

# S1 Science Board Symposium

## North Pacific Ecosystems Today, and Challenges in Understanding and Forecasting Change

*Co-Convenors: John Stein (SB), Michael Dagg (BIO), Mikhail Stepanenko (FIS), Steven Rumrill (MEQ), Hiroya Sugisaki (MONITOR), Michael G. Foreman (POC), Bernard Megrey (TCODE), Thomas W. Therriault (AICE), Hiroaki Saito (COVE), Robin Brown (SOFE), Fangli Qiao (China) and Sinjae Yoo (Korea)*

Climate change and increasing development of coastal areas and their watersheds are two of the most serious threats to marine ecosystems in the North Pacific. It is probable that interactions between these stressors will be complex and consequences unknown and difficult to predict. Knowledge of the sensitivity and adaptability of natural and managed ecosystems to climate change is limited and confounded by the interaction of climate change with additional stressors such as fishing, habitat loss, and pollution. While inter-annual and decadal variability are dominant sources of climate variability in the North Pacific, global warming is expected to contribute significantly to future climate change. To improve our understanding of marine ecosystems of the North Pacific, it is imperative we identify the contribution of climate change to overall ecosystem change, and to strengthen our ability to forecast how marine and coastal ecosystems will adjust or respond to ongoing stresses from climate change and other human activities.

This symposium will focus on a series of major issues that are affecting North Pacific marine ecosystems including, but not limited to: changes in cycling of carbon and other elements, increasing acidification, decreasing oxygen concentrations, eutrophication, chemical and biological pollution, changing patterns of oceanic circulation, changes in the productivity and distribution of species (including shifts in migratory routes), shifts in species interactions, increased sea-level rise, and coastal erosion. Ideally, the contribution of climate change to ecosystem characteristics can be quantified and the information made available to the 5th assessment of the Intergovernmental Panel on Climate Change scheduled for 2013-2014.

### Monday, October 25 (11:10-18:15), Day 1

- 10:30      **John A. Barth (Keynote)**  
Observing change in the Northeast Pacific: Past, present and FUTURE
- 11:10      **Enrique N. Curchitser (Invited)**  
Modeling the Earth System: Are we ready? (S1-6770)
- 11:35      **Yasuhiro Yamanaka, Takeshi Okunishi, Taketo Hashioka, Hiroshi Sumata and Shin-ichi Ito (Invited)**  
Predicting marine ecosystem responses to climate change by a 3-D high-resolution ecosystem model (S1-6813)
- 12:00      **Neil S. Banas**  
Limits on predictability in a diversity-resolving plankton model: A strategy for ensemble ecosystem forecasting (S1-6442)
- 12:20      **Evan A. Howell, Jeffrey J. Polovina and John Dunne**  
Modeling the central North Pacific ecosystem response to predicted climate variations and fishery management scenarios (S1-6846)
- 12:40      **Lunch**
- 14:00      **Minhan Dai (Invited)**  
Coastal ocean carbon cycling – Current understanding and challenges (S1-6584)
- 14:25      **James C. Orr (Invited)**  
Chemical potential for impacts of ocean acidification on Pacific Ocean ecosystems (S1-6853)

- 14:50 **Jeffrey J. Polovina, John Dunne, Phoebe Woodworth and Evan A. Howell**  
Projected expansion of the subtropical biome and contraction of the temperate and equatorial upwelling biomes in the North Pacific under global warming (S1-6441)
- 15:10 **Kenneth O. Coyle, Sarah Hinckley, Wei Cheng, Georgina Gibson, Albert J. Hermann and Kate Hedstrom**  
Production on the Gulf of Alaska shelf: Spatial-temporal expansion of GLOBEC field measurements using an ecosystem model embedded in a circulation model (S1-6658)
- 15:30 **Emanuele Di Lorenzo, Julie E. Keister, Sanae Chiba, Vincent Combes, Andrew C. Thomas, P. Ted Strub, Harold Batchelder, Steven J. Bograd, Peter J.S. Franks and William T. Peterson**  
The Pacific Boundary Ecosystems and Climate Study (POBEX) (S1-6757)
- 15:50 *Coffee/Tea Break*
- 16:10 **Albert J. Hermann, Kerim Aydin, Nicholas A. Bond, Wei Cheng, Enrique N. Curchitser, Georgina A. Gibson, Kate Hedstrom, Ivonne Ortiz, Muyin Wang and Phyllis J. Stabeno (Invited)**  
Modes of biophysical variability on the Bering Sea shelf (S1-6689)
- 16:35 **Michael A. Litzow and Franz J. Mueter**  
Hare and Mantua updated: Four decades of climate-biology covariation in the Northeast Pacific (S1-6491)
- 16:55 **Muyin Wang, James E. Overland and Nicholas A. Bond**  
Contributions of episodic events in decadal climate variation of the Bering Sea (S1-6544)
- 17:15 **George L. Hunt, Jr., Kenneth O. Coyle, Lisa Eisner, Edward V. Farley, Ron Heintz, Franz J. Mueter, Jeffrey M. Napp, James E. Overland, Patrick Ressler, Sigrid Salo and Phyllis J. Stabeno**  
Climate impacts on eastern Bering Sea food webs: A synthesis of new data and an assessment of the Oscillating Control Hypothesis (S1-6590)
- 17:35 **Hiroaki Saito, Shin-ichi Ito, Atsushi Kawabata, Mitsutaku Makino, Shoshiro Minobe, Masami Nonaka, Takeshi Okunishi, Kazutaka Takahashi and Ichiro Yasuda**  
Forecasting fish species alternation: Results of the SUPRFISH programme and remaining issues (S1-6704)
- 17:55 **Shin-ichi Ito, Takeshi Okunishi, Michio J. Kishi and Muyin Wang**  
Projection of Pacific saury response to future climate change (S1-6660)
- 18:15 *Session ends*

**Friday, October 29 (14:00-17:30), Day 2**

- 14:00 **Frank Whitney, Steven Bograd and Tsuneo Ono (Invited)**  
How does expanding hypoxia affect the nutrient budget of the subarctic Pacific? (S1-6575)
- 14:25 **Tsuneo Ono**  
Oxygen decline in the continental slope waters off-Japan and its potential influence on groundfishes (S1-6561)
- 14:45 **Steven J. Bograd, Carmen G. Castro, Francisco P. Chavez, Curtis A. Collins, Vincent Combes, Emanuele Di Lorenzo, Mark Ohman, Ryan Rykaczewski and Frank Whitney**  
The California Undercurrent: 1949–2009 and beyond (S1-6798)
- 15:05 **J. Anthony Koslow, Ralf Goericke and William Watson**  
Climate and fish assemblages of the southern California Current, 1951–2008 (S1-6633)

- 15:25 **William W.L. Cheung, Thomas A. Okey and Richard D. Brodeur**  
Projecting future changes in distributions of pelagic nekton along the west coast of North America (S1-6640)
- 15:45 **Coffee/Tea Break**
- 16:05 **Mingjiang Zhou (Invited)**  
Understanding harmful algal blooms in eutrophic coastal waters: Necessity of end-to-end studies (S1-6724)
- 16:30 **Alexey V. Vakatov, Valeriy I. Michailov and Andrey A. Smirnov**  
**(NEW)** The present condition of the ecosystem in Taiu Bay in the Sea of Okhotsk (S1-6437)
- 16:50 **Jun-ya Shibata, Ryu Isonaka, Hideki Hamaoka, Kazumasa Matsumoto, Tetsuya Nanko, Todd W. Miller, Hidejiro Onishi, Tadao Kunihiro and Koji Omori**  
Relationship between food web structure of a lower trophic level community and transfer efficiency in a coastal sea (S1-6471)
- 17:10 **Sophia C. Johannessen and Robie W. Macdonald**  
Effects of local and global change on an inland sea: The Strait of Georgia, Canada (S1-6539)
- 17:30 **Session ends**

## S1 Posters

- S1-6424 **Babagana Abubakar**  
The impacts of human activities in Africa and the North and South Pole Regions on the Global Climate Change
- S1-6437 **Alexey V. Vakatov, Valeriy I. Michailov and Andrey A. Smirnov**  
The present condition of the ecosystem in Taiu Bay in the Sea of Okhotsk
- S1-6454 **Svetlana Monakhtina**  
Skiffish (*Erilepis zonifer*): Traits of biology from a fishery near the Emperor Seamounts in the north-west Pacific Ocean
- S1-6501 **Jianxin Ma, Zhenhu Zheng and Maojian Wang**  
The distribution characteristics of phytoplankton in Laizhou Bay
- S1-6527 **Fu-xin Sun, Ying Wang and Zhi-hong Wu**  
Study on bioaccumulation and elimination of *Chlamys farreri* to copper
- S1-6530 **Daoji Li, Haixia Liu and Ping Wang**  
Formation of summer hypoxia in the Yangtze River Estuary of China: “cold pool” and “thermal barrier” effects
- S1-6550 **Sayaka Matsumura, Hiroya Sugisaki, Hiroaki Saito, Yuji Okazaki and Tomohiko Kikuchi**  
Spatio-temporal changes in species diversity and assemblage structure of Euphausiids (Oyashio to Oyashio-Kuroshio Transition Region in the western north Pacific)
- S1-6551 **Kaoru Aoki, Kazuya Takeda, Satoshi Yamada, Takayoshi Yamashita and Tomohiko Kikuchi**  
Spatial-temporal distribution of *Aurelia aurita* in Mikawa Bay inferred from net sampling with a fish finder
- S1-6630 **Vladimir F. Krapivin and Ferdinand A. Mkrtychyan**  
Development of the simulation model of pollutant propagation in the Arctic Basin

- S1-6645      **Donhyug Kang, Hyungbeen Lee, Hye seon Kim, Woongseo Kim and Se-Jong Ju**  
Vertical signatures in acoustic estimates of zooplankton around the Yellow Sea Bottom Cold Water, Korea
- S1-6651      **Jeffery M. Napp, Carin Ashjian, Rodger Harvey, Mike Lomas, Mike Sigler and Phyllis Stabeno**  
Understanding ecosystem processes in the Bering Sea
- S1-6807      **Nora Deans, Thomas Van Pelt, Francis Wiese and Carolyn Rosner**  
Communicating ecosystem science: The Bering Sea Project

# S2 BIO Topic Session

## Understanding the role of iron in regulating biogeochemical cycles and ecosystem structures in the North Pacific Ocean

Co-Sponsored by SOLAS

Co-Convenors: *Angelica Peña (Canada), Toshi Saino (Japan) and Mark Wells (U.S.A.)*

Iron plays a key role in regulating the biogeochemical cycles of carbon and nitrogen, and pelagic ecosystem structures in the North Pacific Ocean, yet our understanding of these effects remains limited. External sources of iron, such as Asian dust, rivers, sediments, and volcanoes, supply large amounts of iron to the North Pacific, while the physical processes of upwelling, meso-scale eddies, boundary currents, and tidal mixing transport deep waters with high iron concentration to the upper ocean. Biological uptake, zooplankton grazing, re-mineralization, and iron chemistry change the forms of iron and its distribution in the North Pacific Ocean. This session invites papers that address physical, biological and chemical processes controlling iron distribution and transformation, linkages between iron and ecosystem responses, and impacts on carbon and nitrogen cycles. Of special interest are papers that combine recent progress from field observations and modeling studies that relate iron cycling to ecosystem structures and carbon fluxes in the North Pacific Ocean.

**Tuesday, October 26 (14:00-18:30)**

- 14:00      ***Introduction by Convenors***
- 14:05      **Jay T. Cullen and Maria T. Maldonado (Invited)**  
Iron speciation and bioavailability: Insight gained from analytical chemistry and microbial physiology (S2-6818)
- 14:35      **Eric G. Roy and Mark L. Wells**  
Evidence for regulation of Fe(II) Oxidation Rates by Organic Complexing Ligands in the Eastern Subarctic Pacific (S2-6840)
- 14:55      **Kazuhiro Misumi, Daisuke Tsumune, Yoshikatsu Yoshida, Takeshi Yoshimura, Keisuke Uchimoto, Tomohiro Nakamura, Jun Nishioka, Humio Mitsudera, Frank O. Bryan, Keith Lindsay, J. Keith Moore and Scott C. Doney**  
Mechanisms controlling dissolved iron distribution in the North Pacific: A model study (S2-6762)
- 15:15      **William Crawford**  
Advection of deep-sea and coastal water into the HNLC region of the northeast Pacific Ocean (S2-6849)
- 15:35      ***Coffee/Tea Break***
- 15:55      **Huiwang Gao, Xiaohong Yao, Jinhui Shi and Jianhua Qi (Invited)**  
Response of marine ecosystem to Asian dust fertilization from coastal sea to open ocean (S2-6622)
- 16:25      **Josiane Mélançon, Maurice Levasseur, Martine Lizotte, Jean-Éric Tremblay, Gui-Peng Yang, Marjolaine Blais, Guangyu Shi, Hui-Wang Gao, Michael Arychuk, Keith Johnson, Nes Sutherland, Marie Robert and Wendy Richardson**  
Impact of Asian dust on plankton and DMS production in the Northeast Subarctic Pacific (S2-6850)
- 16:45      **Jun Nishioka, Tsuneo Ono, Hiroaki Saito, Keiichiro Sakaoka and Takeshi Yoshimura**  
Oceanic iron supply mechanisms supporting the spring diatom bloom in the Oyashio region, western subarctic Pacific (S2-6707)

- 17:05      **Hiroaki Saito, Jun Nishioka, Atsushi Tsuda and Hiroaki Tatebe**  
The role of zooplankton in buffering geographical heterogeneity of primary productivity (S2-6859)
- 17:25      **Fei Chai, Peng Xiu, Huijie Xue, Lei Shi and Yi Chao**  
Modeling impacts of mesoscale eddies on iron cycle and biogeochemical processes in the Gulf of Alaska (S2-6649)
- 17:45      **Emilie Brévière**  
The international Surface Ocean - Lower Atmosphere Study (SOLAS) project and its mid-term strategy (S2-6862)
- 18:05      **Hong Chen, Jianbo Han and Xiaomeng Wang**  
A review of the influence of ocean fertilization on marine biodiversity (S2-6483)
- 18:25      *Summary by Convenors*
- 18:30      *Session ends*

# S3 BIO Topic Session

## The Practical Handbook at 50: A celebration of the life and career of Tim Parsons

*Co-Convenors: James Christian (Canada) and Tsuneo Ono (Japan)*

The importance of Strickland and Parsons' *A Practical Handbook of Seawater Analysis* to the development of oceanographic science is difficult to overstate. The first version of the book, *A Manual of Sea Water Analysis*, was published by the Fisheries Research Board of Canada in 1960. Half a century on, we are in a position to examine the role that this manual and its descendants have played in the development of biological and chemical oceanography. This session invites papers on the role that the development and standardization of analytical methods has played in the evolution of oceanography, and the evolution of our understanding of planktonic ecosystems that methodological innovation has catalyzed.

