:

It is now 12 years since the publication of PICES Scientific Report No. 14, Predation by marine birds and mammals in the subarctic North Pacific Ocean (2000, edited by Hunt, G.L. Jr., Kato, H. and McKinnell, S.M.). This publication remains the sole overview of the trophic requirements and roles of marine birds and mammals for the North Pacific, and has been a much used by a wide variety of scientists and managers interested in modeling or understanding the roles of marine birds and mammals. As of October 16, 2011, Google Scholar lists 49 citations of this PICES publication.

PICES Scientific Report No. 14 is now considerably out of date. In the time since its publication, our knowledge of the distribution and abundance of marine birds and mammals has advanced greatly, as has our knowledge of the food habits of a number of species. For a number of species there exist updates on numbers and distributions, and on changes in numbers in the past decades. Additionally, there has been an increased interest in the roles of large predatory fish in the World’s oceans. Thus it would seem timely to update PICES Scientific Publication No. 14, and, if interest exists, include information on prey consumption by large predatory fish.

The update of PICES Scientific Report 14 will be of value to both scientists and managers in PICES member countries, as well as to the work of expert groups in PICES that are responding to the needs of FUTURE. Knowing the distribution, abundance and prey needs of top predators is the fundamental first step in assessing their role in marine ecosystems, in assessing how their roles may change as climate change and other stressors (natural and anthropogenic) impact marine ecosystems, and in planning for their conservation. AP-MBM will need this information to provide advice to other segments of the PICES community. The data presently assembled in PICES Scientific Report No. 14 is now sufficiently out of date as to be misleading. Thus, an update is timely.

The proposed 1-day Workshop would:

- 1) Assess the feasibility of conducting a full update of PICES Scientific Publication No. 14 with the addition of information on prey consumption of large predatory fish;
- 2) Identify potential candidates from PICES countries with the required expertise;
- 3) Assess the financial and temporal resources necessary to complete such an update;
- 4) Provide a report to the BIO Committee and AP-MBM detailing the above findings.

Requirements of the Workshop: A full day meeting is required during the 2012 PICES Annual Meeting in Japan. To ensure the attendance of at least one expert on large predatory fish, the Workshop would require travel support for one person with appropriate fish expertise.