World Organisation for Animal Health

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WOAH Collaborative Centre Reports Activities 2024

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CENTRE INFORMATION

***Title of WOAH Collaborating Centre**	Epidemiology Aquatic Animal Diseases (Americas)
***Address of WOAH Collaborating Centre**	Centre for Aquatic Health Science
***Tel:**	+19025660728
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Website:	
***Name Director of Institute (Responsible Official):**	Dr. Dominique Griffon, Dean, Atlantic Veterinary College, University of Prince Edward Island
***Name (including Title and Position) of Head of the Collaborating Centre (WOAH Contact Point):**	Dr. K. Larry Hammell, Professor
***Name of the writer:**	Dr. K. Larry Hammell

TOR 1 AND 2: SERVICES PROVIDED

1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by WOAH

Category	Title of activity	Scope
		During the post-outbreak of shellfish

Epidemiology, surveillance, risk assessment, (true)	MSX outbreak assistance	MSX outbreak in Atlantic Canada in 2024, the Centre provided consultant service in the research prioritization related to disease monitoring and risk mitigation
Training, capacity building (true)	Training for multiple aquatic focal point training sessions	Assisted organisation of, and contributed to, workshops on topics, including epidemiology, disease prevention, surveillance, diagnostic test characteristics, emergency preparedness, antimicrobial use and resistance, biosecurity, and others. Workshops held in Singapore (2) and Tunisia (2).
Wildlife (true)	WOAH Risk Mitigation for Global Wildlife Health Data Sharing	Participated as an aquatic disease expert in consultations (Dec 2024)
Aquatic animal diseases (true)	Advised WOAH on implementation of Aquatic Animal Health Strategy	Hammell was based in Paris HQ for April 2023 to April 2024 to provide scientific advice on several sections of the Aquatic Animal Health Strategy, including topics in capacity building, emergency preparedness, enhancing communication among aquatic collaborating centres, and research prioritisation.
aquatic animal diseases (true)	PVS Evaluation Aquatic for Malaysia	Technical expert for team evaluating the PVS Aquatic for Malaysia (Nov 2024).
Aquatic animal diseases (true)	PVS Evaluation Aquatic for Kyrgyzstan	Peer review of PVS Evaluation Aquatic for Kyrgyzstan

TOR 3: HARMONISATION OF STANDARDS

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the main fucus area for which you were designated

Proposal title	Scope/Content	Applicable Area

3. In exercising your activities, have you identified any regulatory research needs* relevant for WOAH?

Yes

Research need 1

Please type the Research need: systematic reviews relevant to WOAH Code / Manual chapters, including those applied to disease risk factors, effect of genotype / strain variation on pathogenicity, diagnostic test performances, disease control (treatment / vaccination) success, and so on.

Relevance for WOAH Disease Control, Capacity Building, Standard Setting, Animal Welfare,

Relevance for the Code or Manual Code, Manual,

Field Epidemiology and Surveillance, Diagnostics, Vaccines, Therapeutics,

Animal Category Aquatic,

Disease:

Channel catfish virus disease
Decapod iridescent virus 1 (DIV1)
Enteric septicaemia of catfish (Edwardsiella ictaluri)
Infection with abalone herpesvirus
Infection with Aphanomyces astaci (crayfish plague)
Infection with Aphanomyces invadans (epizootic ulcerative syndrome)
Infection with Bonamia exitiosa
Infection with Bonamia exitiosa and Bonamia ostreae
Infection with Bonamia ostreae
Infection with epizootic haematopoietic necrosis virus
Infection with Gyrodactylus salaris
Infection with Haplosporidium costale
Infection with Haplosporidium nelsoni
Infection with Hepatobacter penaei (necrotising hepatopancreatitis)
Infection with infectious haematopoietic necrosis virus
Infection with infectious hypodermal and haematopoietic necrosis virus
Infection with infectious myonecrosis virus
Infection with infectious salmon anaemia virus
Infection with koi herpesvirus
Infection with Macrobrachium rosenbergii nodavirus (white tail disease)
Infection with Marteilia refringens
Infection with Marteilia refringens and Marteilia sydneyi
Infection with Marteilia sydneyi
Infection with Mikrocytos mackini
Infection with Perkinsus marinus
Infection with Perkinsus olseni
Infection with ranavirus