### Wednesday, October 27 (9:00-12:10)

- 9:00            *Introduction by Convenors*
- 9:05            *Introduction by Tim Parsons*
- 9:15            **Yukihiro Nojiri (Invited)**  
Good on board practice for ocean carbon measurement and efforts toward international collaboration (S3-6768)
- 9:40            **David L. Mackas (Invited)**  
"You can learn a lot by looking": The importance of exploratory observation (and occasional surprise) in biological oceanographic discovery (S3-6657)
- 10:05          **Michio Aoyama and David J. Hydes (Invited)**  
The new era of nutrients measurements in seawater with RM/CRM and the new manual: The joint IOC-ICES Study Group on Nutrient Standards (SGONS) and recent progress (S3-6547)
- 10:30          *Coffee/Tea Break*
- 10:50          **James R. Christian**  
Evolution of marine microbial ecology (S3-6568)
- 11:10          **K. Banse, S.W.A. Naqvi, J.R. Postel and P.V. Narvekar**  
Twists in estimating temporal O<sub>2</sub> changes in oxygen minimum zones from old O<sub>2</sub> data (S3-6514)
- 11:30          **Frank Whitney and Janet Barwell-Clarke**  
Challenges in observing long term trends in oxygen and nutrients: Ocean Station P as an example (S3-6863)
- 11:50          **Andrew G. Dickson**  
Measuring pH in seawater: Prejudice, practice and pitfalls (S3-6868)
- 12:10          *Session ends*





# S4 BIO Topic Session

## Census of Marine Life - Exploring ocean life: Past, present and future

*Co-Convenors: Michael Feldman, Clarence Pautzke, Andrew Rosenberg (U.S.A.) and Sinjae Yoo (Korea)*

The Census of Marine Life (CoML) is a global scientific initiative to assess and explain the changing diversity, distribution, and abundance of marine species in the past and present, and to build the capacity to project future diversity. CoML is the initiative of unprecedented size and scope, engaging more than 2000 scientists and ocean professionals from over 80 countries with a common mission towards improving the understanding of life in the ocean. This session will summarize the past 10 years of results from the global CoML program, highlighting specific products and how CoML information and data can be used or applied. It will open with an overview of the entire program and its accomplishments, and then delve deeper into various program components with featured speakers representing Census activities in the Arctic, deep sea, tagging and tracking, HMAP, FMAP, NaGISA, corals, DNA barcoding, microbes, and other exciting projects. Contributors will discuss findings and discoveries with particular attention to the information released at the CoML “Decade of Discovery” events in London just weeks earlier. Discussion will also center on additional ways to apply the newly released CoML information to answer the growing global questions of ocean acidification and climate change, and the role of marine biodiversity information with managing through ecosystems approaches and marine spatial planning. The session will conclude with a consideration of lessons learned from CoML, exploring some of the most successful (and some not-so successful) aspects of the program in the context of developing any future coordinated marine biodiversity efforts.

### Friday, October 29 (9:00-13:05)

- 9:00            **Introduction by Convenors**
- 9:05            **Vera Alexander, Patricia Miloslavich and Kristen Yarincik (Invited)**  
The Census of Marine Life – Evolution of a decade of worldwide marine biodiversity research (S4-6680)
- 9:30            **Tim D. Smith (Invited)**  
Confessions of a Convert: From fishery biology to historical marine ecology (S4-6845)
- 9:55            **John Dower**  
A World Census of Marine Life on Seamounts (S4-6865)
- 10:15          **Jose Angel A. Perez, Andrey Gebruk, Alexei M. Orloy, Stanislav Kobylansky and André Lima**  
Surveying the patterns of life in the understudied depths of the South Atlantic: Continuing the legacy of the MAR-ECO project (CoML) into the southern mid-Atlantic ridge (S4-6781)
- 10:35          **Coffee/Tea Break**
- 10:55          **Steven J. Bograd, Barbara A. Block and Daniel P. Costa**  
Building a marine life observing system: Lessons from the Tagging of Pacific Pelagics (TOPP) (S4-6864)
- 11:15          **Elliott L. Hazen, Salvador Jorgensen, Ryan Rykaczewski, John Dunne, Steven Bograd, Dave Foley, Ian Jonsen, Arliss Winship, Daniel Costa and Barbara Block**  
Potential habitat shifts in Pacific top predators in a changing climate (S4-6789)
- 11:35          **John C. Payne**  
The future of POST (S4-6821)

- 11:55      **Reginald Beach, Daphne Fautin, J. Emmett Duffy, Heidi Sosik, John J. Stachowicz, Linda Amaral-Zettler, Tatiana Rynearson, Gustav Paulay and Hilary Goodwin**  
A national marine biodiversity observing network to inform ecosystem based management and science (S4-6679)
- 12:15      **Hiroko Sasaki, Keiko Sekiguchi and Sei-Ichi Saitoh**  
**(NEW)** Cetacean habitat distribution in the eastern Bering Sea and Chukch Sea (S4-6516)
- 12:35      **Paul V.R. Snelgrove (Invited)**  
Marine biodiversity in the 21<sup>st</sup> century: Making ocean life count (S4-6842)
- 13:00      *Summary by Convenors*
- 13:05      *Session ends*

## **S4 Posters**

- S4-6516      **Hiroko Sasaki, Keiko Sekiguchi and Sei-Ichi Saitoh**  
Cetacean habitat distribution in the eastern Bering Sea and Chukch Sea
- S4-6743      **Joon Sang Park, Jang-Seu Ki and Jin Hwan Lee**  
The genus *Thalassiosira* (Bacillariophyceae): The surface ultrastructures of marginal fultoportula and nuclear rDNA phylogenetic relationship
- S4-6819      **Guang-xing Liu, Qiang Jiang, Yan-zhong Zhu and Hong-ju Chen**  
The taxonomic diversity of planktonic copepods in the North Yellow Sea

# S5 FIS Topic Session

## Oceanographic and demographic processes affecting the reproductive biology of exploited marine stocks

Co-Convenors: *Jin-Yeong Kim (Korea), Paul Spencer (U.S.A.) and Chang Ik Zhang (Korea)*

Recent research has demonstrated several complexities in the reproductive processes of marine fish. First, for some cod and rockfish stocks there is evidence of a maternal effect upon larval quality such that larval viability increases with spawner age. Second, some iteroparous stocks show evidence of skipped spawning (i.e., not all mature fish spawn in each year) that is related to environmental conditions and the life-history of the stock. Third, temporal changes in age at reproduction have occurred for some exploited stocks, and researchers are attempting to attribute this pattern to some combination of (1) demographic changes in age and size structure; (2) plastic responses to a changing environment; or (3) evolutionary responses to selective pressures. These complexities indicate that the production of reproductive output of marine stocks may be more complex than typically assumed in population models, and researchers are beginning to more fully incorporate reproductive biology in assessment procedures. The purpose of this session is to review field, laboratory, and modeling studies that may reveal how oceanographic variability, life-history pattern, and fishing pressure may affect the reproductive biology for North Pacific fish stocks, and consider how reproductive biology can best be incorporated into fishery assessment and management.

### Wednesday, October 27 (9:00-12:30)

- 9:00            **Introduction by Convenors**
- 9:05            **Edward A. Trippel (Invited)**  
Demography, degrees and development of scientific advice for fisheries management (S5-6563)
- 9:30            **Doug Hay, Megan Moody, Bruce McCarter and Thomas W. Therriault**  
Is climate change responsible for changes in the distribution, abundance and spawning of the anadromous eulachon (*Thaleichthys pacificus*) in the North Pacific? A synthesis of available information (S5-6722)
- 9:50            **Edward D. Weber and Sam McClatchie**  
Effect of water-mass properties on the spawning location of Pacific Mackerel *Scomber japonicus* in the California Current (S5-6802)
- 10:10          **Steven J. Parker and Paul Grimes**  
Oogenesis in Antarctic toothfish and implications for fisheries management (S5-6497)
- 10:30          **Coffee/Tea Break**
- 10:50          **You Jung Kwon, Chang Ik Zhang and Hyeok Chan Kwon**  
Estimation of biological parameters for rock bream, *Oplegnathus fasciatus*, in Jeju marine ranching area of Korea (S5-6613)
- 11:10          **Cindy J.G. van Damme, Mark Dickey-Collas, Olav S. Kjesbu and Adriaan D. Rijnsdorp**  
Fecundity regulation mechanisms in fish with different spawning strategies (S5-6536)
- 11:30          **Edward J. Dick**  
Modeling the reproductive potential of rockfishes (*Sebastes* spp.) (S5-6683)
- 11:50          **Joel B. Webb, Laura M. Slater, Ginny L. Eckert and Gordon H. Kruse**  
Variability in reproductive potential of eastern Bering Sea snow crab, *Chionoecetes opilio*, demographic and environmental effects (S5-6474)

12:10 **Peng Sun, Zhenlin Liang, Wei Yan and Huaming Yu**  
Chief cause for the change of fish phenotypic traits: Fishing gear selectivity (S5-6451)

12:30 **Session ends**

## S5 Posters

S5-6508 **Miriam J. Doyle and Kathryn L. Mier**  
Species life history patterns and early life ecology as indicators of vulnerability and response of fish populations to climate change in the Gulf of Alaska

S5-6509 **Jie Zheng, Gordon H. Kruse and Bill Bechtol**  
Temporal changes in size at maturity and their impacts on stock assessment and fishery management for eastern Bering Sea Tanner crab

S5-6521 **Laura M. Slater, Joel B. Webb, Kirsten A. MacTavish and Douglas Pengilly**  
Preliminary analysis of demographic and geographic processes influencing Tanner crab fecundity in the eastern Bering Sea

S5-6632 **Paul Spencer, Sarah Kraak and Edward A. Trippel**  
Evaluation of closed areas for fish stocks with maternal effects in larval survival

S5-6634 **Rui-Jing Wan, Feng Zhou and Xiujuan Shan**  
Impacts of temperature and salinity on species composition of ichthyoplankton and distribution of fish spawning ground in the Changjiang River estuary and its adjacent waters

S5-6656 **Susanne F. McDermott, Daniel W. Cooper, Jared L. Guthridge, Ingrid B. Spies, Mike F. Canino, Pamela Woods and Nicola Hillgruber**  
Effects of maternal growth on fecundity and egg quality of wild and captive Atka mackerel (*Pleurogrammus monopteryrius*)

S5-6713 **Sukgeun Jung and Il Su Choi**  
Size-dependent mortality of Pacific cod (*Gadus macrocephalus*) based on their reproduction and growth

S5-6767 **Linsey Arnold, Selina Heppell, Wade Smith and Scott A. Heppell**  
**(Cancelled)** Maternal effects in a long-lived, deep-dwelling rockfish, *Sebastes alutus*: Evidence and management implications

S5-6797 **Sandi Neidetcher**  
Temporal and spatial patterns of Pacific cod spawning in the Bering Sea between 2005 and 2007; A comparison of spawning patterns between warm and cold years

# S6 FIS/BIO Topic Session

## Observations of ecosystem mixing under climate change

*Co-Convenors: Sanae Chiba (Japan), John Field (U.S.A.), Jin-Yeong Kim (Korea), Franz J. Mueter (U.S.A.) and Laura Richards (Canada)*

As the ocean environment changes, we expect species to respond by changing their distribution. Species could expand into habitats newly made available to them and avoid or shrink their abundance in habitats that are no longer viable. Because species respond to these environmental changes at different rates, previously isolated species now interact. We coin the term “ecosystem mixing” to describe the pulling apart and re-mixing of ecosystems and species interactions in a changing environment. For example, Humboldt squid, expanded their range northward along the west coast of North America in 2009, encountering new prey species, potentially including important stocks of juvenile salmon. In this session, we consider the consequences of ecosystem mixing. Papers are invited that describe case studies of ecosystem mixing from a physical, biological and/or socio-economic perspective, especially as they impact the predators and/or prey of key species (such as those important for fishery harvests). Selected oral and poster presentations will be considered for publication in a peer-reviewed journal.

### Thursday, October 28 (9:00-18:00)

- 9:00            **Introduction by Convenors**
- 9:10            **Hjálmar Hátún (Invited)**  
Large-scale shifts in the North Atlantic bio-geography forced by the subpolar gyre (S6-6628)
- 9:50            **Solfrid Sætre Hjøllo, Geir Huse, Morten D. Skogen and Einar Svendsen**  
Modeling secondary production in the Norwegian Sea with a fully coupled physical-primary-secondary production model system (S6-6604)
- 10:10          **Jürgen Alheit and Carola Wagner**  
Impact of Atlantic Multidecadal Oscillation (AMO) on NE Atlantic ecosystems (S6-6843)
- 10:30          **Coffee/Tea Break**
- 10:50          **Lorenzo Ciannelli and Mary Hunsicker (Invited)**  
Predator-prey spatial distribution patterns and spatial overlap in relation to climate driven environmental variability (S6-6593)
- 11:30          **Jin Yeong Kim, Heeyong Kim and Il Su Choi**  
Variation in occurrence of warm and cold water species in response to climate changes off Korea (S6-6827)
- 11:50          **Robinson Mugo, Sei-Ichi Saitoh, Akira Nihira, Tadaaki Kuroyama, Takahiro Toyoda, Shuhei Masuda, Hiromichi Igarashi, Toshiyuki Awaji and Yoichi Ishikawa**  
Potential impact of global warming on skipjack tuna habitat in the western North Pacific (S6-6635)
- 12:10          **Luke D. Whitman, Neal E. McIntosh, Scott A. Heppell and Kelly J. Benoit-Bird**  
Variation in the distribution and energy density of juvenile walleye pollock in the southeastern Bering Sea (S6-6513)
- 12:30          **Lunch**
- 14:00          **William Gilly and Unai Markaida (Invited)**  
Adaptability and plasticity of Humboldt squid, *Dosidicus gigas*, in conjunction with environmental perturbation (S6-6832)

- 14:40      **John C. Field, Ken A. Baltz, William Matsubu, Graham E. Gillespie, Julia S. Stewart, William F. Gilly and William A. Walker**  
Foraging ecology of the Humboldt squid in the California Current (S6-6787)
- 15:00      **Gregory Kowalke, David L. Mackas and Julie Keister**  
Do circulation patterns make the eastern North Pacific especially susceptible to zoogeographic shifts? (S6-6791)
- 15:20      **Vladimir Kulik**  
The role of mesopelagic fishes in ecosystem vertical mixing in the north western Pacific (S6-6860)
- 15:40      ***Coffee/Tea Break***
- 16:00      **Trond Kristiansen, Charles Stock, Ken Drinkwater and Enrique N. Curchitser**  
Effects of climate change on the phenology of spring blooms and consequences for the survival of larval cod (S6-6559)
- 16:20      **Alexei I. Pinchuk and Kenneth O. Coyle**  
Emergence of the Arctic hyperiid *Themisto libellula* on the southeastern Bering Sea shelf as a result of the recent cooling and their potential impact on pelagic food web (S6-6573)
- 16:40      **Sonia Batten and Anthony Walne**  
Variability in northwards extension of warm water copepods in the NE Pacific (S6-6564)
- 17:00      **Harald Loeng, Hjálmar Hátún, Jens Christian Holst, Mark Payne and Aril Slotte**  
The rise and fall of the northern blue whiting stock (S6-6532)
- 17:20      **Aimee Keller, Victor Simon, W. Waldo Wakefield, Keith Bosley, M. Elizabeth Clarke, John A. Barth and Stephen D. Pierce**  
Expansion and shoaling of the oxygen minimum zone off the U.S. west coast in relation to demersal fish distribution and biomass (S6-6814)
- 17:40      **Rong-shuo Cai, Hongjian Tan, Qing-liang Yang and Ji-long Chen**  
The response of sea surface temperature in the offshore area of China to variations in the East Asian Monsoon under global warming and its marine ecological effects (S6-6507)
- 18:00      ***Session ends***

# S7 FIS/MEQ Topic Session

## Economic relation between marine aquaculture and wild capture fisheries

*Co-Convenors: Ingrid Burgetz (Canada), Dohoon Kim (Korea), Minling Pan (U.S.A.) and Qingyin Wang (China)*

Past activities of PICES have mainly focused on physical and biological sciences, such as ecology, ecosystems, fisheries, oceanography, and biogeochemistry, *etc.* While humans are essential parts of marine ecosystems, it is important to consider impacts from human activities/uses upon marine living resources and economic and social science research within the PICES region. Indeed, the new FUTURE science program endeavors to provide a greater role for social and economic scientists in PICES. This session is convened in direct response to this objective and is intended to be a step toward enhancing research and management of marine living resources from a socio-economic perspective.

