



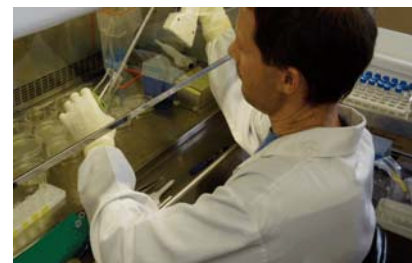
*"Building Research and Development Capacity  
for the Canadian Lobster Industry through the  
AVC Lobster Science Centre"*



# Lobster Science WORKSHOP

*"Working Towards the Future"*

**Delta Prince Edward  
18 Queen Street  
Charlottetown, PEI  
July 28-30, 2004**





July 28-30, 2004

*Charlottetown*  
"Working Towards the Future"



# Lobster Science Workshop

July 28-30, 2004

Delta Prince Edward

18 Queen Street, Charlottetown

Prince Edward Island

## Table of Contents

<i>Words of Welcome</i> .....	2
<i>Workshop Organizing Committee</i> .....	3
<i>List of Sponsors</i> .....	4
<i>Agenda</i> .....	5
<i>List of Presenters</i> .....	7
<i>List of Moderators</i> .....	15
<i>Presentations</i> .....	17
<i>Acknowledgements</i> .....	24
<i>Partners of the Atlantic Veterinary College Lobster Science Centre</i> .....	25
<i>Reader's Notes</i> .....	26



July 28-30, 2004

# Charlottetown

"Working Towards the Future"



## Words of Welcome

Dear Participants,

As Director & Senior Scientist of the Atlantic Veterinary College Lobster Science Centre, and Chair of the Lobster Science Workshop, I am pleased to welcome you to our workshop! Not only do we have some of the best lobster researchers and scientists presenting, we also have industry partners presenting their side of the lobster science equation. By bringing together harvesters, processors, live-shippers, government representatives, academia and other researchers to the same table, one can anticipate a very stimulating event! I encourage you to participate as much as possible in the workshop as this is a unique occasion to have representatives from all sectors of the industry gathered together. Finally, make sure to be present for the open discussion session on Thursday afternoon. This particular session will allow participants to contribute to the workshop and help identify important issues.



I thank you all for attending the workshop; I am convinced you will find this workshop an exciting and rewarding experience. Welcome to Charlottetown, welcome to Prince Edward Island, and again, welcome to the Lobster Science Workshop.

**Dr. Richard J. Cawthorn**  
Chair, Lobster Science Workshop



"Welcome to the first Lobster Science Workshop hosted by the Atlantic Veterinary College Lobster Science Centre. The unique environment created by the AVC Lobster Science Centre provides a vehicle for all stakeholders to work shoulder to shoulder, to capture opportunities and to enhance the economic return from the Canadian lobster resource for the benefit of all Canadians. I encourage all of you to attend as many sessions possible and participate in the Lobster Science Workshop as I am confident that you will find this a very positive event all together. This workshop promises to be a great forum for all sectors of the industry to meet and discuss concerns and issues that are relevant to all of

us. Welcome to the Lobster Science Workshop and I personally look forward to seeing you all at this event."

**Mr. Alan W. Baker**  
Chair, AVC Lobster Science Centre Management Council



July 28-30, 2004

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**Workshop Organizing Committee**

**Rick Cawthorn**  
Workshop Chair  
Director & Senior Scientist  
AVC Lobster Science Centre  
Tel: (902) 566-0584  
Fax: (902) 894-2885  
CAWTHORN@UPEI.CA

**Alan Baker**  
Industry Liaison  
AVC Lobster Science Centre  
Tel: (902) 962-2345  
BAKER@AURACOM.COM

**Lori Edwards**  
Secretary & Data System Coordinator  
AVC Lobster Science Centre  
Tel: (902) 894-2884  
Fax: (902) 894-2885  
LAEDWARDS@UPEI.CA

**Jean Lavallée**  
Clinical Scientist  
AVC Lobster Science Centre  
Tel: (902) 628-4392  
Fax: (902) 894-2885  
JLAVALLEE@UPEI.CA

**Barry Stahlbaum**  
Associate Director  
AVC Lobster Science Centre  
Tel: (902) 566-0827  
Fax: (902) 894-2885  
STAHLBAUM@UPEI.CA



July 28-30, 2004

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## Sponsors

### Principal Sponsor



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**Clearwater Seafood Ltd Partnership**  
757 Bedford Highway  
Bedford, NS  
Canada B4A 3Z7  
902-443-0550  
[www.clearwater.ca](http://www.clearwater.ca)



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550 University Avenue,  
Charlottetown, PE  
Canada C1A 4P3  
902-566-0300  
[www.upei.ca](http://www.upei.ca)



July 28-30, 2004

# Charlottetown

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## AGENDA

### Thursday - July 29, 2004

- 7:30 - 12:30 Registration
- 8:15 - 8:30 **Alan Baker** *Introduction & Welcome*  
Chairman - AVC Lobster Science Centre
- 8:30 - 8:40 **Hon. Kevin MacAdam** *Opening remarks*  
Minister - PEI Agriculture, Fisheries,  
Aquaculture & Forestry
- 8:40 - 9:10 **Ashton Spinney** *Fishermen & Science; vision for a successful future*  
Fisherman - LFA 34

### **Environmental Science Session**

Moderator: **Barry MacPhee**,  
Manager - Marine Fisheries, PEI Agriculture, Fisheries, Aquaculture & Forestry

- 9:10 - 9:30 **Les Burrige** *Anti sea lice pesticides and American lobsters: A summary of ecotoxicological research at the St. Andrews Biological Station*  
Research Scientist - DFO St. Andrews, NB
- 9:30 - 9:50 **Fred Page** *Lobster - Aquaculture Environmental Interactions in the context of Decision Making for Coastal Marine Planning in southwestern NB*  
Research Scientist - DFO St. Andrews, NB
- 9:50 - 10:10 **Gilles Olivier** *Lobsters and chemicals in the environment*  
Manager, Aquaculture & Environmental  
Sciences Division - DFO Moncton, NB
- 10:10 - 10:30 **Charley O'Kelly** *Thoughts on Shell Disease*  
Senior Research Scientist - Bigelow  
Laboratory, Maine USA
- 10:30 - 10:45 - **Health Break** -