Infection with red sea bream iridovirus
Infection with salmonid alphavirus
Infection with spring viraemia of carp virus
Infection with Taura syndrome virus
Infection with viral haemorrhagic septicaemia virus
Infection with white spot syndrome virus
Infection with Xenohaliotis californiensis
Infection with yellow head virus genotype 1
Infection with Batrachochytrium salamandrivorans
Oncorhynchus masou virus disease
Viral encephalopathy and retinopathy

Kind of disease (Zoonosis, Transboundary diseases) Transboundary diseases,

If any, please specify relevance for Codes or Manual, chapter and title

(e.g. Terrestrial Manual Chapter 2.3.5 - Minimum requirements for aseptic production in vaccine manufacture)

Answer: most chapters with specific disease or surveillance sections

Notes:

Answer: summaries of current research are ongoing needs and WOAH should be more involved, including attracting funding, in generating these on a regular basis

4. Did your Collaborating Centre maintain a network with other WOAH Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same specialty, to coordinate scientific and technical studies?

Yes

Name of WOAH CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
EAAD-Europe (NVI), Emerging Aquatic Diseases (CEFAS), CASA (U Chile), GBADS (Liverpool)	virtual	América Europa	multiple coordination virtual meetings to discuss enhancing WOAH mission, capacity building, research, and Aquatic Animal Health Strategy

TOR 4 AND 5: NETWORKING AND COLLABORATION

5. Did your Collaborating Centre maintain a network with other WOAH Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?

Yes

Name of WOAH CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose

Emerging Aquatic Diseases (CEFAS), CASA (U Chile), GBADS (Liverpool), CSIRO	virtual	Americas Asia and Pacific Europe	multiple coordination video meetings to discuss enhancing WOAH mission, capacity building, research, and Aquatic Animal Health Strategy

TOR 6: EXPERT CONSULTANTS

6. Did your Collaborating Centre place expert consultants at the disposal of WOAH?

Yes

Name of expert	Kind of consultancy	Subject
Larry Hammell	Scientific Advisor – April 2023 to April 2024 based in Paris	Aquatic Animal Health Strategy.
Larry Hammell	WOAH representative on organizing committee for FAO/WOAH Fish Vet Dialogue International Conference; represented at meeting and facilitator of plenary.	FAO Fish-Vet+ Dialogue II: One Health and Biosecurity, Rome, Italy, 18-19 Jun 2024. Workshop organizer/presenter/Facilitator (and Mentimeter designer): Plenary Discussions and Conclusions.
Larry Hammell	WOAH representative on organizing committee for FAO International Conference: Aquatic Organism Health: To Vaccinate or Not to Vaccinate; facilitator of plenary.	FAO International Conference: Aquatic Organism Health: To Vaccinate or Not to Vaccinate, Rome, Italy, 20 Jun 2024. Workshop organizer/presenter/Facilitator (and Mentimeter designer): Plenary Discussions and Conclusions.
Mark Fast	Presenter, FAO International Conference: Aquatic Organism Health: To Vaccinate or Not to Vaccinate.	Presentation (Recent developments using mRNA vaccine strategies in fish) and participant in group discussions.
Larry Hammell	WOAH National Aquatic and AMR Focal Points training - organising committee and presenter (Africa)	1. WOAH National Focal Points (Africa – French) on Aquatic Animals Regional Training Seminar, Tunis, Tunisia 8-10 Jul 2024. Workshop organizer/presenter (and Mentimeter designer): Opening Session Survey; La Stratégy Mondiale / Global Aquatic Animal Health Strategy; National Focal Point Survey (Africa); Network of Aquaculture Centres; Program Review and Discussion. 2. WOAH National Focal Points (Africa – French) on Antimicrobial Resistance Regional Training Seminar, Tunis, Tunisia 11-12 Jul 2024. Workshop organizer/presenter (and Mentimeter designer): Treatment Considerations in Aquaculture; Program Review