Considering the growing role of marine aquaculture in both seafood production and consumption as well as the close relationship between marine aquaculture and wild ocean capture fisheries, this session will focus on the relationships of marine aquaculture to capture fisheries with respect to economics, such as (1) marine aquaculture products as a substitute and/or complement for wild caught products owing to consumer preference, price, and availability; (2) the synergies between aquaculture and fishing (use of fish processing trimmings, resilient coastal communities and maintaining working waterfronts), and (3) economic considerations regarding potential environmental effects (positive and negative) interactions between captured fisheries and marine aquaculture (*e.g.*, feed inputs in marine aquaculture derived from captured fisheries, aquaculture stock enhancement, aquaculture structures as fish aggregating devices, *etc.*). Selected oral and poster presentations will be considered for publication in a special issue of a peer-reviewed journal such as *Aquaculture Economics and Management*, *Aquaculture*, *Reviews in Aquaculture*, or *Fishery Research*.

### Tuesday, October 26 (9:00-17:20)

- 9:00      **Introduction by Convenors**
- 9:05      **Michael C. Rubino (Invited)**  
Potential economic effects on wild capture fisheries from an expansion of marine aquaculture in the United States (S7-6782)
- 9:40      **Di Jin (Invited)**  
Aquaculture and capture fisheries: An integrated economic-ecological analysis (S7-6445)
- 10:05     **Yajie Liu, Ola Diserud, Kjetil Hindar and Anders Skonhøft (Invited)**  
An ecological-economic model of genetic interaction between farmed and wild Salmon (S7-6848)
- 10:25     **Coffee/Tea Break**
- 10:50     **Masahito Hirota and Yoshinobu Kosaka**  
The TASC (Total Allowable Scallop Culture) in Japan: An approach for the issue on the overproduction in Yezo giant scallop cultivation in Mutsu Bay (S7-6674)
- 11:10     **Heedong Pyo**  
Analyzing recovered effects of marine contaminated sediment cleanup project on wild capture fisheries in Korea (S7-6502)
- 11:30     **Galina S. Gavrilova**  
Capture fisheries and mariculture of the marine invertebrates in Peter the Great Bay (Japan Sea) (S7-6655)

- 11:50      **Toyomitsu Horii**  
Impacts on fishery products of the Tiger Puffer, *Takifugu rubripes*, by stock enhancement (S7-6817)
- 12:10      ***Lunch***
- 14:15      **Shang Chen, Li Wang, Tao Xia, Guoying Du and Dachuan Ren (Invited)**  
Quantification of maricultural effects on coastal ecosystems services: Sanggou Bay case from China (S7-6553)
- 14:40      **Seong-Kwae Park and Dong-Woo Lee (Invited)**  
Economic relation between marine aquaculture and wild capture fisheries: Case of Korea (S7-6691)
- 15:05      **Hisashi Kurokura, Akira Takagi, Yutaro Sakai and Nobuyuki Yagi (Invited)**  
Tuna goes around the world on sushi (S7-6695)
- 15:30      ***Coffee/Tea Break***
- 15:50      **Chen Sun (Invited)**  
The influence of marine aquaculture to the fishery industry chain in China (S7-6430)
- 16:15      **Kelly Davidson and Minling Pan (Invited)**  
Consumers' willingness to pay for aquaculture fish products vs. wild-caught seafood – A case study in Hawaii (S7-6594)
- 16:40      ***Discussion and Summary by Convenors***
- 17:20      ***Session ends***



# S8 FIS/POC/BIO Topic Session

## Impact of climate variability on marine ecosystems: Understanding functional responses to facilitate forecasting

Co-Sponsored by ICES

Co-Convenors: Jürgen Alheit (Germany), Suam Kim (Korea), Harald Loeng (Norway), James Overland (U.S.A.) and Yasunori Sakurai (Japan)

Understanding the role of natural variability, occurring over a variety of temporal and spatial scales is essential for effective management of marine ecosystems in the wake of predicted global change. Evidence suggests that climate variability can trigger regime shifts in marine ecosystems. Regime shifts are characterized by a re-organization of marine communities, species dominance, and tropho-dynamic relationships. Often, synchronous shifts occur in aquatic ecosystems that are separated by thousands of kilometers. This finding suggests that atmospheric teleconnections are mediating regional system changes. We postulate that comparative studies of ecosystems that have experienced regime shifts will provide insights into the expected responses of marine organisms to climate change. Papers are invited that go beyond simple pattern matching. The primary focus will be on understanding shifts in the pelagic realm, including phytoplankton, zooplankton, small pelagic fishes, gadids, and squids. Preference will be given to research that provides evidence of the functional responses and relationships that underlie regime shifts, and to statistical or modeling studies that successfully simulate observed shifts.

### Tuesday, October 26 (9:00-18:05)

- 9:00 **Introduction by Convenors**
- 9:05 **Hans O. Pörtner (Invited)**  
Oxygen and capacity limited thermal tolerance (OCLT): Linking climate to ecosystem change (S8-6606)
- 9:30 **Julie E. Keister, Emanuele Di Lorenzo, Sanae Chiba, Vincent Combes, Cheryl A. Morgan and William T. Peterson**  
Climate-related changes in ocean transport control zooplankton biogeography around the North Pacific basin (S8-6686)
- 9:50 **Yury Zuenko, Ludmila Chernoiivanova, Alexander Vdovin and Elena I. Ustinova**  
Saffron cod fluctuations in the Japan Sea: An evidence of match/mismatch hypothesis (S8-6816)
- 10:10 **William R. Crawford and James R. Irvine**  
Climate variability and ecosystem response in Pacific Canadian coastal waters (S8-6778)
- 10:30 **Coffee/Tea Break**
- 10:50 **Kazuaki Tadokoro, Yuji Okazaki, Tsuneo Ono and Hiroya Sugisaki (Invited)**  
Geographical comparison of the decadal-scale variations in marine ecosystems in the North Pacific Ocean (S8-6611)
- 11:15 **Ken Drinkwater, Glen Harrison, Erica Head, Padmini Dalpadado, Jim Carscadden and George Lilly**  
Comparison of the ecosystem responses to climate forcing and fishing between the Labrador Sea and the Norwegian/Barents seas (S8-6753)
- 11:35 **Jürgen Alheit, Michele Casini, Wulff Greve, Thomas Pohlmann, Anne Sell, Ralf Vorberg and Carola Wagner**  
Climate variability drives anchovies and sardines into North and Baltic Seas (S8-6844)

- 11:55 **Joachim P. Gröger, Gordon H. Kruse and Norbert Rohlf**  
Climate cycles and population dynamics of North Sea herring (S8-6427)
- 12:15 **Anne B. Hollowed, Steven Barbeaux, Ned Cokelet, Stan Kotwicki, Patrick Ressler and Christopher Wilson**  
Effects of climate change on pelagic ocean habitats and their potential role in structuring Bering Sea and Gulf of Alaska ecosystems (S8-6841)
- 12:35 **Lunch**
- 14:00 **Shin-ichi Ito, Takeshi Okunishi, Atsushi Kawabata, Hiroshi Kubota, Akinori Takasuka, Taketo Hashioka, Hiroshi Sumata and Yasuhiro Yamanaka (Invited)**  
Multi-trophic level ecosystem modeling for understanding the mechanism of small pelagic fish species alternation associated with climate regime shifts (S8-6661)
- 14:25 **Richard D. Brodeur, James J. Ruzicka and John H. Steele**  
Investigating alternate trophic pathways through gelatinous zooplankton, krill, and planktivorous fishes in an upwelling ecosystem using end-to-end models (S8-6641)
- 14:45 **William J. Sydeman, Jarrod A. Santora, Sarah Ann Thompson, Kyra L. Mills, John C. Field, Brian K. Wells, Baldo Marinovic and Bryan A. Black**  
Numerical responses of krill predators to variation in krill abundance and spatial organization (S8-6790)
- 15:05 **Seokjin Yoon, Hiroya Abe and Michio J. Kishi**  
Variance estimation of the growth and food sources of the Manila clam by global warming in a subarctic lagoon, Japan (S8-6822)
- 15:25 **Harald Loeng**  
Impacts of climate change on the Arctic Ocean and adjacent seas (S8-6600)
- 15:45 **Coffee/Tea Break**
- 16:05 **Franz J. Mueter (Invited)**  
Long-term forecasts of walleye pollock dynamics in the eastern Bering Sea based on estimated responses of recruitment and growth to climate variability (S8-6805)
- 16:25 **Oleg Bulatov**  
Climate fluctuations and walleye pollock biomass dynamics (S8-6444)
- 16:45 **Bryan A. Black, Isaac D. Schroeder, William J. Sydeman, Steven J. Bograd and Brian K. Wells**  
Winter and summer upwelling modes and their biological relevance in the California Current Ecosystem (S8-6541)
- 17:05 **Masahide Kaeriyama, Hideaki Kudo, Hideki Kaeriyama and Katherine W. Myers**  
Spacio-temporal changes in the feeding pattern of Pacific salmon, *Oncorhynchus* spp., in the North Pacific Ocean ecosystems during 1958–2009 (S8-6526)
- 17:25 **Melissa A. Haltuch and André E. Punt**  
On the promises and pitfalls of including decadal-scale climate forcing of recruitment in demersal fish stock assessment (S8-6572)
- 17:45 **Yongjun Tian, Hideaki Kidokoro and Tsuneo Goto**  
Long-term changes in the condition factor of small pelagic fishes in the Japan Sea and the impact of the late 1980s regime shift (S8-6500)
- 18:05 **Session ends**

**S8 Posters**

- S8-6439 **Andrey A. Smirnov and Alexey V. Vakotov**  
Change of the migration scheme of larval herring in connection with transformation of directions and forces of the currents caused by climatic factors in the northern Sea of Okhotsk
- S8-6449 **Vanessa R. von Biela, Christian E. Zimmerman, Thomas E. Helser, Bryan Black and David C. Douglas**  
Terrestrial and marine correlates to black rockfish (*Sebastes melanops*) growth in the California and Alaska Coastal Currents
- S8-6492 **Michael A. Litzow, Franz J. Mueter and Dan Urban**  
Can rising variance predict sudden shifts in populations and ecosystems? A test using Alaskan crustacean data
- S8-6499 **Elena A. Shtraikhert, Sergey P. Zakharkov and Tatyana N. Gordeychuk**  
Inter-annual variability of the spring chlorophyll *a* concentration maximum in the Peter-the-Great Bay (Sea of Japan) in 1998-2010
- S8-6504 **Se-Jong Ju, Chang-Rae Lee and Ah-Ra Ko**  
Latitudinal variation of lipid contents and compositions in copepods, *Euchaeta* and *Pleuromamma* spp., from the Northwest Pacific Ocean: Its implication in feeding ecology
- S8-6541 **Bryan A. Black, Isaac D. Schroeder, William J. Sydeman, Steven J. Bograd and Brian (moved to Oral 16:45) K. Wells**  
Winter and summer upwelling modes and their biological relevance in the California Current Ecosystem
- S8-6595 **James J. Ruzicka, Thomas C. Wainwright, Richard D. Brodeur, Jeannette Zamon, Elizabeth Daly, Cheryl A. Morgan and Robert L. Emmett**  
Interannual variability in the Northern California Current food web structure: Inferring trophic pressures upon juvenile salmon
- S8-6627 **Suam Kim, Sangwook Yeh, Chung-Il Lee, Sukyung Kang, Hyunwoo Kang, Jin-Hee Yoon, Jung Jin Kim and Sinjae Yoo**  
Forecasting practice on the common squid (*Todarodes pacificus*) population responding to climate/oceanographic changes
- S8-6684 **Sarah Ann Thompson, William J. Sydeman, Jarrod A. Santora, Robert M. Suryan, Bryan A. Black, William T. Peterson and John Calambokidis**  
Comparing pathways of functional response of top predators to seasonality of upwelling in the California Current
- S8-6690 **Miguel Niquen, Cecilia Peña and Marilú Bouchon**  
Overview of the main pelagic species stocks in Peru during 1950–2009
- S8-6692 **Jun Shoji, Syun-ichi Toshito, Ken-ichiro Mizuno and Yasuhiro Kamimura**  
Possible effects of global warming on fish early life stages: Shift in spawning season and latitudinal distribution can alter growth of juvenile fishes through the changes in daytime length
- S8-6725 **Chan Joo Jang and Sinjae Yoo**  
Variability of mixed layer depth and its relation with chlorophyll concentration in the North Pacific Ocean
- S8-6727 **Ken-ichiro Mizuno, Yasuhiro Kamimura and Jun Shoji**  
Effect of temperature on growth of black rockfish *Sebastes cheni* juveniles in seagrass and macroalgae beds

- S8-6749      **Hee Dong Jeong, Sang-Woo Kim, Yong Kyu Choi, Jeong Min Shim and Kee Young Kwon**  
A striking difference of coastal SST related to climate change in the eastern coast of Korea
- S8-6758      **Jackie R. King, Vera N. Agostini, Chris J. Harvey, Gordon A. McFarlane, Michael G. Foreman, James E. Overland, Nicholas A. Bond and Kerim Y. Aydin**  
Climate forcing and the California Current ecosystem
- S8-6820      **Ann E. Edwards and Shannon Fitzgerald**  
Predicting resilience to ecosystem change in a far-ranging, pelagic, generalist forager
- S8-6835      **Oleg N. Katugin, Konstantin A. Karyakin and Alexander A. Nikitin**  
Contrasting distribution patterns of the common squid (*Todarodes pacificus*) in Peter the Great Bay (Japan/East Sea) in 2008 and 2009
- S8-6837      **Mikhail A. Zuev and Oleg N. Katugin**  
Distribution patterns of the gonatid squids (Gonatidae, Oegopsina) in the northern Sea of Okhotsk in 1990-2008

# S9 MEQ Topic Session

## Conceptual and numerical models of HAB dynamics

Co-Convenors: *William Cochlan (U.S.A.) and Shigeru Itakura (Japan)*

Each PICES member country has conceptual models of harmful algal bloom (HAB) dynamics that link the physics, chemistry and biological aspects of bloom development and decay. The biology gives us information on ecosystem structure but also describes elements contributing to success of a particular species. The chemistry focuses on nutrient dynamics, ratios and preferences among species. Physical processes detail cell and nutrient delivery to the coast. While conceptual models are descriptions of HAB dynamics without numbers, numerical models include rate estimates. In theory, each of these would be supported with the same physical, chemical and ecological foundation, overlain with the unique considerations of different water types and second order ecosystem structure. However, these models vary widely between species and among countries. There have been no comprehensive inter-comparisons among these conceptual and numerical models to identify their similarities and differences. The focus of this session will be to seek commonalities among models and identify the unique second order aspects needed to describe the distribution and dynamics of HAB in different PICES regions. We encourage modelers and non-modelers alike to submit their papers.