### **Fishery Management & Conservation Session**

Moderator: **Joseph Labelle**  
Director - Value Added Products, NB Agriculture, Fisheries & Aquaculture

- 10:45 - 11:05 **Marc Lanteigne** *DFO's perspective on fisheries management*  
Manager, Aquatic Resources Division - DFO  
Moncton, NB
- 11:05 - 11:25 **Martin Mallet** *Hatchery aspect of a lobster enhancement project*  
Université de Moncton
- 11:25 - 11:45 **Patricia King** *Overview of the Fishermen & Scientists Research Society and the Lobster Recruitment Index Project*  
Fishermen & Scientists Research Society
- 11:45 - 12:30 **Lisa Anderson** *Lobster Handling Practices Program: video & presentation*  
Executive Director - Nova Scotia Fisheries  
Sector Council



July 28-30, 2004

*Charlottetown*  
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12:30 - 13:30 - **Lunch** -

13:30 - 14:00 **Jerry Amirault**  
Chairman - Maritime Lobster Processors Co-operative Limited  
&  
**John Garland**  
Senior Biologist - Lobster Division  
Clearwater Seafoods

*Processors, live-shippers & science; Is there a need for collaborative research?*

**Lobster Health Research at the AVCLSC Session**

Moderator: **Doug Pezzack**  
Biologist - Invertebrate Fisheries Division, DFO Dartmouth, NS

14:00 - 14:20 **Rick Cawthorn**  
Director & Senior Scientist  
AVC Lobster Science Centre

*Implications of Paramoebiasis for the Canadian Lobster Industry*

14:20 - 14:40 **Spencer Greenwood**  
Research Scientist  
AVC Lobster Science Centre

*Gaffkemia, seen at the molecular level*

14:40 - 15:00 **Ian Keith**  
Research Scientist  
AVC Lobster Science Centre

*Infectious disease model development at the AVC Lobster Science Centre*

15:00 - 15:20 **Jean Lavallée**  
Research Scientist  
AVC Lobster Science Centre

*Lobster blood protein; a brief overview*

15:20 - 15:40 - **Health Break** -

15:40 - 17:30 **Open discussion**  
Moderator: **Alan Baker**  
Chairman - AVC Lobster Science Centre

17:30 - 17:45 **Rick Cawthorn**  
Director & Senior Scientist  
AVC Lobster Science Centre

*Closing Remarks*

18:00 - 21:00 - **Banquet Dinner** -

**Keynote speaker: James Stewart**  
Scientist Emeritus - DFO Dartmouth, NS

*"Gaffkemia, a fatal bacterial infection of homarid lobsters"*





July 28-30, 2004

*Charlottetown*  
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## Presenters

**GA (Jerry) Amirault, CA**

Chairman

Maritime Lobster Processors Co-operative Limited

Tatamagouche, NS

902-657-0226 jerry.amirault@ns.sympatico.ca

Mr. Amirault has been active with many industries for the past 30 years in a senior management role, always with an interest in facilitating change where challenges are many. Since 2000, he has been Chairman of the Maritime Lobster Processors Co-operative Limited (MLPC). The MLPC has been formed by the major lobster processors in the maritime Provinces to address key issues affecting all the industry. After establishing a process to have open and honest dialogue among the processors, the MLPC has begun to introduce the procurement of live lobster under a negotiated system attached to the market value of the finished product. In addition, the issues of new technology, staff training, etc, are being addressed. All this is to return a focus on building an adequate return on the investment to ensure the long-term health on the industry. Science and conservation of the lobster stock is paramount to a long-term strength of all sectors, thus Jerry is very active in developing processor support of the AVC Lobster Science Centre and its projects, specifically "Lobster<sup>NET</sup>." Currently as a volunteer, Jerry is active in community health and development for the North Shore of Nova Scotia where he operated a farm with his wife Rhonda.

**Lisa Anderson, BBA**

Executive Director

Nova Scotia Fisheries Sector Council

Yarmouth, NS

902-742-6167 ritc@klis.com

Lisa Anderson has over eight years experience working with the fishing industry. Her experiences within the industry are with training and human resources. Lisa's first position held was training coordinator for the Nova Scotia Fisheries RITC. Over the past five years, she has worked as Executive Director of the Nova Scotia Fisheries Sector Council. Lisa is a graduate from Mount Saint Vincent University and holds a Bachelor of Business Administration (1993), majoring in management and accounting.



July 28-30, 2004

*Charlottetown*  
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**Les Burridge, BSc, PhD**

Research Scientist, Marine Environmental Sciences Division  
Fisheries and Oceans Canada - St. Andrews Biological Station  
St. Andrews, NB  
506-529-5903 BurridgeL@mar.dfo-mpo.gc.ca

Dr. Burridge has a BSc from Dalhousie University and a PhD in fish physiology from the University of New Brunswick. He joined the Department of Fisheries and Oceans as a technician in 1978 and has worked in the Marine Environmental Sciences Section (or its equivalent) since that time. Les has been involved in studies to determine the acute and sub-lethal toxicity of pesticides and endocrine disrupting substances to Atlantic salmon. He has also determined the sub-lethal consequences of exposure of marine invertebrates to a number of chemical contaminants. Since the early 1990s he has been studying the acute and sub-lethal effects of chemicals of aquaculture origin on commercially important marine species, particularly the American lobster. He has reported the acute lethality of the anti sea lice pesticides azamethiphos, cypermethrin, pyrethrins, and emamectin benzoate to lobsters. He has investigated the lethality of azamethiphos to various life and physiological stages of the lobster. He identified effects of exposure to anti sea lice compounds on spawning and molting. Finally, he has authored or co-authored three reviews on presence, fate and effects of chemicals of aquaculture origin in the marine environment.

**Rick Cawthorn, BSc, MSc, PhD**

Director & Senior Scientist - Parasitology  
Atlantic Veterinary College Lobster Science Centre  
Charlottetown, PE  
902-566-0584 cawthorn@upei.ca

Dr. Rick Cawthorn is Professor of Parasitology at the Atlantic Veterinary College, University of Prince Edward Island, and the founding Director and Senior Scientist of the AVC Lobster Science Centre. He received his BSc (Fisheries and Wildlife Biology- 1973), MSc (Parasitology - 1976) and PhD (Parasitology - 1979) from the University of Guelph. Rick was a parasitologist at the Western College of Veterinary Medicine (University of Saskatchewan) from 1979-85, specializing in protozoan parasites of cattle, waterfowl and birds-of-prey. After accepting a position as one of the first faculty members of the Atlantic Veterinary College, his research interests shifted to parasitic protozoa of fish, including crustaceans, bivalves and finfish. He has an extensive list of peer-reviewed publications and reviews numerous manuscripts and grant applications for international journals and funding agencies. Rick has led the research program on crustacean health at the University of Prince Edward Island, beginning in spring 1994.



July 28-30, 2004

*Charlottetown*  
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**John Garland, BSc**

Senior Biologist - Lobster Division  
Clearwater Seafood Ltd. Partnership  
Bedford, NS  
902-457-5919 jgarland@clearwater.ca

John Garland is the Senior Biologist for Clearwater Seafood' Lobster Research and Development group. John has been involved with the fishing industry most of his life, working as a deckhand on his father's commercial dragger as well as harvesting sea urchins. After obtaining his Bachelor of Science Degree with an advanced major in Marine Biology at Dalhousie University, he began working with Clearwater, eventually taking over the role of senior biologist. John has been with Clearwater for 10 years, involved in such activities as the design and construction of commercial-sized recirculated water lobster holding systems worldwide, investigating lobster physiological responses to storage, shipment and handling stress and is currently working on implementing a HACCP based critical control point program for quality handling of live lobster.

**Spencer Greenwood, BSc, MSc, PhD, DVM**

Research Scientist - Molecular Biology  
Atlantic Veterinary College Lobster Science Centre  
Charlottetown, PE  
902-628-4308 sgreenwood@upei.ca

Spencer Greenwood is a Research Scientist at the AVC Lobster Science Centre. He is a veterinarian (DVM, Ontario Veterinary College) with a MSc in Zoology (University of Guelph) and a PhD in Biochemistry-Molecular Biology (Dalhousie University). He was awarded a Canadian Institutes of Health Research - Postdoctoral Fellowship for work on gene regulation and host-pathogen interactions. His major research focus is on using the tools of molecular biology to develop a better understanding of how microscopic organisms cause diseases in lobsters. Current research projects are directed towards Gaffkemia, Bumper Car Disease and Paramoebiasis.



July 28-30, 2004

*Charlottetown*  
"Working Towards the Future"



**Ian Keith, BSc, DVM**

Research Scientist - Immunology  
Atlantic Veterinary College Lobster Science Centre  
Charlottetown, PE  
902-894-2887    ikeith@upei.ca

Dr. Ian Keith is a veterinarian with extensive experience in aquatic species. He graduated from the Atlantic Veterinary College with a DVM (1993) after completing his BSc in Microbiology at the University of Guelph (1981). Ian has over 15 years of experience in aquatic species health and research, having worked for Aqua Health Ltd, where he contributed to the development of the first and only vaccine designed for use in lobster. Over the years, Ian gained valuable experience on both coasts of Canada. He moved back to the Maritimes in 1999 where he worked in southwestern New Brunswick with the salmon aquaculture industry and also conducted a major lobster health monitoring project. In 2001, Ian joined the AVC Lobster Science Centre as a Research Scientist. His major research focus has been on lobster bacteriology and immunology. Ian's current research projects include among other thing, the development of infection disease model using gaffkemia and the weak lobster syndrome.

**Patricia King, BBA**

General Manager  
Fishermen & Scientists Research Society  
Halifax, NS  
902-876-1160    pattyfsrs@auracom.com

Ms. King has been the General Manager of the Fishermen and Scientists Research Society since its inception in January 1994. She was also involved in the development and implementation of the concept for the FSRS in 1993. Patty has a Bachelor of Business Administration with Distinction from Mount Saint Vincent University and a Certificate in Adult Education from Henson College. She is the owner of PMD Services - Project Management and Development. In addition to working for the FSRS, her company works with other costal community related clients; she is currently working with the Gulf of Maine Summit as their conference coordinator.



July 28-30, 2004

*Charlottetown*  
"Working Towards the Future"



**Marc Lanteigne, MSc**  
Manager, Aquatic Resources Division  
Fisheries and Oceans Canada - Gulf Fisheries Centre  
Moncton, NB  
506-851-6212    LanteigneM@mar.dfo-mpo.gc.ca

Born in Lamèque, an island along the northeastern shore of New Brunswick, Marc Lanteigne was initiated to the marine environment as deck hand onboard his father's fishing boat. After two years of lobster fishing, he decided to pursue a career in marine biology. In 1985, Marc entered the Department of Fisheries and Oceans after completing his MSc from the Université de Moncton. His graduate research focussed on snow crab larvae distribution and fluctuations along the NB shore. After 20 years with DFO, Marc worked with numerous marine species and fisheries, and on different issues; snow crab, shrimp, cod, herring, scallop and lobster to name a few that took most of his time. For eight years, he was the section head of the lobster research group which dealt mainly with lobster studies and fisheries, but also with rock crab and different emerging fisheries. In 2003, he took a new challenge as manager of the Aquatic Resource Division. As a division manager, he now has the opportunity to work in close collaboration with research teams working with crustaceans (snow crab, lobster, and rock crab), marine, and diadromous fish. He is also the Gulf Region coordinator for all departmental activities related to the new Species at Risk Act.

**Jean Lavallée, DVM, MSc**  
Clinical Scientist - Epidemiology  
Atlantic Veterinary College Lobster Science Centre  
Charlottetown, PE  
902-628-4392    jlavallee@upei.ca

Dr. Jean Lavallée is one of the very few veterinarians with a graduate degree in lobster health in Canada. Jean holds his doctoral degree in veterinary medicine from the University of Montreal (1995). After completing a veterinary residency in aquaculture health management (1998) and a Master of Science degree in epidemiology applied to the Canadian lobster industry (1999) at the Atlantic Veterinary College, University of Prince Edward Island, Dr. Lavallée worked as the Lobster Health Coordinator for AVC Inc., the corporate arm of the University of Prince Edward Island. In January 2000, Dr. Lavallée founded a consulting company, Aquatic Science & Health Services, that specializes in veterinary medicine and research applied to aquatic species. Jean is now working as the clinical scientist with the AVC Lobster Science Centre, where he is researching some of the factors contributing to lobster diseases in both wild and captive populations. His main research focus at the AVC Lobster Science Centre has been the LobsterNET activity, which is an online lobster information delivery system for the industry.



July 28-30, 2004

*Charlottetown*  
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**Martin Mallet, MSc**

Coastal Zones Research Institute, Université de Moncton  
Shippagan, NB  
506-532-2485 Mmallet@umsc.ca

Martin Mallet underwent his MSc studies at Université de Moncton where he worked on the optimization of oyster culture using the floating bag technique. After his studies, he moved on to work with the New Brunswick Professional Shellfish Growers Association where he acted as a research and development consultant for the industry. Last winter, Martin joined the Coastal Zones Research Institute as Head of the lobster hatchery project, where he is currently conducting research on lobster rearing techniques while coordinating the production of stage IV lobsters for seeding experiments.

**Charley O'Kelly, BSc, PhD**

Senior Research Scientist  
Bigelow Laboratory for Ocean Sciences  
West Boothbay Harbor, ME  
207-633-9600 cokelly@bigelow.org

Dr. Charles O'Kelly is a Senior Research Scientist at the Bigelow Laboratory for Ocean Sciences, in West Boothbay Harbor, Maine. He joined Bigelow in 1993, and has been a Senior Research Scientist since 2000. Charley received his BS in Biology from Bates College (1975) and his PhD in Botany from the University of Washington (1980). Among several appointments in his professional career, Dr. O'Kelly was a Program Director in the Systematic Biology Program, Division of Environmental Biology, at the National Science Foundation from 1995 to 1998. Dr. O'Kelly has published close to 60 peer-reviewed publications and he has also contributed chapters in 10 books. His main research interest is protist systematic biology. Specifically, he is interested in the reconstruction of the phylogeny and evolution of poorly known protist taxa (including many algae, fungi and protozoa) using morphological and molecular tools. One area of research in his laboratory is dealing with the relationships among tubulocristate Gymnamoebae, where they seek to discover what the total diversity of amoebae is, and what the significance of this diversity, and of individual species, is in the context of ocean biology.



July 28-30, 2004

*Charlottetown*  
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**Gilles Olivier, PhD**

Manager, Aquaculture and Environmental Sciences Division  
Fisheries and Oceans Canada - Gulf Fisheries Centre  
Moncton, NB  
506-851-2054 OlivierG@mar.dfo-mpo.gc.ca

Dr. Gilles Olivier has spent 15 years working as a research scientist at DFO's Halifax Laboratory on Lower Water Street, Halifax, NS. His research covered the fields of fish immunology and fish diseases including furunculosis caused by the bacterium *Aeromonas salmonicida* and Bacterial Kidney Disease (BKD). In 1998, Gilles relocated to the Gulf fisheries Centre (GFC) in Moncton and became Section Head of the Aquaculture Section including the Aquatic Animal Health (finfish and shellfish) as well as Molluscan productivity programs. Since 2002, Dr. Olivier has been the Manager of the newly formed Aquaculture and Environmental Sciences Division.

**Fred Page, PhD**

Research Scientist, Oceans Sciences Division  
Fisheries and Oceans Canada - St. Andrews Biological Station  
St. Andrews, NB  
506-529-5935 PageF@mar.dfo-mpo.gc.ca

Dr. Page is a research scientist and the Responsibility Centre Manager for the Coastal Ocean Sciences program at the Fisheries and Oceans Canada Biological Station in St. Andrews, New Brunswick. He received his BSc (Hons) in Marine Biology and MSc in Biology from the University of New Brunswick and his PhD in Oceanography from Dalhousie University. His scientific expertise is in the biological, ecological, fisheries and physical oceanographic aspects of the coastal zone and continental shelf, especially in the Bay of Fundy, Gulf of Maine and Scotian Shelf region. His work emphasizes the applications of these disciplines to fisheries, aquaculture and coastal zone management. Throughout the 1980s and early 1990s his work focussed primarily on fisheries oceanography. However, as part of DFO reorganization activities in the mid-1990s his emphasis shifted to the development of an inshore coastal oceanographic program that focuses on oceanographic-aquaculture interactions. More recently this work has expanded to include statistical analyses of phytoplankton bio-diversity, harmful algal abundance dynamics and scientific decision support for sustainable aquaculture development and integrated coastal zone management. A major theme of Dr. Page's research has been the influence of physical transport and dispersal processes on the distribution of living organisms, especially the pelagic early life stages of fish and invertebrates, the dispersal of disease vectors between fish farms and the dispersal of effluents from aquaculture farms. His work with lobster has been in the context of the transport and dispersal of pelagic stages and in the potential for interactions between aquaculture effluents and lobster.



July 28-30, 2004

# Charlottetown

"Working Towards the Future"



**Ashton Spinney**  
Co- Chair, LFA 34 Advisory Committee &  
President, LFA District 34 Lobster Committee  
Glenwood, NS  
902-643-2490

Mr. Ashton Spinney is an active lobster license holder in Lobster Fishing Area 34, in Southwest Nova Scotia. Ashton has been involved in lobster fishing for more than 40 years. Among many involvements, he is also an elected port representative on the LFA 34 advisory committee. Additionally, Ashton is the Co-Chair of this committee and he has held this position for more than 10 years. Ashton also serves the industry as Co-Chair of the Lobster Action Committee where he is leading the charge regarding enhancing the quality of lobster in Southwest Nova. This group is working to develop a mechanism which might provide the industry with a predictive capability whereby expected lobster quality in a given LFA can be determined prior to season start. In general, Ashton is a faithful supporter of all initiatives aimed at enhancing the sustainability of the lobster resource and the maximization of value from the same - whether the meeting is in his home province, the Atlantic region, or in the United States - Ashton will be present and open to provide his insight.

## Keynote Speaker

**James Stewart, PhD**  
Research Scientist Emeritus, Habitat Ecology Section  
Fisheries and Oceans Canada - Bedford Institute of Oceanography  
Dartmouth, NS  
902- 426-8145    StewartJE@mar.dfo-mpo.gc.ca

Dr. Stewart obtained his Bachelor's & Master's degrees in Microbiology with minors in Biochemistry and Chemistry from the University of British Columbia. He then graduated from the University of Iowa (1958) with a PhD in Microbiology with minors in Biochemistry and Chemistry; his thesis was entitled: Microbial Oxidation of Hydrocarbons. After completing his PhD, Jim was employed at the Halifax Laboratory of the Fisheries Research Board of Canada (FRBC). This organization (FRBC), after several twists and turns became part of what eventually developed into the Department of Fisheries and Oceans. He was mostly engaged in studies on metabolism of marine bacteria, diseases of aquatic animals notably the lobster and its disease, gaffkemia (host/pathogen interactions and induction of resistance). Some of the various research side avenues into environmental studies, mariculture concerns and a lengthy excursion in administration. Dr. Stewart is currently a *Scientist Emeritus* at the Bedford Institute of Oceanography, where is cleaning up old files and studying the involvement of microorganisms in the production of toxins by microalgae.



July 28-30, 2004

*Charlottetown*  
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## Moderators

### **Alan Baker**

Industry Liaison

Atlantic Veterinary College Lobster Science Centre  
902-962-2345    baker@auracom.com

Mr. Baker is currently Chairman of the Atlantic Veterinary College Lobster Science Centre Management Council and he also acts as the Industry Liaison for the Centre. Alan obtained a Bachelor of Business Administration from the University of Prince Edward Island in 1975 and he has now over 35 years of professional experience in the fishing industry with an impressive résumé which demonstrates his involvement in all sectors of the industry; from the harvesting to the processing sectors, from the federal enforcement to the industry promotion sectors, from the private sector to the research and academic environment. In fulfilling these roles, countless presentations, submissions and briefs have taken place to audiences such as: Senate Standing Committees, Parliamentary Standing Committees, Government Commissions, inquiries, working groups, roundtables, vision sessions, on areas specific and related to the fishery and seafood sectors including Aboriginal issues, international fishery agreements, international trade challenges, industry and human development matters. Since 1975, Alan has served as a member of several fishery related working groups, advisory committees. Additionally, Mr Baker is a very active community member, serving on committees and boards of administration of various community and service based organizations.

### **Joseph Labelle**

Senior Project Executive - Strategic Marine Resources Branch  
New Brunswick Department of Agriculture, Fisheries and Aquaculture  
Bouctouche, NB  
506-743-7222    joseph.labelle@gnb.ca

Mr. LaBelle was born and spent his early years in Charlottetown. He later moved to New Brunswick and completed his education there and in Quebec. Joseph spent ten years in the food service and hospitality industry in Western Canada, Québec, Ontario and the Maritimes. Additionally, he worked in the retail food sector for a number of years. He has been the Executive Director of the New Brunswick Seafood Processors Association and is currently a Senior Project Executive with the Strategic Marine Resources Branch of the New Brunswick Department of Agriculture, Fisheries and Aquaculture.



July 28-30, 2004

*Charlottetown*  
"Working Towards the Future"



**Barry MacPhee**

Manager - Marine Fisheries

Prince Edward Island Department of Agriculture, Fisheries, Aquaculture & Forestry

Charlottetown, PE

902-569-7710 jbmacphee@gov.pe.ca

Mr. MacPhee graduated from Acadia University, Wolfville, Nova Scotia in 1988 with a BSc in Biology. Through university, Barry worked at the Margaree Salmon Hatchery, where he developed an interest in aquaculture. He then proceeded to the Marine Institute in St. John's Newfoundland and then obtained a Graduate Diploma in Aquaculture (1990). Barry has worked for Clearwater Lobster as a lobster biologist in Clarks Harbour and Arichat, and after moving to British Columbia, he worked in the aquaculture industry. He worked at Heritage and Stolt Aquaculture operations in British Columbia in sea cage and hatchery aquaculture. Barry then took a position as fisheries manager with the Kitkatla Tribal Council, located southeast of Prince Rupert where he was involved in all aspects of the tribal councils fisheries program from management plans to shellfish aquaculture. He was also involved in treaty negotiation research and the forestry program. Barry eventually took a position as Director of Co-Management with the Heiltsuk Tribal Council in Bella Bella, BC, where his duties included the development of fisheries management plans, co-coordinating license leases, fish plant operations and sales, establishing a community dog fish fishery, spawn on kelp management, treaty negotiations, hatchery operations, overseeing the tribal councils clam fishery, reviewing forestry plans and advising Chief and Council on Fishery, Treaty and Forestry issues. Since November 2001 Mr. MacPhee has been Manager of Marine Fisheries for the PEI Department of Agriculture, Fisheries, Aquaculture and Forestry. His duties include representing the Province in the advisory committee process. He is the alternate provincial Cosewic member. He has just been nominated to represent the province on the newly established aquatic species at risk task group.

**Douglas Pezzack, MSc**

Biologist - Invertebrate Fisheries Division

Fisheries and Oceans Canada - Bedford Institute of Oceanography

Dartmouth, NS

902-426-2099 PezzackD@mar.dfo-mpo.gc.ca

Mr. Pezzack graduated from University of Guelph with an MSc in Marine Biology, and began his work at the St. Andrews Biological station in St. Andrews, NB in 1978. Doug first worked on the uptake of heavy metals and PCBs by invertebrates, then later as the biologist responsible for the offshore lobster fishery. Doug moved to Halifax in 1981 where he has worked with lobsters and the lobster fishing industry in LFA 34 and the offshore fishery in LFA 41. He has attended numerous national and international meetings and served as an external reviewer in assessments of the USA and Canadian lobster fisheries. Research interests include lobster growth, movements, stock structure and the role of environmental changes on lobsters. Doug has conducted work in the offshore regions studying lobster growth and migration and working with American scientists who observed lobster in their deepwater



July 28-30, 2004

# Charlottetown

"Working Towards the Future"



habitat using submersibles and ROVs. In the winter of 1999 he filled in as acting Senior Advisor for Invertebrate Fisheries at DFO head quarters in Ottawa, but returned to the Maritimes to continue working on the lobster fishery. In recent years, Doug has also been responsible for the developing crab fisheries (Rock, Jonah and deep-sea Red Crab) in LFA 34 and the offshore. Present projects include the assessment of the LFA 34 and 41 lobster fisheries, lobster growth and maturity, and the role of environment on lobster populations and fisheries.

## Presentations

### **Processors, live-shippers & science; Is there a need for collaborative research?**

*Ashton Spinney*  
LFA 34 Fisherman

*Denny Morrow*  
Nova Scotia Fish Packers Association

For fishermen to have a successful future, they must first come to grip with two significant concepts; *trust* and *greed*. Everyone within the industry, not only fishermen, must work towards achieving *trust* and admit that the *greed* is present, recognise it and work towards getting rid of it. The outcome of all research completed within the lobster industry must be beneficial to all, including the harvest and post-harvest sides of the industry. This is why I asked Mr. Denny Morrow of the Nova Scotia Fish Packers Association to present with me some of our past experiences and newer approaches to lobster science. This presentation will briefly discuss some projects that we have been involved with, including the making of a lobster best practices video in collaboration with Nova Scotia Fisheries Sector Council, and the establishment of a Lobster Action Committee. The formation of this committee was important since it was able to secure funding from DFO to study the soft shell and lower quality problem that has affected Southwest NS 2 out of the last 3 years. Another topic that will be discussed is the pilot project allowing fishermen along with other scientists to review the resource assessment information prior to being discussed at local RAP's. This would enable everyone to both scrutinize and be well informed at the RAP's.



July 28-30, 2004

*Charlottetown*  
"Working Towards the Future"



**Anti sea lice pesticides and American lobsters: A summary of ecotoxicological research conducted at the St. Andrews Biological Station**

*Les Burridge*

Fisheries and Oceans Canada - St. Andrews Biological Station

The salmon aquaculture industry in Southwest New Brunswick is twenty-five years old. There are currently 96 farms, producing in excess of 33,000 tonnes of salmon. Since 1994 use of pesticides and drugs to treat salmon against infestations of ectoparasitic copepods (sea lice) has become a normal part of aquaculture operations. Use of these compounds has raised concerns regarding their potential effects on indigenous, non-target species, and particularly the American lobster. A summary of experiments conducted at the St. Andrews Biological Station will be presented. Azamethiphos, trade name Salmonsan®, is used as a bath treatment for parasite-infected salmon. After treatment the effluent is released directly to the water surrounding the aquaculture net pen. The 48 h LC50 of Azamethiphos ranges from 1 to 3 µg/L for larval stages of the lobster. This represents 1 % to 3 % of the recommended treatment concentration. Emamectin benzoate, trade name SLICE®, mixed with fish food and fed to salmon as an in-feed drug. Faeces and uneaten food can carry this drug into the surrounding environment. Emamectin benzoate is not lethal to lobsters at concentrations used by the aquaculture industry. Studies have shown that azamethiphos and emamectin benzoate can affect reproduction and molting in the American lobster. The results of all studies will be discussed in terms of risk to non-target organisms.

**Lobster - Aquaculture environmental interactions in the context of decision making for coastal marine planning in southwestern New Brunswick**

*Fred Page*

Fisheries and Oceans Canada - St. Andrews Biological Station

**Lobsters and chemicals in the environment**

*Gilles Olivier*

Fisheries and Oceans Canada - Gulf Fisheries Centre

DFO is currently funding the Centre of Excellence for Research on Pesticides (CERP) operating out of Winnipeg, Manitoba. One of the projects funded under this new initiative targets lobsters in an effort to investigate the potential for pesticides to interfere with the nearshore/estuarine early life stage development of American lobster (*Homarus americanus*). Emphasis will be placed on endocrine active compounds that have the capacity to interfere with normal hormonal function in animals. A brief history of the rationale for choosing this project will be presented; why is it considered to be a concern and why the unique geography of PEI (short length of their freshwater systems) could influence this project. Earlier results obtained with salmon and nonylphenol will be discussed. Finally a brief description of the proposed workplan of this project will be presented.



July 28-30, 2004

*Charlottetown*  
"Working Towards the Future"



**Thoughts on shell disease**

*Charley O'Kelly*

Bigelow Laboratory for Ocean Sciences

The term "shell disease" is used to describe progressive erosive lesions in the exoskeleton of crustaceans. In the American lobster (*Homarus americanus*) there are at least two forms of the disease. The "impoundment" form most often appears in captive animals, while the "rosette" form is known primarily from wild-caught stock. Animals with either form of shell disease are unsightly and therefore difficult to market; an aggressive form of "rosette" shell disease has had serious impacts on the lobster fishery in eastern Long Island Sound and Massachusetts Bay. The lobster exoskeleton normally carries a complex microbial community ("biofilm") consisting of both bacteria and protozoa. Shell disease lesions result when bacteria from this biofilm attack the exoskeleton from the outside. Research led by Drs. Roxanna Smolowitz (Marine Biological Laboratory) and Andrei Chistoserdov (University of Louisiana, Lafayette) indicate that the bacteria in "rosette" shell disease lesions mostly belong to a group (*Flavobacteriaceae*) that are primary colonizers of substrate, produce enzymes that break down complex polysaccharides including chitin, and are resistant to grazing by protozoa. Susceptibility to shell disease may result from conditions that favor the development of shell disease bacteria over other components of the exoskeleton biofilm, and/or from conditions that remove or disable compounds from the exoskeleton that prevent bacterial attack.

**The lobster fishery in Atlantic Canada - Managing the fishery and protecting the resource**

*Marc Lanteigne*

Fisheries and Oceans Canada - Gulf Fisheries Centre

A historical overview of lobster catches in Atlantic Canada and United States is presented, with a focus on the southern Gulf of St. Lawrence. Recent high catches are presented with emphasis on resource geographical similarities and differences. The management regime adopted in Canada, and associated conservation measures are explained.

Although the lobster fishery is one of the most regulated fisheries in Canada, and recent catches have peaked to record levels, this fishery still operates under a management regime and effort levels which contribute to a situation of high risk of recruitment overfishing. The challenge facing the long term sustainability of the lobster fishing industry is presented and explained.



July 28-30, 2004

*Charlottetown*  
"Working Towards the Future"



**Hatchery aspect of a lobster (*Homarus americanus*) enhancement project**

*Martin Mallet*

Coastal Zones Research Institute

The constant decrease of lobster catches in the southern Gulf of St-Lawrence has prompted the Maritime Fisherman's Union to establish, in collaboration with several partners\* including the Coastal Zones Research Institute (CZRI), a research project aiming at determining the effects of stage IV lobster seeding and habitat enhancement on the lobster resource. Within this project, one of the CZRI's roles is to ensure a production of hatchery-reared stage IV lobsters for release on pre-selected experimental sites in Caraquet Bay, NB. A periodical survey of those sites by DFO will be done in order to measure the success of lobster seeding in this area. The CZRI is also committed to the development of a simple and economic hatchery technology, which will be transferred to community based fishermen groups in order for them to conduct their own seeding efforts in the future. Our experience and preliminary results with this project will be discussed.

- \* Orion Seafood Group Canada;  
Eel River Bar First Nation;  
Department of Fisheries and Oceans, Canada; and  
NB Department of Agriculture, Fisheries and Aquaculture

**Overview of the Fishermen and Scientists Research Society and  
the lobster recruitment index project**

*Patty King*

Fishermen & Scientists Research Society

The Fishermen and Scientists Research Society (FSRS) is a non-profit society incorporated in 1994 with the primary goals of collaborative research and co-education of fishermen and scientists. The FSRS currently has over 300 members from across Atlantic Canada and beyond. Through the FSRS, fishermen have a key role in identifying research priorities and implementing research. Scientists provide guidance in developing scientific protocols. One of the primary research activities of the FSRS is the Lobster Recruitment Index Project, however, other work is ongoing on groundfish, several crab species, lobster and dogfish.

This presentation will provide an overview of the FSRS, its objectives and operations, and details about the Lobster Recruitment Index Project. Information will be provided on the design and implementation of the project, trap and gauge design, data collection and analysis, and how the data is being used. The future direction of the project and the collaboration that is occurring with the Gulf of Maine Lobster Foundation will also be highlighted.



July 28-30, 2004

*Charlottetown*  
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**Lobster handling practices program**

*Lisa Anderson*

Nova Scotia Fisheries Sector Council

This presentation is about a recent project that was undertaken by the sector council. A group of concerned fishermen's organizations and processors initiated a research and consultation project to identify ways to improve the handling of lobster at sea by Nova Scotian vessels. Since the inception of the project in 2002, the group led by the Nova Scotia Fisheries Sector Council, shared a common goal of achieving the highest quality lobster thus increasing the value of their product in the face of ever increasing world wide competition. Phase I of the Project focussed on identification of current at-sea lobster handling practices across Nova Scotia and a review of current research on the effects of these handling methods. Phase II developed a workshop and video to educate both existing fishermen and new entrants to the fishery by demonstrating proper lobster handling at sea from the perspective of industry participants across the province.

The ultimate goal was to develop material that would promote the best at-sea lobster handling practices, improve the profitability for harvesters and processors while reestablishing pride within industry members. During her presentation, there will be an opportunity to view the instructional video. *Quality Lobster from Ship to Shore* gives an overview of the best lobster handling practices on board Nova Scotian lobster vessels. Designed for both the harvesting and processing sector, this video will provide the viewer with the know how to effectively land high quality lobster.

**Processors, live-shippers & science; Is there a need for collaborative research?**

*Jerry Amirault*

Maritime Lobster Processors Co-operative Limited

*John Garland*

Clearwater Lobsters

The lobster industry is Canada's most valuable commercial fishery with approximately \$987 million in sales from live and frozen markets in 2003. This value extends into the hundreds of small communities in Atlantic Canada that rely heavily on the success of this industry. Are we, as an industry doing, enough to ensure the sustainability of this fishery? Are we using practices that reduce the amount of waste in the industry so that we can extract full value from this limited resource? We as an industry have relied on the Canadian government to collect data that would allow us to manage the fishery for future sustainability. However, in today's climate of shrinking government budgets, this management program may not be able to respond to the current needs of the industry by itself. Industry must become significantly more involved in the efforts needed to advance lobster science and increase data collection and analysis to ensure that this precious, limited resource continues thrive and produce. A comparison of scientific efforts will be made between Canada and other commercial lobster fishing industries worldwide.



July 28-30, 2004

*Charlottetown*  
"Working Towards the Future"



**Implications of paramoebiasis for the Canadian lobster industry**

*Richard J. Cawthorn*

Atlantic Veterinary College Lobster Science Centre

Paramoebiasis is a disease well recognized and documented in farmed Atlantic salmon (Australia, western USA), wild blue crabs (eastern seaboard USA), and wild sea urchins (Canada). Recently this disease was considered an important factor in the die-off of lobsters (*Homarus americanus*) in Long Island Sound. Although the causative agents, species of *Neoparamoeba* (*Paramoeba*), apparently live in Atlantic Canadian waters, their impact on the lobster fishery is unclear. A primary concern is that ten's of millions of pounds of live lobsters are imported annually into Canada for processing - are pathogens imported at the same time? The focus of research on paramoebiasis at the AVC Lobster Science Centre is: to identify, using molecular tools, which species of *Neoparamoeba* infect lobsters; determine how species of *Neoparamoeba* cause disease in various vertebrate and invertebrate hosts; develop assays to test chemotherapeutants and disinfectants against *Neoparamoeba* spp.; and to develop diagnostic tools for detection of *Neoparamoeba* spp. in host tissues and the environment. Additionally we will evaluate the role of species of *Neoparamoeba* in the development of shell disease. Our ultimate intent is to develop tools for monitoring and surveillance programs on paramoebiasis.

**Gaffkemia, seen at the molecular level**

*Spencer Greenwood*

Atlantic Veterinary College Lobster Science Centre

More than 50 years after it was first discovered, *Aerococcus viridans* var. *homari*, the causative agent of gaffkemia continues to account for significant losses within the post harvest sector of the commercial lobster industry. Since this time, a considerable body of research has detailed the biology of the bacterium *A. viridans* var. *homari* and the impact of gaffkemia on lobsters. However, the exact mechanism(s) by which the bacterium causes disease in lobsters have remained elusive. As a first step in the exploration of the molecular pathogenesis of gaffkemia, we wanted to know the amount of genetic diversity within *A. viridans* var. *homari*. Understanding the genetic diversity within a species is important for the recognition of disease outbreaks, the determination of sources of infection, the detection of particularly virulent strains as well as the host distribution and geographical origin of possible variants of a specific pathogen. In the present study, a combination of DNA sequencing and fingerprinting was used to characterize the genetic diversity within *A. viridans* var. *homari* found on the Atlantic Coast of North America.



July 28-30, 2004

# Charlottetown

"Working Towards the Future"



## **Infectious disease model development at the AVC Lobster Science Centre**

*Ian Keith*

Atlantic Veterinary College Lobster Science Centre

When lobsters are captured and transported to storage, whether to tidal pounds or to dryland pounds, they will often receive wounds. Bacteria in the water or on the surface will enter through the wound resulting in what is appropriately called capture-bacteremia. Obviously, the defence mechanisms responsible for removing these bacteria are essential to the successful live marketing of lobsters. The bacterium *Aerococcus viridans*, the causative agent of gaffkemia, is highly pathogenic. It follows a predictable course to death. Because so much about the bacterium and its effect on the lobster has been uncovered, sound management practices can be adopted to minimise losses to it. An opportunistic pathogen has more recently been described; it has caused losses in the late summer and fall in tidal pounds and is often referred to as "weak lobster syndrome." An opportunistic pathogen differs from a primary pathogen like the bacterium causing gaffkemia. A healthy lobster will die from a single bacterium of *Aerococcus viridans* no matter how ideal the holding conditions are; a lobster will die from an opportunistic pathogen if the conditions are right for the disease. It is very difficult to figure out the conditions that result in disease. This is not unique to lobsters: bivalves like clams and oysters have opportunistic bacterial pathogens of the same family of bacteria, and other crustaceans like shrimp also have opportunistic bacterial pathogens of the same family. What makes opportunistic pathogens appropriate for study is that you can infect lobsters with the bacterium and measure the immune parameters that are activated in successful defence against the bacterium and we are developing disease models using these bacteria. One speculates that these factors are important to defence, and one can then look to conditions that are associated with a failure of activation. Measures of these factors then become potential tests for predicting survival under the storage conditions.

## **Lobster blood protein; a brief overview**

*Jean Lavallée*

Atlantic Veterinary College Lobster Science Centre

Lobster blood, or hemolymph, protein is being used widely by researchers and industry as an indicator of lobster health. The low cost and readily availability of refractometers to measure protein levels in lobster hemolymph has helped increase the number of commercial facilities using this method to assist in making production and marketing decisions. There are presently several different models of refractometers on the market, all with their pros and cons. However, they all measure a refractive index that is correlated to protein levels. Several factors will influence those protein levels such as diet, time of the year, gender, temperature, dehydration or just the molt cycle. Therefore, it is important to understand these variation biases when comparing total solids protein levels among groups of lobsters. This presentation will explain some of the science behind the refractometric method of measuring lobster hemolymph protein, what those readings really mean, and will identify some of the causes of variations among readings.



July 28-30, 2004

*Charlottetown*  
"Working Towards the Future"



**Gaffkemia, a fatal bacterial infection of homarid lobsters**

*James Stewart*

Fisheries and Oceans Canada - Bedford Institute of Oceanography

Gaffkemia, a bacterial disease caused by *Aerococcus viridans* var. *homari*, is probably the most important infectious disease of impounded American lobsters causing major economic impact. The history of this disease will be reviewed briefly with key features highlighted to illustrate particular host/pathogen interactions and will close with a short account of some results not previously reported.

## Acknowledgements

The Atlantic Veterinary College Lobster Science Centre and especially the Lobster Science Workshop Organising Committee would like to take this opportunity to thank all the presenters and moderators for their valuable contributions to the successful delivery of this workshop. Additionally, the workshop would not have been possible without the generous contribution of our sponsors including the Atlantic Veterinary College Lobster Science Centre, the Atlantic Veterinary College, Clearwater Seafood Ltd Partnership, the Delta Prince Edward, Millbrook Band Council, Ocean Choice International Ltd., PaperFlow and the University of Prince Edward Island. We want to extend our thanks to the staff of the Delta Prince Edward for their professionalism throughout the preparation and delivery of the Lobster Science Workshop. Finally, we would like to sincerely thank all attendees for participating in our workshop. We hope that all stakeholders in the lobster industry benefited from this Lobster Science Workshop.

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**Dr. Richard J. Cawthorn**  
Lobster Science Workshop Chair



July 28-30, 2004

# Charlottetown

*"Working Towards the Future"*



## Partners of the Atlantic Veterinary College Lobster Science Centre

The AVC Lobster Science Centre is funded through various partners representing the lobster industry, including fisher organizations, processors, exporters, other private sector companies, several provincial and federal government agencies, First Nations, and the Atlantic Innovation Fund which is administered by the Atlantic Canada Opportunities Agency. The overall research activities of the AVC Lobster Science Centre are directly overseen by our partners and are applicable to the needs of the lobster industry. *To find out more information on how to become one of our esteemed and valuable partners, give us a call!*

The AVC Lobster Science Centre would like to take this opportunity to sincerely thank and recognize the many partners, past and current, that contributed and keep contributing to our success.

### **CONTRIBUTING PARTNERS (2001 - June 30, 2004)**

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