Canadian Diarrhetic Shellfish Poisoning Symposium

November 27, 2012

Pinnacle Hotel at the Pier
138 Victory Ship Way, North Vancouver, BC

www.pinnaclepierhotel.com
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.
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


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
Toll Free Reservation: 1.877.986.7437
Reservation Email: info@pinnacleatthepier.com

Rates:
$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**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
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<tbody>
<tr>
<td>7:30 am to 8:30 am</td>
<td>Registration and Continental Breakfast</td>
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<tr>
<td>8:30 am to 9:00 am</td>
<td>Welcome and Opening Remarks</td>
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<tr>
<td>Dr. Catherine Elliott</td>
<td>BC Centre for Disease Control</td>
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<td>Paul Simpson</td>
<td>Saltspring Island Seafarms</td>
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<tr>
<td>8:30 am to 9:00 am</td>
<td>Dr. Lora Fleming</td>
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<tr>
<td>European Centre of Environment and Human Health</td>
<td>An Overview of Harmful Algal Blooms and Human Health.</td>
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<tr>
<td>9:00 am to 10:00 am</td>
<td>Refreshment Break</td>
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<tr>
<td>10:00 am to 10:15 am</td>
<td>Monitoring Programs for Shellfish Safety, Risk Assessment, Regulation</td>
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<tr>
<td>10:15 am to 10:45 am</td>
<td>Dr. Nathalie Arnich, Health Canada</td>
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<td>Health Risk Assessment &amp; Regulatory Standards for DSP</td>
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<tr>
<td>10:45 am to 11:15 am</td>
<td>Wade Rourke</td>
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<td>Canadian Food Inspection Agency</td>
<td>Testing for Marine Toxins and DSP</td>
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<tr>
<td>11:15 am to 12:00 pm</td>
<td>Panel Discussion with Speakers. Facilitators: Eleni Galanis and Keith Reid</td>
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**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), diarrheic 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.

**Monitoring Programs for Shellfish Safety, Risk Assessment, Regulation**

- **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.

**Panel Discussion with Speakers.** Facilitators: Eleni Galanis and Keith Reid
### Diarrhetic Shellfish Symposium Agenda
#### Tuesday, November 27, 2012 Afternoon

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tr>
<td>12:00 pm to 1:00 pm</td>
<td>Lunch</td>
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<tr>
<td>1:00 pm to 1:30 pm</td>
<td><strong>Harmful Algal Blooms: Environmental Factors, Phytoplankton Monitoring and Research</strong></td>
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<tr>
<td>Dr. Vera Trainer</td>
<td>Northwest Fisheries Science Centre, Seattle</td>
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<td></td>
<td>Marine ecology of harmful algal blooms</td>
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| 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 1:50 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. |
| 1:50 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                 |
| 2:45 pm to 3:00 pm | Refreshment Break                                                        |
| 3:00 pm to 3:20 pm | **BC and Washington DSP Outbreaks in 2011**                              |
| 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. |
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.
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.

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

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.
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.

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.

**Robert 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

Granting agency: UBC CDC Communal Fund

Health Canada

Santé Canada

Canadian Food Inspection Agency

Agence canadienne d’inspection des aliments

BCSGA

BC Shellfish Growers Association

We also thank the following industry suppliers for their support of this symposium:

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