### Wednesday, October 27 (9:00-12:40)

- 9:00            **Introduction by Convenors**
- 9:05            **Wolfgang Fennel (Invited)**  
Construction of models with reference to HABs (S9-6871)
- 9:35            **Theodore J. Smayda (Invited)**  
Modeling harmful algal blooms: The need for a conceptual template harmonious with empirical evidence (S9-6464)
- 10:05          **Jenny Q. Lane, Peter T. Raimondi and Raphael M. Kudela**  
The development of toxigenic *Pseudo-nitzschia* bloom models in Monterey Bay, California, and their application at a single monitoring site within the model domain (S9-6484)
- 10:25          **Shigeru Itakura, Ichiro Imai, Satoshi Nagai and Mineo Yamaguchi**  
*Chattonella (antiqua/marina)* versus diatoms - Different seeding strategies and their bloom dynamics in enclosed embayments (S9-6739)
- 10:45          **Coffee/Tea Break**
- 11:05          **Tamiji Yamamoto and Ryoko Sakai (Invited)**  
Numerical modeling of the slow-growing, motile harmful alga *Gymnodinium catenatum* in Inokushi Bay, a small inlet in southern Japan (S9-6574)
- 11:35          **Donald M. Anderson, Dennis J. McGillicuddy, Jr., Bruce A. Keafer and Ruoying He**  
Bloom dynamics of the red tide dinoflagellate *Alexandrium fundyense* in the Gulf of Maine: A synthesis and progress towards a forecasting capability (S9-6755)
- 11:55          **J.E. Jack Rensel**  
Modeling fish-killing blooms of *Heterosigma akashiwo* in the Salish Sea (S9-6874)
- 12:15          **Angelica Peña and Michael G. Foreman**  
Phytoplankton bloom development in the Juan de Fuca Eddy: Insights from a simple biophysical model (S9-6788)
- 12:35          **Summary by Convenors**
- 12:40          **Session ends**



# S11 MEQ/FIS Topic Session

## Identifying vulnerable marine ecosystems in the North Pacific

Co-Sponsored by NPFMC

Co-Convenors: *R. Ian Perry (Canada) and Chang-Ik Zhang (Korea)*

The Food and Agriculture Organization (FAO) and the Convention on Biological Diversity (CBD) have been encouraging the sustainable use of marine living resources by the identification of vulnerable marine ecosystems (VMEs) and ecologically and biologically significant areas (EBSAs), in particular but not exclusively in international waters, and have developed criteria. The broad purpose for identifying such areas is to prevent significant adverse impacts and to protect the marine biodiversity and services that these ecosystems provide.

To achieve these objectives, researchers and managers must be able to identify areas where VMEs are known, or are likely, to occur. Outstanding questions related to VME identification include: (1) what characteristics should be used to classify these systems, (2) how can current information on VMEs and EBSAs be consolidated, and (3) how can models which predict the locations of such areas be developed and tested. PICES member countries are beginning to identify VMEs that meet a variety of biological and socio-economic objectives. However, no comprehensive comparison of the different methods or assessment of their performance against established ecological, social and economic objectives exists to provide guidance on the appropriate tools to be used. This session will bring together researchers and managers engaged in ecosystem-based management to address two objectives: (1) to compare current approaches and datasets used to identify VMEs/EBSA by different member countries in order to develop a list of appropriate tools and (2) to explore how the criteria for these areas (such as defined in the FAO Guidelines FIEP/R881 and CBD Resolution UNEP/CBD/COP/DEC/IX/20) can be used to identify VME/EBSA-type areas in the high-seas of the North Pacific Ocean. Both benthic/demersal and pelagic systems will be considered, as they may have different characteristics. Presentations and methods developed for shelf and coastal waters are welcome to the extent that they provide guidance and case studies for open ocean situations. This review of international experiences with applying approaches and data to identify VMEs and EBSAs will contribute to the international discussion and evaluation of these issues, and to the application of measures to protect these significant regions.

### Friday, October 29 (9:00-12:45)

- 9:00            ***Introduction by Convenors***
- 9:05            **Edward J. Gregr, Andrea Rambeau and R. Ian Perry**  
Identifying ecologically and biologically sensitive areas in the eastern North Pacific (S11-6772)
- 9:25            **Doo-Nam Kim, Jae-Bong Lee, Kyu-Jin Seok and Dong Woo Lee**  
Investigating Vulnerable Marine Ecosystems (VMEs) from Korean distant-water fisheries (S11-6829)
- 9:45            **Steven J. Parker and David A. Bowden**  
Criteria to select benthic invertebrate taxa to monitor potential impacts to vulnerable marine ecosystems: Lessons from the Southern Ocean (S11-6496)
- 10:05          **Glen Jamieson**  
Moving from EBSAs to a protected area network: Framework considerations and progress challenges in Canada's Pacific waters (S11-6702)
- 10:25          **Jessica L. Finney, Isabelle M. Côté, Randall M. Peterman and Edward J. Gregr**  
Using the overlap of predicted cold-water coral habitat and bottom-contact fisheries to identify vulnerable marine ecosystems in British Columbia, Canada (S11-6571)
- 10:45          ***Coffee/Tea Break***

- 11:05      **Takeshi Hayashibara, Mai Miyamoto and Takashi Yanagimoto (Invited)**  
Investigation of the cold-water corals in the Emperor Seamount Area by Fisheries Agency of Japan (S11-6603)
- 11:25      **Yukimasa Ishida, Kazuaki Tadokoro, Akihiko Yatsu and Mitsutaku Makino**  
Japanese-type marine protected areas (MPAs) and their contributions to biodiversity and fisheries in Tosa Bay, southern Japan (S11-6560)
- 11:45      **Robert M. Suryan, Jarrod A. Santora and William J. Sydeman**  
Biological “hotspots” of the California Current revealed by satellite imagery: Temporal and spatial variability and implications for biodiversity conservation (S11-6765)
- 12:05      **Jarrold A. Santora, William J. Sydeman, John Field, Robert M. Suryan and Stephen Ralston**  
“Hot zones” of krill in the California Current: Application to marine spatial management? (S11-6703)
- 12:25      **Jaime Jahncke, Nadav Nur, Lance Morgan and Astrid Scholz**  
Identifying vulnerable marine ecosystems in the California Current System (S11-6777)
- 12:45      ***Session ends***



# S12 MEQ/FUTURE Topic Session

## Anthropogenic forcing in North Pacific coastal ecosystems: Understanding changes in ecosystem structure and function

### Co-Sponsored by IMBER

*Co-Convenors: Blake Feist (U.S.A.), Hiroshi Kawai (Japan), Olga Lukyanova (Russia), Steven Rumrill (U.S.A.) and Thomas Therriault (Canada)*

The North Pacific marine environment has provided a diverse and valuable series of ecosystem services to coastal communities for many thousands of years. Ocean and land-based anthropogenic activities are now widely recognized to have a strong influence on ecological processes throughout the North Pacific marine ecosystem. Anthropogenic influences such as commercial fishing, aquaculture, pollution, and urbanization are particularly strong in coastal waters where they impose a wide variety of multiple stressors that can impact fundamental ecosystem functions, critical processes, and marine biodiversity. Changes in the physical and biological environment perturb native communities, often resulting in disruption of species interactions and trophic relationships that can negatively impact productivity and diminish ecosystem resilience. In addition, large scale processes such as regime shifts, ocean oscillations, and climate variability can alter near-shore processes. For example, introduced species can negatively impact native communities, and commercial shipping and recreational activities can be a powerful vector for changes in the geographic distribution of marine and estuarine species. Similarly, changing ocean conditions have facilitated the continued pole-ward range expansion of a number of marine organisms, often with unknown impacts on the ecosystems they are moving into. Recent range expansion (*e.g.*, Humboldt squid) and population eruptions (*e.g.*, jellyfish) on both sides of the Pacific have had negative consequences for native flora and fauna.

Application of an ecosystem-based approach to coastal management would provide a template to better understand multiple stressors in coastal systems. Continuing to study and manage these stressors independently as single problems must be replaced by examining multiple stressors within the context of the ecosystems they are altering. Further, global climate change is expected to have clear consequences with respect to future species introductions, establishment, and range expansion. Ignoring complex interactions will only hinder management efforts. Thus, integrating non-indigenous species invasions with existing anthropogenic stressors will facilitate a holistic approach to addressing the challenges facing our coastal marine ecosystems.

This session will explore the characterization, understanding, and forecasting of the influence of multiple anthropogenic stressors in North Pacific coastal ecosystems. For example, how do non-indigenous species interact with other anthropogenic stressors? Contributed papers will provide a higher-level overview of stressors in various North Pacific ecosystems (*e.g.*, overharvesting, urbanization, habitat alteration and loss, mariculture, HABS, pollution, non-indigenous species, *etc.*) and the types of impacts that have been observed, especially those linked to changes in biodiversity and productivity (*e.g.*, extinctions, species interactions, trophic cascades).

### Tuesday, October 26 (8:55-18:00)

- 8:55      **Introduction by Convenors**
- 9:00      **John J. Stachowicz (Invited)**  
Changing biodiversity and the functioning of coastal marine ecosystems (S12-6677)
- 9:30      **Steven S. Rumrill, Alicia R. Helms and Adam S. DeMarzo**  
Potential influence of multiple anthropogenic stressors on restoration and recovery of native Olympia oysters (*Ostrea lurida*) in the Coos Bay estuary, Oregon, USA (S12-6510)
- 9:50      **Olga N. Lukyanova, Sergei A. Cherkashin and Mikhail V. Simokon**  
Multiple stressors impact on the ecosystem of Peter the Great Bay (Japan/East Sea) (S12-6624)

- 10:10 **L.I. Bendell**  
Influence of near bottom mariculture structures on intertidal diversity (S12-6597)
- 10:30 **Coffee/Tea Break**
- 10:50 **Thomas A. Okey, Andrew Day, Laura A. Loucks, Jennifer Spencer and Kathryn Wallace (Invited)**  
An application of Integrated Ecosystem Assessment in the marine areas of the West Coast of Vancouver Island to support integrated planning and management (S12-6643)
- 11:10 **Jameal F. Samhuri, Cameron H. Ainsworth, D. Shallin Busch, William L. Cheung and Thomas A. Okey**  
The importance of community interactions for predicting climate change impacts (S12-6759)
- 11:30 **D. Shallin Busch, Cameron H. Ainsworth, Jameal F. Samhuri, William L. Cheung, John Dunne and Thomas A. Okey**  
Evaluating uncertainty in estimates of how climate change may impact Northeast Pacific marine ecosystems (S12-6592)
- 11:50 **R. Ian Perry, Diane Masson, David L. Mackas and Gisele Magnusson**  
Developing ecosystem-based management in a human-dominated marine system: The Strait of Georgia, Canada (S12-6659)
- 12:10 **Lingbo Li, Tony Pitcher and Robert Devlin**  
Investigating potential ecological impacts of growth-hormone transgenic coho salmon using a marine ecosystem model (S12-6699)
- 12:30 **Lunch**
- 14:00 **Toshiyuki Yamaguchi, Yuu Ohshiro, Masashi Kiuchi, Michio Otani, Ikuo Ueda and Hiroshi Kawai (Invited)**  
The introduction of the Titan Barnacle, *Megabalanus coccopoma* (Darwin, 1854) (Cirripedia: Balanomorpha) to Japan (S12-6446)
- 14:20 **Vasily I. Radashevsky**  
World wide dispersal of mudworm *Boccardia proboscidea* Hartman, 1940 (Annelida, Spionidae) (S12-6667)
- 14:40 **Shang Chen, Tao Xia, Guoying Du, Huiyang Wang, Li Wang and Dachuan Ren**  
Quantification of influence of *Spartina* spp. invasion on coastal wetland ecosystem services: Yancheng case study, China (S12-6552)
- 15:00 **Thomas W. Therriault, Claudio DiBacco, Leif-Matthias Herborg and Graham E. Gillespie**  
The importance of scale for predicting impacts of stressors in nearshore environments: An example using European green crab (*Carcinus maenas*) invasions in British Columbia (S12-6678)
- 15:20 **Coffee/Tea Break**
- 15:40 **Peter S. Ross, Donna Cullon, Andrea Buckman and John K.B. Ford**  
Climate change may exacerbate pollution impacts in marine mammals of the North Pacific Ocean (S12-6681)
- 16:00 **Burke Hales, Jesse Vance, Sue Cudd, Mariona Segura, Wiley Evans and Alan Trimble**  
Changing carbonate chemistry and the future of oysters in the eastern North Pacific boundary system (S12-6538)

- 16:20 **Tatiana Yu. Orlova, Inna V. Stonik, O.G. Schevchenko and Vladimir I. Ponomarev**  
Long-term changes in phytoplankton communities in Amursky Bay (the north-western part of the East/Japan Sea) under eutrophic conditions (S12-6701)
- 16:40 **Elizabeth Logerwell, Mary Baker and Amy Merten**  
Natural resource damage assessment in Arctic waters (S12-6652)
- 17:00 **Xianshi Jin, Xiujuan Shan, Xiansen Li, Jun Wang, Yi Cui and Tao Zuo**  
Long-term variations of ecosystem structure in the Laizhou Bay, China (S12-6731)
- 17:20 **Vjacheslav. S. Labay**  
Variability of macrobenthos structure in coastal waters of northern Sakhalin Island (Okhotsk Sea) around oil- and gas extracting objects (S12-6465)
- 17:40 **Tatiana V. Morozova, Tatiana Yu. Orlova, Boris A. Burov, Alexander Yu. Lazaryuk, Sergey P. Zakharkov and Vladimir I. Ponomarev**  
Dinoflagellate cysts as indicators of eutrophication in the Amursky Bay, Sea of Japan (East Sea) (S12-6576)
- 18:00 *Session ends*

## S12 Posters

- S12-6428 **Lailah G. Lartey-Antwi, Ayaa K. Armah and J. Laudien**  
Population dynamics and ecology of Surf Clam *Donax pulchellus* in Ghana
- S12-6447 **Valentina V. Slobodskova, Evgeniya E. Solodova and Victor P. Chelomin**  
DNA strand breakage in aquatic organisms as a biomarker in environmental monitoring
- S12-6466 **Vjacheslav. S. Labay**  
Malacostraca (*Crustacea*) – A new species in coastal waters of Aniva Bay (Okhotsk Sea, Sakhalin Island)
- S12-6494 **Xiukai Song, Jianxin Ma, Yihao Liu, Lijuan Liu, Yuanqing Ma, Lihua Ren and Xianchun Tang**  
(Cancelled) History and causes of *Alexandrium Tamarense* red tide blooms in the waters near Nanhuangcheng Island, China
- S12-6533 **Takeo Kurihara, Hideki Takami, Takeharu Kosuge, Susumu Chiba, Masatsugu Iseda and Takenori Sasaki**  
Area-specific temporal changes of species composition and species-specific range shifts in rocky-shore molluscs associated with a warming Kuroshio Current
- S12-6609 **Tao Yu, Bin Chen, Weiwei Yu, Wenhua Liu and Zhenghua Liu**  
(Cancelled) Restoration of typical marine ecosystems in China
- S12-6631 **Ferdinand A. Mkrtchyan, Vladimir F. Krapivin, V.I. Kovalev, V.V. Klimov**  
An adaptive system to identify pollutants on the water surface
- S12-6665 **Alexandra S. Kondakova and Andrey P. Chernyaev**  
Anthropogenic hormone substances in coastal waters of Peter the Great Bay (Japan/East Sea)
- S12-6666 **Andrey P. Chernyaev and Anna S. Vazhova**  
Oil pollution in Nakhodka Bay (Japan/East Sea)
- S12-6711 **Yasuhiro Kamimura and Jun Shoji**  
Effects of environmental conditions on growth-selective survival of juvenile black rockfish *Sebastes cheni* in a vegetated habitat in the central Seto Inland Sea, Japan