		and Summary
Larry Hammell	Technical Expert for PVS Evaluation Mission (Malaysia)	WOAH Aquatic PVS Evaluation of Aquatic Animal Health Services of Malaysia (14-25 October 2024). BELMAR KRETSCHMANN P, HAMMELL L, BARIŠIĆ N, PATANASATIENKUL T.
Larry Hammell	WOAH National Aquatic and AMR Focal Points training - organising committee and presenter (Asia Pacific)	1. WOAH National Focal Points (Asia-Pacific) for Aquatic Animals Regional Training Workshop, Singapore, 29-30 Oct 2024. Preparedness and Response for Emerging Diseases in Aquatic Animals for Asia and the Pacific, Workshop organizing committee / session facilitator / presenter: Introduction and objectives for Emergency Responses; Group Exercises; Conclusions and Next Steps. 2. WOAH National Focal Points (Asia-Pacific) for Antimicrobial Resistance Regional Training Workshop, Singapore, 31 Oct – 1 Nov 2024. Antimicrobial Use and Resistance in Aquaculture for Asia and the Pacific, Workshop organizing committee / session facilitator / presenter: Workshop Introduction and Objectives; Group Exercise Facilitator for Main Barriers for Collecting and Reporting AMU in Aquaculture; Biosecurity, Disease Prevention, and Control Methods in Aquaculture; Assessing Field Effectiveness of Health Management Methods in Aquaculture.
Larry Hammell	AQMENET Technical Committee member	Expert advice for aquaculture network in Middle East
Larry Hammell	Technical Expert - Participant in planning meeting on Wildlife Health Data	Virtual meeting: Risk Mitigation for Wildlife Health Data Sharing at the Global Level, Dec 2024
Larry Hammell	Technical Expert reviewer for Capacity Building	Review of e-modules on aquatic epidemiology being developed by WOAH project (based in Italay), Aqua-estrength
Larry Hammell	Technical Expert - WOAH / STAR-IDAZ Research Prioritisation	Scientific Organising Committee for WOAH / STAR-IDAZ Research Prioritisation in Aquatic Health; meeting to be held in Paris, Feb 2025
Larry Hammell	Peer review	PVS Evaluation (Aquatic) report for Kyrgyzstan

Larry Hammell	Technical Expert participant representing aquatic animal health	WOAH Risk Mitigation for Global Wildlife Health Data Sharing Virtual Meeting, Dec 2024

TOR 7: SCIENTIFIC AND TECHNICAL TRAINING

7. Did your Collaborating Centre provide advice/services to requests from Members in your main focus area?

No

8. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by WOAH, to personnel from WOAH Members?

Yes

a) Technical visit : 0

b) Seminars : 350

c) Hands-on training courses: 85

d) Internships (>1 month) : 0

Type of technical training provided (a, b, c or d)	Content	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
B	aquatic health seminars to Competent Authority staff; aquatic focal point meetings	global, Africa, Asia-Pacific, Canada,	350
C	Farmer training on parasite identification	Canada	85

TOR 8: SCIENTIFIC MEETINGS

9. Did your Collaborating Centre organise or participate in the organisation of scientific meetings related to your main focus area on behalf of WOAH?

Yes

National/International	Title of event	Co-organiser	Date	Location	No. Participants
Internationally	Emergency Preparedness in Aquaculture for Asia Pacific	WOAH Asia Pacific office (Tokyo - Thitiwan Patanasatienkul)	2024-10-29	Singapore	40

Internationally	Aquatic Animal Health for WOAH Aquatic Focal Points	WOAH Africa (French) office (Tunisia - Francesco Valentini)	2024-07-08	Tunis	35
Internationally	AMU / AMR for WOAH Aquatic Focal Points	WOAH Africa (French) office (Tunisia - Francesco Valentini)	2024-07-11	Tunis	45
Internationally	AMU AMR for WOAH Aquatic Focal Points	WOAH Asia Pacific office (Tokyo - Thitiwan Patanasatienkul)	2024-10-31	Singapore	45

TOR 9: DATA AND INFORMATION DISSEMINATION

10. Publication and dissemination of any information within the remit of the mandate given by WOAH that may be useful to Members of WOAH

a) Articles published in peer-reviewed journals:

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Patanasatienkul T, Gautam M*, Hammell L, Gilang D, Delphino M, Burnley H, and Thakur K (2023). Survey of farm management and biosecurity practices in shrimp farms in Java Island, Indonesia. Front Aquac, doi.org/10.3389/faquc.2023.1169149*

Bravo F, Oliveira M, Parent MI, Korus J, Sclodnick T, Gardner I, Whidden C, Filgueira R, Hammell KL, Swanson Ak, Torgo L, Grant J. Modeling Sea Lice Dynamics at salmon farming sites in Eastern Canada: A Stochastic, State-Based Approach. Aquaculture (submitted 2024)

Thapa PC, Raquib A*, Mears K, Hammell KL, Thakur KK. The global genetic diversity of infectious salmon anemia virus (ISAV): a systematic review protocol. PLOS One (submitted 2024)*

Raquib A, Thapa PC*, Mears K, Hammell KL, Thakur KK. Risk factors, and transmission dynamics of infectious salmon anemia virus: protocols for two systematic reviews. Environmental Evidence (accepted 2024)*

Raquib A, Hammell KL, Sanchez J, O'Brien N, Thakur KK. Network analysis of farmed Atlantic salmon movements in British Columbia, Canada. Transboundary Emerging Disease (submitted 2024)

Elghafghuf A, Vanderstichel R, Hammell L, Stryhn H. Estimating common patterns of sea lice infestation among marine aquaculture sites. Communications in Statistics: Case Studies, Data Analysis, and Applications (Submitted 2024)

Parent MI, Stryhn H, Hammell KL, Fast MD, Vanderstichel R. 2024. Predicting the dispersal of Lepeophtheirus salmonis in the Bay of Fundy, New Brunswick. J Aquatic Animal Health 36: 355-377. http://dx.doi.org/10.1002/aah.10235

Parent MI, Stryhn H, Hammell KL, Grant J, Vanderstichel R. 2024. Estimation and comparison of connectivity measures for the dispersal of Lepeophtheirus salmonis sea lice among Atlantic salmon farms in New Brunswick, Canada. J Experimental Marine Biology and Ecology 572: 151992. https://doi.org/10.1016/j.jembe.2024.151992

Gautam M, Hammell KL, Burnley H, O'Brien N, Whelan D, Thakur KK. 2023. Description of spatiotemporal patterns of infectious salmon anemia virus (ISAV) detection in marine Atlantic salmon farms in Newfoundland and Labrador. J Aquatic Animal Health 35: 296-307. http://doi.org/10.1002/aah.10205

Patanasatienkul T, Gautam M, Hammell L, Gilang D, Delphino MC, Burnley H, Salsabila NA, Thakur K. 2023. Survey of farm

management and biosecurity practices in shrimp farms in Java Island, Indonesia. (Brief Research Report). Frontiers in Aquaculture https://doi.org/10.3389/faquc.2023.1169149.

Jia B, Burnley H, Gardner IA, Saab ME, Doucet A, Hammell KL. 2023. Diagnosis of Renibacterium salmoninarum infection in harvested Atlantic salmon (Salmo salar L.) on the east coast of Canada: Clinical findings, sample collection methods, and laboratory diagnostic tests. J Fish Diseases 00: 1-15. https://doi.org/10.1111/jfd.13770

Delphino MKVC, O'Brien N, Laurin E, Whelan D, Burnley H, Hammell KL, Thakur K. 2023. Bayesian analysis of diagnostic sensitivity and specificity for detecting infectious salmon anemia virus (ISAV) using IFAT and real-time RT-PCR testing from laboratories in Atlantic Canada. Aquaculture 563: 739006 https://doi.org/10.1016/j.aquaculture.2022.739006
Jyoti S, Jia B, Saksida S, Stryhn H, Price D, Thakur K (2024). Utilization of publicly available data to summarize spatio-temporal patterns of fish health events of Atlantic salmon (Salmo salar) reported by marine finfish industries in British Columbia (BC), Canada. Accepted for publication in J Fish Dis DOI: 10.1111/jfd.14022*

Neokye E, Wang X , Thakur K , Quijon K, Nawaz R , and Basheer S (2024). Climate Change Impacts on Oyster Aquaculture- Part II: Impact Assessment and Adaptation Measures. Environ Res, 119535.

Koepper S, Revie C, Clarke F, Stryhn H, and Thakur K (2024). Bacterial interactions and diversity patterns in the shell microbiome of American lobster (H. americanus) in Atlantic Canada. Front Microbiol doi.org/10.3389/fmicb.2024.1320812*

Neokye E, Wang X , Thakur K , Quijon K, Nawaz R , and Basheer S (2024). Climate Change Impacts on Oyster Aquaculture - Part 1: Identification of key factors. Environ Res 118561.

Jeong J, Awosile B, Thakur K, Boyce B, Stryhn H and Vanderstichel R (2024). Longitudinal dissolved oxygen patterns in Atlantic salmon aquaculture sites in British Columbia, Canada. Front Mar Sc DOI 10.3389/fmars.2023.1289375*

Koepper S, Revie C, Stryhn H, and Thakur K (2023). Observed size distribution changes in American lobsters over a 12-year period in southwestern Nova Scotia, Canada. PLOS ONE, 18(12)*

Koepper S, Revie C, Clarke F, McClure J, Stryhn H, and Thakur K (2023). Long-read sequencing reveals the shell microbiome of apparently healthy American lobsters Homarus americanus from Atlantic Canada. Front Microbiol doi.org 10.3389/fmicb.2023.1245818*

Gautam M, Hammell L, Burnley H, O'Brien N, Whelan D, and Thakur K (2023). Spatio-temporal patterns of Infectious Salmon Anaemia virus (ISAv) in marine salmon farms in Newfoundland and Labrador. J Aquat Anim Health, doi/10.1002/aah.10205*

Koepper S, Kelley S, Thakur K and Clark F (2023). Interspecies and spatial differences in the shell microbiome of Atlantic rock crab Cancer irrotatus and European green crab Carcinus maenas from Atlantic Canada. Front Mar Sc, doi.org/10.3389/fmars.2023.1152544*

Michaud D, Fast MD, Wilson BM, Trudel M. In Review. Characterization of virulence factors in the salmon louse (Lepeophtheirus salmonis) using post-transcriptional silencing. Submitted to Dis Aquat. Org.

Michaud D, Fast MD, Wilson BM, Cai W, Trudel M. In Review. Assessing the evolution of virulence in the salmon louse (Lepeophtheirus salmonis) in the Bay of Fundy. Submitted to Evol. App.

Ghanei-Motlagh R. Hernandez-Orts JS, Fast MD, El-Matbouli M, Saleh M. Revisions. Morphology and molecular barcoding of Neorhadinorhynchus nudus (Harada, 1938) (Ancanthocephala: Cavisomatidae) from Euthynnus affinis (Scombridae) in the Persian Gulf of Iran, with phylogenetic position of the Cavisomatidae within the order Echinorhynchida. Submitted to Systemic Parastiol.

Zaidi M, Goldberg S, Brocca G, Groman D, Purcell SL, Whyte SK, Tibbetts SM, Colombp SM, Manrichez-Hernandez J, Navaneethaiyer U,

Fast MD. In Review. Impact of astaxanthin inclusion in the diet on wound healing in Atlantic salmon (Salmo salar). Submitted to FACETs.

Fast MD, Veltman CV, Purcell SL, McCurdy R, Maguire D, Groman DB, Jia B, Andrew S, Poley JD, Whyte SK. In Review. Impacts of jellyfish nematocyst homogenates on Atlantic salmon (Salmo salar) gill and head kidney cells. Submitted to FACETs.

Veltman CV, Whye SK, Purcell SL, Groman DB, Jia B, Andrew S, Poley JD, Fast MD. Revisions. Repeated, dose and temperature dependent hydrogen peroxide exposures stimulate sensitive wound repair and ion regulation expression even under mild histological impacts in Atlantic salmon. Manuscript submitted to Aquaculture.

Armwood AR, Cai W, Leary J, Lopez-Porras A, Richardson BM, Ware C, Purcell SL, Wise D, Fast MD, Griffin MJ, Camus AC. In Review. Comparative immune responses to experimental Edwardsiella ictaluri challenges in vaccinated and non-vaccinates channel and channel blue hybrid catfish. Submitted to J Fish Dis.

Zhang Y, Whyte SK, Purcell SL, Jahangiri L, Zhu R, Garber A, Li R, Fast MD, Cai W. Revisions. Identification of SNPs associated with salmon lice (Lepeophtheirus salmonis) resistance in North American Atlantic salmon by combining genome wide association study (GWAS) and RNA Seq. Submitted to Aquacult.

Daniels R, Salisbury SJ, Sveen L, Taylor RS, Vaadal M, Tengs T, Monaghan S, Villamayor PR, Ballantyne M, Penaloza C, Fast MD, Bron JE, Houston R, Robinson N, Robledo D. Revisions. Characterization of mesenchymal stromal cells in the skin of Atlantic salmon. Submitted to BMC Genomics.

Sveen L, Fast MD, Tengs T, Timmerhaus G, Vaadal M, Houston RD, Bron JE, Monaghan SJ, Mohammed H, Daniels RR, Salisbury S, Robledo D, Braceland M, Robinson N. Revisions. Local inflammation at the attachment site of Lepeophtheirus salmonis salmonis drives copepodid rejection in Coho salmon (Oncorhynchus kisutch). Manuscript Submitted to Cell Tissue Res.

Xue X, Eslamloo K, Caballero-Solares A, Katan T, Umasuthan N, Taylor RG, Fast MD, Andreassen R, Rise ML. 2024. Characterization of the impact of dietary immunostimulant CpG on the expression of mRNA biomarkers involved in the immune responses in Atlantic salmon (Salmo salar). Fish Shellfish Immunol. 153: 109540.

Cardé EMQ, Anenson K, Yun S, Heckman TI, Jungers HT, Henderson EE, Fast MD, Soto E. 2024. Effects of Acipenserid Herpesvirus 2 on the outcome of a Streptococcus iniae co-infection in white sturgeon (Acipenser transmontanus). Front. Aquac. 3:1306518. doi: 10.3389/faquc.2024.1306518

Salisbury SJ, Ruiz Daniels R, Monaghan S, Bron JE, Vallamayor PR, Gervais O, Fast MD, Sveen L, Houston R, Robinson N, Robledo D. 2024. Keratinocytes drive the epithelial hyperplasia key to sea lice resistance in Coho salmon. BMC Biology 22:160.

Cai WC, Zhong L, Parrish K, Kumar S, Whyte SK, Purcell SL, Jahangiri L, Li R, Taylor RG, Balder R, Rise ML, Fast MD. 2024. Effects of single infection and different scenarios of co-infection with sea lice (Lepeophtheirus salmonis) and the bacteria Moritella viscosa on Atlantic salmon (Salmo salar): Insights from global transcriptome analysis of the skin. Aquacult 591, 741115.

Sajid Z, Gamperl AK, Parrish CC, Colombo S, Santander J, et al., Fast MD, Wells M, Singh G. 2024. An aquaculture risk model to understand the causes and consequences of salmon mass mortality events (MMEs). Rev Aquacult. 1-22. DOI:10.1111/raq.12917

Gao S, Tan S, Purcell SL, Whyte SK, Parrish K, Zhong L, Zheng S, Zhang Y, Zhu R, Jahangiri L, Li R, Fast MD, Cai W. 2024. A comparative analysis of alternative splicing patterns in Atlantic salmon (Salmo salar) in response to Moritella viscosa and sea lice (Lepeophtheirus salmonis) infection. Fish Shellfish Immunol 149, 109606.

Fajei E, Cai WC, Whyte SK, Despres B, Dixon B, Estrada MP, Fast MD. 2024. Assessing impacts of two forms of PACAP-38 (pituitary adenylate cyclase-activating polypeptide) on Nile tilapia (Oreochromics niloticus) immunophysiology. Comp Immunol Rep. 7, 200155.

Carvalho LA, Whyte SK, Purcell SL, Hay T, Taylor RG, Balder R, Gagne N, Dalvin S, Fast MD. 2024. Impacts of functional feeds on Atlantic salmon (Salmo Salar) systemic immune responses to high and low levels of sea lice infection and co-infection of sea lice and ISAv. Comp Immunol Rep 6, 2000147.

b) International conferences:
28
Thakur K. Aquaculture and fishery: At the crossroads of climate change and infectious diseases, NRC ADRC Seminar Series, Virtual, November 2024

Thakur K. Importance of diagnostic testing in aquatic food animal epidemiology: An example for site level detection of infectious salmon anemia virus in farmed Atlantic salmon. 3rd International Aquatic Epidemiology Conference, Lucknow, India, November 2023

Jyoti S, Jia B, Thakur K. Spatio-temporal Descriptions Of Mortality Events Of Farmed Atlantic Salmon (salmo salar) In British Columbia. Presented at the 17th International Symposium of Veterinary Epidemiology and Economics, Sydney, NSW, November 2024

Arkanit S, Stryhn H, Clark F, Scott-Tibbetts S, Thakur K. Longitudinal study of juvenile American lobster population in Nova Scotia, Canada. Presented at the 17th International Symposium of Veterinary Epidemiology and Economics, Sydney, NSW, November 2024

Raquib A, Hammell L, Thakur K. Network analysis of Atlantic salmon movements in British Columbia, Canada. Poster, 17th International Symposium of Veterinary Epidemiology and Economics, Sydney, NSW, November 2024*

Pradhan P, Paria A, Thakur K, Pathak A, Kanaujia S, Nirmalkar R, Jiji A, Verma D, Basheer V, Rajendran K, Sarkar UK, Sood N. A survey of biosecurity and management practices of Tilapia farms in Kerala and West Bengal States of India to identify risk factors of Tilapia Lake Virus. Poster, 17th International Symposium of Veterinary Epidemiology and Economics, Sydney, NSW, November 2024

Raquib A, Hammell L, Thakur K. Detection of bacterial diseases before transfer of fish from Atlantic salmon hatcheries in British Columbia, Canada. Poster, 3rd International Aquatic Epidemiology Conference, Lucknow, India, November 2023*

Jyoti, S, Jia, B, Thakur, K. