



BIO-OCEANS ASSOCIATION NEWSLETTER

Issue 35, July 2007

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**HAVE A
GREAT
SUMMER!**

FROM THE PRESIDENT

I am writing this column the day after a very successful and enjoyable trip to Georges Island for 37 lucky OA members and their guests. Even the weather cooperated. This tour proved so popular that it was sold out within 48 hours of the notice of the event going out via e-mail to Association members. The next issue of the Newsletter will include a description of the tour and some photos.

The BIO-OA ended 2006/07 with its Annual General Meeting on 30 May. At a mercifully brief business meeting, we said goodbye to Shiri Srivastava as an Executive Board member after many years of faithful service. Mind you, he is not disappearing from the scene. In fact he has offered his home as the location for our annual summer barbecue on 23 August. We also voted for and welcomed three new executive members: Bob O'Boyle as a vice-president, and Don Gordon and Georgina Phillips as directors-at-large. And finally, we agreed to raise membership fees for the first time since the Association began. Starting with the 2008 membership year, the new fee structure will be \$10 for a one-year membership, \$40 for 5 years, and \$150 for a life membership. The increase in fees will allow us to continue producing a good quarterly newsletter and to develop other member programs and services as well.

The business meeting was followed by the Beluga Award ceremony at which the award was presented to a very deserving Murray Scotney.

The next social event will be the summer barbecue. Hope to see many of you there.

— Betty Sutherland

DON'T MISS OUT: PICNIC PLANS IN PREPARATION

On Thursday, 23 August 2007, Shiri Srivastava will host our annual summer barbecue and picnic at his lovely home at 349 Waverley Road on Lake Charles. Our 1999 picnic was also held at the Srivastavas, and it was a great success. Shiri plans to serve Chicken Tandoori from his own kitchen especially for us so plan to arrive early.

CALL FOR OPEN HOUSE VOLUNTEERS

The next Bedford Institute of Oceanography Open House will take place from Wednesday, 17 October to Sunday, 21 October 2007. Our Association will be contributing a new version of its "Old Marine Hardware & Instruments What Is It?" display to the Open House. Volunteers are needed to monitor the display and to pass out and collect questionnaires from visitors. A four-hour commitment is needed from each of eight volunteers.

BIO will also be needing volunteers to help out with many other aspects of Open House. We will pass along to our members via e-mail any general calls for volunteers that may be issued before the event.

If you are interested in helping out, please contact either Carol Manchester or Charles Schafer to volunteer your participation: you can find their phone numbers and e-mail addresses on page 12 of this newsletter.

FROM THE ARCHIVES 36 YEARS AGO – 1971

Compiled by Bosko Loncarevic

[These highlights are excerpted from the BIO World Newsletter, published at the Institute between 1967 and 1973. Complete versions are on our web site.]

(August, 1971, Vol. 5, No. 8) Mr. J. Austin, DM of EMR, visits BIO. – *Hudson* reported from Davis Strait: “Work definitely confirms the possibility of using air-guns for exploration purposes in this area.” – *Dawson* reported: “Survey results confirm Cumberland Sound as major graben.” – Long report by R.T. Haworth on Moscow IUGG meeting. – “On the sidewalks of New York”, a trip account by Graham Pearson. – “CAN SDI or can’t it?” by R.T. Haworth – Joined BIO: L.C. Rosenthal, L. Keddy, K. Conrod, G. Hendsbee, H.B. Nicholls (as Head of Scientific Information Services and Library) and M.T. Darwood (as Head, Computing Service). – Robson Channel, NWT, Air-Sea Interaction Experiment by Erik Banke.

(September, 1971, Vol. 5, No. 9) Subsurface float #24, lost about 80 miles from Halifax in December, 1968, returned to BIO after 2 years, 2 months, ten days. Economic Studies Unit established. John Lazier returns after three years at University of Southampton. New staff join BIO: Ian D. Macaulay, J.E. Moffat and C. D. Conrad (Chemical Oceanography) and Dan Ware, Nick J. Prouse, Barry Hargrave, Ray Edmonds, and Gerald Grey (MEL). – *CSS Acadia* as a tourist attraction had 3,300 visitors. – *Hudson* reports damage to retractable transducer in transit to Thule. Also “...first successful use of recording sonobuoy.” – *Dawson* reports: “1) brackish water lens extends from Bridgewater to outer LaHave estuary and carries humic compounds from river to open ocean. 2) high correlation of dissolved Al, Fe, and Mn with humic compounds derived from LaHave River. 3) No placer gold found in sand fraction of bottom sediments.”

(October – November, 1971, Vol. 5, No. 10-11) The Hon. Alastair W. Gillespie, Minister for Science and Technology, visited BIO. – Extensive report on *Hudson* cruise to Baffin Bay by Dave Heffler – New in the Library: “Oceanographic Index” compiled by Mary Sears of WHOI. – Ronald Heath arrives from New Zealand as new PDF in Ocean Circulation. Dr. Alan Walton awarded D.Sc. from Glasgow University. – V. M. Hodder is the new Assistant Executive Secretary of the ICNAF Secretariat.