- S12-6719 **Yulia V. Koudryashova, Tatiana L. Chizhova, Evgeniya E. Solodova and Nina N. Belcheva**  
Age-specific oxidative stress response to cadmium in the scallop *Mizuhopecten yessoensis*
- S12-6720 **Alexander Sevastyanov, Anastasia Chernova and Tatyana Lishavskaya**  
Results of long-term pollution monitoring in Peter the Great Bay (Sea of Japan)
- S12-6721 **Takuma Morita, Yuji Iwamoto and Jun Shoji**  
Significance of estuarine habitat as nursery for yellowfin sea bream *Acanthopagrus latus*:  
Comparison of feeding, growth and possible predators for larvae and juveniles in two habitats  
around Ohta River estuary northern Hiroshima Bay, Japan
- S12-6723 **Young Shil Kang, Won-Chan Lee, Sok Jin Hong and Dong-Wook Kim**  
Seasonal and spatial variability in the zooplankton community in Masan Bay, Korea
- S12-6733 **Jung-Hoon Kang, Oh Youn Kwon, Kyoungsoon Shin and Man Chang**  
Distribution of potentially risky heterotrophic *Noctiluca scintillans* and port specific capacity  
based on port baseline surveys in Korea
- S12-6741 **T.V. Konovalova, T.A. Belan, A.V. Moshchenko, B.M. Borisov and L.S. Belan**  
Distribution of macrobenthos around the LUN-A platform at the initial phase of Lunskeye  
field development (North-East Sakhalin Island Shelf)
- S12-6745 **Guo Ying Du, Shang Chen, Tao Xia, Dachuan Ren, Li Wang and Min Wang**  
Valuation of ecological capital in coastal area of Shandong province, China
- S12-6794 **Ik Kyo Chung, Jung Hyun Oak, Sang-Rae Lee and Jeong Ha Kim**  
Estimation of the seaweed biomass by the extensive field survey
- S12-6812 **Hee Won Park, Jae Bong Lee, You Jung Kwon, Chang Ik Zhang and Sung Il Lee**  
Estimating optimum size of stock enhancement in marine ranching ecosystem
- S12-6856 **Sangjin Lee and Mark Walton**  
Threats to marine and coastal biodiversity in the NOWPAP region
- S12-6873 **Leslie H. Harris**  
Is it or isn't it? Taxonomic proficiency of North Pacific NIS Polychaete assessments in the  
Northeast Pacific

# S13 POC/BIO/MONITOR/FUTURE Topic Session

## Comparing the two major gyres of the subarctic North Pacific - Seasonal and interannual variability and its predictability

*Co-Convenors: James Christian (Canada), Emanuele Di Lorenzo (U.S.A.), Shin-ichi Ito (Japan), David L. Mackas (Canada), Vyacheslav B. Lobanov (Russia) and Atsushi Tsuda (Japan)*

In the North Pacific, there are two major gyres; the western subarctic gyre and the Alaskan gyre. Although severe winter conditions have limited observational activity, recent progress in observational networks, including satellites, drifters and Argo floats, have improved our understandings of the two gyres. Both gyres are mainly driven by the subarctic wind field and are expected to be synchronized with each other. However, the real responses are not so simple. For example, the western subarctic gyre shows large seasonal variability in the western boundary current (Oyashio), while the Alaskan stream does not show large seasonal variability. In addition to these physical characteristics, chemical and biological characteristics are different. For example, iron supply is larger in the western subarctic gyre since the distance from the terrestrial sources is closer than in the Alaskan gyre. This, in turn, affects seasonal cycling and magnitudes of phytoplankton and zooplankton production. Therefore ecosystems are also different in the two gyres. To achieve better understanding of the mechanisms of the subarctic response to atmospheric forcing, comparisons of the responses of the two gyres are essential. This session will focus on the comparison of the physical, chemical and biological characteristics of the two gyres, on all time scales. Presentations on predictability of the two gyres, or which address additional improvements of the subarctic observation network are also welcome.

### Friday, October 29 (9:00-12:30)

- 9:00 *Introduction by Convenors*
- 9:10 **Osamu Isoguchi and Hiroshi Kawamura (Invited)**  
Seasonal to interannual variations of the western boundary current of the subarctic North Pacific using altimeter data (S13-6477)
- 9:40 **Howard Freeland**  
Heat and Salt conservation in the N.E. Pacific (S13-6796)
- 10:00 **Sachihiko Itoh, Ichiro Yasuda and Hiromichi Ueno**  
Warm and cold-core anticyclonic eddies in the western subarctic North Pacific (S13-6545)
- 10:20 *Coffee/Tea Break*
- 10:40 **Joaquim I. Goes, Helga do R. Gomes, Kosei Sasaoka and Toshiro Saino (Invited)**  
The role of the Aleutian Low Pressure System in regulating phytoplankton biomass, primary production and export production across the subarctic Pacific Ocean basin (S13-6610)
- 11:10 **Rui Saito, Atsushi Yamaguchi, Ichiro Imai, Sei-Ichi Saitoh and Kenshi Kuma**  
East-west comparison of the zooplankton community in the Subarctic Pacific during the summers of 2003-2006 (S13-6433)
- 11:30 **Sanae Chiba (Invited)**  
An overview of ecosystem state variability in the subarctic North Pacific: East-west synchrony and contrast (S13-6587)
- 12:00 **Hiroaki Saito, Atsushi Tsuda, Hiroaki Tatebe**  
West meets East: Inter-gyre transportation of *Neocalanus* copepods (S13-6669)
- 12:20 *Discussion and Summary by Convenors*
- 12:30 *Session ends*

## S13 Posters

- S13-6662      **Shin-ichi Ito, Yugo Shimizu, Shigeho Kakehi, Taku Wagawa, Akira Kusaka and Masatoshi Sato**  
Seasonal variation of the Oyashio transport compared with the Alaskan Stream
- S13-6712      **Yuichiro Kumamoto, Akihiko Murata, Shinya Kouketsu, Michio Aoyama, Shuichi Watanabe and Masao Fukasawa**  
A comparison of dissolved oxygen concentration in intermediate layer between the western and eastern subarctic gyres of the North Pacific from 1985 to 2007
- S13-6716      **Yugo Shimizu, Taku Wagawa, Shin-ichi Ito, Shigeho Kakehi, Akira Kusaka and Masatoshi Sato**  
Velocity structure and transport of Oyashio measured by vessel-mounted acoustic Doppler current profiler along repeat hydrographic section A-line

# S14 POC/MEQ/FUTURE Topic Session

## Marine renewable energy development in coastal and estuarine environments around the North Pacific

*Co-Convenors: George Boehlert (U.S.A.), Michael Foreman (Canada), Glen Jamieson (Canada) and Kuh Kim (Korea)*

Renewable energy projects are increasing worldwide, and many types involve the marine environment. Those under active development are typically designed to directly extract energy from waves, tides, currents, wind, or thermal gradients or indirectly from biomass energy. These novel technologies will require new emplacements, moorings, or other structures in marine and estuarine environments with attendant intrusions upon the environment, including acoustic signals, changes to mixing, and electromagnetic fields. Marine renewable energy sources are able to provide clean energy, but their effects on the physical and biological environment are not well understood. This session will examine the technologies under development in PICES nations and address the current state of our knowledge on how they will interact with estuarine, coastal, and offshore environments.

This session seeks contributions that deal with any topics pertinent to marine renewable energy development, including: (1) status of marine renewable energy in PICES countries; (2) economic costs and benefits of different approaches; (3) marine spatial planning for renewable energy; (4) physical effects of marine renewable energy development (current flow, energy reduction, mixing, sediment transport); and (5) ecological effects (larval transport, entrainment, entanglement, behavior, habitat changes, communities) on all trophic levels.

### Wednesday, October 27 (9:00-12:30)

- 9:00      *Introduction by Convenors*
- 9:05      **Henry Jeffrey (Invited)**  
Ocean energy: A European perspective (S14-6676)
- 9:35      **Tokio Wada and Ken Takagi**  
Status and perspectives of the utilization of marine renewable energy in Japan (S14-6619)
- 9:55      **Keyyong Hong, Seung-Ho Shin and Seok-Won Hong**  
Current status and future perspectives of marine renewable energy development in Korea (S14-6761)
- 10:15     **George W. Boehlert and Philip C. Malte**  
Wave and tidal energy research in the Pacific Northwest: The Northwest National Marine Renewable Energy Center (S14-6779)
- 10:35     *Coffee/Tea Break*
- 10:55     **Brian Polagye (Invited)**  
Environmental effects of tidal energy development (S14-6565)
- 11:25     **Yong Jun Cho, Min Kyun Kim**  
On the likelihood of Power-Breaker as wave energy extractor and its hydraulic characteristics (S14-6617)
- 11:45     **Michael Foreman, Dario Stucchi, Kyle Garver and Thomas Grime**  
A circulation model for the Discovery Islands, Canada: The first step in assessing tidal energy potential and impacts (S14-6540)
- 12:05     *Discussion and Summary by Convenors*
- 12:30     *Session ends*





# S15 MONITOR Topic Session

## Development and use of ocean observing and forecasting systems in coastal and marine management

### Co-Sponsored by ICES

*Co-Convenors: Jonathan Hare (U.S.A.), Vyacheslav B. Lobanov (Russia), David L. Mackas (Canada), Phillip R. Mundy (U.S.A.), Young-Jae Ro (Korea) and Hiroya Sugisaki (Japan)*

The session will advance the objectives of the PICES Technical Committee on Monitoring, the PICES FUTURE program (Forecasting and Understanding Trends, Uncertainty and Responses of North Pacific Marine Ecosystems) and the ICES-GOOS Steering Group. These groups have terms of reference related to the coordination of Global Ocean Observing Systems, the development and evaluation of forecasting systems, and their application to ocean management. The session will focus on examples where ocean observations and forecasts have been used in PICES and ICES products.

Methodological advances and issues will also be presented to promote the development of observing and forecasting capabilities. Finally, this session will serve as a forum to bring the ocean observing, ecological forecasting and resource management communities together to better link observing and forecasting efforts with the need to provide scientific advice for marine and coastal resource management.

### Thursday, October 28 (9:00-18:00)

- 9:00      *Introduction by Convenors*
- 9:05      **Glenn Nolan, Eugene Colbourne and Hedinn Valdimarsson (Invited)**  
The ICES Working Group on Oceanic Hydrography (WGOH): Building on over 100 years of North Atlantic observations (S15-6485)
- 9:30      **Molly McCammon, Carl Schoch and Darcy Dugan**  
Alaska Ocean Observing System: Lessons learned in developing an end-to-end observing system (S15-6811)
- 9:50      **Vyacheslav B. Lobanov**  
North-East Asian Regional Global Ocean Observing System: The story of success and current requirements for coastal and marine management (S15-6828)
- 10:10     **Kwang-Soon Park, Dong-Young Lee, Ki-Cheon Jun, Sang-Ik Kim, Jae-Il Kwon and Jung-Woon Choi**  
Introduction of Korea operational oceanographic system (KOOS) (S15-6520)
- 10:30     *Coffee/Tea Break*
- 10:50     **Toshio Suga (Invited)**  
Profiling floats as tools for biogeochemical and biological monitoring (S15-6696)
- 11:15     **Gillian B. Lichota and John A. Calder (presented by Sue Moore)**  
Monitoring Pacific Arctic ecosystem change through development of a Distributed Biological Observatory (DBO) (S15-6776)
- 11:35     **Yoichi Ishikawa, Toshiyuki Awaji, Teiji In and Sei-Ichi Saitoh**  
Development of coastal data assimilation system for environmental monitoring/forecasting (S15-6535)

- 11:55      **Jerome Fiechter, Gregoire Broquet, Andrew M. Moore and Hernan G. Arango**  
 A data assimilative, coupled physical-biological model for the Coastal Gulf of Alaska  
 (S15-6460)
- 12:15      **Yasumasa Miyazawa, Toru Miyama, Sergey M. Varlamov, Xinyu Guo and Takuji Waseda**  
 Application of the Ensemble Kalman Filter to the Kuroshio variations around the Kii Peninsula  
 (S15-6750)
- 12:35      ***Lunch***
- 14:00      **Sonia Batten (Invited)**  
 The Continuous Plankton Recorder - A lengthy history and a global future (S15-6638)
- 14:25      **William Peterson, Edmundo Casillas, Jay Peterson, Cheryl A. Morgan and Jennifer Fisher**  
 Forecasting returns of coho and Chinook salmon in the northern California Current: A role for long term observations (S15-6834)
- 14:45      **David G. Foley**  
 Identification and monitoring of Chinook salmon habitat along the California coast  
 (S15-6823)
- 15:05      **Réka Domokos**  
 Acoustic investigation of bigeye tuna at Cross Seamount (S15-6542)
- 15:25      ***Coffee/Tea Break***
- 15:45      **Jonathan A. Hare, Jack A. Jossi and Joseph M. Kane**  
 Fifty years of ship-of-opportunity observations on the northeast U.S. continental shelf: Results and management applications (S15-6586)
- 16:10      **Carrie A. Holt, Ashleen Benson, Brigitte Dorner, Melissa A. Haltuch, Megan O'Connor and Mary Thiess**  
 Forecasting Pacific hake distribution at fine spatial scales using satellite-derived oceanographic data (S15-6596)
- 16:30      **Dong-Jin Kang, Kyung-Ryul Kim, Kyung-Il Chang and Ki Wan Kim**  
 E-RAP (EAST-1 Real-time Automatic Profiler): Its development and application (S15-6830)
- 16:50      **Sei-Ichi Saitoh, Toru Hirawake, I Nyoman Radiarta, Tomonori Isada, Robinson Mugo, Fumihiko Takahashi, Ichiro Imai, Yasuhiro Sakurai, Michio J. Kishi, Masaaki Wada, Toshiyuki Awaji and Yoichi Ishikawa**  
 New challenge of integrated coastal fisheries information system in southern Hokkaido, Japan  
 (S15-6740)
- 17:10      **Phillip R. Mundy and Dani F. Evenson**  
 Use of ocean observations to develop forecasts in support of fishery management operations  
 (S15-6598)
- 17:30      **David W. Welch**  
 Applications of coastal ocean acoustic telemetry arrays for marine fisheries: Making research cost-effective and policy relevant (S15-6650)
- 17:50      ***Discussion and Summary by Convenors***
- 18:00      ***Session ends***

## S15 Posters

- S15-6423     **Babagana Abubakar**  
The impacts of human activities on the Atlantic and Indian Oceans in Africa
- S15-6470     **Mohamed Rawidean Mohd Kassim**  
A statistical model approach for fish forecasting system using SST and Chlorophyll Satellite Images
- S15-6487     **Chunjiang Guan, Minghui Ma, Feng'ao Lin and Xiutang Yuan**  
The application of coastal wetland management techniques to absorb greenhouse gases and reduce of nitrogen and phosphorus
- S15-6566     **Megan O'Connor, Melissa A. Haltuch, Carrie A. Holt, Brigitte Dorner, Ashleen Benson and Mary Thiess**  
Forecasting the north-south distribution of Pacific hake using coastal upwelling indices and oceanographic model outputs
- S15-6577     **Zhaohui Zhang, Tao Xia and Pixi Sun**  
Risk forecasting of shellfish contamination by ecosystem monitoring in Yellow Sea, PR of China
- S15-6616     **Hisashi Yamaguchi, Young Beak Son, Eko Siswanto, Joji Ishizaka, Sinjae Yoo, Yu-Hwan Ahn, Sang-Woo Kim, Junwu Tang, Hiroshi Kawamura and Yoko Kiyomoto**  
Variation of satellite chlorophyll *a* in the East China Sea based on local satellite algorithm with reduced influence from suspended sediment
- S15-6625     **Tadafumi Ichikawa and Hiroya Sugisaki**  
Long term variations of abundance and size composition of copepod communities off southern Japan using bench-top Video Plankton Recorder system (B-VPR)
- S15-6675     **Huade Zhao, Xuemei Xu, Minghao Li and Juying Wang**  
The partial pressure of carbon dioxide and air-sea fluxes in the northern Yellow Sea of China
- S15-6729     **Hikomichi Igarashi, Nozomi Sugiura, Shuhei Masuda, Takahiro Toyoda, Yoshihisa Hiyoshi, Yuji Sasaki, Mitsuo Sakai, Taro Ichii, Takushi Kindaichi, Jun-ya Tanaka, Masaharu Oomizu, Yoichi Ishikawa and Toshiyuki Awaji**  
Improved approach for the identification and prediction of neon flying squid abundance and distribution in northwestern North Pacific using an integrated 4D-VAR data assimilation system
- S15-6735     **Vadim Burago, Georgiy Moiseenko and Igor Shevchenko**  
Modeling spatial distribution of the ocean chlorophyll *a* concentration from remote sensing data
- S15-6737     **Xiang Pu, Huiwang Gao, Zhe Liu and Yunjun Yu**  
Simulation of non-point source nutrient flux and its impact on water quality of coastal ocean: A case study on Jiaozhou Bay in China
- S15-6795     **Howard Freeland**  
Argo: A decade of success, what have we learned and what comes next?



# BIO Paper Session

Convenor: Michael J. Dagg (U.S.A.)

This session invites oral and poster presentations on all aspects of Biological Oceanography in the North Pacific and its marginal seas that are not covered in specific BIO Topic Sessions (S2, S3, S4, S6, S8 and S13). Papers on marine birds and mammals are especially encouraged this year.

## Thursday, October 28 (9:00-17:30)

- 9:00      **Introduction by Convenor**
- 9:10      **Se-J. Ju, H.S. Kim, W.S. Kim, D.H. Kang and A.R. Ko**  
Understanding the role of the Yellow Sea Bottom Cold Water Mass ( $\leq 10^{\circ}\text{C}$ ) on the survival strategy of *Euphausia pacifica* throughout the hot summer in the Yellow Sea (BIO-P-6728)
- 9:30      **C. Tracy Shaw, Leah R. Feinberg, Hongsheng Bi and William T. Peterson**  
Cohort data for the euphausiid *Euphausia pacifica* based on biweekly sampling off Newport, OR, USA (BIO-P-6693)
- 9:50      **Xiuning Du, William T. Peterson and C. Tracy Shaw**  
Feeding rates of adult *Euphausia pacifica* on natural particle assemblages in the coastal upwelling zone off Oregon, USA (BIO-P-6764)
- 10:10     **Harold P. Batchelder and Brie J. Lindsey**  
On adding a stage-structured model of krill to NEMURO (BIO-P-6806)
- 10:30     **Coffee/Tea Break**
- 10:50     **Kenji Tsuchiya, Yoshiki Tomoko, Hideo Miyaguchi, Kenichi Mori, Tomohiko Kikuchi and Tatsuki Toda**  
Typhoon-driven variations in productivity and species composition of phytoplankton in Sagami Bay, Japan (BIO-P-6730)
- 11:10     **Atsushi Yamaguchi, Yurika Hanamiya, Hikaru Watanabe and Hiroto Murase**  
**(NEW)** Macrozooplankton diel vertical migration and carbon flux in the summer, western North Pacific Ocean (BIO-P-6436)  
**(from poster)**
- 11:30     **Bridget E. Ferriss and Timothy E. Essington**  
Regional patterns in mercury concentrations of yellowfin and bigeye tuna in the Pacific Ocean (BIO-P-6803)
- 11:50     **Anastasia S. Dolganova**  
The current condition of *Polychaeta* of the northwestern shelf of Bering Sea (BIO-P-6478)
- 12:10     **Angelica Peña and Diane Masson**  
Modelling plankton dynamics in the Straits of Georgia and Juan de Fuca (BIO-P-6786)
- 12:30     **Lunch**
- 14:10     **Meredith L. Elliott, Jaime Jahnce, Moira Galbraith and David L. Mackas**  
Copepod assemblages as indicators of ocean conditions in Central California (BIO-P-6769)
- 14:30     **Hidefumi Fujioka, Atsushi Tsuda and Ryuji J. Machida**  
A molecular method for species identification of early life stages of *Neocalanus plumchrus* and *Neocalanus flemingeri* using Real-Time PCR (BIO-P-6534)

- 14:50 **Tomoko Yoshiki, Tsuneo Ono, Akio Shimizu and Tatsuki Toda**  
Egg development time and hatching success of deep sea spawning calanoid copepods, genus *Neocalanus* (BIO-P-6754)
- 15:10 **Todd W. Miller, Richard D. Brodeur, Koji Omori, Robert L. Emmett and Hideki Hamaoka**  
A stable isotope trophic assessment of upper trophic level nekton in the Northern California Current ecosystem (BIO-P-6876)
- 15:30 ***Coffee/Tea Break***
- 15:50 **Chiyuki Sassa and Youichi Tsukamoto**  
Interannual comparison of diet of larval jack mackerel *Trachurus japonicus* in the southern East China Sea during 2002-2005 (BIO-P-6498)
- 16:10 **Ah-Ra Ko, Dae-Yeon Moon, Seok-Gwan Choi, Kyung-Hoon Shin and Se-Jong Ju**  
Lipid metabolism of minke whale and pacific white-sided dolphin in Korean waters and implications for feeding ecology (BIO-P-6517)
- 16:30 **Olga Yu. Tyurueva, Yuri M. Yakovlev, Vladimir V. Vertyankin, Glenn Gailey, Olga Sychenko and Judy E. Muir**  
Discovering a new feeding area for calf-cow pairs of Western Gray Whales on the south-east shelf of Kamchatka in 2009 and their utilization of different feeding regions within one season (BIO-P-6858)
- 16:50 **Hector D. Douglas III, Alan M. Springer, Suzanne Budge and Lacey Aucoin**  
Fatty acid and stable isotope analyses reveal consumption patterns of planktivorous auklets and variability in ecosystem productivity (BIO-P-6705)
- 17:10 **George L. Hunt, Jr., Stephani Zador and James Ianelli**  
Declines of northern fur seals at the Pribilof Islands: Forage fish depletion, competition with adult pollock and arrowtooth flounder, or fishing activity? (BIO-P-6591)
- 17:30 ***Session ends***

## BIO Paper Session Posters

- BIO-P-6458 **Alexander V. Zavolokin** (presented by V. Kulik)  
Forage base of Pacific salmon (*Oncorhynchus* spp.) in the Northwest Pacific Ocean in 2004-2009
- BIO-P-6461 **Tatyana A. Belan and Alexander Moshchenko** (presented by A. Chernova)  
Near-bottom environmental conditions and polychaete taxocenes in the north part of Amursky Bay (The Sea of Japan/East Sea)
- BIO-P-6531 **Ludmila S. Belan and Tatyana A. Belan** (presented by A. Chernova)  
Composition and distribution pattern of macrozoobenthos on the continental shelf of the Okhotsk Sea near NE Sakhalin Island
- BIO-P-6557 **Xuehai Liu, Yeli Yuan and Fangli Qiao**  
(Cancelled) Numerical modeling of physical-biological processes and carrying capacity in an aquaculture sea: A case of the Sanggou Bay in China
- BIO-P-6570 **Brett R. Dumbauld and John W. Chapman**  
Can an introduced parasitic bopyrid Isopod *Orthonie griffenis* cause extinction of mud shrimp *Upogebia pugettensis* populations in U.S. west coast estuaries?

- BIO-P-6580 **Sarat C. Tripathy, Joji Ishizaka, Tatsuya Shibata, Eko Siswanto and Yoshihisa Mino**  
Evaluation of Vertically Generalized Production Model (VGPM) in Ariake Bay, Southwestern Japan
- BIO-P-6581 **Evgeniya E. Vekhova, Michael I. Kusaykin and Konstantin V. Kiselev**  
**(NEW)** The phytoplankton contribution to the diet: A comparison of two mussels (Mollusca: Bivalvia) from different biotopes of the Sea of Japan
- BIO-P-6583 **Katsumi Takayama, Tatsuro Watanabe, Hideyuki Kawamura and Iori Tanaka**  
Reproducibility of chlorophyll *a* and nutrient variability in the Japan Sea by the three-dimensional ecosystem-circulation model
- BIO-P-6636 **Hyun Woo Kim, Yong-Rock An, Tae-Geon Park, Zang Geun Kim, Dae-Yeon Moon and Seok-Gwan Choi**  
Validity of a photo-identification method for spotted seals in the Baekryongdo, Korea
- BIO-P-6647 **Yuji Okazaki, Kazuaki Tadokoro and Yugo Shimizu**  
The vertical distribution of krill in the Oyashio and mixed water regions, western North Pacific
- BIO-P-6648 **Tae-Geon Park, Yong-Rock An, Zang-Geun Kim, Seok-Gwan Choi and Dae-Yeon Moon**  
Distribution of the spotted seal, *Phoca largha*, along the coast of Baekryeongdo in 2006 - 2008
- BIO-P-6663 **Shin-ichi Ito, Hiroshi Kuroda, Takahiko Kameda, Takeshi Okunishi, Enrique N. Curchitser, Kate Hedstrom and Jerome Fiechter**  
A test of a coupled physical and lower-trophic-ecosystem model NEMUROMS in the North Pacific
- BIO-P-6668 **Xiu-ning Du and Guang-xing Liu**  
Phytoplankton community structure and its relation to hydrographic conditions in the North Yellow Sea in autumn, 2007
- BIO-P-6709 **Soo Jeong Lee, Hyeok Chan Kwon, Sang Cheol Yoon, Yeong Min Choi and Chang Ik Zhang**  
Age and growth of *Gomphina veneriformi* in the east coast of Korea
- BIO-P-6734 **Youngju Lee, Joong Ki Choi**  
Phytoplankton dynamics and primary production of the Yellow Sea in winter and summer
- BIO-P-6771 **Brie J. Lindsey and Harold P. Batchelder**  
Potential spawning behaviors of *Euphausia pacifica* in the upwelling region of the Oregon coast: A 2-D modeling exploration
- BIO-P-6839 **Natalia M. Aminina, Irina A. Kadnikova, Yeon-Kye Kim and Ho-Dong Yoon**  
Comparison of UV-absorbing and antioxidant activity of seaweed extracts





# FIS Paper Session

Co-Convenors: *Gordon H. Kruse (U.S.A.) and Mikhail Stepanenko (Russia)*

Papers addressing general topics in fishery science and fisheries oceanography in the North Pacific and its marginal seas are invited, except those covered by Topic Sessions S5, S6, S7, S8, S10 and S11.

## Tuesday, October 26 (9:00-12:30), Day 1

- 9:00      *Introduction by Convenors*
- 9:05      **Jennifer L. Nielsen**  
Adaptive and behavioral responses to a changing climate: A genomic perspective (FIS-P-6567)
- 9:25      **Stewart Johnson, Marije Booman, Sophie Hubert, Brent Higgins, Tudor Borza, Jennifer Kimball, Cynthia Stone, Gary Simpson, Marlies Rise, Charles Feng, Tiago Hori, Jennifer Hall, Edward A. Trippel, Sharen Bowman and Matthew L. Rise**  
Atlantic Cod Genomics: Development of tools, resources and applications (FIS-P-6847)
- 9:45      **Anna V. Dakus**  
The use of molecular techniques for population genetic analysis of the Pacific herring (*Clupea pallasii*) in the northwestern Pacific (FIS-P-6861)
- 10:05     **Angela M. Johnson, Lorenzo Ciannelli and W. Waldo Wakefield**  
Effects of hypoxia on the juvenile demersal fish community structure in nearshore Central Oregon waters (FIS-P-6793)
- 10:25     *Coffee/Tea Break*
- 10:50     **Motomitsu Takahashi, David M. Checkley, Jr., Marisa N.C. Litz, Richard D. Brodeur and William T. Peterson**  
Responses in growth rate of larval northern anchovy to anomalous upwelling in 2005 in the northern California Current (FIS-P-6815)
- 11:10     **Vladlena V. Gertseva, Jason M. Cope and Sean E. Matson**  
Growth variability of the splitnose rockfish (*Sebastes diploproa*) in the Northeast Pacific Ocean: Pattern revisited (FIS-P-6438)
- 11:30     **Hye-Min Park, Jung Nyun Kim, Hae Won Lee, Byeong Gyu Hong, Jin Ho Bae, Hyeong Gi Kim and Chul-Woong Oh**  
Vertical distribution and reproductive aspects of caridean shrimps in the deep-water of the East Sea, Korea (FIS-P-6698)
- 11:50     **Tetsuichiro Funamoto, Satoshi Honda, Yuho T. Yamashita, Masayuki Chimura and Kazushi Miyashita**  
Distribution of walleye pollock (*Theragra chalcogramma*) larvae around Funka Bay, Japan: Relationships with environmental factors (FIS-P-6440)
- 12:10     **Kerim Aydin and Troy Buckley**  
An analysis of 30 years of seasonal and geographic variability in marine food webs through fish food habits and stable isotope analyses (FIS-P-6800)
- 12:30     *Session ends*

**Friday, October 29 (9:00-12:40), Day 2**

- 9:00        **Jennifer L. Boldt, Thomas W. Therriault, Marc Trudel, Tyler Zubkowski and Jake Schweigert**  
 Recruitment strength indices for northern British Columbia stocks of Pacific herring (FIS-P-6543)
- 9:20        **Akihiko Yatsu**  
 A two-stanza outbreak hypothesis for the Pacific stock of Japanese sardine during the 1970s (FIS-P-6486)
- 9:40        **Jung Jin Kim, William T Stockhausen, Yang-Ki Cho, Chang Sin Kim and Suam Kim**  
 Inter-annual variability in larval dispersion of common squid *Todarodes pacificus* during the 2000s (FIS-P-6671)
- 10:00       **Akira Okuno, Tatsuro Watanabe, Katsumi Takayama, Naoto Honda, Koji Kakinoki and Osamu Katoh**  
 Numerical simulation of the larval transport of snow crab *Chionoecetes opilio* in the Japan Sea (FIS-P-6585)
- 10:20       **Elizabeth A. Daly and Richard D. Brodeur**  
 Shifting trophic utilization by juvenile Chinook salmon in coastal marine waters: An interdecadal perspective with implications for climate change (FIS-P-6443)
- 10:40       ***Coffee/Tea Break***
- 11:00       **Beverly Agler and Greg Ruggerone**  
 Growth of the Bristol Bay and Yukon River, Alaska, chum salmon in relation to climatic factors and inter-specific competition (FIS-P-6569)
- 11:20       **Bernard A. Megrey, Jason S. Link, Thomas J. Miller, Tim Essington, R. Ian Perry, Alida Bundy, Ken F. Drinkwater and Erlend Moksness**  
 Can production models be used as a tool to examine factors that influence productivity of marine systems? (FIS-P-6718)
- 11:40       **Louis W. Botsford, Matthew D. Holland, J. Wilson White and Alan Hastings**  
 Population dynamic effects of fishing and climate change on upper trophic levels in the northeast Pacific (FIS-P-6752)
- 12:00       **Shang Chen, Dachuan Ren, Dong Wang, Jingmei Li, Tao Xia and Guoying Du**  
 Marine ecological capital assessment: Concepts and frameworks (FIS-P-6554)
- 12:20       **James R. Irvine, Kim D. Hyatt, Janelle Curtis and Ray Lauzier**  
 Science-based ecosystem approaches under Canada's Wild Salmon Policy (FIS-P-6763)
- 12:40       ***Session ends***

## FIS Paper Session Posters

- FIS-P-6435     **Elena V. Gritsay**  
Effectiveness of walleye pollock fishing in the northwestern Bering Sea in 2007-2009
- FIS-P-6452     **Michio J. Kishi, Kenta Awa and Takeshi Terui**  
Ecosystem approach for management of chum salmon coupled with NEMURO
- FIS-P-6459  
(Cancelled)     **Oleg G. Zolotov**  
Greenlings of the genus *Hexagrammos* in waters off the Kamchatka Peninsula: Distribution and some biological features
- FIS-P-6469     **Sang-Rae Lee, Tae Keun Rho, Jung Hyun Oak, Tongsup Lee, Jin Ae Lee and Ik Kyo Chung**  
Metagenomic approach to plankton species diversity of the East Sea of Korea
- FIS-P-6495     **Eugene Samko, Nafanail Bulatov, Larisa Muktepavel, Alexander Nikitin and Alexander Kapshiter**  
Use of remote sensing data to support a fishery in the Far-Eastern Seas
- FIS-P-6511     **Thomas C. Kline, Jr.**  
Estimating over-winter mortality of age-0 Pacific herring based on loss of energy content and implications for recruitment
- FIS-P-6515     **Yu-Chun Huang and Wen-Bin Huang**  
Maturation of female Pacific saury *Cololabis saira* (Brevoort) in the northwestern Pacific from the Taiwanese fishery catch
- FIS-P-6582     **Takaomi Kaneko, Takashi Yamakawa and Ichiro Aoki**  
Formularization and internalization of the future external diseconomies produced by present fishing activities
- FIS-P-6589     **Thomas C. Wainwright and Laurie A. Weitkamp**  
Climate effects and Oregon coast coho salmon: A multi-ecosystem approach
- FIS-P-6599     **Hideaki Kudo, Akihiro Etoh and Masahide Kaeriyama**  
Attempt to estimate spawning escapement of chum salmon, *Oncorhynchus keta*, using aerial census by radio-controlled helicopter
- FIS-P-6614     **You Jung Kwon, Doo-Hae An, Keith Bigelow and Dae-Yeon Moon**  
Effects of fishery factors on catch rate of bigeye tuna, *Thunnus obsesus* and yellowfin tuna, *Thunnus albacare* in the Korean tuna longline fishery
- FIS-P-6615     **Hyeok Chan Kwon, Chang Ik Zhang and You Jung Kwon**  
Estimation of population parameters for filefish (*Stephanolepis cirrhifer*) in the Japan/East Sea of Korea
- FIS-P-6623     **Hiroshige Tanaka, Seiji Ohshimo and Chiyuki Sassa**  
Trophic relationships of small pelagic fish in the East China Sea and Sea of Japan: A stable isotope approach
- FIS-P-6626     **Yuichiro Kogura, James E. Seeb, Noriko Azuma, Hideaki Kudo, Syuiti Abe and Masahide Kaeriyama**  
Genetic population structure of lacustrine sockeye salmon, *Oncorhynchus nerka*, in Japan
- FIS-P-6629     **Alexei M. Orlov, Vadim F. Savinikh and Eugeny F. Kulish**  
Pacific sleeper shark in the North Pacific: New data on distribution and size composition
- FIS-P-6639     **Kevin Thompson**  
Factors affecting the diets of groundfish in the Gulf of Alaska

- FIS-P-6654 **Elizabeth Logerwell, Kimberly Rand and Tom Weingartner**  
Arctic cod (*Boreogadus saida*) and snow crab (*Chionoecetes opilio*) distributions relative to oceanography in the Alaskan Beaufort Sea, August, 2008
- FIS-P-6672 **Ryuji Yukami, Mari Yoda, Seiji Ohshimo and Hiroshige Tanaka**  
Stock size fluctuations in chub and spotted mackerel in the East China Sea and Sea of Japan from 1973 to 2008
- FIS-P-6687 (Cancelled) **Nancy D. Davis, Robert V. Walker and Katherine W. Myers**  
Factors affecting winter survival of Chinook salmon in the Bering Sea: Start of a new investigation
- FIS-P-6700 **Tao Xia, Shang Chen, Li Wang, Dachuan Ren and Min Wang**  
A software for marine ecosystem services assessment: Main functions and application
- FIS-P-6706 **Hector D. Douglas III, Alan M. Springer, Suzanne Budge, Igor Ermakov and Werner Gellermann**  
Discriminating variation in consumption patterns and carotenoid content of juvenile Pacific Salmon with fatty acid analysis and Raman spectroscopy
- FIS-P-6710 **Ji-Hyeon Kim, Jung Nyun Kim, Tack-Yoon Oh, Jin Ho Bae, Hyeong Gi Kim and Chul-Woong Oh**  
Age, growth and reproductive biology of Filefish *Tamnaconus modestus* in the Southern Sea of Korea
- FIS-P-6714 **Sukgeun Jung and Il Su Choi**  
Estimating abundance of Pacific cod (*Gadus macrocephalus*) by applying a mark-recapture method during the spawning season in Jinhae Bay, Korea
- FIS-P-6732 **Heui Chun An, Bong Seong Bae, Kyoung Hoon Lee, Chang Doo Park and Chae Sung Lee**  
Evaluation of LED fishing lamps for jigging and angling boats
- FIS-P-6738 **Jae Bong Lee, Soo Jeong Lee, Jong Hee Lee, Young Jae Shin, Yeong Min Choi, Dong Woo Lee and Chang Ik Zhang**  
Seasonal variations in the composition of fisheries resources in the coastal ecosystem of Youngil Bay, Korea
- FIS-P-6742 **Jong Hee Lee, Jae Bong Lee and Chang Ik Zhang**  
Forecasting variations of fishery and ecosystem risk indices for large purse seine and two-paired trawl fisheries in Korean waters using IFRAME
- FIS-P-6783 **Graham E. Gillespie, Antan C. Phillips and Lindsay C. Orr**  
Population dynamics and biological characteristics of the invasive European green crab, *Carcinus maenas*, in British Columbia, Canada
- FIS-P-6784 **Tatiana Tunon and Gottfried Pestal**  
Authorship patterns in 30 years of DFO research documents: Is applied fisheries research like other science?
- FIS-P-6785 **Gottfried Pestal and Tatiana Tunon**  
Visualizing a complex spawner-recruit model for sockeye salmon
- FIS-P-6804 **Jung Hyun Lim and Chang Ik Zhang**  
Estimation of population ecological characteristics of Thomas's rapa whelk, *Rapana venosa*, along the west coast of Korea
- FIS-P-6809 **Hee Won Park and Chang Ik Zhang**  
Study on the ecological characteristics of *Mugil cephalus* in waters south of Korea

- FIS-P-6810 **Soo Jeong Lee, Hyeok Chan Kwon, Sang Cheol Yoon, Yeong Min Choi and Chang Ik Zhang**  
Age and growth of *Gomphina veneriformi* along the east coast of Korea
- FIS-P-6825 **Jae Bong Lee, Young Jae Shin, Jong Hee Lee, Yeong Min Choi, Jae Seong Lee, Dong Woo Lee and Inja Yeon**  
Spatial biomass distribution of *Corbicula japonica* in the Seomjin River of southern Korea
- FIS-P-6854 **Hyun Jeong Lim, Kwang Jae Park, Sang Ho Baik, Tae Seek Lee, In Kwon Jang, Hyun Sob Han and Phillip R. Mundy**  
Recovery of the productivity of shellfish aquaculture in the Western Sea of Korea after the *Hebei Spirit* oil spill
- FIS-P-6870 **Theresa A'mar**  
Incorporating ecosystem forcing through predation into a management strategy evaluation for the Gulf of Alaska walleye pollock (*Theragra chalcogramma*) fishery



# POC Paper Session

Co-Convenors: *Michael G. Foreman (Canada) and Ichiro Yasuda (Japan)*

Papers are invited on all aspects of physical oceanography and climate in the North Pacific and its marginal seas, except those covered by Topic Sessions S8, S13 and S14.

## Thursday, October 28 (9:00-18:00)

- 9:00 ***Introduction by Convenors***
- 9:05 **Young Jae Ro**  
Linking tropical oceanic conditions to water characteristics in the subtropical western Pacific marginal seas (POC-P-6467)
- 9:25 **Antonietta Capotondi, Michael Alexander, James Scott, Enrique Curchitser and Nicholas Bond**  
Climate change in upper-ocean stratification as inferred from the IPCC AR4 models (POC-P-6682)
- 9:45 **Fangli Qiao, Zhenya Song, Changshui Xia and Dejun Dai**  
The improvement of ocean circulation models and climate models through surface waves: From mean state to long-term variations (POC-P-6607)
- 10:05 **Liqi Chen, Zhongyong Gao and Weijun Cai**  
Precision evaluation of air–sea fluxes of CO<sub>2</sub> in the western Arctic Ocean under rapid sea ice shrinking and its implication to global climate change (POC-P-6506)
- 10:25 ***Coffee/Tea Break***
- 10:45 **William R. Crawford**  
Features of the northeast Pacific Ocean (POC-P-6780)
- 11:05 **Maxim A. Ishchenko and Vladimir B. Darnitskiy**  
New effects of synoptic dynamics of sea currents and fluctuations in the North Pacific (POC-P-6642)
- 11:25 **Hanna Na, Kwang-Yul Kim, Kyung-Il Chang, Kuh Kim and Shoshiro Minobe**  
Warming signal in the upper layers of the East/Japan Sea (POC-P-6736)
- 11:45 **Olga Trusenkova and Dmitry D. Kaplunenko**  
Low frequency variability of sea level in the Japan/East Sea estimated from AVISO satellite altimetry (POC-P-6481)
- 12:05 **Hiroshi Kuroda, Takashi Setou, Yuichi Hirota, Manabu Shimizu and Kazuhiro Aoki**  
A numerical study on the winter mixed layer on the shelf-slope region south of Japan (POC-P-6646)
- 12:25 ***Lunch***
- 14:00 **Phyllis J. Stabeno, Nicholas A. Bond and Jeffrey M. Napp**  
Eastern Bering Sea shelf: Comparison between a cold period (2007–2010) and a warm period (2001–2005) (POC-P-6694)
- 14:20 **Nicholas A. Bond, Phyllis J. Stabeno, Albert J. Hermann and Muyin Wang**  
What controls the extent of ice in the Bering Sea in spring? (POC-P-6620)

- 14:40      **Elena I. Ustinova and Yury D. Sorokin**  
Winter extreme events in the thermal state of the Okhotsk and Bering Seas (POC-P-6748)
- 15:00      **Olga Trusenkova**  
Multivariate analysis of wind stress and curl over the Japan/East Sea based on satellite scatterometry data (POC-P-6482)
- 15:20      **Zhongyong Gao, Liqi Chen and Heng Sun**  
Developments of the Arctic carbon sink from 1999 to 2008 (POC-P-6548)
- 15:40      ***Coffee/Tea Break***
- 16:00      **Jae-Hyung Park and Kyung-Il Chang**  
Characteristics of anomalous coastal upwelling detected off the east coast of Korea in summer 2007 (POC-P-6824)
- 16:20      **Carol Ladd, Phyllis J. Stabeno and Julia O’Hern**  
The Pribilof Eddy in the eastern Bering Sea (POC-P-6605)
- 16:40      **Svetlana Y. Ladychenko, Vyacheslav B. Lobanov and Dmitry D. Kaplunenko**  
Evolution and hydrographic structure of mesoscale eddies formed in the northwestern Japan Sea (POC-P-6726)
- 17:00      **Karen Nieto, Sam McClatchie and Edward D. Weber**  
How does mesoscale oceanic structure in the California Current System affect the distribution and ultimately the survival of larval fish? (POC-P-6801)
- 17:20      **Hiroimichi Ueno, Hiroji Onishi, Sachihiko Itoh, Ichiro Yasuda, Yutaka Hiroe, Toshio Suga and Eitarou Oka**  
Observations of a Kenai eddy along the Alaskan Stream south of the Aleutian Islands (POC-P-6448)
- 17:40      **Guangliang Liu, Zhe Liu, Huiwang Gao and Shizuo Feng**  
Simulation of the Lagrangian tide-induced residual current in Jiaozhou Bay, North China (POC-P-6747)
- 18:00      ***Session ends***



**POC Paper Session Posters**

- POC-P-6480 **Fedor F. Khrapchenkov and Nadezda M. Dulova**  
Current variability features in the northeastern part of Posyet Bay, the Sea of Japan (East Sea)
- POC-P-6489 **Zhongyong Gao, Liqi Chen and Heng Sun**  
CO<sub>2</sub> system in the Bering Sea
- POC-P-6518 **Ze Liu and Yijun Hou**  
The Stratified Influence of the Kuroshio Intrusion over the Continental Shelf Break off Northern Taiwan
- POC-P-6519 **Talgat R. Kilmatov, Elena V. Dmitrieva and Olga I. Trinko**  
The indirect estimation of the climatic trend of kinetic energy production in the North Pacific
- POC-P-6549 **Zhongyong Gao, Liqi Chen and Heng Sun**  
Summertime CO<sub>2</sub> system distribution and air–sea CO<sub>2</sub> fluxes in the Bering Sea
- POC-P-6562 **Yugo Shimizu, Lynne D. Talley, Shin-ichi Ito, Shigeho Kakehi and Taku Wagawa**  
Spreading pattern and transport of the Okhotsk Sea Intermediate Water to the northwest Pacific revealed by profiling floats with optode and hydrographic observations
- POC-P-6673 **V.V. Moroz**  
Peculiarities in intermediate water characteristics in the Komandor–Kamchatka area
- POC-P-6715 **Tae-Hoon Kim and Guebuem Kim**  
Basin-scale low N:P ratios and DOC export in the East/Japan Sea



# E-Poster

## TCODE Topic Session Monitoring and Ocean Observing Systems

Convenor: *Bernard A. Megrey (U.S.A.)*

Integrated Ocean Observing Systems have recently received significant attention for monitoring and reporting the status of coastal, continental shelf and even deep ocean ecosystems. Ocean Observing Systems enhance our ability to collect, deliver, and use ocean information, and they deliver the data and information needed to increase understanding of our oceans and coasts, so decision makers can take actions to improve safety, enhance the economy, and protect the environment. Ocean Observing System information is also used to initialize numerical ecosystem models. Contributors to this session will demonstrate the application of ocean observing systems that support the FUTURE goals of improved understanding, status reports, outlooks and forecasts through the use of electronic display systems, including interactive web sites and animations.

**Thursday, October 28 (18:00-20:30)**

### TCODE E-Poster Session Posters

- E-poster-6450 **Igor Burago, Bernard A. Megrey, Georgiy Moiseenko, Olga Vasik, Tatiana Semenova and Igor Shevchenko**  
Using the PICES rented server
- E-poster-6685 **Karen Baker, Edward D. Weber and J. Anthony Koslow**  
CalCOFI information management and data delivery
- E-poster-6717 **Richard Dewey and Verena Tunncliffe**  
VENUS: Real time ecosystem monitoring from a coastal observing system



# W1 BIO Workshop

## Marine ecosystem model inter-comparisons (III)

*Co-Convenors: Bernard A. Megrey (U.S.A.), Harold P. Batchelder (U.S.A.), Shin-ichi Ito (Japan), Guimei Liu (China) and Yvette Spitz (U.S.A.)*

The objective of the Marine Ecosystem Model Inter-comparison Project (MEMIP) is to compare the performance of various lower trophic level marine ecosystem simulation models at predicting the abundance and distribution of coastal zooplankton functional groups. Models with high performance will be used to examine the future state of the marine ecosystem to global climate change. This workshop builds upon the discussions and planning accomplished at the successful workshop held at PICES-2009. The workshop will be technical, hands-on, and focus on parameterizing, executing and calibrating three test bed versions of a biogeochemical lower trophic level (LTL) marine ecosystem models. At each test bed 3 to 6 ecosystem models will be run. Specific ecosystem models (i.e., NPZD, NEMURO and CoSINE) will be executed. Some models will be tuned to run in a specific region and others will be applied to areas different from where they were calibrated. Model skill assessment will be evaluated. The models will be used to identify important mechanisms that control secondary production, zooplankton biomass and variability, as well as bounding the levels of uncertainty in model predictions by calculating ensemble statistics. Comparisons at multiple locations will provide information on the spatial-temporal robustness of particular model structures and parameterizations. The products of the comparison will contribute to FUTURE by estimating the uncertainty and the limits of forecasting.

### Saturday, October 23 (9:00-18:00), Day 1

- |       |  |
|-------|--|
| 9:00  | <b>Workshop Convenors</b><br>Welcome, Introductions and General MEMIP Goals  |
| 9:30  | <b>Guimei Liu, Hui Wang and Fei Chai (Invited)</b><br>Developing Nowcast/Forecast Ecosystem Model in the South China Sea (W1-6493) |
| 10:00 | <b>Harold Batchelder</b><br>Data types and availability for the CCS (Newport) and GOA (Seward) test bed locations                  |
| 10:30 | <b>Coffee/Tea Break</b>  |
| 10:50 | <b>Shin-ichi Ito</b><br>Data types and availability for Western Subarctic (A-Line) test bed location                               |
| 11:05 | <b>Harold Batchelder (with input from all)</b><br>Test beds, Ecosystem Models Available, Computer Platforms for MEMIP              |
| 11:25 | <b>Yvette Spitz</b><br>Demonstration: How to merge/modify an ecological model into ROMS/Compiling Example                          |
| 11:55 | <b>Small group activity</b><br>Whet your modeling appetite before lunch; identify biological models to implement                   |
| 12:30 | <b>Lunch</b>   |
| 14:00 | Implement new ecosystem models into ROMS and run existing codes  |
| 15:30 | <b>Coffee/Tea Break</b>  |
| 15:50 | Meet in plenary to discuss problems/troubleshoot   |
| 16:10 | Continue implementation of models  |
| 18:00 | <b>Workshop ends</b>   |

**Sunday, October 24 (9:00-18:00), Day 2**

- 9:00        ***Introduction by Convenors***
- 9:05        **Yvette Spitz**  
Demonstration: Running a model; an example from the Oregon Shelf; BC's, IC's, surface forcing
- 9:25        Continue implementation of models/run models if ready/debugging
- 10:30       ***Coffee/Tea Break***
- 10:50       More debugging
- 12:30       ***Lunch***
- 14:00       More debugging, and hopefully some successful model runs
- 15:30       ***Coffee/Tea Break***
- 15:50       Debugging, debugging, debugging...
- 17:30       **Workshop Convenors**  
Progress Review, Timetable, Next steps incl. post-simulation analyses, Action Item Identification
- 18:00       ***Workshop ends***

## W2

## FIS Workshop

### Beyond Lagrangian: Modeling migratory fish behavior in Global Circulation Models

*Co-Convenors: Enrique Curchitser (U.S.A.), Shin-Ichi Ito (Japan), Michio Kishi (Japan), Skip McKinnell (PICES)*

The advent of high resolution coupled atmosphere–ocean circulation models and the creation of repositories of high resolution 4-D ocean hindcasts and future scenarios has made it possible to contemplate adding virtual fish to an increasingly virtual ocean. The ability to study virtual fish in a virtual ocean has a potential to understand past phenomena and potentially, to predict future behavior. Recent developments in satellite data availability, in data assimilating physical models, and in tagging technologies for fishes, all increase the chance to improve our understanding of fish migration mechanism. However, fish behavior is complex. It is a consequence of genes, the physical, chemical and biological environment and their interaction, and perhaps even from learned behavior. This makes the modeling of fish behaviors potentially very complex, and this complexity suggests that a team approach to model building might be desirable. The purpose of this workshop is to understand the current state of development in modeling fish behaviour. Presentations are anticipated that discuss successes (and failures) in modeling migratory fish behavior. Presentations related to data availability to evaluate fish behavior models and laboratory experimental approaches to investigate fish behavior are also welcomed. Based on the results and opinions expressed at the workshop, the convenors would like to discuss the desirability of establishing a group that will focus its attention on developing and advancing the state of fish behavioral modeling.

#### Saturday, October 23 (14:00-18:00)

- 14:00      ***Introduction by Convenors***
- 14:05      **Geir Huse (Invited)**  
Individual based modeling of fish behavior in coupled biophysical models (W2-6588)
- 14:35      **James Anderson**  
Seeking principles for modeling fish migratory behavior - A cross discipline approach (W2-6766)
- 14:55      **Dongwha Sohn, Lorenzo Ciannelli, Janet T. Duffy-Anderson and William T. Stockhausen**  
Modeling the drift pathways of Greenland halibut (*Reinhardtius hippoglossoides*) from spawning to settling locations in the eastern Bering Sea using the Dispersal Model for Early Life Stages (W2-6792)
- 15:15      **Chloe Bracis**  
Successes and limitations modeling fish behavior with limited data (W2-6546)
- 15:35      ***Coffee/Tea Break***
- 15:55      **Brian J. Burke, James J. Anderson and Edmundo Casillas**  
Evaluating behavioral rules potentially used by migrating salmon (W2-6432)
- 16:15      **Steven L.H. Teo, Suzy Kohin, Heidi Dewar, David Wells and Candan Soykan**  
Movement patterns of pelagic sharks and tunas in the Northeast Pacific (W2-6537)
- 16:35      ***Discussion and Summary by Workshop Convenors***
- 18:00      ***Workshop ends***





## W3

## MEQ Workshop and a Laboratory Demonstration

### New technologies and methods in HAB detection: I. HAB species detection and HAB-S Meeting

*Co-Convenors: Ichiro Imai (Japan) and Vera Trainer (U.S.A.)*

Here we begin a series of workshops focusing on new technologies in harmful algal bloom (HAB) research and monitoring. The first workshop in this series will include lectures and integrated demonstrations of new methods in organism detection with concentrated information on HAB species. This workshop will describe equipment and methods from the following list: environmental sampling platform (ESP), FloCam, sandwich hybridization assay (SHA), qPCR, FISH, and in situ sensors including gliders. This series will continue in the future with demonstrations on automated nutrient samplers, modeling, remote sensing, and other techniques.

#### Saturday, October 23 (9:00-18:00), Workshop 3 Presentations

- 9:00 **Introduction by Convenors**
- 9:05 **Satoshi Nagai (Invited)**  
Recent developments in molecular diagnostic technology for HAB detection (W3-6472)
- 9:40 **Katie Flynn Bush, Juli Dyble Bressie, Chris Navas and Clare E. Rogers**  
A novel, portable flow cytometer facilitates algal population quantification in cultures and environmental samples (W3-6826)
- 10:05 **Ichiro Imai, Tomotaka Shiraishi, Ken-Ichiro Ishii, Keigo Yamamoto, Masaki Nakajima and Satoshi Nagai**  
Detection of *Alexandrium tamarense* (Dinophyceae) cysts in bottom sediments with real-time PCR assay: Cyst dynamics and occurrence of bloom in Osaka Bay, the Seto Inland Sea (W3-6744)
- 10:30 **Coffee/Tea Break**
- 10:50 **Katherine Hubbard, Claire H. Ellis and E. Virginia Armbrust**  
Molecular detection and insights into differentiation of Eastern Pacific *Pseudo-nitzschia* communities from the open ocean to the Puget Sound estuary (W3-6855)
- 11:15 **Vera L. Trainer, Mark S. Strom, Qiuming Yu and Mark L. Wells**  
A proposal for raman-based barcoding for the identification of toxic marine pathogens and phytoplankton (W3-6775)
- 11:40 **Nicolaus G. Adams, Piper Schwenke and Vera L. Trainer**  
Population structure of *Pseudo-nitzschia australis* and its association to domoic acid production in the waters of Washington State (W3-6688)
- 12:05 **James Birch, Scott Jensen, Brent Roman, Doug Pargett, Christina Preston, Roman Marin, Cheri Everlove and Christopher Scholin**  
Remote detection of marine microbes, their genes and gene products using the Environmental Sample Processor (ESP) (W3-6857)
- 12:30 **Lunch**
- 14:00 **Harry Nelson and Benjamin Spaulding**  
Demo: Identification and enumeration of *Alexandrium* using an imaging flow cytometer (FlowCAM®) (W3-6831)

- 14:45      **Wet Labs, Inc.**  
Demo
- 15:30      ***Coffee/Tea Break***
- 15:50      **Satoshi Nagai and Shigeru Itakura**  
Demo: Simple, rapid, specific and cost-effective method for identifying *Alexandrium tamarense* and *A. catenella* using “LAMP” method (W3-6468)
- 16:50      **Katie Flynn Bush**  
Demo: Flow Cytometry
- 17:35      ***Discussion and Summary by Workshop Convenors***
- 18:00      ***Workshop ends***

### **W3 Posters**

- W3-6760      **Bich-Thuy L. Eberhart, Brian D. Bill, Nicolaus G. Adams, Soram Hong and Vera L. Trainer**  
*Pseudo-nitzschia* and cellular domoic acid levels along the coastline of the Pacific Northwest, USA: Summer 2009
- W3-6773      **Brian D. Bill, William P. Cochlan and Vera L. Trainer**  
Kinetics of nitrogen uptake and transient ammonium uptake response by the toxigenic diatom *Pseudo-nitzschia turgidula*

**Sunday, October 24 (9:00-18:00), HAB-S Meeting Presentations**

- 9:00 **Vera Trainer and Changkyu Lee**  
Welcome, goals of HAB Section meeting, introduction of Dr. Lee as new HAB Section co-chair
- Country Reports (2009-10) and HAE-DAT (year 2005) reports**
- 9:30 **Changkyu Lee**  
R Korea
- 9:45 **Shigeru Itakura**  
Japan
- 10:00 **Jinhui Wang**  
PR China
- 10:15 **Charles G. Trick**  
Canada
- 10:30 **Coffee/Tea Break**
- 11:00 **Vera L. Trainer**  
U.S.A.
- 11:15 **Tatiana Orlova**  
Russia
- 11:30 **Mingyuan Zhu**  
Harmful algal blooms (HABs) in the Coastal Waters of China in 2009 (HAB-6555)
- 11:50 **Donald Anderson**  
Report on ICES HAB working group and potential areas of collaboration
- 12:10 **Discussion**
- 12:30 **Lunch**
- 14:00 **Yoshida Takafumi**  
NOWPAP/CEARAC
- 14:20 **Charles Trick**  
PICES Seafood Safety Project
- 14:40 **Charles Trick and William Cochlan**  
Report on GEOHAB Open Science Meeting on Benthic HABs (HAB-6875)
- 15:00 **Vera Trainer**  
The joint Harmful Algal Bloom Programme and International Oceanographic Data and Information Exchange Harmful Algae Information System: An update and proposal for the future
- 15:30 **Coffee/Tea Break**
- 16:00 **Final Discussion of Proposals for the Future**
- 18:00 **Meeting ends**



# W4

## POC Workshop PICES Working Group on Evaluations of Climate Change Projections (WG 20): Progress and FUTURE

*Co-Convenors: Michael G. Foreman (Canada) and Yasuhiro Yamanaka (Japan)*

Presentations and discussions will be carried out on: (1) progress related to the WG20 Terms of Reference, (2) status of, and future work on, the final report, and (3) follow-up activities that conform to FUTURE objectives and needs.

**Sunday, October 24 (14:00-18:00)**

### Objectives and Agenda for Workshop W4

Objectives: Present and discuss drafts of chapters for the final WG20 Report and finalize recommendations to PICES/FUTURE. The following list of possible chapters was put forward at the April WG20 meeting in Sendai, Japan:

- **Introduction:** Background and Terms of Reference
- **Wang, Overland, Bond:** GCM downscaling procedures & examples
- **Di Lorenzo, Miller:** Regional climate modeling and covariability in North Pacific
- **Foreman and colleagues:** RCM development for BC shelf waters
- **Christian:** GCM carbon cycle development
- **Curchitser, Hermann:** RCM development for the NE Pacific and Bering Sea and two-way coupling of this RCM into the NCAR GCM
- **Ustinova, Zuenko:** Evaluation of climatic variability in Far Eastern Seas
- **Navrotsky:** interactions between climate and ecosystems
- **Yamanaka, Hasumi, and colleagues:** Ecosystem projections for the Kuroshio/Oyashio system
- **Jang, Pang, Park, Yeh, and colleagues:** GCM projections of changes to mixed layer depth
- **Qiao, Wang, Wu and colleagues:** Chinese contributions
- **Summary and recommendations**

Informal Agenda:

1. Review of WG20 Terms of Reference and what was accomplished
2. Discussion of proposed chapter topics and presentations of recent research that might be included
3. Updates on chapter assignments and setting of deadlines
4. Recommendations for follow-up work and/or groups within FUTURE  
Summary of Seoul Advisory Panel meeting, August 16-18
5. Adjournment to local pub/restaurant



# W5 POC/BIO Workshop

## Carbon data synthesis (III)

Co-Convenors: Masao Ishii (Japan) and Robert M. Key (U.S.A.)

This workshop will continue the implementation of the North Pacific carbon data synthesis. Investigators who submit data to the workshop will collectively review the progress of the QA/QC process, and discuss the degree of success of the techniques applied and whether different or additional approaches are necessary. This is a highly “hands-on” activity that will involve data originators who submit data to the synthesis, and investigators participating in the synthesis process, and will lead directly to value-added data products and collective publications.

### Friday, October 22 (9:00-18:00), Day 1

- 9:00            **Masao Ishii, Masahide Wakita, Akihiko Murata, Toru Suzuki, Alex Kozyr and Robert Key**  
Second-level quality control of PACIFICA synthesized database (W5-6602)
- 9:30            **Robert M. Key (Invited)**  
Expanding the ocean interior carbon data collection
- 10:00          **Toru Suzuki**  
Review for the method of cross-over analyses and inversions for secondary QC of PACIFICA
- 10:30          ***Coffee/Tea Break***
- 10:50          Subgroup-1: Secondary QC of CO<sub>2</sub> parameters - 1  
Subgroup-2: Secondary QC of oxygen and nutrients - 1
- 12:30          ***Lunch***
- 14:00          Subgroup-1: Secondary QC of CO<sub>2</sub> parameters - 2  
Subgroup-2: Secondary QC of oxygen and nutrients - 2
- 15:30          ***Coffee/Tea Break***
- 15:50          Subgroup-1: Secondary QC of CO<sub>2</sub> parameters - 3  
Subgroup-2: Secondary QC of oxygen and nutrients - 3
- 18:00          ***Workshop ends***

### Saturday, October 23 (9:00-18:00), Day 2

- 9:00            Subgroup-1: Secondary QC of CO<sub>2</sub> parameters - 4  
Subgroup-2: Secondary QC of oxygen and nutrients - 4
- 10:30          ***Coffee/Tea Break***
- 10:50          Subgroup-1: Secondary QC of CO<sub>2</sub> parameters - 5  
Subgroup-2: Secondary QC of oxygen and nutrients - 5
- 12:30          ***Lunch***
- 14:00          **Michio Ishii**  
Report from sub-group - 1

- 14:20      **T. Ono**  
Report from sub-group - 2
- 14:40      **A. Murata**  
Secondary QC of data from Bering Sea
- 15:00      **K. Sasaki**  
Secondary QC of CFCs
- 15:30      ***Coffee/Tea Break***
- 15:50      Discussion on the future plan : Opening of PACIFICA to the public
- 17:00      Discussion on the future plan : Scientific products
- 18:00      ***Workshop ends***