

Canadian Diarrhetic Shellfish Poisoning Symposium

November 27, 2012

Pinnacle Hotel at the Pier

138 Victory Ship Way, North Vancouver, BC

www.pinnaclepierhotel.com



 Fisheries and Oceans Canada / Pêches et Océans Canada

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BC Centre for Disease Control
An agency of the Provincial Health Services Authority

First Diarrhetic Shellfish Poisoning Outbreak in the Pacific Northwest in 2011

In August 2011 over 60 people became sick from eating cooked mussels. This was BC's first [diarrhetic shellfish poisoning](#) (DSP) outbreak. DSP is caused when shellfish ingest toxin producing algae. When consumed by humans the toxin can cause rapid onset of diarrhea, nausea and vomiting (similar to [norovirus](#)). The toxin cannot be inactivated by heat and, therefore, DSP can be associated with both raw and cooked shellfish.

Why did this outbreak occur?

Do we have monitoring programs in place to safeguard commercial shellfish?

What roles do industry and government have in this process?

What methods exist to detect marine toxins in shellfish, to detect harmful algal blooms, and does phytoplankton monitoring have a role?

Is there public health significance to sharing environmental marine results routinely with public health practitioners?

Do you know what specimens to collect if a marine toxin poisoning occurs?

Do you know what messaging exists currently about marine toxins, both to key stakeholders and to the public?

Can we improve risk communications between ourselves, and to the consumers and self-harvester?

These questions, and more will be addressed during this symposium.

This symposium is intended for a diverse audience, including:

- Shellfish growers
- Epidemiologists
- Laboratory Scientists
- Medical Practitioners
- Environmental Health Officers
- Researchers
- Government Regulators

Objectives:

- provide a forum to educate key stakeholders on this emerging issue
- to create a DSP network
- to identify research and surveillance priorities in BC
- to build capacity in BC to respond to DSP and other shellfish toxin outbreak investigations.
- to optimize risk communication messaging to stakeholders and the public during outbreaks and harmful algal bloom events

This symposium was made possible through funding and sponsorship from the following agencies:

- BCCDC/UBC Foundation Grant
- BC Shellfish Growers' Association
- Canadian Food Inspection Agency
- Health Canada

Special thanks to symposium organizers:

Lorraine McIntyre, Marsha Taylor, Nataliya Skuridina, Jeff van de Riet, Wade Rourke, Deirdre Kelly, Roni Bronson, Matt Wright and Catherine Elliott

Tuesday November 27, 2012—DSP Symposium Registration Form

Please pre-register by completing the registration form by **November 1, 2012**.
Space is limited for this FREE symposium, so please register early!

Name: _____ Job Title: _____
Company Name: _____ Address: _____
Tel: _____ City: _____
E-mail: _____ Postal Code: _____

We plan to include a contact list of symposium participants in the conference package hand-out. Indicate if you agree to have your personal information, provided above, shared with other symposium participants for networking opportunities.

Yes share my info Yes but exclude e-mail Yes but exclude e-mail & phone No, do not include my info

Send this registration by FAX to **604.707.2441** (c/o Lorraine McIntyre) or by e-mail to lorraine.mcintyre@bccdc.ca

Information about the hotel:

Pinnacle Hotel at the Pier

www.pinnaclepierhotel.com

ADDRESS: 138 Victory Ship Way, North Vancouver

GETTING THERE: two blocks west of the sea-bus terminal and Lonsdale Quay in North Vancouver.

[Driving directions link](#)

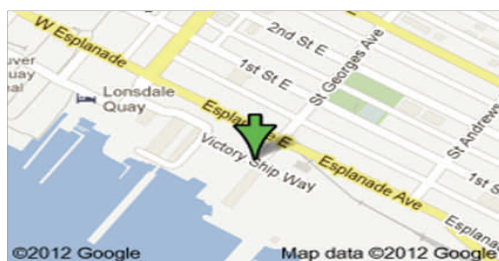
FROM YVR AIRPORT: take Canada-Line sky-train to Waterfront terminal, then transfer to sea-bus.

[Directions from airport link](#)

HARBOUR AIR: from Nanaimo, fly to Vancouver Coal Harbour, and transfer to sea-bus. Book on-line reservations at <http://www.harbour-air.com>

PARKING: A special reduced rate of \$8 per day in the underground hotel lot is available. Come to the registration desk in the morning to register your parking plate if you are not staying at the hotel.

Guests staying overnight at the hotel will have parking added to their room charge.



ACCOMMODATIONS:

Group ID Code: 52861 - delegates must quote group code when making room reservations

Guest rooms will be held until **Tuesday, Nov 6, 2012**.

Hotel Reservation Phone: 604.986.7437

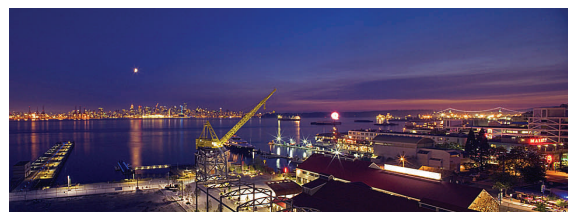
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\$119.00 per night, Mountain View King Bed Guest Room (upgrade to Harbour view for \$149 per night).

Guest room charges are subject to 2% Provincial Hotel Tax and 12% HST (overall 14.24%).



Diarrhetic Shellfish Symposium Agenda

Tuesday, November 27, 2012 Morning

7:30 am to 8:30 am

Registration and Continental Breakfast

Welcome and Opening Remarks

8:30 am to 9:00 am

Dr. Catherine Elliott
BC Centre for Disease Control

Roberta Stevenson
BC Shellfish Growers Association

Welcome and Opening Remarks

2011 DSP Outbreak at Saltspring Island Shellfish Farms:
an industry perspective

An Overview of Harmful Algal Blooms and Human Health

9:00 am to 10:00 am

Dr. Lora Fleming

European Centre of Environment and
Human Health

An Overview of Harmful Algal Blooms
and Human Health.

Learning Objectives:

1. Identify harmful algal bloom (HAB) shellfish poisonings associated with natural aquatic toxins including paralytic shellfish poisoning (PSP), amnesiac shellfish poisoning (ASP), diarrhetic shellfish poisoning (DSP), neurotoxic shellfish poisoning (NSP) and azaspiracid shellfish poisoning (AZP) as well as other HAB-associated illnesses;
2. Explore clinical symptom profiles caused by shellfish toxins during patient diagnoses;
3. Identify most commonly consumed shellfish associated with shellfish toxins poisonings;
4. Describe acute and chronic sequelae associated with shellfish toxin poisonings.

10:00 am to 10:15 am

Refreshment Break

Monitoring Programs for Shellfish Safety, Risk Assessment, Regulation

10:15 am to 10:45 am

Deirdre Kelly

Canadian Food Inspection Agency

Monitoring Programs for Shellfish in BC

Learning Objectives:

1. Describe shellfish monitoring and management programs; differentiate agency roles and responsibilities & recognize Canadian Shellfish Sanitation Program (CSSP) activities,
2. Relate marine biotoxin program to outcomes when toxin levels exceed standards, and recognize common shellfish species associated with marine biotoxins.

10:45 am to 11:15 am

Dr. Nathalie Arnich,

Health Canada

Health Risk Assessment & Regulatory
Standards for DSP

Learning Objectives:

1. Identify the types of toxins associated with DSP (OAs & DTXs) and their mechanism of action,
2. Describe illness thresholds for toxins & relationship to risk assessments,
3. Review Canadian and international standards.

11:15 am to 11:45 am

Wade Rourke

Canadian Food Inspection Agency

Testing for Marine Toxins and DSP

Learning Objectives:

1. Describe existing and emerging methods for DSP toxin testing,
2. Describe sensitivity/specificity and TAT for tests.

11:45 am to 12:00 pm

Panel Discussion with Speakers. Facilitators: Eleni Galanis and Keith Reid

Diarrhetic Shellfish Symposium Agenda Tuesday, November 27, 2012 Afternoon

12:00 pm to 1:00 pm

Lunch

Harmful Algal Blooms: Environmental Factors, Phytoplankton Monitoring and Research

1:00 pm to 1:30 pm

Dr. Vera Trainer

Northwest Fisheries Science Centre,
Seattle

Marine ecology of harmful algal blooms

Learning Objectives:

1. Enumerate environmental and human factors contributing to harmful algal blooms (red tides) leading to DSP,
2. Consider partnerships between industry, universities and governments focusing on algal identification and toxicity that provide a greater understanding of diarrhetic shellfish poisoning in the Pacific Northwest.

1:30 pm to 1:55 pm

Nicky Haigh

Vancouver Island University, Nanaimo

The benefits of phytoplankton
monitoring for aquaculture operations:
lessons learnt from HAMP and the DSP
outbreak in 2011

Learning Objectives:

1. Interpret application of HAMP to fish and shellfish farming operations,
2. Assess value of phytoplankton monitoring for HAB and poisoning syndromes.

1:55 pm to 2:20 pm

Dr. David Cassis

Phytoplankton diversity and screening
for small shellfish growers

Learning Objectives:

1. Consider value of volunteer based harmful algal bloom monitoring,
2. Appraise networking opportunities.

2:20 pm to 2:45 pm

Panel Discussion with Speakers. Facilitator: Matt Wright, Deirdre Kelly

2:45 am to 3: 00 pm

Refreshment Break

BC and Washington DSP Outbreaks in 2011 Risk Management and Risk Communication

3:00 pm to 3:20 pm

Marsha Taylor

BC Centre for Disease Control

The BC Experience

3:20 pm to 3:40 pm

Jenny Lloyd

Seattle-King County Public Health

The Washington Experience

3:50 pm to 4:30 pm

Risk Management and Communication

Multi-agency Presentation/Panel Discussion. Facilitator: Lorraine McIntyre
Presentations by: Roberta Stevenson, BCSGA; Elysha Gordon, DFO;
Deirdre Kelly, CFIA; Lorraine McIntyre, BCCDC

Learning Objectives:

1. Differentiate modes of communications used by agencies,
2. Recommend risk communication best practices.

Speaker Biographies and Abstracts



Dr. Nathalie Arnich is a toxicologist PhD, with a background in biology and marine biology.

She has recently joined Health Canada this year, as a Toxicologist Evaluator at the Food Directorate, Bureau of Chemical Safety. She came from ANSES (the French Agency for Food, Environmental and Occupational Health & Safety) where she has been involved in many risk assessments associated with marine biotoxins in shellfish (bivalves and non-bivalves molluscs) and other seafood products as well as freshwater cyanotoxins.

Her contribution to ANSES's risk assessments also dealt with food contact materials and various other contaminants in food and drinking water such as metals, persistent organic pollutants, pesticides.

Health Risk Assessment & Regulatory Standards for DSP
The types of toxins associated with DSP (OAs, DTXs, PTXs), their mechanisms of action, risk assessment and illness thresholds will be explored. Canadian and international standards will be discussed.



Dr. David Cassis has studied harmful algal blooms in the estuarine systems of western Canada and southern Chile over the last 15 years. His work has been focused on obtaining a better understanding of the marine environment with special focus on phytoplankton composition and the

presence of harmful algae, to improve the oyster grower's site selection criteria and culture methods. Dr. Cassis is currently working as an independent consultant in harmful algae, aquaculture, and education.

Volunteer-based harmful algae monitoring system for British Columbia

The 2011 DSP outbreak highlighted the need for a monitoring system that can serve as an early warning to flag potential problems in BC. Unlike other areas of the west coast of North America (e.g. Alaska, Oregon), BC does not currently count with a volunteer-based harmful algae monitoring program. Such a program could focus on training shellfish growers, as well as interested members of local communities and universities, in seawater sampling techniques and harmful algae identification. The objective is to use volunteers, low cost materials, and freely available information and resources for maximum community engagement, geographical coverage, high temporal resolution, and low cost.

Once a potential harmful algal event has been observed, a "yellow alert" could be declared. The response to such

an alert could include increased monitoring and a self-imposed moratorium on shellfish extraction until further toxin testing can be effected. A quick preliminary risk assessment could be obtained by means of qualitative toxin testing with Jellett Rapid tests.

To be effective and actionable, the information gathered by this network needs to be analysed, modulated, and channelled in real time to CFIA and other government environmental agencies. These channels need to be defined and regulated, and could be created by liaising and training existing experts, industry associations, government agencies and educational institutions.



Dr. Catherine Elliott is a physician epidemiologist with Environmental Health Services at the BC Centre for Disease Control and the National Collaborating Centre for Environmental Health. She earned her BSc in Ecology and Environmental Science from McGill and completed her medical degree, rural

family medicine residency, Master's degree in Health Sciences and fellowship in Public Health and Preventive Medicine at UBC. She has practiced family medicine in Northern BC with a focus on rural and Aboriginal health. In the field, she has been the site lead for investigations of heavy metals intoxication and tuberculosis. Dr. Elliott's current research includes health effects of air pollution, health impact assessment, heavy metals exposures in population subgroups and environmental health surveillance.



Dr. Eleni Galanis is a physician epidemiologist with Communicable Disease Prevention and Control at the BC Centre for Disease Control. She obtained her medical degree from the Universite de Sherbrooke in 1995 and a Master of Public Health

from Harvard University in 1998. She trained in Family Medicine and Community Medicine at the University of Toronto as well as in the Field Epidemiology Training Program. She is certified with the College of Family Physicians of Canada and is a Fellow of the Royal College of Physicians of Canada. She has worked at Health Canada and at the Danish Zoonosis Centre on the World Health Organization Global Salm-Surv project. Dr. Galanis is currently working on enteric and zoonotic disease surveillance, control and prevention at the BCCDC. Her interests include communicable disease epidemiology, outbreak investigation, surveillance methods and international health issues.

Speaker Biographies and Abstracts



Elysha Gordon is a Resource Management Biologist with the Department of Fisheries and Oceans in Nanaimo, BC. She received her undergraduate degree in biology, specializing in Fisheries and Aquaculture at the Vancouver Island University of Nanaimo, British Columbia in 2005. She has worked with the Department of Fisheries and Oceans for 12 years in both the Science and Resource Management Departments. Her current position is Lead of the Pacific Regional and South Coast Area Canadian Shellfish Sanitation Program (CSSP). She is the DFO spokesperson for the CSSP, media relations, and public inquiries regarding closures/openings, areas to harvest, Biotoxin closures and Sanitary Contamination/Wastewater Treatment Plant issues.



Dr. Lora Fleming MD PhD MPH MSc FAAFP

Dr. Lora Fleming is a Professor and Director of the European Centre of Environment and Human Health at the Peninsula College of Medicine and Dentistry in Cornwall, UK. She is a Chair of Oceans and Human Health University of Exeter; and Adjunct Senior Scientist of the Lovelace Respiratory Institute. Professor Fleming is a board certified occupational and environmental health physician and epidemiologist with over 2 decades of experience and expertise in environmental and occupational exposures and human health. Her research interests include

- Human health exposures and effects of harmful algal bloom toxins
- Effects to human health of microbial pollution -
- Health disparities in the workplace

An Overview of Harmful Algal Blooms and Human Health

Dr. Fleming will provide a general overview of the most common types of non-infectious shellfish poisoning (Diarrhetic, Paralytic, Neurotoxic and Amnesiac shellfish poisoning syndromes—DSP, PSP, NSP, ASP). These syndromes are caused by specific marine toxins (okadaic acid, saxitoxin, brevetoxins, domoic acid); other toxins, such as azaspiracids and emerging marine threats such as blue-green algae (cyanobacteria) and ciguatera (from fish) will also be introduced. A differentiation of clinical symptom profiles arising acute and chronic sequelae and exposure sources for these toxins will be highlighted.



Nicky Haigh, Harmful Algae Monitoring Program, Nanaimo, BC

Nicky has been the Manager and Senior Phytoplankton Analyst of HAMP in Nanaimo since its inception in 1999. Building on her education with Dr. Max Taylor at UBC and experience on a BC salmon farm, she and Dr. Ian Whyte (DFO) developed HAMP to help the BC finfish aquaculture industry with issues of harmful algae monitoring, management and mitigation. She's worked with BC shellfish growers, academia, and government agencies on identification and monitoring of algae. In the past 13 years Nicky has helped finfish farmers to develop a long-term database of phytoplankton species abundance and diversity, identified new fish-killing species of phytoplankton in BC, and increased the competence of fish-farming personnel on monitoring and identification of harmful algae species. She is the author of the HAMP Harmful Plankton Handbook (updated annually), and the Plankton Identification Handbook for Shellfish Growers on the West Coast of Canada, and in 2007 earned the 'Certificate of Proficiency in Identification of Harmful Marine Microalgae' from the Intergovernmental Oceanographic Commission of UNESCO in Denmark.

The benefits of phytoplankton monitoring for aquaculture operations: lessons learnt from HAMP and the DSP outbreak in 2011

Phytoplankton monitoring is a relatively low-cost and simple way to detect harmful algae bloom (HAB) species before they affect other marine organisms. HAMP has helped BC salmon farmers with monitoring and management of HABs for 14 years. Samples are collected and sent to HAMP for analysis weekly; providing real-time warning of harmful species, and allowing the construction of a long-term database to predict future HABs. HAMP also has an educational component - fish farmers who routinely analyse samples on site are trained in microscopic phytoplankton identification and supplied with the HAMP Plankton Identification Manual. Routine monitoring can also be of benefit to shellfish growers. Among other things, phytoplankton sample analysis may give advance warning of poisoning syndromes, e.g. paralytic shellfish poisoning (PSP), affecting shellfish stocks. In 2011 regular HAMP samples from salmon farm sites near Quadra Island had notably high concentrations of *Dinophysis* species, known to cause diarrhetic shellfish poisoning (DSP) elsewhere; shortly afterward the first reported cases of DSP in BC were traced to a nearby shellfish aquaculture site. In addition, HAMP sample analysis often shows PSP-causing *Alexandrium* species to be present prior to the closure of the areas for shellfish harvesting by DFO.

Speaker Biographies and Abstracts



Deirdre Kelly received an undergraduate degree in biology from the University of Victoria, British Columbia in 1997. She has worked for the Canadian Food Inspection Agency for 10 years and has been involved in the marine biotoxin monitoring

program for the last 8 years as a Fish Policy Officer. Deirdre has worked in the operational management aspect of the biotoxin program and now is involved in policy / program development.

Monitoring Programs for Shellfish in BC

Shellfish monitoring and management is well regulated in BC. Do you know what is being done, and who is responsible? Deirdre will provide an overview of the Canadian Shellfish Sanitation Program (CSSP) and describe the roles and responsibilities of the federal government agencies involved. How CFIA monitors and manages marine biotoxins will be explored, and what occurs when levels exceed standards will be reviewed. Details on common toxins in BC, areas and types of shellfish where they're found will be highlighted.



Jenny Lloyd received her undergraduate degree from the University of Michigan, where she studied biology and Spanish. She later pursued her master's degree in epidemiology at the University of Washington School of Public Health and Community Medicine while also working at the

Harborview Injury Prevention and Research Center. In 2004, she was hired as a disease investigator in the Communicable Disease Epidemiology and Immunization Section of Public Health – Seattle & King County. Ms. Lloyd now works as an epidemiologist within the Communicable Disease Section, overseeing seasonal influenza surveillance, and monitoring, analyzing and disseminating notifiable condition surveillance data. In particular, her interests include foodborne disease epidemiology and the practical application of public health surveillance data.

DSP Outbreak: The Washington Experience

DSP has been documented in Europe and Asia, but never before reported in the United States. Though the dinoflagellate associated with DSP has been observed in Puget Sound and Washington coastal waters in previous years, DSP toxins have been detected at levels too low to cause human illness. In July, 2011, Seattle & King County Public Health received a report of possible DSP in a family who had harvested and consumed mussels from the underside of a public dock at Sequim Bay State Park in Clallam County, WA on June 24, 2011. This is the first time toxin levels have knowingly increased to pathogenic levels

in Washington state waters. Ongoing sampling should be conducted to detect the presence of DSP toxins in Washington State waters. Because the symptoms are nonspecific, illness from DSP is likely to be under-reported. Health care providers should consider DSP in the differential diagnosis of patients presenting with gastrointestinal symptoms and recent shellfish consumption, and report illnesses to Public Health.



Lorraine McIntyre is a Food Safety Specialist with Environmental Health at the BC Centre for Disease Control specializing in fish and shellfish issues. She received her undergraduate degree from UBC, and Masters in

Public Health Science from the UK. She's worked at the BCCDC for over 15 years, conducting research on *Giardia*, supervising the food poisoning and outbreak laboratory, and currently working on food safety policy and training.



Keith Reid, Owner, Stellar Bay

Keith started Odyssey Shellfish over 20 years ago and now employs over 25 people. He has been the President of the BC Shellfish Growers Association for over ten years. Keith designed the raft systems, High Flow trays, and other innovations currently used by much of the shellfish industry. Keith designed and built the first FLUPSY system used in BC. He initiated many of the carrying capacity studies done on the coast and was involved in water quality initiatives.



Wade Rourke works in the Toxins Unit at the Canadian Food Inspection Agency's Dartmouth Laboratory in Nova Scotia, Canada. He has worked with marine toxins for ten years, and was involved in the replacement of animal testing for PSTs through the development,

validation and implementation of a post-column oxidation HPLC method (AOAC OMA 2011.02). Wade currently balances the supervision of toxin testing in the CFIA Dartmouth Laboratory with focussed research to improve toxin detection and ensure food safety.

Analysis of DSP and Related Toxins: An Overview

The methodology used to DSP and related toxins will be described, highlighting changes that have been implemented based on technological improvements. There will be some discussion of different forms of the toxins, the methods which can be used to detect these different forms, and practical laboratory considerations (including turn-around-time and sensitivity).

Speaker Biographies and Abstracts



Marsha Taylor is a Communicable Disease Epidemiologist at the BC Centre for Disease Control in Vancouver. She is responsible for surveillance, outbreak investigation and research related to enteric, zoonotic and vectorborne diseases. Her background includes an undergraduate degree in Microbiology

and a graduate degree in Epidemiology, both from the University of Guelph. Previously, Marsha completed the Canadian Field Epidemiology Program and has worked for the Foodborne, Waterborne and Zoonotic Infections Division of the Public Health Agency of Canada.

DSP Outbreak: the BC Experience

In 2011, BC experienced an outbreak of DSP for the first time. Over 60 cases were reported associated with cooked mussels from a single harvest area. Collaboration and investigation by industry, public health and food safety colleagues lead to rapid mitigation and control measures. The trigger for toxin production that led to this outbreak is unknown but improved understanding could improve monitoring and approaches to surveillance for clinical illness. This outbreak provided colleagues in BC and the Pacific Coastal waters an opportunity to expand knowledge in this area and make changes to regulatory action levels and monitoring programs in BC. Ongoing work to improve our understanding of marine biotoxins and appropriate public health response will help investigate and control any potential future events.



Dr. Vera Trainer is the Supervisory Oceanographer for the Marine Biotoxin program at the Northwest Fisheries Science Center in Seattle. Current research activities include refinement of analytical methods

for both marine toxin and toxigenic species detection, assessment of environmental conditions that influence toxic bloom development and understanding shellfish susceptibility to toxins in their environment. She directs the North Pacific Marine Science Organization (PICES) Harmful Algal Bloom International project focusing on bringing sustainable methods to developing Nations for assessing seafood safety. Dr. Trainer is the lead investigator of the Puget Sound Monitoring Program for harmful algal blooms and *Vibrio* (SoundToxins). She received her B.S. in Biology from Indiana University of Pennsylvania, and both her M.S. in Biological Oceanography, and Ph.D. in Biochemistry and Molecular Biology at the University of

Miami, with postgraduate studies in the Pharmacology Department at the University of Washington.

Marine ecology of harmful algal blooms

Dr. Trainer will discuss what is known about the conditions leading to some harmful algal blooms, and review whether increases may be occurring due to global warming and human activities. She will also discuss how partnerships between industry, universities and governments focusing on algal identification and toxicity have provided a greater understanding of the first cases of diarrhetic shellfish poisoning in the Pacific Northwest.



Roberta Stevenson holds the key role as Executive Director for the BCSGA which is the voice of the shellfish aquaculture industry in BC. She has an extensive background in shellfish initiatives, ranging from developing Viking Bay Ventures (est.1973) as a productive shellfish farm with sales of clams, oysters and

mussels, to instructor, mentor, and developer of shellfish and adult education courses. Through her work as CEO for the Nuu-chah-nulth Shellfish Development Corporation, she developed and established shellfish aquaculture farm sites, along with undertaking activities in assessment from water quality, product grow-out suitability, substrate health and farm infrastructure needs. She has taken leading roles as a business plan and strategic plan developer for First Nations, coastal communities, and non profits through her consulting company. Her experience teaching adults, securing funding, managing projects, marketing shellfish, and promoting the shellfish industry is pivotal to her career highlights.



Matthew Wright is the Communications Manager at the BC Shellfish Growers Association and Executive Director of the BC Shellfish Festival. He has worked over 6 years in the agri-food industry in Manitoba with the Manitoba Cattle

Producers Association and now with shellfish farmers in BC. After obtaining a communications degree from Red River College in Winnipeg, he spent a few years as a journalist reporting on agricultural issues before jumping into a communications position full-time. Developing communication and marketing strategies are his focus and the last few years in the shellfish industry have been keeping him busy with a multitude of projects including the unusual DSP outbreak in 2011.

Sponsorship for this symposium was made possible by the following organizations:



BC Centre for Disease Control
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