ON THE LIGHTER SIDE

Subject: Three Minute Management Course

A husband prepares to get into the shower just as his wife is getting out of it when their front doorbell rings. The wife quickly wraps herself up in a towel and runs downstairs. When she opens the door, there stands Bob, the next-door neighbour.

Before she can say a word, Bob says, "I'll give you \$800 to drop that towel." After thinking for a moment, the woman drops her towel and stands naked in front of Bob. After a few seconds, Bob hands her \$800 and leaves. The woman wraps herself back up in the towel and goes upstairs.

When she gets to the bathroom, her husband asks, "Who was that?" "It was Bob from next door," she answers. "Great!" the husband says. "Did he say anything about the \$800 he owes me?"

Moral of the story:

If you share critical information pertaining to credit and risk with your shareholders in time, you may be in a position to prevent avoidable exposure!

Police Humour

(Comments from actual police videos...allegedly!)

"You know, stop lights don't come any redder than the one you just went through."

"If you take your hands off the car, I'll make your birth certificate a worthless document."

"If you run, you'll only go to jail tired."

"You don't know how fast you were going? I guess that means I can write anything I want to on the ticket, huh?"

"The answer to this last question will determine whether you are drunk or not. Was Mickey Mouse a cat or a dog?"

"Relax, the handcuffs are tight because they're new. They'll stretch after you wear them a while."

"I'm glad Chief of Police Beazley is your personal friend. It's good to have someone who can post bail for you."

"How big were those 'Just two beers' you say you had?"



Marine Ecology Laboratory Reunion

Among those attending the MEL Reunion held at BIO on 17 November 2006 were:

Back Row (Left to Right): Paul Dickie, Doug Sameoto, Tim Lambert, Maurice Zinck, Heinz Wiele, Doug Willis, Peter Vass, Chris Hawkins, Don Gordon, Glen Harrison, Mary Lewis, J.-C. Therriault, Brian Fraser, Bill Silvert, Jim Reid

Front Row (Left to Right): Steve Kerr, Bob Miller, Donna (Darrow) Sameoto, Dwight Reimer, Chantal Abou Debs, Anand Prakash, Paul Keizer, Erica Head, Carl Cunningham, Georgina Phillips (in front), Cynthia Bourbonnais-Boyce, Jackie Dale, Pat Pocklington, Lloyd Dickie, Ken Mann, Doug Loring, Bob Conover, Don Peer, Bill Hardstaff, Subba Rao Durvasula, Steve Bates, Jacqueline Demestral, Gareth Harding

THE IMPACT OF PAST MEL RESEARCH ON THE CONDUCT AND UNDERSTANDING OF ECOLOGICAL SCIENCE TODAY

Ken Mann

[Editor's Note: In the second and concluding part of this series on "The Marine Ecology Laboratory Reunion", held on 17 November 2006 at the Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Dr. Kenneth Mann, past director of the Marine Ecology Laboratory (MEL), presents an insightful overview of MEL's influence on marine ecology and science worldwide.]

When Don Gordon asked me to speak to this topic at the Marine Ecology Laboratory (MEL) reunion on 17 November 2006, I realised that there were several pitfalls. It is only too easy to be biased in favour of one's own particular favourite items of research. Because all good science makes a contribution to its field, it would also be necessary to be very selective or the talk could become a massive catalogue of MEL research.

To help overcome the first difficulty, I enlisted the help of someone quite remote from MEL. Tim Parsons, who served with distinction in oceanography on the west coast, published two useful papers. In 1975, he published a review of biological oceanography, stressing the deficiencies and needs for future research. Then, in 2002, he was asked to make proposals for future research in the North Pacific, and his main points could be a benchmark for the state of ecological science at the beginning of the 21st Century.

Armed with Tim Parsons's objective comments and based on my own experience, I came up with perhaps the three main contributions of MEL research, the first of which I consider to be the most important, and will give several examples:

1. Pioneering the Ecosystem Approach in Marine Ecology

Taking an ecosystem approach to fisheries management is now considered an enlightened and impor-

tant aspect of good management. However, in the 1960s it was considered by ecologists and fisheries scientists alike as a way-out, flaky kind of science. Ecologists studied the ecology of individual animals, or whole populations, and even of whole biological communities, but the idea that the ecosystem was a useful concept to work with was confined to a few enthusiasts.

Ecosystem science involves the physics of solar heating, winds, waves, tides and currents, chemical cycling of plant nutrients, and the dynamics of all levels of the biological community, so it seemed impossibly complex and impracticable. I remember going to St. Andrews for a meeting and being persuaded to give an impromptu talk on the scientific programs of MEL. When I spoke about studying St. Margaret's Bay as an ecosystem, one scientist said, "What about the huge exchange of water on each tide? It's about as useful as trying to study the population dynamics of a micro-organism in a flushing toilet."

That remark highlighted an important deficiency in existing models of ecosystems. Most people did not know how to combine the physical aspects with the biology. The Fisheries Research Board of Canada recognized this and asked MEL to investigate "environmental effects on fisheries". Ron Trites, the senior physical oceanographer in MEL, explained to me some earlier attempts to get physical oceanographers and fisheries biologists to work together. He said that the physical oceanographers would make thousands of current measurements to work out the current patterns in a particular area, and then the fisheries scientists would bring their general understanding of the biology of a fish species and say, "Well it looks as if the currents will take the larvae from here to there."

It was the genius of those controlling the programs of MEL to recognize that environmental (or physical) effects on fish populations were experienced by the fish mainly as effects on the ecosystems in which they lived, and to lay out the programs accordingly.

First Example: The Flushing of Bedford Basin

In the 1960s, Bedford Basin was badly polluted with sewage, causing very high plankton production. Advice was needed on whether the ecosystem could accept all the extra nutrients, and whether they were causing major harm. One of the questions was “how much of the phytoplankton production is grazed by zooplankton, how much sinks to the bottom, and how much is exported from the basin with the twice-daily tidal flushing and the river runoff?” It was part of my job to get the physical oceanographers and the biologists working together on this.

After his experience with the fisheries biologists, Ron Trites said that he would cooperate only if the biologists made about the same number of observations as the physical oceanographers. A scheme was agreed in which there would be current meters at various depths in the narrows, and the biologists would make a large number of observations of phytoplankton biomass using chlorophyll as an indicator of phytoplankton. The biologists would also make a large number of net hauls of zooplankton. At the end of a 25-hour series of measurements, in both the narrows and the main basin, the budget for phytoplankton biomass in the basin was balanced within 7%. A large amount was being exported from the basin through the narrows, a good amount was being consumed by the zooplankton, and not much was sinking to the bottom. The results were published by Trevor Platt and Bob Conover¹. This was a landmark in the history of cooperation between physical oceanographers and biological oceanographers. After that, it was less difficult to get physicists and biologists to work together.

Second Example: Comparative Studies of Coastal Inlets.

In the first decade of the existence of MEL we learned to measure the productivity of seaweeds and

of marsh grass and eelgrass. These values, expressed as carbon units, could be compared with the productivity of phytoplankton. It turned out that while phytoplankton dominated the production in Bedford Basin, seaweeds dominated the production in St. Margaret's Bay, and marsh grass and eelgrass dominated production in Petpeswick Inlet.

It was obvious in a qualitative way that these differences were the result of the shapes of the basins and the differences in sedimentation and tidal flushing. These differences between coastal ecosystems had not been investigated quantitatively anywhere else, but were later imitated by other groups around the world.

During the 1980s, MEL had teams that made comparative ecosystem studies of the Bay of Fundy and St. Georges Bay. By this time, many similar studies were underway around the world, but the Bay of Fundy study, and its model², led by Don Gordon and Barry Hargrave, and the George's Bay study led by Gareth Harding, Barry Hargrave, and Ken Drinkwater³ were major contributions to the world literature on coastal ecosystems.

Third Example: The Strong Influence of River Run-off on Production in Estuaries.

It was well understood that the runoff of the river into an estuary causes upwelling of nutrients and stimulation of biological production. Bill Sutcliffe wondered whether this could be used to predict the fluctuations in commercially important species. He obtained good predictions for several species in various estuaries, but the most spectacular result was to show that the catches of lobsters in the Gulf of St. Lawrence could be predicted from the amount of spring runoff of the St. Lawrence River nine years earlier.

In a year of high river runoff, biological production was high, lobster larvae did well, and their numbers were high when they reached catchable size nine years later. This correlation held good for 35 years, and would have been a valuable tool in stock management. However, the correlation finally broke down. We now understand that ecosystem function

is influenced by many environmental factors, but sometimes one factor overrides all others and produces a very useful correlation. Usually, sooner or later, another factor overrides the first. This was a landmark in the study of correlations between physical and biological processes.

Fourth Example: Turbulence and Phytoplankton Production in Bedford Basin

The amount of vertical mixing in Bedford Basin is determined in part by the strength of the tidal currents, and the amount of river runoff, but most of all by the strength of the wind over the surface. A good indication of these differences is measured as turbulence. Neil Oakey had developed a new instrument for measuring turbulence at various depths, which he called “octuprobe”. A team of MEL scientists led by Marlon Lewis studied the photosynthetic performance of phytoplankton on many days when there were different levels of mixing and turbulence. They found that turbulence had a major effect on the phytoplankton. In a landmark paper in the journal *Nature*⁴, they were able to make the following strong statements:

We recently succeeded, for the first time to our knowledge, in making direct measurements of turbulence kinetic energy dissipation, simultaneously with those of photoadaptive properties of natural phytoplankton populations. (We conclude that) the vertical mixing induced by turbulence to a large degree controls the photosynthetic performance of algae in nature.

This was a major contribution to international science.

2. Inventing Size-Based Ecosystem Models⁵

Before coming to MEL, Ray Sheldon had worked with Tim Parsons in BC to explore the use of the newly invented Coulter Counter for counting and sizing particles (i.e., the plankton) in the sea. By displaying the results on a logarithmic scale of particle sizes, they were able to make a quick assessment of the biomass of the various size groups of phytoplankton and zooplankton. In 1969-70, the *Hudson* circumnavigated North and South America (the Hudson '70 cruise). Sheldon, Prakash, and Sutcliffe

teamed up to collect a very large number of samples from the North and South Atlantic, then the South and North Pacific. They combined their plankton data with estimates of the biomass of larger invertebrates, fish, and mammals in those waters, and came up with a very remarkable conclusion. In the water column of these oceans:

To a first approximation roughly equal concentrations of material occur at all particle sizes within the range from about 1 micron to about 10^6 microns, i.e. from bacteria to whales⁵

They carried their thinking one stage further:

Since in general larger predators feed on smaller prey, the pattern we have outlined can only be maintained if the rate of particle production varies inversely with size.

In other words, the smaller particles must reproduce faster than the ones that feed upon them, in order to maintain the food supply. Taking values from the literature, they showed that this is the case. Thus was launched a totally new model of an ecosystem, one that could be monitored by instrumentation. The idea had legs. It became known as the biomass spectrum and the class of models as size-based models. From information about the size spectrum of plankton in an area, predictions could be made about the biomass of fish it would support in an equilibrium situation. See for example, Sheldon, Sutcliffe and Drinkwater's estimates for the Scotian Shelf.⁶

In the late 1970s, T. Platt and K. Denman refined the original biomass model. They developed what they called “a continuous steady state theory for the abundance of organisms in pelagic ecosystems.” Their theory predicted that the biomass spectrum was not flat, but had a slope of -0.22 . Many other uses were made of biomass models and in 2001 Steve Kerr and Lloyd Dickie summarized the field in a book entitled *The Biomass Spectrum: a Predator-Prey Theory of Aquatic Production*.⁷

Thus, the initial insight of three MEL scientists, Ray Sheldon, Anand Prakash, and Bill Sutcliffe, in the early 1970s led to a worldwide development of in-

terest in the biomass spectrum. The model was further developed by Trevor Platt and Ken Denman of MEL in the late 1970s, then reviewed in detail in a book by two former MEL scientists, Steve Kerr and Lloyd Dickie, 30 years later.

3. Pioneering innovative sampling systems

There were many innovative developments in biological sampling in MEL. One example is an acoustic fish-finding system called ECOLOG, developed by Lloyd Dickie and Dick Dowd. The one that Tim Parsons singled out to recommend to marine scientists in 2002 was BIONESS, developed by Doug Sameoto, Harry Jaroszynski, and Brian Fraser. It consisted of a group of ten sampling nets that could be opened and closed on command, together with an array of other instruments, many of them developed in other parts of BIO. Together, they permitted the gathering of detailed information about zooplankton, along with an array of physical information about the environment.

The first detailed published description appeared in 1979⁸. During the 1980s it was used to reveal a previously unknown food chain in the deep basins of the Scotian Shelf. The relatively small copepods were fed upon by large populations of shrimp-like euphausiids, which in turn were preyed upon by fish populations, silver hake, and sandlance⁹.

4. Conclusions

The policy, initiated by the Fisheries Research Board and implemented by Lloyd Dickie, of setting up a laboratory with a broad mandate to investigate the effects of environmental factors on fish populations, and of implementing that mandate with programs focused on the properties of the total ecosystems of which the fish were a part, resulted in a quite remarkable output of highly creative world class science that influences oceanography and marine ecology to this day. The items selected for review by no means exhaust the depth and scope of the achievements of the Marine Ecology Laboratory.

- ¹ Platt, T. and Conover, R.J. 1971. Variability and its effect on the 24h chlorophyll budget of a small marine basin. *Mar. Biol.* 10: 52-65.
- ² Gordon, D.C., Keizer, P.D., Schwinghamer, P., and Daborn, G.R. 1987. Ecological evaluation of the Cumberland Basin ecosystem model. *16th Annual Symposium of the Estuarine and Brackish Water Sciences Association. Plymouth, U.K. Continental Shelf Research.*
- ³ Hargrave, B.T., Harding, G.C., Drinkwater, K.F., Lambert, T.C., and Harrison, W.G. 1985. Dynamics of the pelagic food web in St George's Bay, southern Gulf of St Lawrence. *Mar. Ecol. Prog. Ser.* 20: 221-240.
- ⁴ Lewis, M.R., Horne, E.P.W., Cullen, J.J., Oakey, N.S., and Platt, T. 1984. Turbulent motions may control phytoplankton photosynthesis in the upper ocean. *Nature* 311: 49-50.
- ⁵ Sheldon, R.W., Prakash, A. and Sutcliffe, W.H. 1972: The size distribution of particles in the ocean. *Limnol. Oceanogr.* 17: 327-340.
- ⁶ Sheldon, R.W., Sutcliffe W.H. and Drinkwater, K. 1982. Fish production in multispecies fisheries. *Can. Spec. Publ. Fish. Aquat. Sci.* 59: 28-38.
- ⁷ Kerr, S.R. and Dickie, L.M. 2001 *The Biomass Spectrum: A Predator-Prey Theory of Aquatic Production.* Columbia University Press. New York.
- ⁸ Sameoto, D.D., Jaroszynski, L.O., and Fraser, W.B. 1979. Bedford Institute of Oceanography Net and Environmental Sensing System (BIONESS) construction details. *Tech. Rep. Fish. Mar. Serv. (Can.)* 903.
- ⁹ Cochrane, N.A., Sameoto, D., Herman, A.W., and Neilson, J. 1991. Multiple frequency acoustic backscattering and zooplankton aggregations in the Inner Scotian Shelf Basins. *Can. J. Fish. Aquat. Sci.* 48: 340-355.

[Editor's Note: An illustrated version of this article can be viewed at our web site www.bedfordbasin.ca/]

BENTHIC HABITAT STUDIES: AN ENGINEER'S PERSPECTIVE – PART VII

David McKeown

unattached samples. Kelly Bentham made it look so easy, but his ability was honed by many hours using the same technique to collect aircraft debris.

Until I became involved with the Institute's benthic ecological program, I had no idea that there were coral colonies in close proximity to Nova Scotia's coast. Rather than the corals that create shallow water reefs in warm water, these are more like underwater trees or bushes. They attach themselves to boulders, rocks, shell mounds, and bedrock in waters deeper than 200 m, can grow to heights of 25 m and are sometimes several hundred years old. They are suspension-feeders, thrive in the absence of sunlight, and are an important habitat for fish. There are believed to be about 35 species off our coast. Because of their height, fragility, and slow growth rate, they are very vulnerable to damage by fishing gear. It was not uncommon during the previous century to see on front lawns in coastal Nova Scotia fragments of these corals that had been collected in bottom trawls.

Until the late 1990s, most of the information about their distribution was based upon anecdotal reports from the fishing industry with DFO taking little interest in this family of organisms. During our 1997 cruise, we began to map benthic habitat on an opportunity basis using Campod and the Video Grab. Areas we visited during this period included the Gully near Sable Island and the Stone Fence off Cape Breton in the Gulf of St. Lawrence.

By 2000, both the government and non-government scientific communities were pressing DFO to identify the Gully as a Marine Protected Area (MPA). In support of this effort, we spent several days mapping the habitat there during our 2000 CCGS *Hudson* cruise and noted the presence of some deep-sea corals. After the Gully survey, we proceeded to Romey's Peak in the Northeast Channel, the body of water that connects the Gulf of Maine to the North Atlantic. What we found was breathtaking. The best way I can describe it to those who have not seen the video is to suggest that one thinks of vast expanses of brush land consisting of bushes in various shades of pink with fish flitting about amongst them. I had no idea that these areas would be so beautiful or the corals so numerous. We used the Video Grab to collect one sample of sea-corn coral attached to a rock plus two

On our homeward journey in 2001, we visited the Swissair crash site to do a Towcam survey. An Eco-Nova TV team then joined us via a launch from Peggy's Cove to participate in a survey of a mysterious wreck that had shown up on the multibeam survey of the area done during the Swissair search and recovery operation. We obtained remarkable images of the wreck using Campod and confirmed that it was a submarine. A number of people thought that it might be a German vessel either lost during the Second World War or scuttled at the end of it. Subsequent investigation revealed that it was indeed a German submarine but its demise was much more prosaic than we had thought. The Captain had surrendered it at the end of the war and the Canadian navy then sank it by gunfire during a training exercise.

Based on our coral survey efforts and the growing interest within DFO for the creation of MPAs, Don Gordon was able to get funding to create a deep-sea coral research project at BIO. To lead this research program, he was able to entice Norwegian deep-sea coral experts Paal Mortensen and Lene Buhl-Mortensen to join our research team for a limited period.

In 2001, we returned to the Gully to continue our benthic-mapping program. This time, with the aid of very dramatic multibeam imagery, we were able to target some prime coral habitats and collect more live samples. While some days at sea can be boisterous, there are others that make up for it. To quote from the cruise report for 25 September 2001, the mid-point of the cruise: "Started to steam back to BIO. Passed north of Sable Island and came in close for a view. Lovely evening with whales and seals around the ship, flat calm and beautiful sunset. Staff and crew enjoyed pizza and beer on the flight deck. A memorable end to the first leg." After offloading the live corals and exchanging staff we commenced the second phase of the cruise. One of our prime objectives during this period was to map the presence or absence of deep-sea corals at likely sites along the Scotian Shelf edge between the Gully and Northeast Channel. The sites were selected on the basis of deep-sea multibeam imagery collected some months earlier by the Ocean Alert.

During the 2002 CCGS *Hudson* cruise, we extended our deep-water coral mapping program to the Laurentian Channel from the Stone Fence off Cape Breton to the southern edge of the Grand Banks. Shortly after we began the survey, the wind started to increase as Hurricane Gustav approached so we headed for shelter in La Poile Bay on the south coast of Newfoundland. What a magical place! The small village near the mouth of the bay is only accessible by sea or helicopter. We saw several black bears playing in the meadows while we did a Campod survey up the axis of the bay.

During this cruise, a very notable event occurred when we found some small (under 30 cm) living fragments of the reef building coral *Lophelia pertusa* at 317 m depth at the Stone Fence. This was the first time this species had been observed alive in its natural habitat in Atlantic Canadian waters. I can still recall the elation that was expressed by the coral experts on board for hours after the discovery. It was apparent from the video we obtained from this area that fishing activity was probably quite intense. Paal Mortensen concluded that the fishing gear had probably broken the coral fragments off a larger living community in the vicinity and destroyed most of the parent *Lophelia*. As a direct result of this field work, DFO and the fishing industry agreed to the closure to fishing of a 15-km² area around this reef.

In 2003, we set out to determine the extent and condition of the live *Lophelia* observed at the Stone Fence in 2002 and to occupy a number of Campod stations between there and the Gully in order to complete a continuous

survey from Georges Bank to the Grand Banks. This survey took place under blue skies on a calm sea while Hurricane Juan was devastating Halifax. The following day, we watched the TV news in near disbelief as we saw how much damage had been done while we totally escaped the effects. We arrived at the mouth of Halifax Harbour late on the evening of 2 October. Large patches of the city were still blacked out, as was almost the entire area around Bedford Basin including BIO. For all aboard, this entry into the harbour that we knew so well was a very eerie sensation.

This turned out to be our last coral cruise. In spite of our accomplishments, funding for the coral program and Paal's postdoctorate appointment at BIO had come to an end. The Mortensens returned to Norway but not before they hosted a wonderful farewell party for many of the good friends their family had made during their stay here. Paal has continued his deep-sea coral research program in Norway with the aid of a Campod clone he has had built.

Two pictures of deep-water corals we collected using the Video Grab are shown below. Paal attempted to keep one of these samples alive in an aquarium at BIO. Unfortunately it contracted some sort of disease and died. The remains are on view in a glass case in the Lower Cafeteria area at BIO. For additional photographs and more detail of this project refer to the link: <http://www.marinebiodiversity.ca/CoralWebsite/Homepagecorals.htm>.





Noteworthy Reads: BOOK REVIEWS IN BRIEF

David N. Nettleship
Book Review Editor

The Noteworthy Reads section is an effort by BIO-OA to produce a representative list of recent noteworthy book publications related to the marine sciences and other subjects of general interest. The listing is not intended to be comprehensive or complete, but merely an attempt to highlight a number of 'good reads' that may be of interest to OA members and associates. Most books listed are available at local bookstores and HRM libraries. Book prices are regular retail in Canadian funds, but discounts of 20-30% are normally available on line at: e.g., amazon.ca or chapters.indigo.ca. Contributions of book reviews to 'Noteworthy Reads' are welcome – send via e-mail to David Nettleship: dnnlundy@navnet.net (phone: 902-826-2360).

SPECIAL DVD RELEASE:

THE WOLFFISH OF NEWFOUNDLAND AND LABRADOR

Blanchard, Kathleen. 2007. Wolffish: A Balance of Life.

DVD Video production (20 min. duration) by Intervale Associates Inc. & Canada Habitat Stewardship Program for Species at Risk, Doyles, NL. \$24.99 including postage (for details, contact: Intervale Associates, P.O. Box 172, Doyles, NL A0N 1J0; ph: 709-955-3132, e-m: info@intervale.ca, www.intervale.ca). – In this short documentary, producer and writer Kathleen Blanchard introduces us to the three species of wolffish that occur in eastern Canadian waters - striped (or Atlantic) wolffish, spotted (or leopard) wolffish, and northern wolffish – little known fishes that have undergone marked population declines since the 1980s and are listed as "threatened" (spotted and northern) or a species of "special concern" (striped) under the Species at Risk Act. Although ferocious in appearance with impressive teeth and jaw muscles, wolffish are relatively docile and play an important role in marine ecosystems. Their diet includes large numbers of sea urchins, a foraging habit that helps control urchin numbers and maintain healthy kelp beds that many other marine species require for shelter, nursery habitat and food. This DVD presents a unique look at the underwater habitat and habits of wolffish, the attitudes of fishermen who encounter wolffish at sea, and the need for conservation measures.

GENERAL REVIEWS

de Villiers, Marq. 2007. Witch in the Wind: The True Story of the Legendary Bluenose. Thomas Allen Publishers, Toronto, ON. 320 pp. Hardcover, \$36.95 (ISBN 0887622240).

– Marq de Villiers, distinguished author of natural history subjects such as wind and weather, water, deserts and islands, has a knack of uncovering new things about topics believed to be well known. This his latest book, 'Witch in the Wind', addresses Canada's famed sailing schooner 'Bluenose' taking the reader from the drama of her construction in 1920, to her triumphs in international races that captured the attention of two countries – Canada and the United States – in the 1920s and thirties, and to her

life as a working fishing vessel and the people who sailed her including the famous 'Bluenose' captain Angus Walters. Although the focus is on the 'Bluenose', which provides a comprehensive and insightful overview of its design and journey, de Valliers also presents a short history of the shipbuilding industry in Nova Scotia and the skill, courage and determination required to sail these wooden square-riggers. The book is so rich in detail that it will cause any 'Bluenose' aficionado's pulse rate to rise by how much remains to be learned about this legendary vessel. No fan or scholar of wooden boats and fishing schooners can afford to be without copies of this volume.

Elphick, Jonathan (ed.). 2007. Atlas of Bird Migration: Tracing the Great Journeys of the World's Birds. Firefly Books, Buffalo, NY. 176 pp. Hardcover, \$35.00 (ISBN 1554072484).

– The fascination of migration in birds is gripping. In North America alone, about 5 billion birds comprising 500 species leave their breeding grounds for wintering areas farther south. Many books on bird migration exist, but this new one 'Atlas of Bird Migration' uses specially designed, computer-generated maps to trace the migratory movements of more than 100 major bird species worldwide. The book begins with an introductory section on migration, providing a comprehensive review of the latest scientific findings on why birds go where they do, flight techniques, orientation and navigation including the use of the Sun and stars as visual clues, timing, staging areas, and the role of genetics, weather and more. But the bulk of the book consists of a visual directory to the routes of various birds with more than 350 colour illustrations. It is here where details are found about individual species themselves such as wingspan, migration calendars, and related facts of their migratory habits. The timing of events is remarkable and highly predictable even when journeys span continents and thousands of miles. This atlas provides a striking visual guide to these incredible avian odysseys.

Hall, Richard. 2006. The World of the Vikings. Thames and Hudson, London, UK. 240 pp. Hardcover, \$46.00 (ISBN 0500051445).

– Richard Hall presents the complete story of the Vikings' world and culture. It starts with their origins as farmers and fishermen, through the so-called "Viking Age" as adventurous explorers across uncharted seas, raiders, traders and settlers, to the last surviving Viking settlements in 15th century Greenland. The Vikings sphere of activity and influence extended far beyond their homelands in Scandinavia and coastal lands around the Baltic Sea, extending throughout Europe to Russia and Byzantium. Their impact on Christian communities of western Europe was immense in the late 8th and 9th centuries, but their power and contacts reached a peak around the year 1000. This highly illustrated book, with 330 illustrations (165 in colour) explores Viking life and culture in detail, with chapters that cover their journeys of exploration and discovery, warfare, targets and tactics, as well as their stunning weapons, crafts and ships. Overall, 'The World of Vikings' offers a thorough treatment of a fascinating society and period of human history.

Kindersley, Dorling. 2007. Map: Satellite. DK Publishing, New York, NY. 360 pp. Hardcover, \$50.00 (ISBN 0756626412). – Here is a work that reveals Earth to us in a way no previous atlas has

ever managed. On each of its two-page spreads, 'Map: Satellite' features a detailed map of a specific region on Earth and a satellite image of the exact same area, shown on the same projection and scale. Continent by continent, DK publishers examine the world through a series of hundreds of maps and satellite images. The result is most impressive and a visual feast with more than 450 colour photographs and illustrations. For example, the section on North America is subdivided into sections on Canada, the United States, Mexico, Central America, and the Caribbean. Certain subsections are divided further highlighting key features and cities, with special pairs of map-satellite images on particularly striking features of Earth, such as the Greenland ice cap, the Great Barrier Reef, Niagara Falls, Mount Etna, Mount St. Helens, and Mount Everest. This world atlas will provide endless hours of examination and enjoyment, in a manner you've never experienced before.

Pope, Frank. 2007. Dragon Sea: A True Tale of Treasure, Archeology, and Greed off the Coast of Vietnam. Harcourt Trade Publishers, New York, NY. 368 pp. Hardcover, \$25.00US (ISBN 0151012075). – Here is a work that delivers an engrossing, true tale of the recovery of the 'Hoi An' ship wreck in the Dragon Sea, a sunken trove of precious 15th century porcelain off the coast of Vietnam. Pope provides the drama and excitement of this amazing discovery, an effort that became the largest and most expensive underwater archaeology project in history. He also illuminates the fierce competition that exists for the recovery of shipwrecks, especially from the relatively high numbers of looters, souvenir seekers and well-equipped treasure hunters. But in the end, it is the detail of the demanding research and commitment by the legitimate maritime archaeologists that captivates the reader and underlines the powerful allure of shipwrecks and the nature of man. Truly an exciting and enjoyable read!

Steene, Roger and Gerry Allen. 2006. Oceanic Wilderness. Firefly Books, Buffalo, NY. 380 pp. Hardcover, \$59.95 (ISBN 1552979997). -- This large-format book takes the reader on an extraordinary illustrated journey under the ocean waves, revealing new and often unusual life forms. Current technology allows us to see what occurs at the ocean's deepest depths, and Steene and Allan do a magnificent job in revealing the stunning beauty and colour of macro and micro organisms inhabiting reefs, tropical islands and lagoons, and cold- and warm-water environments via 500 colour photographs and accurate descriptive text. Regions explored include the Caribbean, Japan, Australia, southeast Asia, and the Pacific and Indian Oceans. Overall, 'Oceanic Wilderness' goes a long way to demystify the Earth's darkest frontier by showing us some of its secrets and exquisite beauty. It is an ideal book for ocean enthusiasts and naturalists, and anyone with an interest in marine conservation and photography.

Villiers, Peter. 2006. Joseph Conrad: Master Mariner. Sheridan House, Dobbs Ferry, NY. 125 pp. Softcover, \$22.95 (ISBN 1574092448). – Here is a biography of Joseph Conrad, the 19th-century novelist, with a difference. It breaks new ground by revealing Conrad's skills as a master mariner, every bit as

accomplished as those depicted in his marine-associated novels. The work, based on researches and an unpublished study report by expert sailor Alan Villiers, was completed after his death by his son, Peter Villiers, and focuses on Conrad as sailor rather than as a writer. It is this that distinguishes this biography from the many others that have been produced since Conrad's death in 1924. Conrad began his career as a sailor in 1874, became a master mariner in 1886, and after 20 years at sea (1894) he settled in England and devoted himself to writing. The sea supplied the setting for most of his novels and short stories as vividly shown here. The book contains a wealth of detail about 19th century sailing and includes a glossary of sailing terms and is illustrated by paintings of ships on which Conrad sailed. Anyone with an interest in 19th century merchant sailing and the associated economic, social and political realities or a Conrad student will want this scholarly book in their library.

Ward, Peter D. 2007. Under a Green Sky: Global Warming, the Mars Extinction of the Past, and What They can tell Us About Our Future. HarperCollins Canada, Toronto, ON. 256 pp. Hardcover, \$33.95 (ISBN 006113791X). – Life on Earth and its development has been periodically interrupted by mass extinctions, most famous of which was the abrupt end of the 'Age of Dinosaurs' 65 million years ago caused by a giant asteroid slamming into the Yucatan Peninsula. Other major disturbances have also been blamed on asteroid strikes, but Peter Ward in his most recent book, 'Under a Green Sky', argues that climate change, not rocks from outer space is responsible for many of these events including the great Permian Extinction, when 97% of life perished. The recently proposed model for mass extinctions, known as the "Greenhouse Extinction", suggests a process where the world warms up over relatively short intervals due to an increase of atmospheric carbon dioxide and methane. This leads to changes in ocean circulation and a vastly enlarged population of green sulfur bacteria, that goes on to produce toxic amounts of hydrogen sulfide. The mass extinction results from the combination of high heat and hydrogen sulfide. In summary, Ward combines a fresh explanation for life's greatest upheavals with a timely message about our own future.

Wright, Larry and Patricia. 2006. Great Lakes Lighthouses Encyclopedia. Boston Mills Press (Firefly Books), Erin, ON. 448 pp. Hardcover, \$45.00 (ISBN 1550463993). – For more than 200 years, lighthouses have provided 'aids to navigation' for mariners on the Great Lakes. This incredibly well-researched and comprehensive full-colour encyclopedia, compiled by the Wrights over a 15-year period, provides detailed information on the more than 650 Canadian and American lighthouses located round the five Great Lakes. Details for each lighthouse include a description of its history, design and construction material, names and timing of the lightkeepers, highlights of events – tragedies and triumphs – that have occurred, and present condition and status. The photos of the lighthouses are striking, vividly showing the great diversity of building forms and styles employed. In summary, this massive guide is both lovely and definitive, a volume that no maritime enthusiast or lover of the 'beacons of hope' should be without.

BRIEF OBITUARY NOTICES

John Butters died in Halifax on 17 May 2007 at the age of 91. In the 1960s, he served as a scientific support officer at Maritime Command and subsequently at BIO as an engineering and science support officer until his retirement in 1981.

Larry Johnston of Mount Uniacke died at home on 28 April 2007 at the age of 59. Larry was a technician at BIO for 31 years, much of it with the Program Support Subdivision of the Atlantic Geoscience Centre.

ABOUT THE ASSOCIATION

The Bedford Institute of Oceanography Oceans Association was established in 1998 to foster the continued fellowship of its members; to help preserve, in cooperation with the Institute's managers and staff, BIO's history and spirit; and to support efforts to increase public

understanding of the oceans and ocean science. Membership is open to all those who share our objectives. Most current members are present or past employees of BIO or of the federal departments of Environment, Fisheries and Oceans, and Natural Resources (or their prede-

cessors) located in the Halifax Regional Municipality. Membership is \$5.00 per year, \$25.00 per half decade, or \$100.00 for a lifetime membership. (Note: Dues will increase in 2008, see p. 1 for details.)

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