
PROFILES IN CANADIAN AQUACULTURE



Bulletin

de l'Association aquacole du Canada

112-1

Vous pouvez recevoir le *Bulletin* en vous y abonnant pour la somme de 60\$ par année ou en devenant membre de l'Association aquacole du Canada (AAC), organisme à but non lucratif. Pour de plus amples renseignements, communiquez avec l'Association aquacole du Canada, 16 Lobster Lane, St-Andrews (Nouveau-Brunswick), Canada E5B 3T6 [tél.: 506 529-4766; téléc.: 506 529-4609; courriel: aac@dfo-mpo.gc.ca; Internet: <http://www.aquacultureassociation.ca>]. La cotisation s'élève à 100\$ par personne (50 \$ pour les étudiants et les retraités) et 300\$ pour les sociétés. Le *Bulletin* est répertorié dans les Résumés des sciences aquatiques et halieutiques (ASFA) et le Zoological Record. Envoi de publication Enregistrement n° 40065445.

ISSN 0840-5417

Conception et mise en page: Capamara Communications Inc.
Imprimé par Rhino Print, Vancouver, BC

Dirigeants

Shelley King, Présidente

Kathy Brewer-Dalton, Présidente désignée

Céline Audet, Président sortant

Joy Wade, Vice présidente

Grant Vandenberg, Secrétaire

Matthew Liutkus, Trésorier

Membres du conseil d'administration

David Stirling, Jessica Whitehead, Myron Roth,
Tom Taylor, Stefanie Hixon

Rédactrices

Linda Hiemstra and Joy Wade

Bulletin

of the Aquaculture Association of Canada

112-1

The *Bulletin* is available through subscription (\$60 per year) or as a benefit of membership in the Aquaculture Association of Canada, a nonprofit charitable organization.

For membership information contact:

Aquaculture Association of Canada, 16 Lobster Lane,
St. Andrews, N.B., Canada E5B 3T6

[telephone 506 529-4766; fax 506 529-4609;

e-mail aac@dfo-mpo.gc.ca;

website <http://www.aquacultureassociation.ca>].

Annual dues are \$100 for individuals (\$50 for students and seniors) and \$300 for organizations. The *Bulletin* is indexed in Aquatic Sciences and Fisheries Abstracts (ASFA) and the Zoological Record. Mailed under Canada Post Publications Mail Commercial Sales Agreement No. 40065445

ISSN 0840-5417

Design and layout: Capamara Communications Inc.
Printed by Rhino Print, Vancouver, BC

Officers

Shelley King, President

Kathy Brewer-Dalton, President-Elect

Céline Audet, Past President

Joy Wade, Vice-President

Grant Vandenberg, Secretary

Matthew Liutkus, Treasurer

Directors

David Stirling, Jessica Whitehead, Myron Roth,
Tom Taylor, Stefanie Hixon

Editors

Linda Hiemstra and Joy Wade

Cover: AAC Photo Contest Winner: Marine Harvest Canada

PROFILES IN CANADIAN AQUACULTURE

The Aquaculture Association of Canada (AAC) has been an important part of the Canadian aquaculture landscape for the past 30 years. The AAC is uniquely Canadian consisting of members from industry, industry associations, academia, and federal and provincial governments. As part of the 30th anniversary celebration, the AAC is acknowledging in this publication the talented and hard working people of Canadian aquaculture.

The Canadian aquaculture industry is a highly diverse and exciting sector. We grow many different species of freshwater and saltwater finfish in addition to marine plants and invertebrates. The conditions, methods of culture, regulations, research requirements, and social acceptance all vary from one region to another and from species to species. The people who work in the aquaculture industry and collaborate with the industry are equally diverse providing a broad array of expertise, talent and ingenuity; many dedicating their careers and sometimes their personal lives to Canadian aquaculture. Being proud of this diversity spawned (pardon the pun) the idea to document personal stories and celebrate our industry. Thus the year long road to this publication, *Profiles in Canadian Aquaculture*, was started.

The profiles presented in this publication describe personal paths within the aquaculture industry – the successes, joyful events, humorous situations, and for some of us the serendipitous moments that brought us to this industry in the first place. These stories describe individual dedication to the industry and a belief in the future of Canadian aquaculture. We are deeply grateful to the authors for sharing their aquaculture stories and thoughts.

Our sincere thanks to Morgan Townsend whose exceptional writing and editing skills were invaluable.

And thanks to all of you who have contributed to making Canadian aquaculture a viable and thriving industry.

Linda D. Hiemstra, Joy Wade

Fisheries and Oceans Canada provided financial support for this publication through the Aquaculture Collaborative Research and Development Program (ACRDP).

CONTENTS

PROFILES

Mary Ellen Walling	3
Jeff Eastman	4
Fernando Salazar	7
Linda Hiemstra	10
Henrik Kreiberg	12
Thierry Chopin	14
Pamela Parker.....	17
Lawrence J. Albright.....	18
Chris Pearce	20
Matthew and Joanne Liutkus	22
Thomas George	25
Steve Neil	26
Bill Pennell.....	28
Timothy DeJager.....	31
Stephen F. Cross	32
Shelley King.....	35
Tillmann Benfey.....	36
Leslie-Anne Davidson	38
Myron Roth	40
Andrew Boghen	43
René E. Lavoie	45
Helen Gurney-Smith.....	47
Shawn Robinson	48
Steve Leadbeater.....	50
Julian Hynes.....	52
Danny Boyce.....	54
Chris Hendry	56
Neil Bourne	58
Brad Hicks	60
Ward Griffioen	62
Dave Conley	64
Céline Audet	66
Terry Brooks.....	68
Craig Clarke.....	70
Profiles of Fisheries and Oceans Canada	
Aquaculture Facilities	72

Mary Ellen Walling

AAC member since 1987



HISTORY

I am a long time resident of the British Columbia coast and worked hard with my colleagues, my contacts and friends to ensure the stability and growth of the salmon farming industry in BC.

Working with the BC Salmon Farmers Association since 2002 has been a great privilege. It has given me a window into many coastal communities around the world, from Klemtu to Tasmania. One of my fondest connections with salmon farming came before I assumed the role as Executive Director. It was a graduation ceremony in Klemtu where I had been working with North Island College to establish the aquaculture program up there. During the graduating class dinner one of the students took my hands across the table with tears in his eyes and said to me; "I am forty three years old and I have never had a full time job. Now I have a job and I am a college graduate." I will never forget that moment.

I chose this opportunity in aquaculture because I thought I could make a difference. I researched the industry and recognized that it could play an important role to diversify British Columbia's economy for the small communities struggling to survive on the coast. I wanted to be a part of that future –where kids don't have to leave home to find work and people can have the pride and dignity that comes from having meaningful work in their own town.

As I worked to build a strong future for our industry in Canada, creating wealth for remote coastal communities and First Nations as an integral part of the British Columbia working coast, I felt and still do feel that this is an important part of BC's economy providing well paying year round jobs to individuals, income to our province and a good return on company investments.

VALUE OF THE AAC AND AQUACULTURE CANADA MEETINGS

And where does AAC fit in to that vision? Knowledgeable public debate on scientific concepts and ideas is essential to inform public policy decisions and for effective participation in modern civil society. One of the challenges we all face is the need to bridge scientific knowledge with an increasing understanding gap in the general public.

Having a clear understanding of basic science concepts and scientific practices would assist public knowledge about science. Once this foundation is in place then more complex issues about how scientific concepts develop within societal limitations and how policy issues are influenced by scientific research can be explored.

Everyone in the sector has a role to play in demonstrating industry's sustainability and by continually improving practices you are building a world class sustainable industry that every British Columbian and every Canadian will be proud of. I urge everyone who shares this vision to continue your efforts to tell the story, to support each other and to work collaboratively to build your future together.

Keep the faith, Mary Ellen

As former Executive Director of the BC Salmon Farmers Association, Mary Ellen Walling played a key role working with her Board of Directors to establish and implement long-range goals and objectives for BC's salmon farmers. She has a Masters degree from Royal Roads University in Applied Communications. She was named Business Leader of the Year in Campbell River in 2010.

Mary Ellen Walling

Email: mwalling@telus.net

Jeff Eastman

AAC member since 2006

Affiliations to AAC

Member and AAC Ambassador

HISTORY

Born Jeffrey Charles Eastman on a hot late-spring day in Winnipeg Manitoba, not many would have predicted the path I've followed to date. Who knows what the future will hold but so far it's been an exciting ride filled with fishy memories and great people along the way!

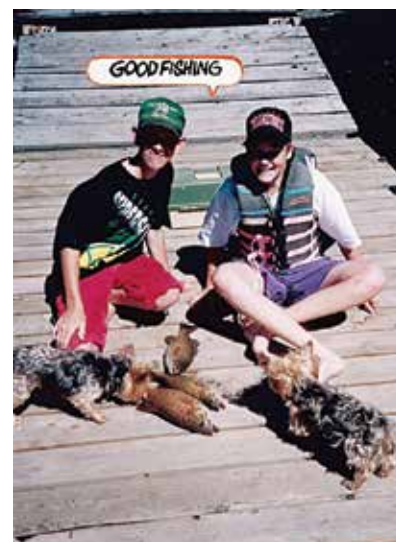
As a youngster, I was always fond of spending time casting a line and seeing which fish species I could get to bite. From days spent still fishing over the pier wall in Gimli or from any accessible point along the Red River to boating around Lake of the Woods in search of a quiet bay or underwater structure, fishing was usually my choice of summer activity. Even the odd ice fishing expedition would keep my hooks sharp over the winter. I've always thought that fishing can be a solo venture that offers time to reflect (think *The Old Man and the Sea*) but can also be an excellent bonding opportunity for family and friends who share the same passion. Even hearing new perspectives from inexperienced fishers has always been interesting to me and so exciting for everyone when a newbie catches their first fish!

My love for fishing and fish more generally has resulted in almost always keeping an aquarium or two. I have spent hours peering through glass studying the various types of fish's behaviours that I've kept. Gatherings with some of my fishier friends have often foregone the usual watching movies, playing games and instead involved setting chairs up in front of the fish tank and doing our best Jacques Cousteau or David Attenborough narrations.

My passion for fish became parallel to my pursuit of post-secondary education from my first year in University. My biology laboratory instructor Fernand Saurette held a Master's degree in fisheries biology which was one of our usual topics of casual conversation (which also included beer making, which is now another hobby of mine). Following my first year of University I wanted to gain work experience in something at least biology related. It turned out, I landed a summer student job with Manitoba Agriculture in their provincial honey bee disease inspection lab. This job opened my eyes to the working world of biology: A place where what you learn in classrooms is applied in the real world. One year later, with another year of University focused on biological/zoological sciences under my belt I tapped into Fernand's network of folks



Holding an Atlantic salmon at a fish farm in Knight Inlet.



Left to right: Long-time friends Jeff Eastman and Brendan Berg (age 11) celebrating a good day fishing at Lake of the Woods. Brendan decided to pursue a career in music and currently plays in the internationally acclaimed band *Royal Canoe*.



Left to right: Friends and fellow Malaspina U-C Fisheries and Aquaculture BSc. grads Brian Ringwood and Jeff Eastman show off a sea urchin during a class outing in Deep Bay. Brian is currently the Aquatic Unit Coordinator at UVic's Aquatics Facility.

working in fisheries research at the Freshwater Institute, DFO's headquarters in the Central and Arctic Region. After a couple of interviews it seemed I was set to depart with a research team to Ellesmere Island to study Arctic charr. Due to unfortunate circumstances, the field season was cancelled at the last minute. This almost left me with no job but as fate would have it, I interviewed and was hired on by another group at the Freshwater Institute whose research projects were focused in the prairie region. That group with whom I worked for the following several summers was led by Bill Franzin and his biologist Douglas Watkinson who were tremendous mentors to me. Along with the late Ken Stewart, these three people had a profound impact on me and encouraged me to pursue a career in fishery science of some sort. By learning from these people I found myself falling under a distinct pedigree of fishery scientists that includes legends such as Cass Lindsey.

In 2003, I was scratching my head wondering what to do next. I knew my passion was in fisheries and aquatic science and had even had some very minor exposure to aquaculture but I had exhausted all related courses at the University of Manitoba: I needed to make a move. A biologist that I was lent to for a field excursion named Bob Evans mentioned in passing a school that I should consider called Malaspina University-College in Nanaimo, BC. After looking into their Fisheries and Aquaculture program, I decided to make a call to the chair of the department. I explained who I was and my intentions. The patient chair named Chris Foote listened

to me before interjecting with something to the effect of (and I'm paraphrasing) "Well... We come from the same pedigree." Chris explained his relationship with some of the researchers that I had studied under and right away I knew this school was the place for me. I signed up and ultimately completed my BSc. there. Through the program, I met fabulous people and made lifelong friends from across Canada and abroad.

It didn't take long for me to gravitate towards the aquaculture side of programming at Malaspina (now Vancouver Island University). Aquaculture offered the perfect balance of all science disciplines that I was interested in, a level of applied engineering and business aspects that ties the discipline in with the global economy. It was as a student that I first became interested in the AAC. I would often read AAC publications and associated reading (mainly Northern Aquaculture) during breaks between classes. I was amazed at the diversity of aquaculture activity taking place around the world and knew that it was in this industry that I wanted to work to make a difference. One publication that caught my eye in particular was the proceedings of the Canadian Freshwater Aquaculture Symposium that took place at Aquaculture Canada 2004. In this publication, you can find a bar graph that shows freshwater aquaculture production by province. Every province is represented but the bar for my home province of Manitoba barely registers on the scale. Being familiar with the abundance of high quality freshwater resources back home, I wondered why this was the case. In the back of my head I was determined to make a difference. I had thoughts of establishing my own fish farming operation in Manitoba one day and discussed many ideas with professors, fellow students and other friends back home that knew nothing about aquaculture and probably thought I had gone crazy living on Vancouver Island.

After completing my degree, I had the opportunity to gain work experience in the aquaculture industry while still living on Vancouver Island. One of the biggest highlights for me was the opportunity to work under Dick Beamish with Joy Wade and Bill Pennell in the Broughton Archipelago. Working up there and seeing firsthand the way one of the most important components of the Canadian aquaculture industry functions was truly transformational for me. Working alongside Joy and Bill taught me so much about the industry there and also by asking them 1,000,000 questions about their experiences in the industry over the years I gained valuable knowledge



*“Fish,” he said
softly, aloud,
“I’ll stay with
you until I am
dead.”*

*~ Santiago, The Old
Man and the Sea
(Hemingway)*

At the Manitoba – Canadian Model Aqua-Farm

and an appreciation for the dedication people have to working in aquaculture. Joy and Bill have had a profound impact on my personal and professional development.

One day while contemplating my next move which was primarily focused on pursuing a Master’s degree and considering a move overseas, I was reading my own copy of Northern Aquaculture (by this time I had joined the AAC myself). At the back, in the job post section an ad for an aquaculture position with the Manitoba government immediately caught my eye. I actually nearly spit the coffee I was drinking over the paper when I saw it. It sounded like an even better opportunity to make a difference in the development of aquaculture in Manitoba than I could have ever imagined. I decided to apply and after two interviews, I was hired as the first Business Development Specialist – Aquaculture with Manitoba Agriculture, Food and Rural Development. I was immediately struck by the level of support and vision that the department already had for aquaculture development when I arrived. In the past five years, we have participated in fairly major initiatives including the Manitoba – Canadian Model Aqua-Farm Initiative and have demonstrated leadership in the development of the

freshwater aquaculture sector in Canada. I am proud of the collaborative work that has been done here and thank all partners who have worked with us to advance the industry. I think aquaculture holds tremendous potential for the growth and diversification of the rural economy in Manitoba. We have begun to build the supports and infrastructure required to see the potential realized and it will be through dedicated work by many participants that will help to get us there. I know that the AAC will continue to be an important contributor to industry development in Manitoba and across Canada. I will continue to work with the AAC because of the devoted people that make the organization great. There are too many people to name specifically so I will end by saying that I enjoy a good success story, like when project results and data analysis can support these stories; have a respect and fascination for fish and really like eating delicious seafood. But it is the people who work in aquaculture that I love and believe in.

Jeff Eastman

*Business Development Specialist- Aquaculture
Manitoba Agriculture, Food and Rural Development
Email: jeff.eastman@gov.mb.ca*

Fernando Salazar

AAC member since 2004

HISTORY

After graduating from the Marine Biology program at Universidad Autónoma de Baja California Sur in Mexico, I was a jack of all trades: I worked in studies of reproductive biology and population abundance of commercially fished sharks and rays, as a natural resources park ranger in Cabo Pulmo marine park, a technician and business developer of a pearl culture project, ran my own recycled plastics commercialization business, and provided consultancy services to aquaculture and environmental management initiatives. At the end, things didn't work out as I wanted and I decided to leave my homeland.

In 2002, I immigrated to Canada and I spent the first 2 years in Toronto working at the most odd jobs imaginable: building pallets, cleaning a carpentry, helping a handyman install air conditioners, in a demolition crew, etc. All while searching for jobs in my career but to no success. Finally, I decided that the only way forward was to go back to school and in 2006 I completed a Masters in Aquaculture from the University of Guelph. My work at the university focused on the environmental management side of trout aquaculture, especially in matters related to tracking organic effluents using stable isotopes.

By 2007, I moved to DFO's Biological Station in St. Andrews, NB (SABS) to work in the Integrated Multi-trophic Aquaculture project (IMTA) doing a meta-analysis of species with potential to be used as bio-filters of organic matter originating from fish farming practices. Upon completion of my contract at SABS, I joined the Aquaculture Association of Nova Scotia (AANS) as an R&D Coordinator to provide assistance and advice in



En route to the trout farm for sampling

project management, technology transfer, innovation and development of aquaculture. This position gave me the necessary exposure to understand the challenges and needs of aquaculture in Atlantic Canada and to build a valuable network of national and international key contacts within the sector.

In 2010, I joined Ulnooweg Development Group Inc. as an aquaculture business development advisor to work on behalf of the Atlantic Policy Congress of First Nations Chiefs Secretariat. Working with Atlantic Canada's First Nation communities has been an incredible experience. I have been fortunate to enrich my knowledge with the immense traditional wisdom of First Nations and it has given me a more conscious and rounded vision of where and how I would like to see aquaculture development being done in Canada. I am currently providing advisory and project management services to 9 communities and I look forward to more!



Working with thesis samples



With Jaqui Milne from Environment Canada at the LaCloche channel



With Stephanie Hixson during AAC 2010



Translating to Spanish at an AquaNet workshop in Nanaimo, BC

MEMORABLE MOMENTS

It is very hard to pick just one memorable moment during my career in Canada, but I think one of my favorites happened shortly after I joined Ulnooweg and I had my first meeting with a First Nation community where I was the only non-Native person in the room. They were all staring, scrutinizing me and finally one of them asked: “So, are you Native?” and I said, “Nope. I am Mexican, that’s why I am brown” he chuckled and went on asking personal questions about me in what I believe was an attempt to break the ice, and those who know me are aware that I am very personable, so we engaged in a hearty conversation. After about 10 minutes of Q&A he asked, “so do you have siblings?” and I said, “yes, actually I have a brother, a step-sister and a half-brother” and one of them turns around and says with a big grin: “Oh there! You are Native!” Needless to say, the atmosphere instantly relaxed and we ended up having a great meeting.

INFLUENTIAL PEOPLE

But funny stories aside, which I have many, I have also been lucky in knowing fantastic people that have inspired and influenced me deeply. One of them, Rich Moccia, even went as far as helping me with my immigration requirements when I was still looking for a way to settle permanently in this beautiful country. Shawn Robinson from SABS and Brian Muise from AANS believed in me and offered me those first job opportunities that initiated my “Canadian experience” which every immigrant knows it is one of the most vicious circles we encounter when we come to this country since everybody asks for it but nobody wants to give you a chance to build it. So, I am forever grateful to them and to everyone else that has opened their arms in welcoming me during the 11 years that I have been now living as a Canadian.

I can also extend my gratitude to those who welcomed me as a member at AAC back when I started my Masters. The AAC and what used to be AquaNet were amazing organizations that helped me develop my skills, knowledge and network. Now, every time I attend the AAC conferences I always try to engage with students and newcomers to Canada to share my experiences with them and to always make a point: “Never stop searching, attend meetings, workshops, events, anything. Give yourself exposure, meet tons of people and learn as much as you can. These conferences are the best vehicle for doing it. One day, all that effort will pay off”



Having fun in Victoria, BC during an AquaNet event

I see the aquaculture industry as the most promising sector for food generation. Our home is not Planet Earth, it is Planet Sea and our species has abused of its bountiful waters for centuries. It is time to drop those archaic practices of just taking without giving back and we need to keep farming our waters, but doing it in a responsible, sustainable, and intelligent way. In Canada, the potential is there, but we need more commitment from our

Governments and financial institutions. They need to be proud of the first world level aquaculture we have. They need to stop being reactive and start being proactive. An industry will never be fully developed when the regulators and funders or investors don't support it and instead just put up barriers to it. There are two types of aquaculture, the one to feed the masses and the one to generate wealth. In Canada, we can't do the first one. We don't have the necessary weather and natural resources, but we are perfectly positioned for the second one, a high value aquaculture that can generate the wealth that will eventually pour down in the form of professional support, grants, international development programs, etc. to those areas where aquaculture to feed the masses takes place. Canadian expertise, human resources and



My first AAC conference in Quebec City, 2004

I see the aquaculture industry as the most promising sector for food generation.

technology are amongst the best in the world, but I believe it is quite underutilized since the aquaculture sector in Canada (and its extreme regulations) is not a suitable environment for investment and business development. We need to change that so we can, once again jump on the growth curve of aquaculture at its current worldwide rate as opposed to the flat line that we have seen in Canada for the last 10 years.

Fernando Salazar, M.Sc.

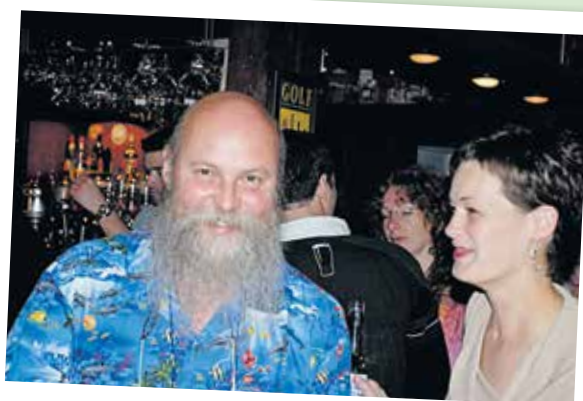
Business Development Advisor (Aquaculture)

Ulnooeweg Development Group Inc.

Tel: (902) 448-0539

Email: fsalazar@ulnooeweg.ca

AAC PHOTO ALBUM



Linda Hiemstra

AAC member since 1988

Affiliations to AAC

President 2000-2001, Director 1996-2002

Publication Editor 2001, 2004, 2005, 2006, 2009, 2014

Aquaculture Canada Conference Organizer 1999, 2001, 2003, 2005, 2006, 2007

AAC Ambassador 2012-present



HISTORY

As the daughter of a west coast commercial fisherman, I grew up on the ocean with an insatiable curiosity about the marine environment. My career in aquaculture started in 1986 at the Pacific Biological Station as the Algae Queen on the Scallop Research Project under the direction of Dr. Neil Bourne. Through 1997-2005, I taught algae culture and other aquaculture courses and managed the Aquaculture Extension Program at Vancouver Island University. I currently provide consulting services for research and development projects for both shellfish and finfish aquaculture companies. Starting in 2011, I have worked extensively with Sable Fish Canada to develop a new sablefish culture industry in British Columbia. I managed the hatchery in 2012 and

continue to work on advancing the business of sablefish aquaculture.

Canada is a large country with a great diversity of aquaculture activities. The sharing of information is an essential component of a healthy Canadian aquaculture industry. Starting with my first publication in 1989, I have been committed to ensuring aquaculture information is provided to the industry through primary research publications, proceedings, training courses, industry workshops, and other special publications.

A very enjoyable related activity has been managing events and I have organized eight Aquaculture Canada meetings and numerous other aquaculture events including five Aquaculture Pacific Exchange conferences in Campbell River.



AAC Gala Halifax



Aquaculture Canada 02 with Yves Bastien



AAC Past Presidents at Aquaculture Canada 06

A recreational runner since 2007, I have completed seven half marathons and a highlight was completing the Womens Nike Full Marathon (42km!) in 2011. I reside in Nanaimo BC where you can run all year in a t-shirt - and yes the rain is warm.

INFLUENTIAL PEOPLE

I have worked with many wonderful people during my career in aquaculture and they have been generous in providing their time and knowledge to assist me. Early in my career, Dr. Neil Bourne taught me the value of critical thinking and the importance of research planning. Those lessons remain as important to me today as when I first heard them. Dr. Bill Pennell, always one to push thinking to the limit, promoted chaos or “letting things go to see what happens” as a research tool – a difficult sell to someone who believes that organization is the key to success! We had many lively and highly entertaining debates which helped keep me open minded.

VALUE OF THE AAC AND AQUACULTURE CANADA MEETINGS

The Aquaculture Canada meetings play an important role as one of the few opportunities for the industry to get together and have some laughs, share knowledge and discuss new ideas. I am always impressed with the very



competent students who bring new ideas and enthusiasm which moves the industry forward with their efforts.

The AAC is to be commended for its long term commitment to organizing the AC meetings and in doing so supporting aquaculture throughout Canada.

Linda Hiemstra, PMP

Mel Mor Science

Cell: (250) 751-4862

Email: Linda.Hiemstra@shaw.ca

Henrik Kreiberg

AAC member since 1988



HISTORY

Perhaps it's fitting that I write this as an old trout; trout were the species that introduced me to the world of aquaculture. That was in 1976, the New Brunswick government was going to build a nuclear generating station, and fish enthusiasts saw an opportunity for surplus warm water. That led to an M.Sc. project at UNB with mentors including John Anderson and Dick Saunders, but perhaps best, to being tossed into the deep end of the pool at a time when commercial aquaculture of salmonids was just getting started in the Maritimes. I got to know Arnie Sutterlin and Art MacKay as they were building their first wooden cages to see if Atlantics could be over-wintered in the Bay of Fundy, Gene Henderson, Dave Aiken and his lobster culture passion which AAC's torch-bearer Susan Waddy carried on, and others like Ken Waiwood who would join the field later in flatfish culture.

I have some treasured old documents from those days, including Art's lovingly hand-illustrated five-volume inventory of Fundy's aquatic plants and animals, and a DFO report on a 1977 aquaculture meeting in Winnipeg which I went to as the lone student. Looking at the group photo now, I think this was the first national assembly of Canada's aquaculture R&D enthusiasts, and a foreshadowing of the AAC. Many of these names will be familiar even to current-generation aquaculturists; from the east coast (Roy Drinnan, Arnie Sutterlin, Dave Aiken, Dick Saunders, Ian Neish, Ken MacKay, John Castell and Jim Stewart), across the dry patch (Dave Reid, Peter Ihssen, Stan Slinger and Burt Ayles) to the west coast (Ed Donaldson, Roly Brett, Dave Groves and John Zahradnik). Some stayed in research as I did, others plunged into the business side and helped to build that.

The Pacific Biological Station was a crossroads of aquaculture R&D in 1981 when I began work with Roly Brett.

A scientist of truly impressive renown, he taught me a wonderful lesson in my interview. He needed help to see if aquaculture methods could alleviate gold-rush issues in the herring fishery, and at the end of the interview, when I asked why there were no questions about herring, Roly said honestly and with supreme confidence "because we don't know anything about them". I learned then and there that a good scientist acknowledges such challenges, and then tackles them. We proceeded to figure out a lot of stuff about handling very touchy fish, modifying sea cages to expedite towing fish among locations, I fell in the ocean a few times, met my first predators and cage morts (of many to come) and started a lifelong love for the Pacific coast.

I look at today's fish pumps, net-pullers, the omnipresent divers, the big cages, biosafety, training, the comprehensive software which manages the mechanized feeding systems and the rest of the farm.....it surely has come a long way. I know what it's founded on: the drive which I saw reflected one day in 1986 in Hidden Basin on a steep fir-clad hillside up a goat-trail from some tiny wooden sea cages. There in the small cabin where one of the founders of BC's salmon-farm business was raising his family, was a full-size upright piano. There was only one way to get it there; do it, then consider if it was possible.

Being part of the past forty years of trial and error for aquaculture in Canada has been highly rewarding, with seldom a dull moment. Some were a little rough; pulling nets after toxic algae went through, straining backs to get the web moving, and then slowly the morts rise up and just won't stop coming.....others were exhilarating. It's hard to say which looked better from a farm site's improvised hot tub far out in the Alberni Inlet darkness, the stars above or the bioluminescence each time you plunged into the sea.



*“finfish aquaculture and wild-fish
harvesting should really get on the same page”*

But right up there I would also have to cite finding that unobtrusive introduction of the precursor to Marinil™ into a tank of small salmon mellowed them from rockets to aquatic pussycats, the last one just as easy to dipnet as the first. That got written up, and launched an interest I’ve stayed with, in applications of physiological understanding of fish to improve their husbandry, and particularly, pre-harvest handling.

To recognize that a few minutes of bungling at harvest time can undo all the work that brought those fish to that point is to be inspired to improve it. With a number of excellent colleagues, I’ve worked with chemical and physical means to make the harvesting of caged finfish less traumatic, as that links directly to longer pre-rigour time windows and much-slowed loss of shelf quality. More recently, that has also become a welfare consideration, which subject I expect we will see continue to evolve as a marketplace concern.

In my personal opinion, finfish aquaculture and wild-fish harvesting should really get on the same page; for that sector of the market which prefers buying wild fish for the table, fish farming’s established procedures for live-haul and processing into top-quality fresh marine foods could be used with commercially-caught wild fish too. Conservation goals could be more easily met, while improving what goes to market, and providing the best possible welfare when a fish’s life is taken to feed us. There remains much distance to make up; I believe that Canada’s aquatic harvests would benefit from a will to convert the market from its commodity basis where least cost takes all the marbles, to something more diverse with room for differing levels of quality. We still forget in aquaculture that dry-land agriculture has covered a lot of the same ground

already, and if we ignore those economic and biological lessons, we’ll have to repeat the experience, and the risks.

VALUE OF THE AAC MEETINGS

I thank the AAC for a lot of good years so far. Annual meetings have been good crossroads and leveraging events, and Canada is fortunate to have the warm and productive environment AAC creates for growth of R&D to support a national industry. To the present Board, let me say that greatness beckons anew. And for all of us, I might venture to say that maturity beckons too. That’s not being rude; I’m encouraged to see that Europe’s example, where opponents of aquaculture have some years back started the process of working collaboratively with aquafarmers to seek more broadly acceptable outcomes of change, is starting to manifest in Canada too. We surely have much to achieve yet, but the effort to do so is within us to muster, and so very worthwhile.

Currently, I am Section Head for Applied Technologies in DFO’s Marine Ecosystems and Aquaculture Division at the Pacific Biological Station, Nanaimo BC. I still handle live fish, share my life with Andrea (an aquavet), and my 27-year-old daughter still gives her catch-and-release fish a quick little smooch before she sends them off.

Henrik Kreiberg

Head, Applied Technologies Section

Marine Ecosystems & Aquaculture Division, Science Branch

Fisheries & Oceans Canada

Pacific Biological Station

Nanaimo BC Canada V9T 6N7

Tel: (250) 756-7019

Email: henrik.kreiberg@dfo-mpo.gc.ca

Thierry Chopin

AAC member since 1997

Affiliations to AAC

President 2004-2005, Past President 2005-2006

Treasurer 2001-2003, President Elect 2003-2004

Member of the Board of Directors 2001-2006



HISTORY

Two weeks after defending my PhD thesis, in February 1985, I arrived in Moncton, New Brunswick (NB), in the middle of a snow storm. I was starting my 16 months “cooperation” (an alternative to the French military service at that time) with Fisheries and Oceans Canada, based in Charlottetown, Prince Edward Island (PEI), and then Halifax, Nova Scotia. The topic of my PhD was the impact of phosphorus and nitrogen on the growth and production of the sugars called carrageenans in the red seaweed *Chondrus crispus*, commonly known as Irish moss. Carrageenans are among the sugars extracted from seaweeds and that we use every day without knowing it, from our orange juice in the morning to our toothpaste in the evening. During my first stay in Canada, I looked at harvesting issues on natural populations of *C. crispus*.

Then, I did a postdoctoral fellowship at Harbor Branch Oceanographic Institution, in Florida, under the supervision of Dennis Hanisak, and continued to look at the effect of phosphorus, more limiting than nitrogen in tropical environments, on carrageenan production in tropical/subtropical seaweeds. I returned to France for almost two years and from there applied for a job at the University of New Brunswick Saint John campus (UNBSJ). Chris Lobban, author of several well-known textbooks, had moved to the island of Guam and UNBSJ was looking for a new phycologist (yes, that’s what we call people who study algae, the small ones called microalgae or the large ones called macroalgae, and, if they are in the sea, called “seaweeds”, which is a misnomer in English because they are far from being weeds of the sea!). I was given the job and started at UNBSJ on July 1, 1989 (well, a few days later because I did not want to miss the bicentennial of the French Revolution I celebrated with cousins in Paris on July 14).

From 1989 to 1999, I pursued more work on phosphorus metabolism, polyphosphate granules (observed for the first time in macroalgae) and the chemistry of seaweed sugars (phycocolloids). I was able to demonstrate an inverse relationship between phosphorus concentration in red seaweeds and carrageenan production, which some colleagues were kind enough to call the “Chopin effect” by analogy to the “Neish effect”, demonstrated with nitrogen by Arthur Neish when he was Director of what later became the Institute for Marine Biosciences of the National Research Council of Canada in Halifax.

By then, I had also realized that with the development of salmon aquaculture in the Bay of Fundy we had a significant source of dissolved nutrients (such as inorganic nitrogen and phosphorus) available and that we could do something with them by recognising them as nutrients for another crop rather than wastes (like in the proverbial “what is waste for somebody is gold for somebody else”). In September 1995, I gave a presentation entitled “Mixed, integrated, poly-, or multi-level aquaculture - whatever you call it, it is time to put seaweeds around your cages!” at the Conference on Cold Water Aquaculture to the Year 2000, at the Hunsman Marine Science Centre, in St. Andrews, NB (the abstract was published in the Special Publication No. 2 of the AAC in 1997). I could see a number of faces in the room saying “What is this guy with a strange accent talking about?”!

In 2000, at the AAC meeting in Moncton, I gave a presentation entitled “Nutrients, fish, and seaweeds: integrating “fed” and “extractive” aquaculture for bioremediation of coastal nutrification”. I started this presentation with an aquarium in which I had little salmon cages and little fishes. I added a dye and a reddish coloration developed to visualize nutrients. Then, I added a curtain of “seaweeds” (a carpet underlay cut in strips)



all around inside the aquarium. While continuing to give my presentation, I discretely added some basic solution from time to time and at the end of the presentation I removed (harvested) the seaweeds and *Oh, Magic!* the red coloration had disappeared, *i.e.* the seaweeds had done their trick and absorbed the dissolved nutrients released by the fish. Due to the success of that gimmick, and the mesmerized looks on the faces in the room, I repeated it at several other conferences.

The period 1995-2000 was the period of “preaching in the desert” for what was just “integrated aquaculture”. Shawn Robinson, from the St. Andrews Biological Station, had joined the cause with a similar approach involving shellfish recapturing organic particles. We started to be taken seriously when we joined AquaNet, the Network of Centres of Excellence for Aquaculture, in 2001, with our first industry partner, Atlantic Silver Inc., and later with Heritage Salmon Ltd. In 2005-06, after a period of consolidation and acquisitions in the aquaculture industry, we started to work with Cooke Aquaculture Inc., which has remained our partner ever since.

In the interim, we had given a name to what we were doing. At a workshop in Saint John, NB, in March 2004, I came with “Integrated Aquaculture” and Jack Taylor (Fisheries and Oceans Canada) with “Multi-Trophic Aquaculture”. By combining the two, “Integrated Multi-Trophic Aquaculture”, or “IMTA”, was born and in almost 10 years more than 400 publications referring to IMTA have been published worldwide.

When people tell me that even IMTA is still a mouthful, I tell them that they can also sing this acronym to the music of “YMCA” by Village People (I know, it’s starting to date me... 1978!). I am known to do my “IMTA dance” at the podium at some conferences and generally it leaves an impression on people who, the next time I meet them, say “I remember, you are the crazy IMTA Frenchman”... best trick for them to remember IMTA!



At the Joe Brown Barbecue of AC2007 (in Edmonton, Alberta), the IMTA team performed brilliantly at the karaoke competition with an original adaptation of “YMCA” by Village People. From left to right: Christie Whelan, Tim Jackson, Thierry Chopin, Cyr Couturier and Bill Heath



A biased Master of Ceremony (Gregor Reid) and jury (Chris Pearce, Linda Hiemstra and Shawn Robinson) failed to recognize the originality of that approach and the IMTA team finished second

In 2009, Shawn Robinson and I were the recipients of the AAC Research Award of Excellence for taking the IMTA concept from the laboratory to the realm of commercial production.

Over the years - with the support of the New Brunswick Innovation Foundation (NBIF), the Atlantic Canada Opportunities Agencies-Atlantic Innovation Fund (ACOA-AIF), the Natural Sciences and Engineering Research Council of Canada (NSERC) strategic Canadian Integrated Multi-Trophic Aquaculture Network (CIMTAN) and its partners (Fisheries and Oceans Canada, the University of New Brunswick, the New Brunswick Research and Productivity Council, Cooke Aquaculture Inc., Kyuquot SEAfoods Ltd., Marine Harvest Canada Ltd. and Grieg Seafood BC

Ltd. - we have been progressing along the continuum from R (Research) to D (Development) to c (small scale commercialization) to now enter C (larger scale commercialization) and making the Blue Revolution greener to enter the new ERA of Ecosystem Responsible Aquaculture through the Turquoise Revolution!

The world-renowned phycologist Max Doty talked about “marine agronomy” in the 1970’s.

However, the Turquoise Revolution is not only targeting practices in the marine environment, but also in the freshwater environment, and in open-water as well as in closed containment operations. Instead of talking about agronomy (in Greek, “the laws of the [land] fields”) in marine or freshwater environments, it may now be time to give a proper name to this discipline and talk about aquanomy (“the laws of the aquatic fields”), especially if we want to responsibly produce large amounts of diversified crops.



Shawn Robinson (left) and Thierry Chopin (right) received the 2009 AAC Research Award of Excellence from AAC President Debbie Martin-Robichaud at AC2009 (in Nanaimo, British Columbia)

INVOLVEMENT WITH THE AAC

Dennis Hanisak not only cultivated seaweeds; he inoculated deeper in me the bug of associative life, which I had started to develop in France with my involvement in the renowned sailing centre, the Centre Nautique des Glénans.

I was recruited to the Board of Directors of the AAC in 2001 by Andrew Boghen, who had noticed that I already had quite a lot of experience with the running of associations. From 1994 to 2000, I was the Membership Director of the Phycological Society of America and, in 2000, I became also the Treasurer of the International Phycological Society. So, I was elected to the Board of Directors of the AAC in 2001 and immediately convinced to be its Treasurer until 2003. I was President Elect of the AAC in 2003-04, President in 2004-05 and Past President in 2005-06.

During these years, I was also very involved with the other two associations:

- The International Phycological Society: Treasurer from 2000 to 2005, and
- The Phycological Society of America: Vice President in 2003, President in 2004 and Past President in 2005.

If that was not enough, I was also Chair of the Biology Department at UNBSJ from 2002 to 2005. All these

activities require a lot of multitasking and some days I wondered if I should have contemplated a sex change, as women are generally much better than men at that!

I also started to be involved with the International Seaweed Association (ISA; no, this is not always a salmon disease!), becoming a member of its Council in 2004. Having concluded my time on the AAC Board of

Directors, I became President Elect of the ISA from 2004 to 2007, President from 2007 to 2010 and Past President from 2010 to 2013. I am now its Secretary General.

I have truly enjoyed this period of dedication to associative life: it is a wonderful school of responsibility, management and decision making. It gives you a unique opportunity for networking and developing many professional contacts and some long-term friendships.

The drawback with all these volunteer organizations is a significant turnover of their officers and a certain tendency to reinvent the wheel. To avoid that, it is very important to keep the institutional memory of the association and to remember what has been tried before and what worked or did not work. This is not an easy task and it demands that a balance be found between allowing creativity and innovation and being careful not to repeat past and forgotten failures. This is what I am trying to do with the ISA presently.

The AAC recently changed its structure with the creation of an Executive Director position. This is a significant evolution in the Association and I hope this will free the President up from pretty much spending all his/her presidency organizing the next annual conference and having no time for reflecting and, hopefully, participating in the evolution of policies and regulations of the aquaculture sector. However, to allow a President to be fully up to speed, I believe his/her mandate should be extended to two years.

Long live the AAC! Tous mes vœux de succès durable à l’AAC!

Dr. Thierry Chopin

Consul Honoraire de France

Scientific Director, Canadian Integrated Multi-Trophic Aquaculture Network (CIMTAN)

Professor of Marine Biology, University of New Brunswick

E-mail: tchopin@unb.ca

www2.unb.ca/chopinlab/, www.cimtcan.ca

Pamela Parker

AAC member since 2003



HISTORY

A prairie girl with roots in terrestrial agriculture, I moved to Vancouver Island from Saskatchewan in 2001. My aquaculture career began in 2002 as the Executive Director of the BC Shellfish Growers Association. In 2004, the Province of British Columbia invited me to help them establish the BC Pacific Salmon Forum (BCPSF) and I was subsequently hired by the Forum as their Managing Director. The BCPSF was charged with “examining the issues surrounding the wild and farmed salmon resource in British Columbia.” It was mandated to analyze both scientific and socio-economic issues and generate balanced and impartial advice for managing the salmon resource; both wild and farmed. The final Forum report was delivered to the Premier in February 2009, which included a series of recommendations to support wild salmon. On the question of wild/farmed interaction, the Forum found that wild and farmed salmon can co-exist in the coast waters of BC.

Much of the Forum’s agenda was to facilitate collaborative research on wild/farmed salmon interactions - the majority of that focused on sea lice. I learned a lot in those four years but the most significant for me was my belief that if growing world populations want to eat salmon we need to farm it! So, when the Forum’s mandate was complete I was thrilled to have the opportunity to become directly involved in the salmon farming industry.

In May 2009 – as the AAC was adjourning its annual meeting in Nanaimo, BC - I was getting on the plane with many of the eastern Canadian AAC members as they returned to their homes and I moved to my new one.... only I had more luggage and two cats! On June 1st, I officially became the Executive Director of the

Atlantic Canada Fish Farmers Association (then the New Brunswick Salmon Growers).

What a full four plus years it has been.... Much of it focused on developing collaborative research projects in the area of fish health and sea lice management. New Brunswick has been leading in Canada on testing new sea lice treatments and technologies such as well boats in support of Integrated Pest Management.

It appears that the sea louse has become my totem - I’m considering getting a tattoo!

VALUE OF THE AAC AND AQUACULTURE CANADA MEETINGS

I am not a scientist but since 2005 I have been working very closely with many of them – and the Aquaculture Canada meetings provide the perfect place for everyone to come together. It’s an ideal meeting place for both scientists and students. But it also provides a perfect opportunity for laypeople such as me to hear about new research from the researchers involved in the work to get a ‘plain language’ understanding of what the work really means. In addition, the conference always provides lots of opportunities to speak one-on-one to these researchers.

Aquaculture Canada isn’t all work either.... The annual conference is a time when we can all come together and just enjoy spending time with our friends and colleagues from across the country.

Pamela Parker

Executive Director

Atlantic Canada Fish Farmers Association

226 Limekiln Road, Letang, NB E5C 2A8

Tel: 506.755.3526 Cell: 506.721.9447

www.atlanticfishfarmers.com

Lawrence J. Albright

AAC member since 1989



HISTORY

I have had a multifaceted career in aquaculture with academic research at Simon Fraser University for approximately 39 years, followed by seven years of fresh water salmonid farming at a farm in the Fraser Valley.

In my academic career, I was fortunate to have so many colleagues and students to interact with. The main thrust of the research being salmonid microbial diseases and their control in aquaculture situations. For these wonderful interactions I thank all of you.

We always tried to understand the underlying mechanisms by which microbial disease organisms parasitized finfish. And, where appropriate, try and develop ways of preventing the diseases in aquacultured finfish.

Hence our research on vibriosis of both salmonids and tropical shrimp, Epizootic Ulcerative Syndrome (EUS)

of tropical finfish, pathogenicity mechanisms of both harmful and toxic phytoplankters of salmonids, life cycle and pathogenic mechanism of the common sea louse - *L. salmonis*, to name several.

To control these and other salmonid diseases, we investigated the use of vaccines, immunostimulants and an anti-phytoplankton therapy. All of these related publications can be readily obtained by a Google search.

I am particularly pleased how my students have contributed to the knowledge of: (1) the life cycle of the sea louse which forms the basis for ways to control its infection of aqua-cultured salmonids; (2) the virus that causes Epizootic Ulcerative Syndrome in Asiatic finfish which also forms the basis for its control; and (3) knowledge of the pathogenic mechanism of harmful *Chaetoceros* spp. and the use of L-cysteine ethyl ester in feed to control the damage to cultured salmon in seawater by this phytoplankter.

CURRENT

Since retiring, I have been developing a commercial freshwater salmonid farm in the Fraser Valley. Rainbow trout and Sockeye and Coho salmon are cultivated at the farm with the determination of ways to successfully cultivate Sockeye salmon under intensive freshwater conditions. I am also developing a way of economically capturing, concentrating and drying finish manure from the settling tanks on the farm for use as a commercial fertilizer, as well as a food for marine invertebrates.

The farm layout is being gradually changed so the entire water flow is gravity-driven using pure water from artesian springs through circular tanks each with water-powered automatic waste removers to settling tanks.



With AgriMarine and Ian Forster at DFO, I am investigating ways of more efficient feed utilization by coldwater finfish in aquaculture.

FUTURE

I believe that at the farm a way will be determined to: (1) profitably cultivate Sockeye salmon in intensive aquaculture; (2) develop a profitable way of collecting, drying, and marketing the farm waste as a fertilizer and invertebrate food; and (3) decreasing feed usage (hence less off-farm pollution) while retaining similar production levels.

I am not hopeful that recirculating aquaculture systems (RAS) will prove to be as useful as proposed. They are

extremely expensive to build, operate, and maintain. Their finished product is very expensive and cannot readily compete with commodity finfish. Their use may be restricted to extremely high value finfish suitable for very special niche markets.

I am also hopeful that effective substitutes for the fish meal and marine oils currently used in salmonid feeds can be found and used. We simply must find a way of doing this.

Lawrence J. Albright, Ph.D.

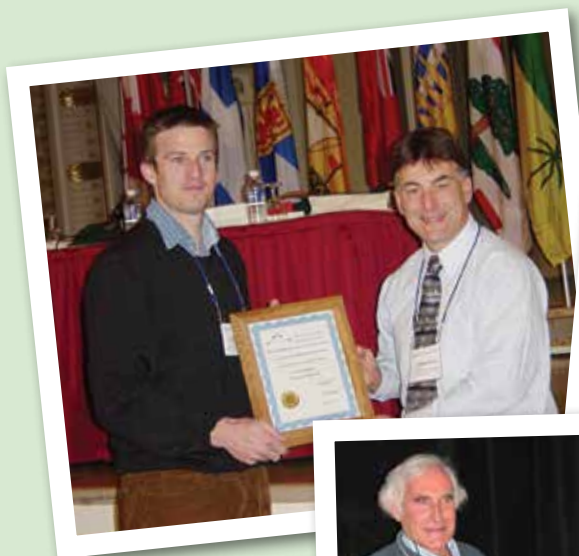
Professor Emeritus, Simon Fraser University

Commercial Aquaculturist

Tel: (604) 626-6747

Email: albright@sfu.ca

AAC PHOTO ALBUM



Chris Pearce

AAC member since 1988

Affiliations to AAC

President 2006–2007, Director 2004–2008

Ambassadors Committee 2012–present

Publications Committee Chair 2004–2006, 2007–2008

Program Committee AC03, AC05, AC06, AC07,
Chair AC09

Organizing Committee AC06, Chair AC07



BIOGRAPHY

I was born and raised in Fredericton, NB and did my BSc at UNB Fredericton. I completed an MSc at Dalhousie University (1990) and a PhD at Université Laval (1996). Both graduate degrees had me exploring the field of invertebrate larval settlement – sand dollars and sea urchins for the former and scallops for the latter. I spent the next five years on a glorious island in the Bay of Fundy (Grand Manan) as an industrial post-doctoral fellow with a commercial salmon farming company that was interested in sea-urchin aquaculture. Most of this research focussed on prepared feed development for gonad enhancement and construction of holding systems for adult urchins. In 2002, I made the jump to the West Coast and began working for Fisheries and Oceans Canada at the Pacific Biological Station in Nanaimo as a research scientist, specializing in invertebrate aquaculture.

INFLUENTIAL PEOPLE

There are too many to list all of them, but here are a few who have been particularly important in my scientific career: Dr. Uno Paim (UNB), Dr. Robert Scheibling (Dalhousie University), Dr. Edwin Bourget (Université Laval), and Dr. Shawn Robinson (DFO, St. Andrews). In terms of scientific research and paper writing, if I had to narrow the list down to one person it would be Bob Scheibling, my MSc supervisor. He first taught me the importance of proper experimental design and statistical

analysis and helped me craft my scientific writing skills. I remember working on my thesis (on a small Mac SE 30 with a 9-inch screen!). I would send Bob individual chapters through the post, as he was on sabbatical at the time in Australia and e-mail was not yet existent. I'd get the papers back a few weeks later marked up in red ink, typically more red ink than black text. There would always be a bunch of deleted text, insertions, re-writing, and movement of text to various places throughout the chapter. I was always amazed at how all of his changes invariably led to something that read so much better than what I could aspire to. He has incredible writing and editing skills which I have attempted to match throughout my career. One of my most memorable quotes comes from Bob and has to do with a particularly poorly written first draft of a thesis chapter: "Let's dispel any anachronistic notion of a thesis as a repository for failed experiments, irrelevant information and wanton speculation. The bottom line is publishability. Let the axe fall." And, indeed, the bottom line in science is getting one's results out to an audience in some form or another, most often through publication. An interesting epilogue is that when I had Bob review this piece for this AAC publication to make sure he was comfortable about what I had written about him he was quite thrilled and replied "I have no revisions or deletions. Let's take this as a sign that you have learned your lessons well."

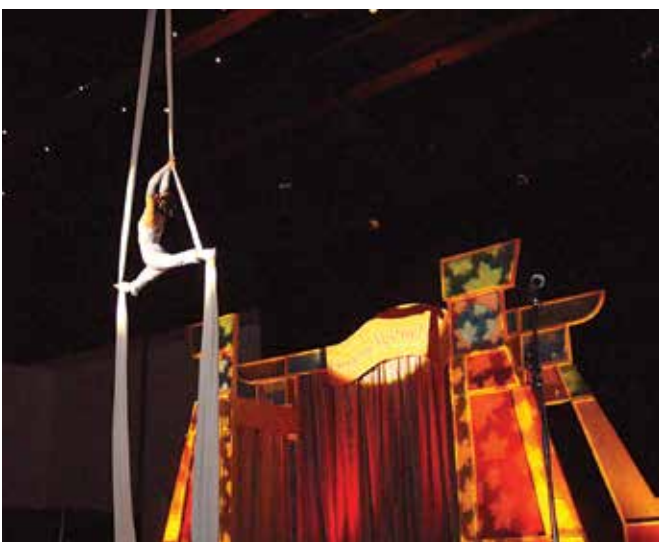
I would be remiss in not acknowledging two more people, who played a vital role in my formative years,



Japanese drummers at AC07 banquet



Jazz band at AC07 banquet



Aerial artist at AC07 banquet

my mother and father (Theresa and Peter Pearce). They both are avid naturalists who instilled in me from a very young age an appreciation of the beauty of nature and the wonders of scientific discovery.

VALUE OF THE AQUACULTURE CANADA MEETINGS

Aquaculture Canada is the only national, annual meeting on aquaculture in Canada. As such, it attracts a wide diversity of people from academia (students, post-docs, professors), government (scientists, managers, policy makers), industry (producers, processors, marketers), and First Nations. It's this cross section of interested parties that makes these meetings so interesting – getting different viewpoints on issues of importance to the industry. It's great to get to hear all the talks and learn about all the new and exciting research going on in Canadian aquaculture. The social events are always very enjoyable too and great occasions to meet old friends and new acquaintances.

MEMORABLE NON-SCIENTIFIC MOMENTS AT AQUACULTURE CANADA

I am going to show my bias here as a lot of my most memorable moments come from AC07 in Edmonton, which was the year I was president and had a big hand in developing the conference.

AC02 Charlottetown: Hilarious comedian at BBQ.

AC03 Victoria: Everyone dressed in Halloween costumes at conference banquet.

AC07 Edmonton: Dr. Thierry Chopin doing his IMTA dance.

AC07 Edmonton: Dr. Gregor Reid in his pink ensemble (including furry hat) as MC at the BBQ.

AC07 Edmonton: Japanese drumming, aerial artist, jazz group, and reggae band as conference banquet entertainment.

AC09 Nanaimo: Another hilarious comedian at BBQ.

There are lots more enjoyable memories! Too many to list them all.

Christopher Pearce

Research Scientist, Pacific Biological Station

Fisheries and Oceans Canada

Tel: (250) 756-3352

Email: Chris.Pearce@dfo-mpo.gc.ca

Matthew and Joanne Liutkus

AAC members since 2006

Affiliations to AAC

Matthew has been a Director since 2011

HISTORY

If you ask Matt what his lasting thought was on his first day of orientation at the Marine Institute of Memorial University of Newfoundland in 2006, and his first day enrolled in the Advanced Diploma in Sustainable Aquaculture (ADSA) Program, you'll find it wasn't some profound revelation of how aquaculture was the way of the future, or how excited he was to have gained so many insightful, inspiring teachers as potential friends and mentors, or his anticipation in delving in the rich culture of the province, so different from where he had come. No. His first impression was "Oh my God, three women".

Matthew, having come across the country from Richmond, British Columbia, having had gained some experience in working on a mussel farm in Nova Scotia, and having been excited to share ideas with fellow young aquaculturalists and learn from others' industry experiences through the program, quickly came to the realization that he was the sole male in a class of only four, and he was the only one with any aquaculture experience. This concerned him. Joanne hadn't given much notice to Matthew on that first day, other than maybe some pity for his unfortunate position as the only male in the class, maybe some admiration on the extent of knowledge he had already seemed to have on aquaculture, his enthusiasm that came forward during the initial introductions, and maybe some fascination with his slow West coast accent... which any Newfoundlander could quickly pick up on as being exotic.

Despite Matthew's worrisome position, his laid back, friendly demeanor quickly allowed him to make connections with his classmates and teachers,



and particularly Joanne. Joanne, being from Placentia, became somewhat of an interpreter of the Newfoundland culture for Matt, and he likewise for her with international seafood cuisine. On the third night of the annual ADSA week-long tour to visit aquaculture operations across the province of Newfoundland, Matthew thought he would make homemade sushi to impress the girls, during their stop in Grand Falls-Windor. When he and Joanne visited the grocery store, and he asked a store employee where the international food section was, he shouldn't have been surprised when the young man turned and asked him "What part of the mainland are you from?" The field trip really sparked Joanne and Matt's interest in each other, particularly fueled by Matthew's screech in a Harbour Breton hotel, and a visit to the Hook and Line Lounge on the last night of the tour.

Over the course of the year Matt and Joanne became excellent partners on school projects, and eventually best friends, a relationship that seamlessly evolved into being

They still feel there are unlimited possibilities ahead of them with respect to where aquaculture will take them next.

“more than friends” – a fact that they thought they were (but probably failed to be) hiding from classmates and teachers for several months.

Aquaculture really made an impression on them that year. They attended the Newfoundland Aquaculture Industry Association annual conference, presenting posters on their research and meeting many inspirational members of the aquaculture industry, not only from Newfoundland but internationally. They were introduced to officials from industry and governments through class seminars and they led their own industry related research projects, among many other activities.

They knew that when the year was over they didn't want to give up each other or their connection to aquaculture. They began to make plans on how they would keep up their relationship, linked in fish, despite the unavoidable long distance relationship they would have to carry on while Matt returned to work on the mussel farm in Nova Scotia and Joanne moved to St. Andrews, New Brunswick, to begin a Master of Science degree, studying the growth of cage cultured halibut with Debbie Martin-Robichaud of Fisheries and Oceans and Dr. Tillmann Benfey at the University of New Brunswick (UNB).

The annual Aquaculture Association of Canada conference held in Halifax in the fall of 2006 provided them with the opportunity to spend some time together and meet the cast of characters that made up the Canadian aquaculture industry. Particularly memorable from this trip was a dinner at an Indian restaurant in downtown Halifax which former teacher, and now friend, Cyr Couturier had invited them to attend with some colleagues. Conversation was going well at the table but they were a little humbled in conversation with Mr. David Rideout when Matthew asked him what he did and he answered that he was the Executive Director of the Canadian Aquaculture Industry Alliance. He didn't seem to be upset – maybe a little amused.

Over the next year, Matthew began a Master of Science with Dr. Shawn Robinson (DFO) and Dr. Bruce MacDonald, UNB studying bio-depositional rates of



mussel wastes in Integrated Multi-trophic Aquaculture and moved to St. Andrews to join Joanne. St. Andrews became home. Over the next three years they spent time providing assistance to Susan Waddy in the AAC office with mail-outs and volunteered to help out with the Student Affairs Committee, developing games for Student BBQs at the conferences, and canvassing for donations to the silent auction. Over those years they also were fortunate enough, by the will and means of their excellent supervisors, to continue to attend the Aquaculture Canada conferences, where they continued to make connections and friends in Canada's aquaculture industry.

Besides socializing within the industry, the pair knew it was important to start their job searches early, and began working contracts and part time positions where possible to gain some experience in aquaculture, before they had finished their graduate degrees. Their first hands-on experience outside of fieldwork for their research was to remove pit tags from freshly harvested Atlantic salmon for a study through the Centre for Aquatic Animal Health Sciences of the Atlantic Veterinary College. It was hard, cold work in the Black's Harbour processing plant, in the winter, but it paid well, and it was experience - they quickly gained hands on experience in the anatomy of salmon and the workings of PIT tag readers.

In the spring of 2008, Joanne began working with Sweeney International Management Corps, on the New Brunswick finfish environmental monitoring program. Matthew wrapped up his field work on IMTA sites and where possible helped out in day to day production activities, out of his own personal interest. After switching positions to work with DFO at the St. Andrews Biological Station in the fall of 2008, and completing her MSc, Joanne was offered a temporary position with the Aquaculture Management Directorate of DFO in

Ottawa. In the winter of 2009, they decided they'd expand their horizons, and take up the opportunity to move to the National Capital Region. Their adopted stray cat from St. Andrews came along for the ride.

It was difficult at first for Matt to find work, and for a period of time, he moved back to St. Andrews over that summer, to do some contract work with DFO on the IMTA sites, and to defend his thesis. Thankfully, in the fall of 2009 he began working as a consultant with the Canadian Food Inspection Agency's (CFIA) National Aquatic Animal Health Program, back in Ottawa, and eventually moved into a position with the group.

Over the next couple of years, finding it hard to settle, and always longing to be back closer to the ocean, the pair moved four times, travelling back to the east coast of Canada for a number of job opportunities in aquaculture, and not being content with any, eventually returned to Ottawa in the fall of 2012 where they both began to work with Dr. Jay Parsons in the Aquaculture Science Branch of DFO. In the meantime, having realized that surviving so many job changes and household moves (8 at that time), lost and adopted cats, family vacations that spanned the continent, and still enjoying each other's company, was no small feat after 6 years, Matthew thought it would be a good idea to propose to Joanne during a break from their bike ride along the Richmond Dyke, with a nice view of the ocean and the Vancouver International Airport. They were married on an exceptionally hot and sunny day in September 2012, in St. John's, Newfoundland, three days after a tropical storm blew through, just in time to let relatives and friends from across the country arrive in time for the party.

Joanne and Matthew still live in Ottawa and aquaculture is still a part of their day to day lives, despite not being near the ocean. Joanne just recently started a position with the Canadian Aquaculture Industry Alliance as their Programs and Office Administrator, a challenge she's excited to take on. Matthew works as a Programs Officer with the Disease Surveillance group of the National Aquatic Animal Health Program in CFIA, with a focus on east coast shellfish aquaculture.

VALUE OF THE AAC

Matthew was voted to the Board of Directors for the AAC in 2011, a position he's held since then, and has recently taken on the role of the Association's treasurer. They feel fortunate every day for the advantages and ex-



periences they've gained through making the decisions to enroll in the aquaculture program at the Marine Institute in St. John's, to stick with working with the industry and through being involved in the AAC. These decisions have brought them valuable experiences in working and connecting with some of the most respected people in the Canadian aquaculture industry. They still feel there are unlimited possibilities ahead of them with respect to where aquaculture will take them next. It brought them together in the first place, from the Pacific to Atlantic Ocean, so they must be doing something right to stick with it.

Matt Luitkus

*Program Officer Surveillance and Epidemiology
Animal Health Science
Canadian Food Inspection Agency
Tel: (613) 773-7155*

Joanne Luitkus

*Programs and Office Administrator
Canadian Aquaculture Industry Association
Tel: (613) 239-0612 ext 224*

Thomas George

AAC member since 1995



HISTORY

I have been a career scientist since 1966 and am well-traveled with many credentials in international aquaculture and fisheries as an independent Consultant or Team-leader with CIDA, WHO, FAO, and UNDP. I have been an active participant or chairperson in international conferences, workshops and exhibitions held in Asian, African, European and North American countries. In 1976, I participated in the first FAO/ UNDP/ Government of Japan International Aquaculture Conference held in Kyoto, Japan. Also, I participated in the release of the Aquaculture Strategy Plan for Canada in 1995 by DFO Minister Brian Tobin at Prince George Hotel, Halifax, Nova Scotia. I planned, formulated and executed several aquaculture projects funded by IDRC, WHO, IFS, and the World Bank as the Project Leader. In addition, I have promoted integrated agro-aquaculture in rural areas and the use of fish as biological control agents (grass carp and tilapia) for aquatic weeds, Bilharzias' snails and larvae of malaria-transmitting mosquitoes. In 2003, I assisted Al Neelain University, Khartoum, Sudan, to establish the Department of Fisheries and Aquaculture as its first Head and graduated the first batch of students in 2006. Throughout the years, I have contributed to public awareness on aquaculture and fisheries through multi-media presentations and interviews: TV, radio and the press.

VALUE OF AC MEETINGS

As AAC member, I had attended several annual meetings and met dignitaries and scientists involved in promoting aquaculture development in Canada as well as abroad and visited several towns in Canada: Ottawa, Quebec, Edmonton, St. John's, Halifax and Charlottetown. Also, I could work closely with AAC editor, Susan Waddy, and publish in the AAC Bulletin the first paper on tilapia



J. Parson, C. Audet, T. George, C. Couturier, AC12



Tilapia served at AC98 dinner S. Waddy, T. George, AC06

as a culture species in Canada and thereafter, several other papers on tilapia culture in Canada and Sudan. Furthermore, I could co-ordinate with Linda Hiemstra to serve tilapia for the first time in Newfoundland during the AAC dinner reception that was held at the Delta Hotel in St. John's, Newfoundland in 1998. At the AAC meeting in Quebec and during the students' fundraising raffle session, I won an air-ticket to attend the 1998 AAC meeting in St John's, Newfoundland. Last but not least, the students' posters are always interesting and informative about aquaculture research in different universities.

Thomas George

*Professor, Aquaculture and Fisheries
President, Global Aquaculture Consultants (GAC),
Toronto, ON Canada. www.tilapiamiracle.com*

Steve Neil

AAC member since 1998



Proud Supporter of Movember

HISTORY

After graduating with my Marine Biology degree from the University of New Brunswick in Saint John, my career in aquaculture started in a familiar place for new graduates, the salmon cages in the Bay of Fundy. In 1995 I started as the site biologist for a salmon operation based out of Black's Harbour, NB. It was here that my interest in aquaculture really started to develop. From there I decided to go back to UNBSJ to take a newly offered aquaculture course which lead to my next position as the lab technician for Dr. Matt Litvak working on aquaculture and ecology of Short-nose and Atlantic sturgeon. This proved to be an amazing learning opportunity not only in aquaculture, but also in academic research and recirculation hatchery technology.

In the spring of 1998, I was offered a 3 month contract at the St Andrews Biological Station to work on a

haddock reproduction study with Dr Ed Trippel, and the rest as they say is history. Over my time with DFO in St Andrews I have worked with a number of different species (haddock, cod, halibut, salmon, turbot and lobster). I served as the hatchery manager for our marine fish hatchery for many years, was involved with the Cod Genomics Project, worked on sperm motility and cryopreservation of cod and turbot sperm, cod triploids, and most recently have been studying the effects of climate change and ocean acidification on various species and life history stages.

I am an avid hockey and soccer player, enjoy golfing and recreational running. I recently completed my first Olympic distance triathlon and continue to volunteer as an officer with the St Andrews Fire Department. This is all in an effort to remain active so I can keep up with my two young children.

INFLUENTIAL PEOPLE

Over the years I have had the opportunity to work with and meet many great people. Dr. Matt Litvak gave me my first real opportunity and his enthusiasm and passion for science was contagious. He was instrumental in getting me in touch with Dr. Ed Trippel which lead me to where I am today. I continue to work with Ed at DFO and he has become a friend and mentor over the years. Paul Harmon was also a great role model early in my career at the Biological Station, teaching me many of the nuances of DFO and always being very supportive. Dr. Dave Aiken was my first Section Head at DFO and always showed great confidence in me and afforded me many great opportunities and support early on in my career.



Haddock spawning in winter

AQUACULTURE CANADA MEETINGS

I have been fortunate enough to attend the Aquaculture Canada meetings for many years now, and have always found them to be extremely beneficial. They serve as the main platform for people in the Canadian aquaculture industry to get together and discuss ideas, success stories and develop collaborations and directions for future research and development. Not to mention all the great student support the AC meetings provide to the future leaders and visionaries of the aquaculture industry.

Steve Neil

Research technician

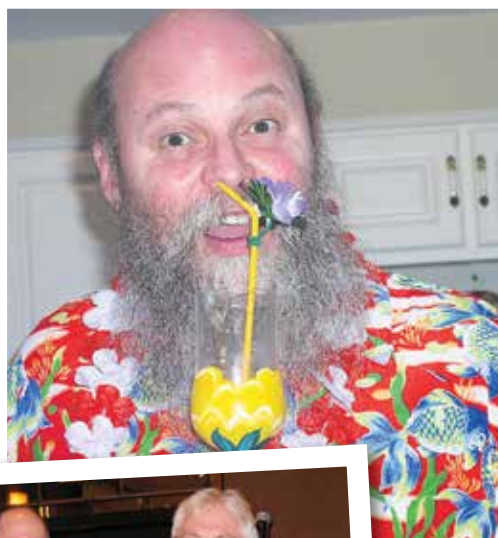
St. Andrews Biological Station

Email: Steven.Neil@dfo-mpo.gc.ca



Ed Trippel and I heading out for a day of sampling, 2007

AAC PHOTO ALBUM



Bill Pennell

AAC member since 1984

Affiliations to AAC

President 1990-1991, President-Elect 1989-1990

Vice-President 1988-1989

Director 1985-1987

HISTORY

I have never had a good sense of direction and can still easily get lost in my home town. In life too, I frequently have turned right when I should, by normal standards, have turned left. And yet I have always ended up in good places. Not on my CV are many of these wrong turns and good places – a major in philosophy (instead of biology), a good job turned down in favour of living on a sheep farm in Wales (trying to become an artist), extensive travels through many tropical countries, and homesteading in the Kootenays (where I met my wife).



Sea Urchin Kebob

In 1976, I came down to the BC coast from Kootenay Lake with my new wife Elizabeth and our daughter Sara, spurred westward after reading a Malcolm Lowry book which made the rain coast sound a very romantic and adventure filled place as indeed it is. I had no intention of rejoining academia (I had a PhD from McGill in plankton studies), and I had never heard of aquaculture. However, after a year in a small town on Vancouver Island where several dreary

metres of rain fell each winter, I became restive and started to cast about for something interesting to do. By chance, the Nimpkish Indian Band (now the 'Namgis First Nation) was looking for an additional person to work on an aquaculture project. I got the job and joined a team (Michael Berry, Basil Ambers, and Dan Gillis) that was trying to start a salmon farm, an oyster farm, and several



Jellyfish eyes



Seining

For me it was an experiential crash course in everything aquatic – Pacific salmon, shellfish, aquaculture- with another layer of First Nations issues and culture.

wild salmon hatcheries. The job involved teaching as well, something else I had never considered. The next three years were among the best of my life. Our aquaculture team had little relevant experience or knowledge, reinventing ourselves each week, and little money, but we managed. For me it was an experiential crash course in everything aquatic – Pacific salmon, shellfish, aquaculture- with another layer of First Nations issues and culture. A whole new world.

In 1979, I was approached by Malaspina College in Nanaimo to see if I would like to take part in a new diploma program called Fish Culture Technology. I was intrigued and came down part time to teach courses in fish husbandry while keeping my several projects going in Alert Bay. Then, I decided to move down to Nanaimo full time leaving behind what had been a paradise in Alert Bay. The history of the program at Malaspina College has been told in another issue of this Bulletin, so I will not repeat it, but in brief we grew and grew in scope and



Ricker Trip 2011



Raptor Day

finally became the Fisheries and Aquaculture Program with respectable facilities and several diploma and degree options. I worked initially with David Lane and Eunice Lam but we expanded in staffing over the years to about 12 people.

Numerous people generously mentored me in my first years of teaching: Roly Brett at the Pacific Biological Station (Pacific Biological Station) in the subtleties of fish growth and energetics, David Groves on fish nutrition (at his kitchen table on many evenings), and D.B. Quayle and Neil Bourne (Pacific Biological Station) on shellfish biology and farming. Later, there were many others who helped me clamber up endless learning curves as I developed new courses. I could not have managed without such help (and good directions).

I found teaching to be both challenging and immensely enjoyable. The students throughout the years were always great. I recall one student especially well – highly organized, she lectured me on many topics and was bored by my Friday afternoon salmon culture classes - she preferred the order and precision of algae culture and shellfish hatchery technology. I refer of course to the capable Linda Hiemstra, a close friend still today.

There were many other excellent students, too many to mention here, and I continue to encounter them all over BC. This is an outcome of teaching that I had not considered, life long friends everywhere one goes. After 15 years of teaching salmonid topics, we developed a

BSc degree and I shifted my courses to shellfish culture, invertebrate zoology, and oceanography. During the teaching years, I was also able to travel abroad on various exchanges, CIDA projects and other ventures throughout SE Asia and parts of South America. These trips added much richness to an already full life and also allowed me to see aquaculture in very different environments.

Then after 25 years of teaching, I retired early and took on other work at what had become Vancouver Island University (VIU). I was given an opportunity to develop the Institute for Coastal Research which focuses on interdisciplinary approaches to coastal resource management, the thought being that polarized science was not solving the aquaculture and fisheries issues in BC and that we needed a broader approach taking human dimensions into account.

I was also privileged to be part of a team tasked with developing new research infrastructure at VIU. Together, we created the Centre of Shellfish Research, the Deep Bay Marine Field Station, and the above Institute for Coastal Research. Another group created the International Centre for Sturgeon Studies. This was highly rewarding work, although the easy part was getting the initial capital. Staffing and obtaining operating funding is always harder to do. However, these facilities, under the leadership of Don Tillapaugh and Brian Kingzett, are going concerns and provide fantastic opportunities for VIU students whether they be marine ecologists or aquaculturists. I still have an office at VIU and participate in campus life where I find the intellectual and social simulation invaluable.

Over the last ten years, I have also been involved in various field research projects, the most notable working in the Broughtons during the sea lice wars. I worked for Dick Beamish (Pacific Biological Station) and in the field with several great people including one highly organized young woman, Joy Wade, an AAC veteran of many talents. I came close to dying several times flying through fog in DeHaviland Beavers, in freak winds in small boats, grizzly bear encounters (Jeff Eastman was the cause of this near disaster), and worst of all, hauling Joy's 50 pound cannon ball weights from deep water. However, Dick Beamish told Joy not to worry about me: "Bill's fine – and anyway he has had a good life". True enough I guess. Joy remains a very special friend.



I have been engaged in photography for much of my life, and for years trudged ponderously around with an Ansel Adams like camera on heavy tripod. During the teaching years, I took thousands of 35mm slides of aquaculture and fisheries subjects that I used in lectures. When I retired from teaching, I was given Nikon's first digital SLR, which changed everything for me. I have ever since been spending more and more time with digital photography mostly taking pictures of birds, animals, fish and nature scenes.

Those are the highlights, but the underlying value of everything has been greatly enhanced by the many wonderful people encountered along the way, people I met through AAC, the industry, the research and academic communities, and of course by all those fantastic students.

Bill Pennell

Professor Emeritus

Vancouver Island University

Email: bill.pennell@viu.ca

Timothy DeJager

AAC Member since 1998

Affiliations to AAC

Vice President 2007-2009

Director 2006-2007



HISTORY

Aquaculture called me from the dusty archives of academia. After completing my PhD at the University of Toronto in the history and philosophy of science and technology and a 2-year post-doctoral fellowship at the University Manchester (UK), I spent a 6-month sabbatical at the Australian Institute of Marine Sciences, then moved to the Pacific coast of Canada to become involved in shellfish aquaculture – for 5 years as a producer with Desolation Sound Oysters Ltd and subsequently as a consultant in education, training and research programs for aquaculture under the banner of co3 consulting. I have had a lifetime of adventure and have had the privilege to learn from and work with many passionate, talented and fun people. Preparing the first three editions of the Canadian Aquaculture R&D Review and leading the AquaPort.ca project have been special highlights of my work in Canadian Aquaculture. I presently work in Canada as executive manager of the BC Aquatic Food Resources Society, an organization formed to facilitate research and innovation, and I am leading an international project on aquaculture for food security in Sri Lanka. I live in Nanaimo, Belgium, and Sri Lanka with my very travel-tolerant partner Bea.

INFLUENTIAL PEOPLE

I have a long list of people who have shared their enthusiasm with me, mentored me, and collaborated

on numerous projects. I wish I could list them all, but a few I must mention. Ruth Salmon and Brian Kingzett helped me get my feet wet in the BC shellfish industry, Linda Hiemstra brought me into the world of the AAC and worked with me on many projects. Keith Reid, Bill Friedel, Duane Johnson and Ben Fulton showed me the ropes of the oyster business. Monty Little and the members of BCARDC have been a constant inspiration. Aldolfo Alvial introduced me to Chile's aquaculture industry and participated as keynote speaker for the 2006 AAC meeting and the 2007 AquaPort workshop.



Sri Lanka Project - We are helping this family and community get started growing oysters

VALUE OF AC MEETINGS

The AAC is the organization that brings the diversity of aquaculture in Canada and the world together. For students the annual Aquaculture Canada meeting a great community to present research, meet people from across the country and build opportunities. For all of us it is a great way to share experiences, learn from each other, and just plain have a great time. The future challenge of AAC and the AC meetings is to both support research and learning but doing so in a ways that bring new value and innovation to the industry. Not an easy goal, but with the people we have in Canada an achievable one!

Tim DeJager, Ph.D.

CO3 Consulting

Tel: (250) 751-9542

Email: dejagert@co3.ca

Stephen F. Cross

AAC member since 1999



HISTORY

My Canadian Aquaculture Career – what a *waste*!

True, but not *really* true! However, having completed the first environmental impact study of salmon aquaculture in Western Canada in the mid-1980's it most certainly set the stage for a career that has been built largely on waste – fish waste. Having spent my early career as a coastal environmental consultant I worked on environmental fate and effects of a wide variety of stakeholder activities – forestry (pulp mills, log booming), mining, municipal outfalls, non-point source inputs, and even the risks of active sonar from US submarines within Canadian deep sea test ranges.

And then along came salmon aquaculture. Well, given that no one had completed an environmental assessment of one of these operations out west, and not being the type who fits willingly into a 9-5 work day or any sort of routine, I started my own firm (Aquamatrix Research Ltd.) and completed that study - ironically with the

funding support of a Job Creation Program. As fate would have it the one study led to a second (government funded), then a third, and then, before you knew it, our group became *all things fish waste* and we were working as an independent contractor for government, industry, and coastal First Nations. My career moved from monitoring waste to predicting waste, from site selection and structure orientation (minimizing waste impacts), and finally to the current activities in IMTA and Sustainable Ecological Aquaculture system design and engineering - solutions to the waste!

It has been an interesting ride, and not one without risk or challenge - but throughout, my goal has always been to bring new ideas and approaches to an industry that I strongly support and believe in. And with this philosophy, a few of the achievements that I hope have facilitated positive change include the following:

- Assisted, via directed research and consultation, in the development of performance-based regulations for coastal aquaculture in Canada and in Chile
- Became a Lead Auditor and completed and acquired certification for the first ISO-14001 Environmental Management System (EMS) for coastal aquaculture in North America.
- Developed the Aboriginal Certification of Environmental Sustainability (ACES) program for facilitating the integration of Traditional Ecological Knowledge (TEK) into aquaculture farm siting and operating.
- Created a Shellfish Culture Capability model and conducted extensive biophysical surveys of the entire



S. Cross with products from the SeaSystem



Graduates MSc Program Mozambique

coast of British Columbia (Canada), integrating the acquired spatial data into a detailed coastal Geographical Information System in support of long term coastal planning.

- Completed seafood quality research of co-cultured species that facilitated changes to the CSSP to allow Integrated Multi-Trophic Aquaculture (IMTA) development in Canada.
- Conceptualized the Sustainable Ecological Aquaculture (SEAfood) system in Canada, designed/engineered innovative SEAfood System components, and acquired commercial production status for the first SEAFarm facility.
- Founded the University of Victoria Coastal Aquaculture Research & Training (CART) Network, and established an industry-academic linkage for facilitating ongoing applied aquaculture research. Recently received a NSERC Industrial Research Chair at North Island College to broaden this R.D&T linkage to encompass technical training, innovation, and applied research in support of sustainable aquaculture.
- Industry/academic advisor in international aquaculture research and training through CIDA, IDRC and the UN-FAO - much in support of food security and coastal community livelihoods. Developed a 2-year M.Sc. Program in Sustainable Aquaculture in Mozambique that now has 16 graduate students. Worked with a UN-FAO Team to development and implement an Aquaculture Information Management System (AIMS) for the Department of Fisheries in Thailand.

My present focus – as I am just entering middle age - is to build a strong applied research and training linkage between education institutions and industry. My vision

is to see the further development of our west coast “*CART Path*”, a career path that begins in high-school and continues through college and into university - one that allows a student to enter (or re-enter) and acquire an education that is needed by industry yet suited to their own interests. The institutional linkages will also include a strong, collaborative applied research component, facilitating an academic and technical (trades) partnership that will expedite the movement of innovative ideas to commercialization.



African Leopard



S. Cross NASA

EXHILARATING EXPERIENCES

Life is short, and while the wonderful world of aquaculture does take up a good proportion of my time, in looking back over the past few decades I must admit that I am very fortunate to have been able check off a number of entries on my *Bucket List*. Between travel experiences and just plain fun, these experiences include:

- African Safari – Kruger National Park. Experienced the *Big 5* and others
- Amazon Excursion – camping, hiking and boating into the head waters (Peru).
- Travel to the Mayan and Aztec ruins of Central and South America
- Acquiring a private pilot's license – *a real feeling of freedom*
- Sky-diving – *the ultimate freedom*
- Logging hours on an F-14 Tomcat flight simulator at William's Airforce Base
- Completing an introductory, Astronaut Training session experience at NASA's Kennedy Space Centre in Florida

THE CANADIAN AQUACULTURE INDUSTRY AND THE AAC

The Canadian aquaculture industry is an amazing sector of our national economy. We produce food – good food, and we do so in a manner that continually improves with time. It is my hope that Canadian aquaculture will continue to grow and to diversify – and as recently suggested at the 2013 CAIA AGM in Ottawa we really should be focused on becoming the *World Food Super-Power*. I couldn't agree more – especially having experienced the food and seafood security issues facing many countries.

As we all contribute to our industry's sustainable development, the AAC continues to provide a valuable networking opportunity for researchers across Canada. The annual conferences show-case aquaculture across our country and offer the perfect opportunity to exchange ideas, build partnerships for ongoing research, and in many cases dream up new innovations and approaches (the benefit of great social events).

I look forward to a bright future for Canadian aquaculture and trust that the next generation of researchers, educators, producers, and managers will build on the lessons and experiences of my cohort.

Stephen Cross, Ph.D.

NSERC Industrial Research Chair in Sustainable Aquaculture, North Island College

Associate Professor and Director, Coastal Aquaculture Research & Training (CART) Network University of Victoria, BC

Founder & CEO SEA Vision Group Inc.

Tel: (250) 853-3282, Email: sfcross@office.geog.uvic.ca



Sea System

AAC PHOTO ALBUM



Shelley King

Member Since 2006

Affiliations to AAC

President 2013-2014

President-Elect 2012-2013

Secretary 2011-2012

Director 2009



HISTORY

I've been hanging around the aquaculture space for a longtime - most recently with Genome Atlantic, where I've had the privilege of working with a wide range of producers and researchers from across Atlantic Canada. As a not for profit company in the gene discovery business, our goal for the aquaculture industry is to see producers leverage the power of genomics to become more profitable and sustainable.

Genomics (the study of an organism's entire DNA information) is a fairly exclusive term – not many really understand what it means. So I'm really heartened by the fact that so many in the aquaculture space are aware of it. I think that's due in part to the really great genomics expertise we have in the fish realm right across the country.

There have been some very high profile genomics projects, such as the Cod Genomics Project (CGP) on the East Coast, and the Genomics Research on Atlantic Salmon Project (GRASP) and the consortium for Genomics Research on All Salmon Project (cGRASP) on the West Coast. All of these projects focused on the genes that are important to growth, maturation, sex and health. This kind of information is crucial to producers, and we've seen other countries pour lots of resources into these areas, so it's been good to see our national efforts keeping pace with international research. But, of course, there's a lot more we'd like to see happen to ensure the sector stays competitive.

On that note, a highlight for me was the recent development of a genomics strategy for the sector. Genome Atlantic and Genome British Columbia led the

But we're going to have to make sure that all the players –government, industry and academia – continue to work together to make it happen.

effort with financial support from Genome Canada and a lot of input from the other Genome Centres (Alberta, Prairie, Ontario and Quebec). The strategy (which, at time of writing, was in its final development with final product expected in early fall, 2013) took an important look at both the fisheries and aquaculture sectors, given their very close connections both geographically and from a species health management perspective.

The most rewarding part of that initiative was the gathering of people from both sides of the space, and from all interests (industry, government, regulatory, environmental and academic). The conversation between such diverse groups was, as you'd expect, interesting, and not without its conflicts, but we were overwhelmed by the positive response people had for the effort to get everyone in the same room.

I think that's critical for the sector going forward. We're a really big country, with a lot of competing – and often small - interests. And we're competing globally for buyers for our product. There is so much potential for this sector to move to the next stage of growth. But we're going to have to make sure that all the players –government, industry and academia – continue to work together to make it happen.

Shelley King
Genome Atlantic
sking@genomeatlantic.ca

Tillmann Benfey

AAC member since 1988

Affiliations to AAC

AAC Research Award of Excellence 2003

President 2010-2011

Treasurer 1996-1997, 2008-2009, Director 1995-1997, 2007-2012

Student Affairs Committee Chair, 1995-1997

Publication Editor/Co-Editor – Bulletins 96-2, 108-2, 109-1, 110-3; Special Pub 17

HISTORY

After completing a BSc in marine biology at McGill in 1981, with an Honours research project on freshwater sponge physiology, I conducted graduate and post-doctoral research in salmonid physiology and aquaculture at Memorial University's Marine Sciences Research Laboratory (MSc 1981-84), DFO's West Vancouver Laboratory (UBC PhD 1984-1988) and MAFF's Lowestoft Fisheries Laboratory in the UK (PDF, 1988-1989). I have been employed since 1989 as a Professor of Biology at UNB (Fredericton), where I have taught courses in aquaculture, fish biology, environmental biology and animal physiology, and have also done duties as Director of Graduate Studies (1997-2002) and Director of Animal Care (since 2007). I have had the privilege of supervising or co-supervising the research programs of 70 undergraduate and graduate students at UNB. Outside of UNB, I have also served on the Boards of Directors of the Huntsman Marine Science Centre and the AquaNet Network of Centres of Excellence, and have been an advisor to the United Nations (FAO and WHO) as well as the Canadian and US governments on safety of genetically modified fish.



AC13 (Guelph)



PhD student (DFO West Vancouver Lab, ca. 1986)



Early days (near Montreal, ca. 1968)

Every AC meeting is also an opportunity to connect and network with old friends and to make new ones.

INFLUENTIAL PEOPLE

So many to choose from! In 1980, a lecture and tour of the ASF's Salmon Research Centre in St. Andrews by Richard Saunders convinced me that aquaculture was the future and inspired me to pursue graduate studies in salmonid aquaculture. Arnold Sutterlin, my MSc supervisor, took me to a trout farm in rural Newfoundland and told me that if I wanted to work on a practical problem then I should do something to address early maturation of farmed fish. This opened the door to a 3-decades-long (and counting) research career in sex control and triploidy in fish. Arnie led by example: hard working, hands-on and get the job done. Ed Donaldson, my PhD supervisor, gave me the opportunity to develop as an independent scientist and an appreciation for how academic research can be applied to support industry and the public good. And lastly, one of my earliest graduate students and long-time friend Debbie Martin-Robichaud became my principal link to DFO and industry; together we created a collaborative environment that allowed us to support several teams of technicians, graduate students and post-doctoral fellows (most of whom are now themselves working in aquaculture-related jobs and are AAC members), leading to many publications and making genuine contributions to halibut and cod aquaculture.

VALUE OF THE AC MEETINGS

The greatest value of AC meetings for me has always been the opportunity to hear the latest about aquaculture research in Canada and to provide my students with the opportunity to learn how their projects can be applied to aquaculture development. Every AC meeting is also an opportunity to connect and network with old friends and to make new ones.

Tillmann Benfey

Professor, University of New Brunswick

Email: Benfey@UNB.ca



"Mr. Aquaculture" (UNB, ca. 1990)



At a salmon processing plant (St. George, ca. 1995)

Leslie-Anne Davidson

AAC member since 1997



Passionate Scallop Biologist

HISTORY

I started in 1983 as a scallop technician for Fisheries and Oceans Canada to assess the wild scallop fisheries in the Gulf Region. In 1987, I became involved in the scallop aquaculture project in Port au Port, NF. I travelled from Moncton N.B. to Port au Port NF to participate in the biological monitoring of all the steps required to culture scallops: the larval stage to the market stage. In 1992, when the west coast of Newfoundland was no longer part of the Gulf Region, I had to abandon the projects in Port au Port. However, by then I had already conducted all the field work for a Master study to investigate the gonadal maturation of juvenile to adult sea scallops. Even though I worked full time, I was able to graduate in 1998.

When, the fish harvesters in northern and south-eastern New Brunswick learned of my experience capturing



Measuring sea scallop cultured in open-ocean

My passion for scallop aquaculture and enhancement grew with the influence of many great researchers.

scallop spat, they asked if I could teach them how it was done. A spat collection study was conducted with a lobster fish harvester in 1993 from south-east New Brunswick. When the results were favorable, the scallop fish harvesters protested wildly because they felt that such a study should be conducted with them. As a result, the Professional Botsford Fishermen Association (BPFA) and the Maritime Fishermen's Union (MFU) each launched various scallop enhancement and aquaculture projects from 1995 to 2008 in cooperation with the scallop fish harvesters. Fortunately I was able to work with both groups along with my colleagues Monique Niles, Bruno Frenette and Rachel Nowlan. Bruno is now with Environment Canada and Rachel Nowlan is the manager of Indian Island Aquaculture Inc. From 2009 to 2011, I diversified and studied the feasibility of growing oysters glued to strings in an exposed culture site vs a sheltered site. In 2013, after 30 years of service with Fisheries and Oceans Canada, I completed one last aquaculture study! In cooperation with Kenny Aquaculture Inc., a sea scallop aquaculture project was conducted at an open-ocean site, to compare various gear and husbandry practices.

INFLUENTIAL PEOPLE

My passion for scallop aquaculture and enhancement grew with the influence of many great researchers. The infectious enthusiasm of Dr. Mike Dadswell launched me to search for wild scallop spat along the coast of



Participants at the AC2006 tour

NB, PEI and NS. I collaborated with leaders such Dr. Jay Parsons and Dr. Shawn Robinson to search for seed stock when the province of New Brunswick created the “New Shellfish Aquaculture Species Program”. Donna Murray from the BPFA was instrumental in securing funds for enhancement and culture projects and Euclide Chiasson from the MFU was able to keep the various studies afloat by finding the financial assistance needed. The federal program, Aquaculture Collaboration Research Development Program (ACRDP) was a godsend because it allowed me to link up with persevering scallop aquaculturist such as Ron Boudreau. Colleagues in Québec, such as Yves Bastien, Georges Cliche and Madeline Nadeau shared the scallop aquaculture and enhancement passion and provided effective advice.

VALUE OF AC MEETINGS

I have attended and presented at various AC meetings and participated in the registration at the AC 2000 meetings held in Moncton, NB.

The AC meetings are and have always been an invaluable means of exchanging ideas concerning aquaculture, forming new partnerships, partaking in tours and having a lot of fun!

Leslie-Anne Davidson

*Research Scientist, Department of Fisheries and Oceans
Canada, Moncton, NB*

Email: Leslie-Ann.Davidson@DFO-MPO.gc.ca

AAC PHOTO ALBUM



Myron Roth

AAC Member Since 1993

Affiliation to AAC

Director 2013 to present



When not working with fish, Myron spends his time studying wine – seen here in the heart of Tuscany, Italy, with a fine Burnello.

HISTORY

I had my first exposure to aquaculture when I was invited to join, as an “advisor”, a group of Vancouver investors to tour Aquarius Sea Farms on BC’s Sunshine Coast. My knowledge of aquaculture was scant at best but who could say no to a free float plane ride up the BC Coast! That was back in the late 1980s during my undergraduate years at UBC. At the time, I was employed part-time as a lab technician at the Vancouver Aquarium, a position which had all kinds of learning opportunities and without a doubt shaped my career as a fish biologist.

After graduating from UBC with a BSc in zoology, I took up a position with a biotech company called Quadra Logic Technologies, in Vancouver, working on DNA probes for the identification of fish diseases. In those days, molecular biology as a fish health diagnostic tool seemed like rocket science as it wasn’t something taught at the undergraduate level. This made for a great hands-on learning experience and it became clear to me that a career in fish pathology (as nebulous as it sounded at the time) was what I really wanted to do.

I then applied to the graduate school at the Institute of Aquaculture, University of Stirling, Scotland, and took



1993, Pacific National Group. Collecting Broodstock in the Fraser River

a position as Research Associate for an industry led sea lice project, while writing my Ph.D. thesis part-time. My thesis was on sea lice chemotherapy and, in the end, I screened over 20 treatments for sea lice control, several of which became licensed and use extensively around the world. It was a serendipitous opportunity, as I’ve been involved with sea lice in various capacities ever since. Upon returning to Canada, I took up a position as Technical Director for a West Coast Salmon producer, Pacific National Group (PNG).

In addition to learning the ins and outs of sea lice treatments in Scotland, I also had the opportunity be part of the first

applications of non-chemical controls including single year class stocking and fallowing which were put into practice at PNG due to their general applicability to fish health management on farms. However, I also took a lead role in developing PNG’s broodstock program and production planning models and, in the process, learned a great deal about aquaculture production and genetics.

After 4 years, I left PNG and took up a position with the Salmon Health Consortium (SHC) in Ottawa, as the Technical Director, moving to Acting Executive Director, and finally to Chair of the Board of Directors. Memorable projects with the SHC include the creation

and implementation of the on-farm certification program, “Healthy Salmon”, writing the global market assessment for SLICE (we thought it would be a good bet!), and drafting a generic sea lice integrated pest management plan for Canadian salmon farmers. This work led to taking a position with one of SHC’s supporters, Aqua Health Ltd, as the Head of Regulatory Affairs, a position I held for 7 years. At the time, Aqua Health Ltd. was a world leader in the development and



1998 With Dr. John O’Halloran during a Healthy Salmon Audit – in our full biosecurity regalia

from the provincial to the federal government. It will be very interesting to see how the next chapter of unfolds for aquaculture on the West Coast – and in Canada.

Over the years my interests have included out-door pursuits such as camping, hiking, and scuba diving. From many years, I was a competitive archer and stood on the podium one year at the BC Summer Games! However, it hasn’t always been about fish.

“it’s great to have an organisation that honours notable achievers in Canadian aquaculture”

commercialization of fish vaccines around the world. The work was incredibly rewarding, as I had the opportunity of working with the best people in the fish health business at the time. Over my tenure, I managed over 70 registration files for 26 vaccine products in 12 countries making it the best work/learning experience of my career.

Following Novartis’ acquisition of Aqua Health, I left to relocate on the west coast to work as Aquaculture Analyst with BC Ministry of Agriculture, and subsequently took the position of Industry Specialist, Aquaculture and Seafood, the position I currently hold. While with the Ministry, I was fortunate to have been given the opportunity to organize an international sea lice conference and work on a variety of key policy issues. It also gave me the opportunity to see, first hand, significant change in the industry on the West Coast following a BC Supreme Court decision to transfer regulatory responsibility for the aquaculture industry

Lacking funds to attend university, I took a year off to work in a restaurant to save enough money to attend first year. I then worked part-time as a waiter at many restaurants throughout my undergraduate to fund my degree. Always one to combine work with my studies, one summer I worked in a restaurant called “Brothers” where all the staff wore monk robes. We were all given name tags and I had “Gregor Mendel” printed on mine. Of course none understood this until I waited on a group of high school teachers visiting from Europe – who couldn’t take enough pictures to show their students they had met the famous geneticist - even if in Vancouver! This work led to an interest in wine that I’ve had ever since. In fact, a few years ago I took a year off to work for a winery to further on-going studies with the Wine & Spirits Education Trust. Working in the aquaculture industry and having a good knowledge of wine has its synergistic benefits!

I have been fortunate to have had a few career highlights. My passion for science began with my first publication back in 1988 in the *Canadian Journal of Zoology* (on parasitic copepods). I had just graduated and had my name in print - very exciting, very motivational. Without question, the peak of my career was obtaining the licence for the world’s first commercially available DNA vaccine, APEX IHN, while heading up the Regulatory Affairs program for Aqua Health/Novartis.

MOST INFLUENTIAL PEOPLE

Like most people, I have benefited greatly from the people I have worked with over the years. Two, however, stand out for me. The first is Dr. Jeff Marliave of the Vancouver Aquarium. Jeff was the Aquarium’s Resident Scientist at the time and gave me my first job as a biologist and taught me many things. Most important among these were the importance and passion for publishing (Jeff encouraged me to get that first paper out), the importance of field



2010 at the 8th International Sea Lice Conference with Larry Petersen, Deputy Minister, BC Ministry of Agriculture

observation, and keeping a journal. The second is Gerri Greeham. Gerri was the CEO of Aqua Health Ltd. when I started with them. Of all the people I've worked for, Gerri was the consummate leader and a champion motivator. Not only did he give me an incredible opportunity at Aqua Health, he was a great leadership role-model. Many Canadian's don't know it, but Gerri made a huge and significant contribution to fish health management for aquaculture in Canada and abroad.

VALUE OF THE AAC AND AQUACULTURE CANADA MEETINGS

Over the years, I have attended many AAC meetings and have always been impressed by how well they are run. While the focus is research oriented, my feeling is that they would do well to provide a venue for industry-oriented meetings, providing economies of scale for travel now that travel is not as easy as it use to be. I think it would be great to see more workshops or consultations being held in conjunction with the annual AAC meetings. As for myself, truth be known, I was first elected to the AAC board in 1999, but declined the nomination due to work commitments. Nonetheless, I was a keen supporter of student awards when I was with the Salmon Health Consortium and AquaHealth/Novartis and believe that the AAC plays a very critical role in supporting students who will become the future of the industry. I also think it's great to have an organisation that honours notable achievers in Canadian aquaculture for posterity through the Awards Programme.

Myron Roth Ph.D. P.Ag.

*Industry Specialist-Aquaculture & Seafood
Fisheries & Seafood Policy, BC Ministry of Agriculture
Tel: (250) 356-1831, Email: Myron.Roth@gov.bc.ca*



1985 - 2nd year science major at UBC working as a Monk at "Brothers" restaurant in Gastown with name tag "Gregor Mendel"

AAC PHOTO ALBUM



Andrew Boghen

AAC member since 1984

Affiliations to AAC

President 1999-2000, President-Elect 1998-1999

Vice President 1997-1998, Director 1996-1997

Bulletin Contributing Director 1997

Organizing Committee Chair AC2000

HISTORY

I have been a member of the Aquaculture Association of Canada from its inception in 1984. Between 1993 and 1995, I participated actively in the consultation process for the establishment of a Federal Aquaculture Development Strategy for Canada.

Between 1974 and 2011, I was employed by the University of Moncton as a Research-Professor of Aquaculture in the Department of Biology. Over the years, I have served as Department Chair and Director of the Environmental Sciences Research Centre, and between 2003 and 2009, I was appointed Associate Vice-President of Research and Dean of the Faculty of Graduate Studies and Research.

My research interests focused on parasites of marine organisms and on the ecophysiology of the Eastern oyster, *Crassostrea virginica*. In 1996, I initiated a multi-community, multi-disciplinary project in the Richibucto region of New Brunswick which became known as The Richibucto Environment and Resource Enhancement Project (REREP). The program brought together university and government experts and ensured close working arrangements with coastal communities, Mikmaq First Nations and the private sector. REREP was identified as one of Canada's model projects under the Bilateral Agreement between Canada and Germany in the field of Integrated Coastal Zone Management.

I am the Editor of the book - *Cold-Water Aquaculture in Atlantic Canada*, a document initially published in 1989. A second and much more elaborate edition came out in 1995 and the text became a major reference for all Atlantic universities and colleges offering aquaculture and



fisheries programs. Almost all the authors were, and still remain active members of the AAC.

In June 2012, I was presented with a Distinguished Service Award at the 2012 AAC meeting in PEI for exemplary commitment and service to Science Atlantic (Atlantic Provinces Council of the Sciences) between 1976 and 1997. This honour was attributed in large part for my contribution to the organization's Aquaculture Committee.

I enjoy travelling, photography and kayaking. I am President of a Management Committee for a nature park in the Moncton area, teach part-time at the University of Moncton and have been invited to Vietnam on several occasions to offer lectures in aquaculture.

“the AAC continues to go to great lengths to introduce students to the exciting challenges and promises that the aquaculture industry holds”

INFLUENTIAL PEOPLE

I have met and worked with some exceptional people over the years. Several have made lasting impressions and in many ways, have become guiding forces in my professional and personal life. One of these people was Roy Drinnan. Roy was a valued friend of the fish farmer, a fountain of knowledge and an outspoken critic of policies and issues with which he disagreed, particularly those that he thought could be damaging to the industry. He lived by a code, practiced what he preached, and was true to himself and all those who came knocking at his door.

The other special person is Dr. Harald Rosenthal with whom my friendship spans over 30 years. Quite aside from the many prestigious honours and awards that Harald has received from all over the world, I consider him to be a true and long-term ally of the aquaculture industry everywhere. But it is primarily his insistence on truth and excellence, and the way that he employs science as a tool for the betterment of people in both the developing and developed worlds that impress me most and serve as an inspiration. Harald has always pursued his ambition with passion and a reserve of energy and optimism that is unparalleled. He is a mentor and I feel privileged to count him as a good friend.



Future, present, and past presidents, AC2000 Linda Hiemstra, Andrew Boghen, Jay Parsons



Linda Hiemstra and Andrew Boghen AC2000

VALUE OF AC MEETINGS

I am pleased with AAC's evolution and its continuing efforts to fulfill its mission. I am enthusiastic about the progress that the organization has made over the years and am proud of its efforts to promote dialogue between researchers, aquaculture associations and the private sector. I feel that the AAC continues to go to great lengths to introduce students to the exciting challenges and promises that the aquaculture industry holds and remain a firm believer that the AAC represents the best national forum in bringing interested parties together.

I have fond memories of the many stimulating meetings that I was privileged to attend. I retain a special spot for the millennial meeting that I oversaw in Moncton in 2000, and which by all accounts remains memorable for many of the people who participated.

Andrew Boghen, Ph.D.

Retired Professor

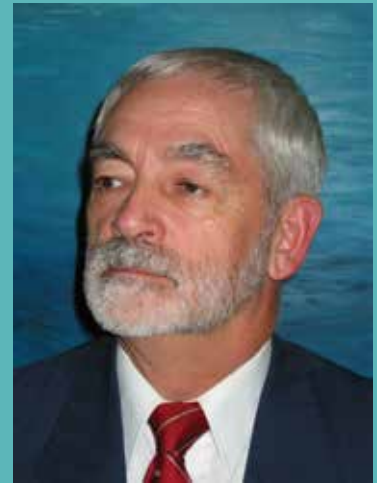
University of Moncton

Tel: (506) 383-9982

Email: andrew.boghen@umoncton.ca

René E. Lavoie

AAC member since 1988



HISTORY

My first ancestor on this land of Canada was René de LaVoye. He arrived in Chateau-Richer, near Québec City in 1655; He was one of those farmers from Normandy brought to New France to help feed the colony and provide relief to the King's treasury.

I had the immense good fortune to be born and raised on a multi-purpose farm bordering on the St. Lawrence River, in that zone where tides and salt combine their powers to precipitate and neutralize upstream "gifts" to the river. All this to say that farming is very much in my blood.

This farming gene expressed itself quickly when I came to the Maritimes in 1971, with a Doctorate in benthic ecology from Laval in my back pocket. I was charged with the research required for the management of wild oyster stocks in the three Maritime provinces for Fisheries and Oceans Canada (DFO). Soon after, the close relationship between wild and cultivated oyster populations brought me the responsibility for shellfish leasing and oyster culture research.

One of my first assignments was to oversee a five-year oyster reproduction monitoring program on the Gulf Coast of New Brunswick and in Prince Edward Island. The objective was to identify locations where oyster leaseholders could reliably collect oyster seed to populate their leases. This assignment brought one of the toughest challenges of my career which was to convince oyster fishermen that collecting oyster spat over the Caraquet Bay public oyster bed would not ruin their fishery. This was a lesson on Acadian tenacity.

For ten years, I very much enjoyed working as oyster biologist for the Scotia-Fundy Region. During that time, I forged many partnerships with the oyster industry and provincial governments. I like to think that my efforts were instrumental in advancing not only oyster science, but also the shellfish culture industry. After moving into management, I maintained these connections and was often called for when

there was a question about oysters. This recognition extended as far as the CBC's program "Ideas" where I was to explain the relationship between oysters and Valentine's Day.

I wrote the chapter on Oyster culture for both editions of the book entitled, "*Cold Water Aquaculture in Atlantic Canada*", edited by Andrew Boghen. I have been retained as expert consultant on fisheries research and aquaculture in the Caribbean, Asia and Africa.

Good fortune placed me at times and places where momentous events were happening. I regularly represented DFO Science on the Council of the Atlantic Provinces Inter-University Council on the Sciences (APICS) and became a founding member of its Aquaculture Committee. In 1983, I became a Charter director of the Aquaculture Association of Canada. In 1985, I headed the Canadian delegation to the "International Seminar on Shellfish Culture Development and Management" organized at La Rochelle, France under the authority of the Working Group "Technology, Growth, Employment" established by the Heads of State and Governments at the Versailles Summit (June 1982). In 2005, I was invited by the Japanese Foundation of Oyster Research Institute to present a paper on oyster culture in North America at the First International Oyster Symposium in Tokyo. At that meeting, I became one of the founding charter members of the World Oyster Society (WOS). (<http://www.worldoyster.org>). We are currently attempting to bring the biannual international Oyster Symposium to eastern North America in 2015.

My peers have been very generous. They caused me to receive a Lifetime Achievement Award from the Aquaculture Association of Canada (2002), the DFO Prix d'Excellence (2003), and the Jim McNeil Award from the Aquaculture Association of Nova Scotia (2006).

When I retired from the Bedford Institute of Oceanography in October 2005 after 35 years with the Department of Fisheries and Oceans, aquaculture stayed with me. On the waters of the

Bras d'Or Lakes, Merigomish Harbour, Little Harbour, and Rose Bay, a man with a white beard and a well weathered Tilley hat is peering through the sheltered waters looking for a good place... chances are that there are oysters on board.

BIRTH OF THE AAC

We were just a bunch of guys, mostly Eastern Canadians, talking and drinking beer together. In the 1970's, we used to meet from time to time at places like Miami Beach, Baltimore, Williamsburg, Seattle etc at the Annual Meeting of the National Shellfisheries Association (NSA).

These NSA meetings were held jointly with the Annual Meetings of the Shellfish Institute of North America (SINA). These were the older guys with the money; they were telling old stories and talked business. NSA guys were little brothers; they had little money and talked Science. But NSA guys had the advantage of fantastic Chinese dinners organized by Ken Chew at a high end Chinese restaurant in whatever city NSA landed in any given year.

We, Canucks, were cousins from up north. We were welcome, but called few or no shots. We, nevertheless, could make it on the NSA Board, and could have an influence. One of us eventually convinced NSA to hold its own annual meeting in Halifax, independently from SINA for the first time.

Slowly, but surely, aquaculture was making its way onto the official agenda and in the off-meeting conversations. Then, one year, Neil Bourne was holding court for his Canadian younger brothers in the pool of the.....in Williamsburg. We were grateful for the opportunity to meet other Canadians shellfish people at these US gatherings, but we also deplored the lack of Canadian organisation that would bring us together on Canadian soil to talk aquaculture in Canada.

A few years went by. Then, all of a sudden, it was July 1983, and there we were, in the basement pub of the Algonquin, in St. Andrews, New Brunswick, talking aquaculture. The event was the National Aquaculture Conference. The event was sponsored by the Department of Fisheries and Oceans and the Science Council of Canada with the lofty objectives of defining strategies for the development of aquaculture in Canada.

The Canadian Aquaculture nobility was upstairs in the banquet hall, eating whatever was put in front of them, engaged in very serious talk, waiting for the Keynote address. By the time the upstairs people were about mid-way into the main course, the downstairs' crowd had agreed to create its own Canadian Association, right then and there. That was the easy part.

The ensuing discussion on mandate was more arduous, high-pitch, at times. As I recall, there were two main options: A) A scientific/knowledge sharing/ networking

organization that would stay away from politics; B) A Scientific/ knowledge sharing/networking organization that would also lobby openly for aquaculture. It was a vigorous discussion. In the end, the apolitical version prevailed, but it was not unanimous.

If my memory serves me well, fourteen of us agreed to be Charter members of an interim Board of Directors, and to contribute \$40 each to cover start-up costs. The rest is history...

This is my recollection of how the AAC came to be and how it was born downstairs, at the Pub of the Algonquin, in St. Andrews-by-the-Sea, New Brunswick. There may be other, more official versions...

CONTRIBUTION OF THE AAC

The Aquaculture Association of Canada has lived up to the hopes of its founders and has become a precious assets in the intellectual and business fabric of Canada. As I see it, several reasons underpin its success.

A permanent secretariat has given it precious stability. Passionate volunteers have anchored it firmly in St. Andrews from the very beginning. The name Waddy comes to mind as having started a tradition of service and excellence that continues to this day.

A first class Bulletin and Special Publications series that gathers and disseminates solid knowledge of practical value to Canadian aquaculturists. The name Aiken comes to mind for his persistent dedication to an often daunting task

An emphasis on youth. Young researchers can safely present their first works in front of friendly audiences, receive constructive feedback, and make precious contacts for the evolution of their careers.. They can also receive financial assistance through the endowment fund. That warm welcome stays with them, and they, in turn, stay with the AAC as supporting members, board members and officers.

A sense of humour. We have, for the most part, retained a sense of humour, a modicum of humility, and an ability not to take ourselves too seriously. The AAC is a place to make friends and have fun while debating important issues. Our sadly missed Joe Brown comes to mind.

The immensely wise original decision to stay away from lobbying and politics. In these troubled times for Science in Canada, the value of that decision has never been more obvious.

René E. Lavoie, Ph.D.

Scientist Emeritus

Bedford Institute of Oceanography, Dartmouth, NS

E-mail: rene.lavoie@ns.sympatico.ca

Helen Gurney-Smith

AAC member since 2003



Getting out on the water in BC is a must
(Johnson Strait, September 2011)

HISTORY

Originally from the U.K. where I was trained and graduated in Marine Biology and Biochemistry (BSc J. Hons, University of Wales Bangor), Biochemical Engineering (MRes, University College London) and finally Marine Ecology (PhD, University of St Andrews). My beginnings in Aquaculture were in post-doctoral positions in Ireland (University College Cork), then moving to Wales (University of Wales Bangor) before coming to Canada in 2007 to lead the Health and Husbandry Group at Vancouver Island University. Our research and collaborations range from species optimization / new species development to population genetics and genomics to a very minor role in the legendary CIMTAN project. I've supervised some amazing students and staff and look forward to more meeting of minds.



Technologic! (Some of the lab members in 2012; (left to right) Helen Gurney-Smith, Angeline de Bruyns, Catherine Thomson)

INFLUENTIAL PEOPLE

There are just too many to mention individually, but I'm sure you know who you are, or at least I hope you do! Someone who really started my passion for marine invertebrates was my incredible first year undergraduate

teacher, Dr. Graham Walker, from the University of Wales Bangor. I remember a field trip, looking through intertidal pools and I found a stalked jellyfish (*Stauromedusae*), which are rarely seen in the UK due to their sensitivity to pollution. I thought it was amazingly beautiful and it really sparked my interest in invertebrates and all their wonderful variety of forms. I remember my marine biology lecturer telling me that marine biologists look at organisms to see how they function, whereas biochemists "grind 'em up to look at 'em", so I thought a mix of the two might be good to study!



The 'wee beastie' that started it all, *Haliclystus auricular* (copyright Donna McCoy, <http://www.mccoyphoto.com/>)

VALUE OF AAC MEETINGS

Coming from outside of Canada, I've found that the organization and meetings are a great way to rapidly work out who's doing what, and to network of course. It's a very friendly and supportive atmosphere at the meetings, so it's a wonderful opportunity for students to either present for the first time and to meet more seasoned members. Normally the meetings are also a good mix of industry, academics and government so it's a great environment to foster collaborations.

Helen Gurney-Smith

Research Scientist

Centre for Shellfish Research, Vancouver Island University

Email: Helen.Gurney-Smith@viu.ca

Shawn Robinson

AAC Member Since 1996

Affiliations with AAC

President 2002-2003

Treasurer 1997-2001

Director 1996-2004

HISTORY

I started my career in marine biology at Acadia University in 1976 where I quickly developed a taste for sub-tidal marine ecology and the practical applications of this knowledge. Summers were spent working for the Prince Edward Island Dept. of Fisheries on fishing boats around the province or for the National Research Council in Halifax doing SCUBA-based seaweed surveys of Irish moss off the north shore of PEI.

After finishing my B.Sc. honors degree with Dr. Sherman Bleakney on the ecology of intertidal invertebrate fauna near Cape Blomidon in Minas Basin, I was convinced by some of my mentors, such as Dr. Dan Toews, that it would be a good idea to continue my studies on the west coast of Canada for a change of scenery as well as experiencing some new ideas. As a result, I spent three rewarding years diving on the west coast of Vancouver Island studying growth rates of the giant Pacific octopus under the tutelage of Dr. Brian Hartwick from Simon Fraser University. Working with fellow graduate student David Fyfe from Montréal, and based out of the quaint little town of Tofino, we were turned loose to pursue science, higher knowledge and hopefully generate a Master's degree in the process.

Those were heady days and we learned a lot about the practicalities of working in the field in remote locations and the importance of seeing things first hand. Ask me sometime about living in a de-commissioned chicken coop. My M.Sc. work led me to the Pacific Biological Station in Nanaimo where I had the distinct pleasure of working with Drs. Norm Sloan and Glenn Jamieson on projects involving geoducks, sea stars, sea urchins, king crabs, snow crabs, and large offshore squid while working



off a multitude of platforms such as zodiacs, Boston Whalers, three-man submarines, large survey vessels like the GB Reid and offshore tuna boats. Two years flew by and I got to work with many talented colleagues on a vast array of interesting projects.

This brief respite in the working world allowed me to replenish my fiscal coffers that had become depleted after my Masters and it also introduced me to two more mentors who would become my main supervisors for my PhD work, Drs. Tim Parsons from the University of British Columbia and Dan Ware from the Pacific Biological Station. I spent the next 4 years happily bobbing away on small vessels in the Strait of Georgia studying biological oceanography on the early life history ecology of Pacific herring.

As per usual, one thing inevitably led to another and after my PhD, I followed other colleagues of mine back to the East Coast where I accepted a job at the St. Andrews Biological Station with the Canadian Dept. of Fisheries and Oceans in 1988 where I have remained ensconced ever since. Belonging to the group of the increasingly rare species of “working invertebrate scientists”, my research species have revolved around softshell clams, sea scallops, sea urchins, sea cucumbers, blue mussels, salmon, periwinkles, sea stars, polychaete worms, copepods parasites such as sea lice and even bacteria and viruses.

"I have been able to indulge my passion for music by playing in a band called Homemade Bread for the last 15 years."

All of these projects on the various species have involved the underlying theme of understanding the ecological dynamics of the populations in relation to the human exploitation of these resources. A current example of this is the development of the integrated multi-trophic aquaculture (IMTA) concept where various organisms are grown together in culture taking into account their position in the food web and mimicking natural



AC04 with Sharon McGladdery

ecosystems. Developing more sustainable practices for food production from the sea has become a passion of mine. All of the above work has been done in conjunction with a cast of talented scientists, biologists, technicians, managers, graduate students interns and ever present marine industry members.

However, "all work and no play makes Jack a dull boy" and living in St. Andrews has allowed me time for raising a family with my wife and muse, Lesa Pomeroy, and recreational activities such as golfing, hockey, tennis, squash and the odd bit of hiking. For the artistic side, I have been able to indulge my passion for music by playing in a band called Homemade Bread for the last 15 years. The band plays a combination of traditional



Judging the Student Idol Contest AC07

Maritime, Irish, Newfoundland and popular folk music at various events in and around the St. Andrews area. It is a lot of fun and we get to meet a wide array of people from all walks of life.

VALUE OF THE AAC AND AQUACULTURE CANADA MEETINGS

One of my professional involvements has been with the Aquaculture Association of Canada as both a member and an executive. Like most people on the board, I was convinced to join and contribute, but once I was involved, I quickly saw the value of such an institution.

Foods from aquatic systems are following the same trends as food from the land and there is no doubt in my mind that we will be culturing more from our oceans and fresh waters on all three coasts. There is no other alternative with our increasing population numbers. Despite our current recession in aquaculture development in Canada, our future in the oceans will rely on culture, either intensive or extensive.

The AAC will have a role in helping to shape that development, as it has been doing over the decades. It provides an unbiased forum for national discussions, it allows for the development and networking of students that will provide the next generation of aquaculturists and it allows for the planning of "blue sky" research that will lead Canada into the more sustainable production of food and other aquatic products in the future. I am proud to be associated with such an organization.

Shawn MC Robinson, Ph.D.

*Research Scientist, Fisheries and Oceans Canada
Biological Station, 531 Brandy Cove Rd,
St. Andrews, NB, E5B 2L9 Tel: (506) 529-5932
Email: Shawn.Robinson@dfo-mpo.gc.ca*

Steve Leadbeater

AAC member since 1996

HISTORY

My entry into the amazing world of aquaculture research and the aquaculture association began one day in 1996 while working at my first job, after graduating from my Biology degree at UNBSJ, in the parts department at Canadian Tire. I overheard two people discussing which portable DC cooler would be best for the lab. Two things happened soon afterwards. First, I arrived at the Huntsman Marine sciences centre to spend the summer working for Matt Litvak growing winter flounder caring for five juvenile haddock that we named the Simpsons. Those fish represented over 100,000 dollars of research and I was so excited to be part of a push to diversify the aquaculture industry in Canada. Second, Canadian Tire became my favorite laboratory supply company.

Over that year I met so many of my peers and mentors and I enjoyed the summers that so many new grads and students in Saint Andrews do. The project ended and I was about to spend the following summer playing in a rock band. Chris Frantsi didn't approve of my too long hair and the way I explained problems ("made excuses") but still took me on as one of the Haddock aquaculture development technicians. By this point in 1998 I was an "expert" live feed technician until Brian Blanchard smirked when he saw the set-up. Chris decided he'd send Cindy (Doherty) Colborne and me to Brian at NRC-IMB in Halifax for "six weeks" to learn how to grow Haddock. So, I left my new wife alone and more than little mad in St Andrews and I discovered this idea of government science in support of industry.

Six years later our little project joined the efforts and pooled talents in three Atlantic Provinces, Maine and New England including research facilities in the Halifax, Saint Andrews, St. John's and Shippegan. We raised survival from less than 1% to well over 10%, produced hundreds of thousand Juvenile's



Juvenile haddock production in support of the Heritage Salmon at Sandy Cove, NRC Halifax. 2003



MSc. Thesis research; Juvenile shortnose sturgeon nutrition. AquaNet. UNBSJ 2006

for sea trials and graduate student work and put haddock from farms on the fish counters of major grocery stores. The Aquaculture Association was there and gave us a forum and a network that was essential to the work. I loved to ask the fish counter staff where the haddock came from and act so surprised and excited when they told me how it was farmed. Chris and Brian, Santosh Lall and Stewart Johnson were amazing mentors; I was crushed when it ended.

In 2004 I took my wife, my son, and our dog and moved back in with my parents to start a long overdue course of graduate study. Santosh Lall and Matt Litvak were there to keep me involved in aquaculture when I was sure it was over. The AAC was there too and I had the privilege to experience the way this group treats their students. Sturgeon is an amazing fish, and I loved every minute. Because of my experience with AAC, I had opportunities to meet so many and come full circle back to St Andrews and the Biological Station. It was time to finally learn something about salmon. Brian Glebe has been my mentor starting in 2007. I continue to find new challenges and experiences all very much because of the role of the AAC. I couldn't be happier.

Over 17 years, I've experienced the amazing work that this association has done and is doing. I can't wait to see what the next 30 will bring.

Steve Leadbeater

Research technician

Saint Andrews Biological Station, St. Andrews

Email: Steven.Leadbeater@dfo-mpo.gc.ca



Assessing reproductive status of captive shortnose sturgeon (with Sean Doyle), Mactaquac Biodiversity Center (UNBSJ) 2006

AAC PHOTO ALBUM



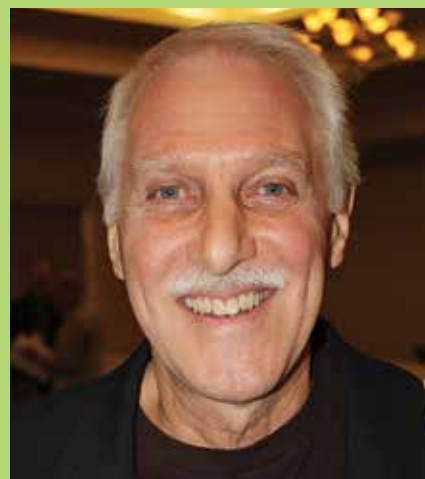
Julian Hynes

AAC member since 1984

Affiliations to AAC

AAC Founding Member

Director and Secretary 1997-1998



HISTORY

From rather isolated early years, I jumped immediately at the opportunity to join the newly formed AAC. It was delightful to review the proceedings of the meeting that stimulated AAC's foundation, published with Allan Castledine in the Canadian Journal of Fisheries and Aquatic Sciences (Hynes & Castledine 1985). The contributions of Dave Aiken in the early years ensuring that AAC created high quality publications, and Susan Waddy as the long time lead anchor for the organisation, deserve our deep gratitude. The highlight of my brief period on the board was raising awareness of aquaculture in Ottawa among members of parliament and ministers in concert with the Canadian Aquaculture Industry Alliance when I was also executive director of the Ontario Aquaculture Association.

After completing my first degree at the University of Western Ontario and a research masters at the University of Ghana, my goal was to work in fish farming for food security in international development. I recognised the huge potential of tilapia in Africa to provide food and alleviate poverty. In early 1970s Ontario, the incipient trout industry raising trout for pond stocking and recreational fishing offered few job opportunities. I apprenticed for four years at the Ministry of Natural Resources Chatsworth Fish Culture Station followed by eighteen years at Queens Park. We raised millions of splake and lake trout for stocking the Great Lakes, progressed from feeding ground liver to formulated diets, carried out the first production scale diet trials, applied genetics and fish health management to the art of fish culture and developed improved culture techniques for walleye and lake whitefish. I was proud to represent one of the then best fish culture systems in North America under the mentorship of Ken Loftus and Chris Armstrong. I

was privileged to work with Young Cho, Al Castledine, Gary Chapman, Gordon Durant, Ed Trippel, Bill Robertson, George Iwama and others. In later years I had the opportunity to implement policies to encourage fish farming in Ontario through extension and research. I led a long and ultimately successful struggle to rationalise the eligible species list that included Arctic charr and tilapia. The former was served at our AC13 Gala dinner, the latter is now produced across the country in recirculating systems.

During the late 1980s and early 1990s a rising opposition to fish farming emerged. At the time I thought it was a quasi-religious, ill-informed environmental movement but later Vivian Krause revealed that it was a well-funded campaign by four US foundations influencing Canadian government policy in favour of Alaska. In Ontario there had been years of collaborative efforts to amend the legislation affecting fish farming but the mood shifted and government stymied and delayed progress with process. After I had left the government a new Fish and Wildlife Conservation Act was implemented in 1998 with conditional licences that discouraged investment in fish farming and obstructed expansion, while thanks to the National Rifle Association and the Ontario Federation of Anglers and Hunters, the opposite was the case for deer and elk farming.

For the past 25 years I have been a part-time consultant and I kept alive my original career goal combining fisheries and international development by working on projects in Kenya, Uganda & Tanzania for FAO, Ghana & Nigeria for the International Research and Development Centre, and Cambodia for the World Bank. With fish farming in Ontario beginning to decline I returned to Ghana to pursue an opportunity I had been chasing for over a decade, to farm to raise tilapia semi-intensively in

ponds with gravity water supply from a low head hydro dam on the Lower Volta River. Unfortunately the project did not succeed and the property remains idle today. But, in just four years Ghana has witnessed a twenty-fold increase in fish farming production of mostly tilapia raised in cages in the Volta Lake. It is testament to the value of appropriate legislation and government support, not only in research, but in creating an enabling environment for an industry. At last Africa is rising in fish farming and the same can yet be true in Canada and the US.

OUR INDUSTRY AND THE AAC

What a shame that in a country with such abundant water supplies the fish cannot swim! What is not to understand and embrace about aquaculture? It is an industry with the potential to create thousands of jobs and generate income from family enterprises, first nations and community-owned farms to international companies. Canada has the natural and human resources to produce fish and fish products in an environmentally responsible manner that are locally grown healthy foods. The AAC has much to be grateful for the administrative, logistical and financial support provided by both the federal and provincial governments to our diverse aquaculture sectors throughout our thirty year history, especially for research and in fish health management. But jurisdiction remains a patchwork mess in spite of numerous coordination efforts and endless many named committees. There is no coherent treatment under law or even a common definition e.g. the declaration by a B.C. judge that marine aquaculture is a fishery directly contradicts the Food and Agriculture Organization of the United Nations definition to which Canada is a party. As noted in our review of the 1983 national aquaculture conference proceedings, “aquaculture is first and foremost farming”. To develop and grow aquaculture needs old fashioned parentage, the paternal source of seed and security and the maternal nurturing and support. Unfortunately we remain mostly under the thumb of fisheries regulation without the essential support that underpins agriculture. Thirty years on it would be useful to review the recommendations to government made in a report of the proceedings (Anon 1983) and see those that remain to be implemented.

I believe that the AAC, working with CAIA, should become more active and impatient with governments to give aquaculture its rightful place in the economy of the nation. We need to devote more resources, make advocacy an important part of the association's agenda and become noisy spokespeople and lobbyists to raise awareness and press for action. We have the knowledge, expertise, dedication and passion for the environment among our

membership to tell our positive story to Canadians. Who will speak up for us in bedlam of modern life if not ourselves? Enough of waiting for Govo!

VALUE OF AAC MEETINGS & PUBLICATIONS

I have been able to attend conferences only irregularly given institutional and budget constraints that limited travel opportunities and then twelve years living in West Africa. Those meetings I did attend were always rewarding networking and learning opportunities. I especially enjoyed the mistily memorable long evenings with friends in hotel rooms when we solved all the industry problems with a bottle or two of scotch, among them the late Joe Brown and John Gracey. I would like to recognise Rich Moccia and Cyr Couturier for their unfailing, consistent, cheerful presence and support throughout many years of conferences.

At AAC meetings it is always gratifying to witness new research directions among the student papers, e.g. in the recent AC13 those on bacterial flora in systems offered a fresh biological view of water quality. I have long supported student participation at the conferences believing that they are the future strength of our association and of the industry. Attending AC13 in Guelph was a special treat for me as I was able to meet again many of the pioneer fish farmers from Ontario with whom I had worked including Jim Taylor, Mike Meeker, Gord Cole, Dan Glofcheskie and Sean Pressey as well as friends from Guelph.

The excellent Bulletins and other AAC publications are a very valuable aspect of the association keeping members in touch with the scientific, technical even economic-social developments in all sectors. While I have been abroad I have relied on them. Thanks to Gregor Reid for establishing the Watermark newsletter and bringing us more immediately in touch; I have greatly appreciated them and expect that we will develop more electronic communications in the coming years.

Above all the AAC is a community of the people in our industry, in the Canadian tradition representing a diversity of activities across the country, working together to realise the great potential that aquaculture offers for the future, now.

Julien Hynes

Hynes & Associates International
P.O. Box 57, Adeiso E/R, Ghana & 31 Park Blvd,
Toronto M8W 1G5, Toronto Tel. (647) 340-3349
Email: hynes.intl@yahoo.ca

Danny Boyce

AAC member since 2001



HISTORY

I completed a Bachelor's degree, supplemented with Graduate Diplomas in both Aquaculture and Fisheries Development, from the Marine Institute of Memorial University. I also completed a Masters in Science in Aquaculture from Memorial, and was awarded *A Distinction as Fellow of School of Graduate Studies*, plus a Masters Certificate in Project Management Program from York University and Memorial's School of Business. Recently, I was awarded a Dean of Science Distinguished Service Award, which recognizes service demonstrably superior to that normally expected of staff members. Other short courses include Cornell University recirculation aquaculture systems, project management, and fish health.

In 1991, I was introduced to marine finfish culture under the guidance of the late Dr. Joe Brown of the Ocean Sciences Centre (OSC). Later that year, I moved to Montebello, Québec raising trout and salmon for grow-out and re-stocking purposes at the Réserve de la Petite Nation. In 1992, I received a phone call from Joe, asking if I wanted to work on an Atlantic halibut project at Memorial University and back I came. When the cod moratorium was announced in 1993, I joined the team at Sea Forest Plantation Co. Ltd. as a regional coordinator for the Cod Aquaculture Training Program and then back to OSC later in the year to gear up for halibut spawning for many years thereafter. From 1999 to present, I assumed the role of Facility and Business Manager at

Memorial University to operate the newly constructed Dr. Joe Brown Aquatic Research Facility (JBARB) which has helped distinguish Memorial as a top university in Canada, and beyond, in the areas of aquaculture teaching, education and research and development.



Dr. Mark Abrahams, Dean of Science at Memorial University, presenting award to Mr. Danny Boyce

I have had the benefit of working closely with aquaculture related industry partners on a provincial, national and international level, and mentored many diploma, graduate, post-docs, and visiting scientists from all over the world in my 20 years here at Memorial. In addition, I have supervised students from programs such as WISE, MUCER, Work-terms, international agencies, and volunteers.



Accepting a Founder's Award from Premier Dunderdale and Fisheries and Aquaculture Minister Clyde Jackman on behalf of Ocean Sciences Centre in recognition of our outstanding efforts and achievements in stabilizing and growing the Newfoundland aquaculture industry

I am very grateful that I was able to be part of some very large scale projects such as the Halibut and Flounder Project, Sea Forest Plantation Cod Farming Project, AIF Cod Innovation Project, AquaNet, Cod Genomics Project, Cod Demonstration Project, Camelina Feed Project, and Cleaner Fish Project.

I have played a role in advancing new ideals and technology for Memorial University and the aquaculture industry, such as the 1st 1 tonne



The Good Ole Halibut Days



Cod Farming Crew

automatic storvik feeding system for the aquaculture industry on the south coast, developing best practices and processes for culturing Atlantic cod from egg to adult that was of benefit to the aquaculture industry, and developing the first generation of an elite Atlantic cod broodstock in partnership with industry. I introduced the knowledge of using cunner to control sea lice (*Lepeophtheirus salmonis*) infestation of Atlantic salmon in Newfoundland. In addition, I was responsible for the Scientific Rapid Image Acquisition System (SRIAS) for Aquaculture Smart Tank Technology at the Joe Brown Aquaculture Research Building and for using and introducing clay at JBARB to overcome bacterial issues with rearing marine finfish larvae in place of traditional algae products.

I have volunteered my time on numerous working groups, boards, committees over the years such as The Newfoundland Aquaculture Industry Association (NAIA), Aquaculture Working Group at Memorial, Aquaculture Association of Canada and NAIA Conferences, National Aquaculture Strategic Action Plan Steering Committee, and BioTalent Canada. As well, I participated in Skills Profiles Development for Industry.

I have a vested interest to see the Canadian aquaculture industry position itself as a leader in production and thus increase its share of the global market, while at the same time maintaining aquaculture sustainability.



July 9, 2007. Unveiling of plaque to officially dedicate the Dr. Joe Brown Research Aquatic Building in memory of Dr. Joe Brown, Professor (Research) at the OSC of Memorial University from 1985-2005

SOME MEMORABLE MOMENTS

Spawning halibut at 2:00 am for the first time.

Spending time in Joe Brown's office listening to stories and hanging out with numerous groups of students.

While working in Montebello, Quebec at Réserve de la Petite Nation, my friend Andre Brunet won the Lotto 6/49 for \$1,189,850.00. We both went to Lotto Quebec in Montreal and

passed in his winning ticket. We then went through the formal proceedings of collecting a lot of money and Andre becoming a millionaire. He became rich and I went back to work on the farm. The experience was quite the ride.

Spending time in Pools Cove with special friends, out on the water for a day on the farms, coming home for the evening to a meal of smoked salmon and a cold drink(s).

The many international trade missions that I have been on to countries such as Norway, Iceland, Scotland, UK, Spain, Portugal, Chile, Denmark, Belgium and US.

Danny Boyce

Facility and Business Manager
Dr. Joe Brown Aquatic Research Building
Department of Ocean Sciences
Memorial University of Newfoundland
Email: dboyce@mun.ca
www.mun.ca/osc/home/

Chris Hendry

AAC member since 1998

AAC Affiliation

President 2005-2006

Director 2000-2007

Publication Editor 1998, 2001, 2002, 2003, 2004,
2005, 2006, 2009



HISTORY

I became aware of the AAC while studying the Advanced Diploma in Aquaculture program at the Marine Institute of Memorial University of Newfoundland through Cyr Couturier and Jay Parsons, who were some of my instructors. The following year, I started my Master's Program at UNB, but I was based out of St. Andrews, where the AAC was coincidentally headquartered. Like other groups I have taken interest in, I decided to get involved, and immediately took on the role of chair of the Student Affairs Committee. After a year of helping coordinate student volunteers and conducting surveys of student members seeking advice on how the Association could serve them better, I decided to run for the Board of Directors, not as a student member, but simply as someone in the aquaculture field who wished to have input into the evolution of the Association. This rewarding involvement continued until 2007, during which I was fortunate to work closely with many familiar



Opening Address AC2006

"Shawn Robinson instilled in me the importance of being excited about what you do, having fun, and always asking questions."

names in aquaculture in Canada, as well as the AAC Home Office. After completing my graduate work, I returned to Newfoundland in 2001 to work with the Department of Fisheries and Aquaculture, and since 2008, I have worked with Fisheries and Oceans Canada, currently as the Regional Aquaculture Coordinator.

MEMORABLE AC EXPERIENCES

I remember organizing the silent auction for AC2003 in Victoria, BC and was canvassing colleagues and friends for donations to raise money for the Student Endowment Fund. Among the gracious donors was Sharon McGladdery, who brought me a silent auction donation in a plastic bag, which I added to my donations pile. While unpacking items for the auction, I noticed there was something else in the bottom of Sharon's bag, and clearly it was something she had not realized she had left in there, so I decided to have some fun with it. I was making donation sheets for each silent auction item, with the name of the donor and approximate value, and along with the other items on display for bid was Sharon McGladdery's black pantyhose, valued at "priceless." The only thing worth more was Sharon's reaction as she was scanning the auction items and realized her special item was up for bids. Fortunately, Sharon was a great sport, and we all had a great laugh.

Additionally, every time I was able to play some music or sing a song with friends and colleagues such as Eddy Kennedy, Shawn Robinson, Jon Grant, and Stephen Stephen really added to the camaraderie that involvement in the AAC and its annual conferences facilitates.

Aquaculture Canada is always memorable in providing a chance to connect face-to-face with friends and colleagues from across the country.

INFLUENTIAL PEOPLE

As already mentioned, I got to work with many influential individuals in Canadian aquaculture thanks to the AAC. One of the most inspiring for me was Susan Waddy, who was running the AAC Home Office on a volunteer basis since its inception. Susan and I worked on many AAC publications, helped organizing conferences, and had many chats about the history and future of the Association. Susan strengthened in me the notion that hard work isn't always about recognition, but satisfaction. Shawn Robinson instilled in me the importance of being excited about what you do, having fun, and always asking questions.

VALUE OF THE AAC MEETINGS

When I was a student, the AAC provided me with valuable opportunities to meet leaders and influential people in all aspects of the Canadian aquaculture sector, which it continues to do for so many other students, and its commitment to students is evident in the amount of student travel awards it grants, as well as student scholarships. Now as a professional, it allows me to chat with friends and colleagues formally and informally about



AC 05

common ideas and potentially new ways of approaching issues.

Christopher Hendry, B.Sc. (Hons.), M.Sc
*Regional Aquaculture Coordinator, Fisheries Management
 Fisheries and Oceans Canada, Newfoundland and
 Labrador Region*
 Tel: (709) 772-6674
 E-mail: Chris.Hendry@dfo-mpo.gc.ca

AAC PHOTO ALBUM



Neil Bourne

AAC member since 1984

Affiliations to AAC

President 1986-1987

Lifetime Achievement Award 2000

HISTORY

I first became interested in aquaculture when I began my professional career at the Biological Station in St. Andrews, New Brunswick under the tutelage of Dr. J.C. Medcof where I was in charge of the sea scallop, *Placopeteten magellanicus*, investigation. Carl was an excellent research scientist and he believed that in order to understand the vagaries of scallop populations in the natural environment we must study the animal itself, learn to breed it in the laboratory and eventually culture scallops similar to the way we culture land crops. I might point out this was well before scallop cultured developed in Japan.

Carl arranged for me to spend a week in the lab of Dr. Victor Loosanoff in Milford, Connecticut to learn some of the technology involved in the artificial breeding of bivalve molluscs. It was a wonderful experience for a young scientist and one could not help but become enthused and convinced about the future for farming bivalve molluscs after working at this laboratory, it was the way of the future! Using technology I learned at this lab, I did undertake some artificial breeding of sea scallops at St. Andrews and I reared larvae to the setting stage. Although I attained some success with the initial stages of scallop culture, we didn't succeed in producing juveniles because I didn't devote sufficient time to the project. However, I had caught the bivalve culture bug!



I transferred to the Pacific Biological Station in Nanaimo, British Columbia in 1965 and my interest in scallop culture was held in abeyance for a few years. I began work at PBS with Dr. D (Dan) B. Quayle primarily studying natural populations of bivalves along the coast but he encouraged me to continue with efforts in bivalve culture, we undertook initial studies to culture butter clams, *Saxidomus giganteus*. I became involved with the BC oyster industry and after Dan retired I assumed the work of studying Pacific oyster, *Crassostrea gigas*, breeding in Pendrell Sound an area in BC where Pacific oyster breeding occurs regularly and extensively and the seed (juvenile) requirements for the BC industry can be met here, particularly if excess seed is stock piled in years of abundance. The area continues to be used by some people in the industry although the main method of

“We were successful in our efforts and a highlight of my career was the fact that a private company took the results of our work, built a large commercial hatchery and started a scallop culture industry in BC that continues to this day.”

obtaining seed is by remote setting. Methods are now available to supply the BC oyster industry with their seed requirements.

In the early 1970's I began investigations to determine the feasibility of Manila clam, *Venerupis philippinarum*, culture in BC. Technology for Manila clam culture was being developed by Dr. K.K. Chew and his group at the School of Fisheries at the University of Washington in Seattle. We studied methods to quickly grow small seed (juveniles) purchased from hatcheries to a larger size for outplanting and to determine whether seed could simply be broadcast on a beach or if it had to be protected. The industry has taken over this technology and a considerable portion of the current Manila clam production in BC is from farming operations.

In 1980 I was provided with an opportunity to return to studying the possibility of scallop culture in BC. Scallop culture had been developed to a high degree in Japan and the question was whether this technology could be repeated in BC. We began work with a BC species of scallop, the weathervane scallop, *Patinopecten caurinus*. We could not use the Japanese method to collect natural seed since the BC weathervane scallop population was too small to provide sufficient spat so a decision was made to develop hatchery methods to produce scallop seed. The weathervane scallop proved to be a difficult species to breed in the lab so a decision was made to develop hatchery methods to produce seed of the Japanese scallop, *Patinopecten yessoensis*, a species similar to the weathervane scallop. We assembled an excellent group of people for this project who were all keen and deeply devoted to the project. We were successful in our efforts and a highlight of my career was the fact that a private company took the results of our work, built a large commercial hatchery and started a scallop culture industry in BC that continues to this day.

INFLUENTIAL PEOPLE

I have had a wonderful career in the field of aquaculture and I thank all of the people who have assisted me with my work. There were a lot of funny and happy occasions during my career and some rather bleak moments but these passed and we continued on and eventually were successful. I have been associated with many excellent people and also met many other wonderful people through my involvement with aquaculture. All of these people have made a contribution to development of aquaculture in Canada and I wish all of those people who follow much success with their careers in aquaculture.

VALUE OF AAC MEETINGS

I was involved in the inauguration of AAC. I well remember when a group of people interested in aquaculture in Canada got together at a conference in St. Andrews in the 1980's to discuss the possibility of establishing such a society. Out of these discussions, the AAC was born and I have been involved with the Association since that time. I served as President of the Association for one year. We had our problems keeping things together in the early years, but, thanks to the wonderful people involved in the society, we survived and it has developed into the vigorous Association of today.

I remain more positive and more convinced of the future of aquaculture in Canada than at any time in the past. I believe it is the only way that we have to increase production of aquatic resources in the future and I believe that every effort must be made to continue with studies in the field of aquaculture and the development of technology to assist the industry to improve methods of production. One thing that has bothered me in the past has been the negative attitude held by many people about aquaculture but I believe this attitude is waning, partly because of efforts of such organizations as AAC to stress the benefits of aquaculture.

I am also impressed with the development of AAC into the excellent society that we now have. The organization is vitally needed for the development of a strong aquaculture industry in Canada. One thing that has greatly impressed me with the society has been the involvement of young people in the Association, there are many students taking graduate degrees in the field of aquaculture and also becoming involved with AAC. The future of the Association looks to be very positive.

Neil Bourne, Ph.D.

Email: neilbourne@telus.net

Brad Hicks

AAC member since 2011

HISTORY

I started my career in aquaculture when I was about 8 years old. I lived in North Western Ontario in a small town called Atikokan. As a toddler, I was out in the bush with my parents hunting and fishing. A neighbour showed me how you could remove the heart from a freshly caught fish and keep it pumping for quite a while by adding a little salt to water (early variation of Ringer's), my first cardio-physiology experiment. It was these early exposures to animals and their inner workings that led to lifelong of learning and understanding about how animals worked.

While studying Fish and Wildlife Biology the University of Guelph, I worked for Dr. John Sprague doing bioassays on drilling muds. One day, when I was counting up the dead fish, Dr. Sprague asked me why the fish had died. I responded I didn't know. His response was they always die for a reason and I should be curious enough to wonder why. So I went to vet school to find out why animals die.

While at vet school, I not only learned why animals died but also how to prevent some of the mortality. Upon graduation there were no jobs for a veterinary fish pathologist in Canada and the Canadian aquaculture industry was not large enough in 1982 to support a veterinary consultancy for aquaculture. I divided my time between fish pathology and marine mammal pathology. Fish pathology focused on both the pet fish industry and the fish farming industry. The pet fish portion of the aquarium trade often a requirement for surgical intervention.

My most memorable case was a lion fish which had decided to eat a cat fish. The spines from the cat fish had



Surgical removal of a tumor from a pet goldfish. The fish survived the ordeal.

lodged in the mouth of the lion fish, anchored into the roof of the cheeks of the lion fish's mouth. What to do? I anesthetized the fish and with a pair of wire cutters snipped the tips of the spines of the cat fish removing the catfish from the mouth of the Lion fish. Both the catfish and the Lion fish survived the ordeal.

I also spent several years working on the Great Lakes harvesting wild fish to examine these fish for a variety of diseases with a focus on cancers in fish.

While working on the Great Lakes, I met several commercial fishermen and all of them told me that the commercial fishery was a dinosaur occupation and the future was in fish farming.

Both the fish pathology and the marine mammal pathology gave me lots of opportunities to travel much of the world to investigate a variety of problems. The highlight of this international work was the chance to work at the whaling station in Iceland where I was able to do detailed pathology work on whales and had an opportunity to go whale hunting which, for a hunter, was phenomenal experience.

After working as a diagnostic pathologist for several years, including a stint as the first provincial veterinary fish health specialist in Canada, I became directly involved in the aquaculture industry as the Chief Operating Officer of International Aqua Foods (IAF). This was a terrific opportunity. We participated in the start-up of farms (salmon, trout, sablefish, tilapia and striped bass)

The AAC has been a great association for aquaculture in Canada.

Harvesting Fish in Great Lakes, Coot's Paradise, Hamilton Harbour with Rich Moccia (left)



in British Columbia, Maine, Florida and Chile. One memorable event was being paid \$6.24 per pound of salmon in 1991 just before prices collapsed. This was a phenomenal price; gas was only \$0.30 per litre. Being a profitable company in the private sector meant a lot of possibilities. We were able to invest in the development of new species and were able to get sablefish to the point where we were producing viable fry. This was a great accomplishment. There are currently a number of sablefish farms operating on the west coast as a result of these early investments.

We also had our share of trials and tribulations. One weekend we lost \$10 million worth of fish in an algae bloom. None the less, working with IAF was a great privilege and a great experience. All good things must come to an end. In 2000 IAF was sold and I had to find a new means of earning a living.

I joined Mike Florian who had an independent feed company in BC. We have been able to grow this business by developing specialty feeds for a variety of farmers. Our main achievement has been working with farmers and consumers to develop organic aquaculture standards for Canada. This process took about fifteen years and countless hours of consultation with a wide variety of stakeholders. We now have an alternative production regime for aquaculture in Canada. Our mill is the first organically certified mill in North America for the production of organically certified fish feeds.

VALUE OF AAC MEETINGS

My relationship with the AAC has been on and off for the past 30 years. In the early days of the AAC, I was an active member and served as the secretary treasurer and helped to stage the AAC conference at the University of Guelph in 1986. I also tried to have the constitution of the AAC changed so that AAC would be able to lobby government on behalf of the nascent Canadian aquaculture industry. The board of the AAC at the time was not interested. The membership of the AAC was primarily government and academia and neither were interested in turning AAC into an industry association. As a result of this decision myself and several other industry participants (Rich Moccia, Brian Rodgers, Peter Darnell, Tom May) formed the Canadian Aquaculture Producers Council (CAPC) which was the foundation for the current Canadian Aquaculture Industry Alliance (CAIA).

The AAC has been a great association for aquaculture in Canada. It has provided a focal point for government, academia and industry to share new developments and for industry to bring problems they face to the academic community so the academic community can research solutions. The AAC is also a great venue for students to present their research findings. I have attended many AAC conferences over the years and have learned a lot and met many brilliant students.

Brad Hicks

Partner, Taplow Feeds

Tel: (604) 788-4752, Email: bhicks@firstmate.com

Ward Griffioen

AAC member since 1984

HISTORY

Retired active and actively retired steelhead salmon farmer from Lois Lake, Powell River BC and an AAC member since its conception, I was thoroughly imprinted and hooked to fish with a childhood history of working on a family owned live commercial fish exportation firm from the Netherlands. After immigrating to Canada in 1958 I found fisheries related work at the Calgary Brewery Aquarium where fresh and saltwater were recirculated on land and the beer was free, as I learned to drink slowly and spill lots I was able to leave without addiction in 1965. We moved to Nanaimo and I obtained work at the Pacific Biological Station, there I started to get seriously involved in farming salmon as hands on Fishculture technician under Dr. R. Brett, after obtaining my informal Aquaculture education, I resigned of Government service and started my own company West Coast Fishculture Ltd in 1978. At that time total production in BC was 60 Tonnes all from a half dozen struggling operators, at present production on our family and friends owned farm is about 1000 Tonnes (www.westcoastfishculture.com).

Reminiscing of the past, I was informally educated by PBS scientists whose doors were always open for pondering questions related to the potential of productively growing salmonids and other species. Aquaculture Research was constantly ongoing questions like, what salmonids on the West Coast were viable for grow- out, as a technician I could try growing them all, pinks, chum, sockeye, coho, steelhead, Chinook, sablefish under direction from scientific experts with some enlightening and some disastrous results. More questions arose; knowledge totally taken for granted nowadays throughout the industry threw us major curve balls. We were only able to grow fish to 300 grams, we



wondered about what the nutritional requirements for growing large salmon were, well we mixed, ground and blended from cow livers to horse meat, to oh joy of joy finally the time came when we could just rip open a bag of frozen pellets. We knew about Norwegians growing Atlantic salmon to 6 lbs and over but we just did not have the present day nutritional know how. Other questions arose why do salmon sometime croak after introduction to salt water, what is the survival relationship to size, what is smolting anyway, how can we change this to our advantage, why do healthy salmon simultaneously die, what has algae blooms to do with this, how does algae kill? What about bacterial and other diseases? We learned all about vibrios and vaccinations and tried to do this amass. Built salt baths, dehydrate the fish and prior to their last gasp throw them into the vaccine, or built a vacuum system were vaccine gets sucked into fish violently splashing into a fibreglass sphere. Name it we built it, they came and if they died we scrapped it. Virus know-how was confined to IHN in association with hatchery fry of sockeye and rainbow.

Annual Northwest Fishculture Conferences were related to the Pacific hatcheries and viable exchange of information helped to pin point and clarify biological problems. Development of an Aquaculture industry started to take place in Washington and British Columbia, salmon farming was beginning and lessons learned from observing salmon in captivity in saltwater was helping salmon enhancement endeavors.

In the late seventies finding sites and starting up a farm site was simple and pleasurable without the environmental impact studies, workman compensation



Down Home on the Farm

rules etc, etc. For example, I traveled throughout Clayoquot Sound in my 18 foot canoe and snorkeling gear talking to the locals along the way and finding protected bays which met anchoring criteria that would do for a salmon farm site application. The canoe doubled for reconnaissance vessel, hauling lumber, personnel and fish transport, feed skiff, etc. Due to a lack of financial help for this new industry I moved to Alaska in 1979 to help start-up the new aggressive ocean ranching concept under direction of politically empowered private fishermen Associations. Could we apply lessons learned from smolting to imprinting, taking large numbers of eggs from one remote location, rearing them somewhere else in a more accessible hatchery, then imprinting them to a third location for increased harvesting potential upon their return in predetermined fishing fleet accessible area's? Feed could not be stored in frozen bags in remote locations so dry highly nutritious fry pellets were formulated. Then, three to five years later successful returns showed up in the Fishery! Tagging results showed clearly that Ocean ranching did pay for commercial and sport fishers, harvesting of salmon stocks greatly improved and stabilized for Alaskan fishermen and fish poor regions were teeming with valuable returns.

In the meanwhile back in BC, in the late seventies Norwegians had appeared with credible spreadsheets and money, showing results of Atlantic salmon farming successes and opportunities arose for implementing salmon farming. Annual salmon production increased in spite of all the setbacks and disasters, Norwegian and general stock exchange financing seemed unlimited and the Canadian Aquaculture industry came into its own with our own Canadian Aquaculture Association. These were the times of a vast developing industry with about 80 private companies, sharing and helping each other, site visits were unrestricted and anyone was welcomed to help share equipment or ideas. The rest is history as biological and financial difficulties increased Canadian monies dried up, banks foreclosed, the small operators slowly were faced with selling sites and presently only a few large international companies do the majority of salmon production on our Coast. As the industry is maturing most large or small companies' emphasis seems to be on production first with the biology playing second fiddle, with the exception of attention paid to the new sophisticated viruses that few farmers understand and Anti farming ecologists and NGO's thrive on. Intercompany information exchange is limited with all watching carefully what they disclose for fear of a backlash from the all powerful anti salmon farm lobby groups.



Innovative System Using Aquaculture Fish Waste to Produce Organic Fish Oil and Fertilizer

I see our biological insights for the future is with institutions like the AAC where freedom of expression of opinions and biological research in publications and conferences seem to prevail. The emphasis on new blood and thinking for the Aquaculture industry is prevalent and I like it very much.

Ward Griffioen

Email: wgriffioen@shaw.ca

Dave Conley

AAC member since 1987

Affiliations to AAC

Session organizer and presenter at a number of AAC Annual Meetings



HISTORY

I was introduced to the concept of aquaculture in 1985 by Dr Mark A. Curtis (McGill – Institute of Parasitology) while working as a field technician in fish parasitology. Later that year, I enrolled in a self-directed learning course supervised by Dr Fred Whoriskey (McGill – Renewable Resources) to teach myself more about aquaculture as McGill had no formal courses. Two years later, I graduated with a BSc (AGR) and was awarded an NSERC Scholarship. I enrolled at McGill's Institute of Parasitology to pursue MSc thesis research on the early life-cycle biology of the parasitic copepod *Salmincola edwardsii* on brook trout. I presented a poster on my research at Aquaculture International, Vancouver, BC in 1988. That was my first major aquaculture conference attended, and I met there many of the people that have since become leaders in the industry. I learned that networking was THE most important thing for advancing one's career. Students, get your business cards printed and get out to every industry gathering possible. Don't be shy! Start in year one of your studies if you want a job by the time you graduate.

- Worked in environmental consulting for Beak Consultants while writing MSc thesis – 1990-91
- Graduated MSc – 1992; moved to N. Vancouver and worked for EVS Environment Consultants – 1992-93
- Moved to Comox, BC and founded DC Conley & Associates – 1993
- Co-organized Kudoa Workshop with Dr Joanne Constantine, Nanaimo, BC – 1994

- Contributor to, then editor of, Pacific Coast Aquaculture – 1994-95
- Founded Coregan, Conley & Associates, Scientific & Technical Information Specialists, with Cathe Egan – 1995
- Managed office administration and communications for BC Shellfish Growers Association – 1995-96
- Regular contributor to *Northern Aquaculture* – 1995-99

I created Aquaculture Newsclips in 1998. With 60 names from my email address book, I compiled web articles, events, and employment opportunities. Aquaculture Newsclips was distributed daily to 6,000+ subscribers worldwide by the time it ceased in 2005. I moved to Ottawa in January, 1999, and became communications and policy advisor in the Office of the Commissioner for Aquaculture Development (OCAD) until it disbanded on March 31, 2004. In 2003, I founded The Aquaculture Communications Group (ACG) with Tor-Eddie Fossbakk. Then, in June of 2004, I left public service to pursue a private consulting practice. I joined the charity Aquaculture without Frontiers (AwF) as a Director in 2010 and used my skills to redesign and developed the AwF website and increase the charity's profile worldwide. I was appointed



Left to right: Tor-Eddie Fossbakk, Dave Conley, Klaus Hoseth – Norwegian Aquaculture Tour 2003

Executive Director in August 2011 for a two-year term. At Aquaculture Canada 2013 in Guelph, I organized and chaired the session – Aquaculture for Food Security in the Developing World. Finally, in July of 2013, I accepted the position of Director of Communications for AquaBounty Technologies.

REFLECTIONS

The quality of the people and the passion they bring to their work has always struck me as one of the real unsung stories of our industry. Their dedication to dispelling the many myths and untruths about aquaculture is legend but under appreciated by the population of Canada at

large. I cannot think of a finer group of people to have spent such a significant amount of my lifetime with. To all of you, my heartfelt thanks for your friendship all these years.

GOING FORWARD

The Canadian aquaculture industry has tremendous potential, but we need the support of the politicians, the government, and the public to achieve it. I am tired of reading press releases with the phrase – “Canada can be a world leader in aquaculture ...”; we wrote this in 1999 when I was at OCAD and it is now 15 years later and counting. I would like to see this industry become the world leader we envisioned in my lifetime.

The world’s growing population and changing atmospheric and oceanic environments will present serious challenges for food producers. Given that the world’s surface is 70% water, a major source of food in the future will have to come from aquaculture. Canadian aquaculturists must rise to the challenges ahead.

Dave Conley, Dip. Agr., B.Sc. (Agr), M.Sc.

Director of Communications

AquaBounty Technologies

Tel: 613.294.3079

Email: dconley@aquabounty.com

AAC PHOTO ALBUM



Céline Audet

Membre de l'AAC depuis 1993

Affiliation à l'Association

Président 2012-2013

Directrice 2008-2014

HISTOIRE

Étonnamment, rien ne m'avait préparé à faire de la recherche dans le domaine de l'aquaculture et pourtant c'est en tant que chercheur dans ce domaine que j'ai obtenu mon premier poste à l'INRS-Océanologie. Formée en écophysiologie et en écotoxicologie des poissons, j'avais acquis une solide expérience de recherche sur les phénomènes de migration, d'osmorégulation et des pluies acides (!), mais de l'aquaculture je ne connaissais strictement rien. Mais bon, quand un poste s'est ouvert sur la production de truite de mer, je me suis dit pourquoi pas, ma principale motivation, avouons-le, étant de réunir ma petite famille après trois années de vie marquée par les distances. Lors du concours d'embauche, je me souviens avoir répondu à une question sur mon manque de connaissances en aquaculture, que comme j'avais appris toute ma vie, j'étais encore capable d'apprendre. Hum... un peu présomptueux me direz-vous. Mais j'ai eu le poste et semble-t-il j'avais raison côté apprentissage. Ce dont je ne me doutais pas, toutefois, c'est que je découvrirais un domaine qui me passionnerait autant.

Et qui dit aquaculture, dit production, alors j'ai commencé en me lançant carrément en production d'omble de fontaine. On ne devient pas un bon producteur avant de perdre au moins 100,000 poissons me dit alors un producteur de la région. Je ne sais pas si j'en ai perdu 100,000, mais j'en ai perdu pas mal au cours des ans. Et j'ai appris ! Tout cela évidemment sans oublier la recherche. Mais encore aujourd'hui quand j'en ai assez des demandes de subventions ou de l'écriture ou de l'administration, toute raison est bonne pour aller me replonger les mains dans l'eau pour aider au projet d'un étudiant ou encore simplement pour aider aux



marquages, aux élevages larvaires ou même aux prises de mesure.

Qui dit recherche orientée, dit également liens plus étroits avec le milieu. Alors je me suis impliquée très rapidement dans les différentes organisations réunissant chercheurs, producteurs et personnel des ministères concernés. Au cours des ans, ce fut la Société de recherche et de développement en aquaculture continentale (SORDAC), la Table maricole du Québec, le réseau des centres d'excellence du Canada « AquaNet », le Centre de transfert et de sélection des salmonidés (CTSS) et le Réseau Aquaculture Québec devenu depuis peu Ressources Aquatiques Québec. Si mes premières présentations scientifiques en aquaculture remontent à 1990 au congrès de la World Aquaculture tenu à Halifax, ce n'est qu'en 1993 que j'ai présenté pour la première fois au congrès de l'Association aquacole du Canada. J'avais déjà des attaches très solides avec une autre société



Céline, Gail Ryan, and Joanne Burry

scientifique canadienne, la Société canadienne de zoologie et j'essayais de partager mes participations à des congrès nationaux entre les deux. Très impliquée dans la dernière, je ne m'impliquais cependant pas dans l'AAC, mis à part ma participation au congrès. C'est Yves Bastien qui me tendit la première perche ! Je me souviens que la première fois qu'il m'a demandé de me présenter comme membre du conseil de l'AAC, je lui ai répondu avoir déjà des engagements avec la SCZ. « Avec quoi ? » me répondit-il et je compris suite à nos discussions qu'il me faudrait sans doute un jour donner aussi du temps à l'AAC. La première fois que je me suis impliquée un peu plus avant, ce fut avec le congrès tenu à Québec en 1997. Mais je l'ai vraiment échappée belle cette fois-là. Un peu fatiguée en fin de congrès, je décidai de reprendre la route pour Rimouski après la dernière journée de conférence et de laisser tomber ma participation au banquet. Le lendemain on me dit que « Mme de la Audet » avait été demandée durant l'activité spéciale. OUF ! Moi qui déteste me faire remarquer, ce fut vraiment minuit moins une ! Il faut croire cependant qu'on ne perd jamais rien pour attendre, puisque cette année je dois à Rich Moccia d'avoir fait un tour de salle du banquet à son bras et celui de Grant Vandenberg au son de la cornemuse...

INFLUENCES PERSONNELLES

J'ai trouvé à l'AAC un milieu particulièrement enrichissant sur le plan des idées et de « la formation continue » pour alimenter mon cheminement de recherche dans le domaine de l'aquaculture. J'y ai fait également des rencontres déterminantes. Je dois beaucoup à Yves Bastien, côtoyé bien sur au Québec avant l'AAC, mais c'est Yves qui fut le premier à me pousser non

« Au cours des années, tous mes étudiants ayant des projets en aquaculture y ont présenté, sans doute avec une petite dose d'adrénaline supplémentaire. »

seulement à m'impliquer davantage au sein de l'AAC, mais qui m'a également fait intégrer AquaNet. Yves ne le sait peut-être pas, mais son empreinte sur mon parcours en aquaculture fut décisive à bien des égards. Bien sur, il y a eu Joe Brown. Comment faire de la recherche en aquaculture et ne pas côtoyer Joe d'une façon ou d'une autre ? C'est l'AAC qui me le fit connaître et j'eus la très grande chance de pouvoir cosuperviser un étudiant au doctorat en sa compagnie avant qu'il ne nous quitte. Et il y a les tous les autres rencontrés au cours des ans et principalement Tillmann Benfey et Rich Moccia, deux chercheurs connus grâce à l'AAC et qui pour des raisons multiples ont scellé mon attachement à l'AAC.

Mais l'AAC c'est aussi un personnel dévoué. Comme présidente en 2013, j'ai appris encore à mieux connaître Gail, Joanne et Catriona. Sans ces femmes formidables qui travaillent dans l'ombre, je me demande bien comment je m'en serais sortie !

VALEUR DE L'ASSOCIATION

Je n'ai que de bons souvenirs de mes participations à l'AAC. Au cours des années, tous mes étudiants ayant des projets en aquaculture y ont présenté, sans doute avec une petite dose d'adrénaline supplémentaire. Comme chercheur présenter les résultats de ses recherches devant ses pairs constitue toujours un certain défi, mais quand le public s'élargit et qu'il compte producteurs, industriels et fonctionnaires, c'est encore plus stressant pour un étudiant. En tout, 19 de mes étudiants aux cycles supérieurs ou stagiaires postdoctoraux ont fait au moins une présentation (orale ou affiche) au congrès de l'AAC et je dois dire qu'ils ont tous trouvé l'expérience enrichissante et qu'aucun n'a regretté sa participation à l'événement.

LAAC fêtera ses 30 ans cette année, souhaitons-lui au moins un autre 30 ans!

Céline Audet

Directrice scientifique

Université du Québec à Rimouski

Email : celine_audet@uqar.ca

Terry Brooks

AAC Member Since 1999



BBQ at Center Cove, Sable Fish Canada Farm

HISTORY

I started in the aquaculture industry salmon farming in 1985 with a small company called Tidal Rush Marine farms which became Pacific Aqua Foods, and for the next 15 years held several positions from site technician to area manager. In 2000, Stolt Sea farms bought Pacific Aqua Foods and I was offered the position of Production Manager. Stolt Sea Farms was subsequently purchased by Marine Harvest and I managed the eight Chinook farms for this company.

Though I was mainly focussed on growing salmon, I also had the opportunity to work with DFO capturing and transporting wild sablefish brood stock to the Pacific Biological Station for the first serious attempt to close the life cycle and to determine the culture potential of sablefish. I was intrigued by this hardy fish and thought it could be a good aquaculture candidate and in 2005 joined Sable Fish Canada as Farm Production Manager. Sable Fish Canada is the only company in the world with both a hatchery and growout sites to produce sablefish from egg to table. I have a great job managing two sites growing sablefish exclusively in beautiful Kyuquot Sound on the west coast of Vancouver Island - great when the weather is good! I am responsible for production planning and harvesting, R&D projects at the farm, transportation of juveniles and live fish including project management, equipment testing, financial reporting and reporting to funding agencies.

I also have the pleasure of working daily with members of the Ka:'yu:'k't'h'/Che:k'tles7et'h First Nations, our joint venture partner and neighbour in Kyuquot Sound. Sable Fish Canada with assistance of the Ka:'yu:'k't'h'/'

Che:k'tles7et'h First Nations, and many supportive government representatives and researchers, has brought sablefish production from an idea in 1995 to sustainable commercial scale production.

I have been an active member of Positive Awareness of Aquaculture and have focussed on educating the public on the facts (i.e. the benefits) of the Aquaculture industry. I was honoured to be awarded the "Most Outstanding Production Manager" in 2000 and the "Most Innovative Industry Individual" in 2003.

Innovation has been both a necessity and a passion of mine and recently I partnered with a local fisherman to build an effective *in situ* net washing system eliminating the need to remove the large salmon farming nets to clean them. Currently, I am upgrading our sablefish hatchery on Salt Spring Island with an innovative marine fish natural spawning system that will improve the number and quality of fertilized eggs, increasing production while reducing costs.

INFLUENTIAL PEOPLE

There are many people who assisted me through my career in aquaculture but two people were very influential. Brad Hicks was in aquaculture at the beginning of the BC industry when we needed to invent policies that had never existed before. He impressed on me the necessity of collaboration between government and industry to create regulations supportive of industry development. He also brought a broad spectrum view of fish health to the industry and showed us how to manage our fish like a terrestrial herd. Mark Asman was the CEO of Marine Harvest Canada from 2000 to 2003

I am extremely proud that both of my sons have chosen to work in the BC aquaculture industry.

and under his guidance; I learned how to take small and diverse fish farming operations and consolidate them into the successful multinational company. As the CEO of Marine Harvest, Mark saw the necessity of continuous improvement and working to high standards, such as ISO9000 and ISO14001, to create quality production.

I am extremely proud that both of my sons have chosen to work in the BC aquaculture industry. My older son Quentin is an experienced fish farmer and has worked in sablefish aquaculture since 2005. My younger son Alex has also worked in the industry since 2010 and is currently enrolled in the Fisheries and Aquaculture Technology Program at Vancouver Island University.

THE VALUE OF THE AAC AND AC MEETINGS

It is important for the future of any industry to not simply maintain existing methods and grow the same species but to seek out new opportunities for growth and advancement. As the demand for aquaculture products expands globally, the Canadian industry has a real opportunity for new species and to lead in environmental sustainability. The AAC has an important role in supporting our future by providing the forum, in the annual conference and publications, for presentation and open discussion of information including new species and new products, unique state of the art methods of culture, and developing regulations and policies so that we may capitalize on future opportunities.

Terry Brooks

Farm Manager, Sable Fish Canada Inc

Tel: (250) 203-0826

Email: terry.brooks@sablefishcanada.com

www.sablefishcanada.com

AAC PHOTO ALBUM



Craig Clarke

AAC member since 1991

Affiliations to AAC

Editor Bulletin 103-3

Steering Committee AC 1999, 2003

Session Chair *New Directions in Enhancement* 1995

Sessions Co-chair *Offshore Aquaculture,*
Commercialization of Alternate Species 2003



HISTORY

I started working for DFO during the summer, first at Babine Lake in 1965 and 1966 while a Zoology student at UBC.

After receiving my BSc, I spent the summer of 1967 at the DFO Vancouver Laboratory on UBC campus with Ed Donaldson before heading east to do an MSc in Zoology at the University of Toronto. Subsequently I received a PhD at UC Berkeley and completed a post doc at UC San Francisco before returning to Nanaimo in 1974 as a research scientist at the Pacific Biological Station (PBS). I was hired by Roly Brett to join his salmon aquaculture program and find ways to improve the growth and survival of accelerated coho salmon smolts in netpens⁽¹⁾. I found that good quality under-yearling smolts could be produced by a combination of photoperiod and temperature control. Sexual maturation of adult coho salmon in netpens could be delayed by photoperiod control (see photo below).



Craig Clarke with Chinook salmon on the Babine River 1966

During a chinook broodstock selection study, I noticed that a group of stream-type chinook held in a netpen in brackish water had a bimodal length distribution, indicating that they had a non-obligatory pattern of smolt development similar to that in coho salmon. I was able to confirm this in several lab experiments and, in collaboration with Ruth Withler, I was able to conduct crossing experiments to show that the obligatory pattern of smolt development in ocean-type Chinook salmon is dominant over the non-obligatory pattern in stream-type Chinook⁽²⁾.

After Don Alderdice retired, I was asked to direct the marine fish aquaculture program and began work on lingcod, sablefish and Pacific halibut. John Jensen provided expertise for incubation of pelagic eggs which had been developed in an earlier program which had been discontinued. We worked in collaboration with several companies⁽³⁾ and by 1998 the first juvenile sablefish were reared from eggs at both PBS and Island Scallops Ltd⁽⁴⁾.

I retired from DFO in 2004. Since then, I have been a volunteer with Rotary and other local organizations, enjoy gardening and travel. I was gratified to be admitted to the Northwest Fish Culture Conference Hall of Fame in 2011.



On left is filet and skin of mature coho under natural photoperiod, on right is filet and skin of immature fish held under long day photoperiod

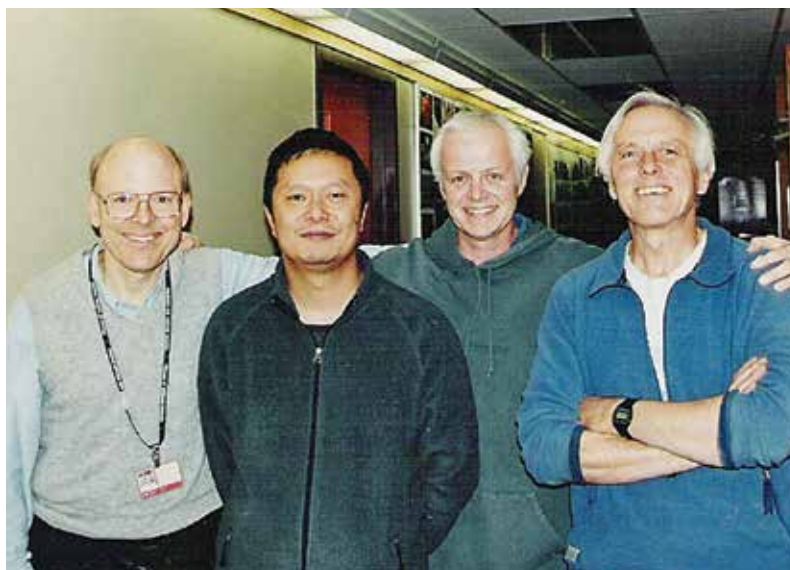
INFLUENTIAL PEOPLE

I was fortunate to have had John Anderson as a lecturer at a summer science camp at Lakefield College School in 1963, two decades before he was involved in the formation of the AAC. John stimulated my interest in fish physiology which I followed in my university studies and on into my career. During my first summer with DFO at Babine Lake, I worked with a senior student, Arthur J. Hansen⁵ who gave me valuable advice about designing my BSc honours research project and organizing my university studies. Although I worked with many talented people at PBS, I was most influenced by Roly Brett's experience with rearing juvenile salmon in the lab and by Don Alderdice's knowledge of experimental design and response surface analysis.

Craig Clarke, Ph.D.

*Retired, Pacific Biological Station,
Fisheries and Oceans Canada*

Email: drcraigclarke@shaw.ca



Some of the crew on the sablefish project: Craig Clarke, Yingyi Chen, John Jensen and John Blackburn

¹ Clarke C & Pennell W 2013. Aquaculture Research and Development on the Pacific Coast. Bull. Aquacul. Assoc. Canada 110-2 (2013) [http://www.aquacultureassociation.ca/sites/default/files/BULLETIN%20110-2\(2013\)_1.pdf](http://www.aquacultureassociation.ca/sites/default/files/BULLETIN%20110-2(2013)_1.pdf)

² Clarke WC, Withler RE, and Shelbourn JE, 1992. Genetic control of juvenile life history pattern in chinook salmon (*Oncorhynchus tshawytscha*). Can. J. Fish. Aquat. Sci. 49: 2300-2306.

³ Industry partners at various times included Northern Marine Farms, Aquamatrix Research, Pacific Aquafoods, Mahata Mariculture, Stolt Seafarm and Sablefin Hatcheries.

⁴ Clarke WC, Jensen JOT, Klimek J, and Pakula Z, 1999. Rearing of sablefish (*Anoplopoma fimbria*) from egg to juvenile. Bull. Aquacul. Assoc. Canada 99(4): 11-12.

⁵ <http://www.iisd.org/about/staffbio.aspx?id=288>
Retrieved July 30, 2013.

AAC PHOTO ALBUM



Institute of Ocean Sciences (IOS)

Located west of Sidney on Vancouver Island, the Institute of Ocean Sciences (IOS) is one of Canada's largest marine institutes. IOS officially opened in 1979 and is the centre for research on coastal waters of British Columbia, the Northeastern Pacific Ocean, the western Canadian Arctic and navigable fresh waters east to the Alberta border.

Research at the Institute includes a focus on understanding and mitigating environmental impacts of aquaculture. Its scientists are experts in ocean currents and water properties (temperature, salinity, oxygen, pH, nutrients, etc.) and how they affect marine species.

IOS staff like Dr. Mike Foreman, Dario Stucchi (retired), and Peter Chandler have led and collaborated on important aquaculture research to study physical oceanographic processes and ocean circulation, including the use of numerical modelling to assess the influence of these processes on the environmental impacts of aquaculture in the near and far-field. Dr. Foreman has been particularly influential in his contributions to the Broughton Archipelago – Coordinated Area Management Production (CAMP) Plan, and has led research projects aimed at establishing zones for managing risks related to pathogens and pollutants originating from finfish aquaculture facilities in the Broughton Archipelago and Discovery Islands.

Other researchers like Dr. Michael Ikononou have studied the distribution, concentration patterns, and environmental fate of chemicals associated with aquaculture such as sea lice chemotherapeutants. Peter Chandler has also been involved in the development and testing of dispersion models for viruses and pathogens, and working to increase our understanding of potential impacts of aquaculture operations on non-target organisms in the near and far-field. The work of Dave Mackas (retired) and Moira Galbraith has provided insights into the distribution and abundance of planktonic stages of sea lice.

The scientific knowledge, advice and research at the IOS continues to provide aquaculture managers and decision-makers with a strong scientific foundation to help regulate the aquaculture industry and ensure its sustainable growth.

Northwest Atlantic Fisheries Centre (NWAFC)

The Northwest Atlantic Fisheries Centre (NWAFC) in St. John's, Newfoundland, is Fisheries and Oceans Canada's Newfoundland and Labrador regional headquarters. NWAFC facilities include a marine and freshwater aquatic facility a wet lab and well equipped laboratories for biochemistry, molecular biology, and microscopy.

The science branch of the NWAFC supports high level research in fisheries, aquaculture, ecosystem and oceanographic studies. In the aquaculture section NWAFC researchers (Dr. Dounia Hamoutene, Dr. Harry M. Murray, and Dr. Andry Ratsimandresy) and their support teams are carrying out both laboratory and field based research programs addressing issues relevant to key questions on the aquaculture file. Along with their partners, these researchers have contributed to important areas of research both within Newfoundland and Labrador Region and nationally, including projects related to: environmental impact of aquaculture on habitat; cod aquaculture and hatchery management; best practices and environmental sustainability in mussel aquaculture; wild and farmed interactions, and oceanography and modelling. In particular, researchers are continuing their efforts to address knowledge gaps in the characterization of oceanographic conditions of new areas of aquaculture expansion, salmon escapees, mussel aquaculture sustainability and bay management, as well as sea lice ecology while continuing to work collaboratively with industry and academia.

The work that is being done at the NWAFC is supporting fish health management for finfish and shellfish aquaculture in the region and is helping identify and mitigate environmental impacts that will support environmentally sustainable growth of the industry in Newfoundland and Labrador.

Institut Maurice-Lamontagne (IML)

L'Institut Maurice-Lamontagne (IML) a été fondé en 1987 le long de l'estuaire du Saint-Laurent, près de Mont-Joli, Québec. De 1988 à 1993, la Section de l'aquaculture, dirigée par Richard Bailey, a axé ses recherches sur le développement de nouvelles espèces marines pour l'aquaculture au Québec en tenant compte des conditions océanographiques particulières du golfe du Saint-Laurent (p. ex. eaux très froides et présence de glaces). On s'est également efforcé de trouver des moyens pour que les pêcheurs puissent augmenter leurs revenus en combinant des techniques d'aquaculture avec leurs pratiques de pêche. À l'aide d'essais dans la salle de bassins de l'IML, une des plus grandes et mieux équipées du genre au Canada, l'équipe de chercheurs, composée de Jean Munro, Yvan Lambert et Jean-Denis Dutil, a mis au point des méthodes d'engraissement de la morue franche et de stabulation du crabe des neiges. En 1994, le groupe est devenu la Section de biologie expérimentale et Denis Chabot s'est joint à l'équipe. Les recherches en bassins sur les températures, l'oxygénation et la salinité optimales pour la croissance ont été très utiles pour comprendre le déclin des populations sauvages de morue du golfe du Saint-Laurent.

Après l'effondrement de la pêche au pétoncle aux îles de la Madeleine dans les années 70, des efforts importants ont été déployés pour déterminer la façon la plus efficace et uniforme de capter et faire croître des naissains pour la culture et l'élevage. Ce travail a été jugé si important qu'au début des années 1990, un programme de recherche et de développement codirigé par Michel Giguère,

REPERE (Recherche sur le pétoncle à des fins d'élevage et de repeuplement), a été créé. Les travaux de REPERE en vue de régler ces problèmes de production ont été menés en étroite collaboration avec l'industrie des pêches et le gouvernement du Québec.

Marcel Fréchette, un autre chercheur de l'IML, a apporté une contribution essentielle au développement de l'aquaculture des mollusques, et s'est attaqué à plusieurs enjeux tout au long de sa carrière, y compris la dynamique alimentaire des moules. Son travail a été à ce point apprécié de ses collègues chercheurs et de l'industrie qu'en 2013, il s'est vu décerner le Prix d'excellence en recherche de l'Association aquacole du Canada (AAC).

Au début des années 2000, la culture du loup tacheté en eaux marines a été explorée par Jean-Denis Dutil et Denis Chabot. Au fil des ans, les efforts combinés des chercheurs de l'Institut, d'agences gouvernementales provinciales, de l'industrie et du milieu universitaire ont mené à la mise sur pied d'un programme de recherche à grande échelle sur des enjeux d'alimentation, de bioénergie et d'échelle de production d'élevage.

La recherche sur l'aquaculture durable et les impacts de l'aquaculture sur l'habitat se poursuit à l'IML. Le groupe de Chris McKindsey étudie les impacts de la charge organique des cultures de bivalves sur les fonds marins, ainsi que l'impact des espèces envahissantes sur l'aquaculture des pétoncles et des moules.

West Vancouver Laboratory - Center for Aquaculture and Environmental Research (CAER)

First completed in 1987, the Center for Aquaculture and Environmental Research (CAER) (formerly the West Vancouver Laboratory) includes a main building with ecology, chemistry, and biotechnology laboratories, warehouse and boat facilities, and multiple complex aquarium facilities for rearing fish under culture or natural conditions. This Fisheries and Oceans Canada (DFO) facility is a specialized centre for aquaculture and coastal research that has long-standing collaborative interactions with local industries and universities (The University of British Columbia, and Simon Fraser University). CAER research programs integrate ecosystem conservation with sustainable aquaculture practices to study aquatic species of global importance.

Research activities at this state-of-the-art facility have focused on a number of key areas related to sustainable aquaculture and marine ecosystems, including studies on ecology, reproductive biology, aquatic animal nutrition, genetics, and biotechnology.

In collaboration with their partners, current DFO researchers Drs Terri Sutherland, Hannah Stewart, and Steve Macdonald have contributed a great deal to assessments of environmental interactions and ecological effects of finfish aquaculture, as well as consequences of coastal urban and industrial development, along the west coast of Canada.

CAER researchers including Drs Robert Devlin and Ian Forster have been influential in areas of finfish (salmon) biology and production research, with studies targeted at enhanced production, regulatory risk assessments, disease diagnostics, genetic sex testing, and aquatic animal nutrition (particularly as it relates to development of sustainable aquaculture), among others.

Freshwater Institute (FI)

In 1973 Fisheries and Oceans Canada (DFO) opened the Freshwater Institute in Winnipeg, Manitoba, replacing the Fisheries Research Board of Canada. Located on the University of Manitoba campus, the institute serves as one of the Department's Central and Arctic regional headquarters. The Institute has a strong history of collaboration that has seen DFO researchers working in close partnerships with government agencies, private industry, community groups, university researchers and students, among others.

Building on the work of earlier Canadian researchers (Drs David Schindler, John Rudd, W.E. Johnson, J.R. Vallentyne, Tom Cleugh, David Rosenberg, Bob Hecky and others), researchers at the Freshwater Institute, including Drs Cheryl Podemski, Paul Blanchfield, Ken Mills (retired), Karen Kidd and numerous graduate students, biologists and technicians have contributed to previous and ongoing research at the Institute, exploring many key questions and issues related to the ecological impacts of freshwater aquaculture. Researchers, including Dr. Mike Rennie, have more recently been exploring potential gains in the area of wild fish recovery using aquaculture methods and facilities.

Research results and advice coming out of the Freshwater Institute are providing the scientific foundation that regulators require to make informed decisions about the sustainable growth of the freshwater aquaculture industry.

The Freshwater Institute is also home to one of DFO's National Aquatic Animal Health laboratories (NAAHLS), providing aquatic animal health monitoring, disease research and diagnostic services that support the responsible management of the industry.

Bedford Institute of Oceanography (BIO)

The Bedford Institute of Oceanography (BIO) is a modern oceanographic research facility on the shores of the Bedford Basin in Dartmouth, Nova Scotia that was first established in 1962. Over the last 50 years it has grown to become Canada's largest centre for ocean research. Fisheries and Oceans Canada (DFO) is one of four federal departments located at BIO.

Research on sustainable aquaculture activities and improving the knowledge of associated environmental impacts has taken place at BIO over the past couple of decades. For example, Dr. Hargrave (retired) was a pioneer in the study of environmental effects of marine finfish aquaculture. He conducted groundbreaking research on benthic sediment profiling and in the development of tools to measure and predict organic deposition from aquaculture operations. Also, genetic research has been completed by Dr. Ellen Kenchington and Barry MacDonald for key bivalve species including mussels and oysters. Stemming from these earlier studies, aquaculture-related research continues at BIO.

Peter Cranford is one BIO researcher who is exploring the interactions between aquaculture and coastal ecosystems, with a focus on ecological carrying capacity indicators and bay scale effects of shellfish

farming. Others such as Brent Law and Tim Milligan (retired) are also tracking the far-field dispersal and transport of aquaculture waste, as well as the use of predictive modelling in collaboration with Yongsheng Wu who develops oceanographic models.

Other areas of study include research led by Dr. Claudio DiBacco, along with Dawn Sephton and Benedikte Vercaemer, who are investigating the environmental interactions related to tunicates and other invasive species affecting aquaculture operations. Furthermore, Dr. Edward Horne and Adam Drozdowski are leading studies on monitoring and modeling physical oceanographic conditions in coastal areas along Nova Scotia, including the Bras d'Or Lakes, that can support siting decisions. Dr. Dave Greenburg (retired) also is involved in developing and improving hydrodynamic models in support of aquaculture-related decision making.

Contributions made by BIO researchers and their partners have contributed to our understanding of the impacts of aquaculture and oceanographic processes that affect them. The research and advice at BIO is helping to build a strong science base for decision-making and ensuring the sustainable development of the industry.

Gulf Fisheries Centre (GFC)

The Gulf Fisheries Centre (GFC) in Moncton, NB was established in 1986 and serves as Fisheries and Oceans Canada's Gulf Region's headquarters. Fields of research at the Gulf Fisheries Centre include a focus on coastal monitoring and shellfish aquaculture interactions (mussel, oyster, scallops, and quahog culture) with the coastal aquatic environment. It is also home to one of two laboratories in Canada that specialize in shellfish health.

Researchers at the Centre (including, Daniel Bourque, Remi Sonier, Marie-Hélène Theriault, Angeline LeBlanc Denise Méthé, Thomas Guyondet, among others), have been working in collaboration with their partners, both in the lab and in the field, to better understand the ecosystem effects of shellfish aquaculture, particularly in the southern Gulf of St. Lawrence.

Targeted research at the Centre addresses some of the key issues related to the industry, including aquatic invasive species like tunicates (Thomas Landry), shellfish carrying capacity (Luc Comeau), and assessment and management of bay scale impacts. Development of bay scale models are the tools necessary for regulatory decision-making to ensure best management of shellfish culture areas.

Some research at the GFC has also focused on shellfish production, culture methods, gear, and techniques (Leslie-Anne Davidson), and other researchers here are involved in aquatic animal health disease research and diagnostic testing (including Nellie Gagné and Mark LaFlamme).

Aquaculture research results and advice coming out of the Gulf Fisheries Centre are supporting both optimal shellfish productivity, and healthy ecosystems.

St. Andrews Biological Station (SABS)

SABS is a Fisheries and Oceans Canada research facility located in St. Andrews, New Brunswick. It is known for its research in fisheries, physiology, ecology and oceanography as well as aquaculture research and development.

One of the first aquaculture research endeavours at SABS was that of Professor A.P. Knight of Queens University. Dr. Knight was instrumental in the formation of the Biological Board of Canada and the establishment of a laboratory at St. Andrews. He worked extensively on larval lobster rearing methods and demonstrated the ineffectiveness of lobster culture systems employed elsewhere. Lobster culture was one of the three priorities in 1908, due to concern about the dismal future of the fishery at the time. The culture of the American oyster was another early aquaculture effort. In response to a disease outbreak in oysters in PEI in 1917, a hatchery was constructed in the 1930s at the SABS field substation, Ellerslie, near Malpeque Bay. Director Dr. Alfred Needler (1941-1954) started his career with oyster culture research and was the first scientist responsible for the Ellerslie operation.

Pioneering work in scallops, soft shelled clams and urchins has also been undertaken at SABS. Early efforts in clam culture were pursued by Dr. John Carl Medcof. Dr. Michael Dadswell began to take an interest in scallop culture in the mid 1980s and, was joined by Dr. David Wildish, Dr. Shawn Robinson and then graduate students Jay Parsons and Cyr Couturier, making significant advancements in scallop hatchery and seed collection, juvenile grow-out and rearing systems. Dr. Robinson continued work on soft shell clam and sea urchin culture.

From the 1930s to the 1960s, Drs. A.F. Chiasson, D.G. Wilder, and D.W. McLeese worked on lobster storage and shipment, a necessary precursor to full-fledged culture and grow out. In 1974, Dr. David Aiken designed and built the first and only lobster grow-out facility to operate as a fully-integrated lobster culture system with year-round production. Strategies developed by Dr. Aiken and Ms. Susan Waddy enabled the production of eggs and larvae every month of the year on a predictable schedule.

Research on the physiology and culture of the Atlantic salmon began in earnest in the 1960s, led by Dr. Richard Saunders. Dr. Saunders and his team would ultimately develop an experimental hatchery and perform research into the smoltification process which would prove vital to future salmon farmers. The image of aquaculture changed dramatically as a result of the salmon aquaculture team at SABS in the 1970s. In the late 1970s, after returning from a sabbatical at the University of Tromsø, Dr. Arnold Sutterlin, a fish physiologist at SABS, began grow-out trials on the east coast. This ultimately led to the first successful overwintering of Atlantic salmon smolts at Lord's Cove, Deer Island, NB in 1978/79. In 1977, Dr. Brian Glebe joined the Saunders DFO team and began work on stock selection for aquaculture purposes.

The aquaculture industry continued to grow in the region with collaborations between industry and research teams at SABS. By the 1990s, disease management became a focus and the need for Bay Management Areas. The oceanography team at SABS led by Dr. Fred Page has and continues to work on the science questions needed for bay management areas to be effective for disease control. Also in the 1990s, there was a push for alternate species (to Atlantic salmon) development for aquaculture. Collaborative work between many provincial and federal government agencies, industry and academia were undertaken on many species including, Atlantic halibut, haddock, cod and several species of flounder. Many key questions in the culture of these species were addressed, and answered, through the collaborative work of SABS researchers such as Dr. Richard Peterson, Ms. Debbie Martin-Robichaud, Dr. Ken Waiwood, and Dr. John Castell.

Presently, a number of SABS researchers are involved in the Canadian Multi-Trophic Aquaculture Network (CIMTAN), a Natural Sciences and Engineering Research Council of Canada (NSERC) Strategic Network. Projects range from co-cultured species nutrition to temporal and spatial patterns of nutrient dispersion from salmon cages.

Adapted from: Reid, G. 2012. A Brief History of Aquaculture Research and Development at the St. Andrews Biological Station. Bulletin of the Aquaculture Association of Canada 110-1.

Pacific Biological Station (PBS)

PBS was established in 1908 in Nanaimo, British Columbia and is the principal centre for fisheries research conducted by DFO on the Pacific coast.

The original species selected for aquaculture in BC was the Pacific oyster, imported from Japan. It was brought to Washington State in 1902, as a source of fresh oysters for luxury ships crossing the Pacific as well as serving the fresh oyster market in western cities. In 1914, Pacific oyster seed was brought into BC from Japan via Washington State. By the 1920's large seed shipments supplied experimental farms in Boundary Bay and Ladysmith Harbour. Initial research on the culture of the species was conducted by Dr. Roy Elsey at PBS and later by his student, Dan Quayle. Quayle joined the staff at PBS in 1938 and left in 1941 to serve in the Air Force. After obtaining his PhD in 1948, he then worked for the BC Department of Fisheries before returning to PBS in 1958. Quayle undertook studies in Pendrell Sound that led to its becoming an important seed source for BC, eventually eliminating the need to import seed from Japan.⁽¹⁾ By the 1960s the intertidal culture of oysters was well established in the Strait of Georgia, and in the 1970s growers began to experiment with raft and long line culture using technology developed by Quayle.⁽²⁾

In 1981, techniques for growing the Japanese scallop were developed by Drs. Neil Bourne and Ian Whyte at PBS. In 2002 following Neil Bourne's retirement, Dr. Chris Pearce was hired to conduct research on shellfish aquaculture at PBS; he continues to work primarily with alternative shellfish species.

Dr. Bill Kennedy initiated research on sablefish at PBS in the 1960s. In 1985, research on sablefish was restarted; Dr. Ed Donaldson at the West Vancouver

Lab developed a method for induced spawning of broodstock, Dr. Don Alderdice developed techniques for egg incubation and Sandy McFarlane studied larval rearing at PBS. The research was interrupted due to lack of funding but Dr. Craig Clarke led a renewed program in 1996 in collaboration with industry.

In the 1960s, Dr. Roly Brett led a number of fundamental studies of energetics and growth of juvenile pink and sockeye salmon. In 1972, Brett and Bill Kennedy received approval for a salmon aquaculture program at PBS and in 1974, a netpen facility was constructed in Departure Bay.

Coho salmon do not readily adapt to seawater until after a year of rearing. Attempts to accelerate smolting resulted in high mortality or stunting of growth. Dr. Craig Clarke was hired at PBS in 1974 to work on this problem and discovered that good quality underyearling smolts could be produced by a combination of photoperiod and temperature manipulation.^(3,4)

Control of disease was a major focus in the early years. Dr. Trevor Evelyn had identified vibriosis as a cause of mortality in tank reared salmon before the experimental farm was established. He directed research to develop vaccines for vibriosis, as well as furunculosis.

Adapted from: Clarke, C, and W. Pennell. 2013. *Aquaculture Research and Development on the Pacific Coast. Bulletin of the Aquaculture Association of Canada* 110-2.

1. Quayle DB. 1988. Pacific oyster culture in British Columbia. Fish. Res. Board of Can. Bull. 218: 241p.

2. Quayle DB 1971. Pacific Oyster raft Culture in British Columbia. Fish. Res. Board of Can. Bull. 178: 34p.

3. Clarke WC and Shelbourn JE. 1986. Delayed photoperiod produces more uniform growth and greater seawater adaptability in underyearling coho salmon (*Oncorhynchus kisutch*). Aquaculture 56: 287-299

4. Clarke WC, Shelbourn JE, Ogasawara T, and Hirano T. 1989. Effect of initial daylength on growth, seawater adaptability and plasma growth hormone levels in underyearling coho, chinook and chum salmon. Aquaculture 82: 51-62.



AQUACULTURE ASSOCIATION OF CANADA	ASSOCIATION AQUACOLE DU CANADA
-----------------------------------------	--------------------------------------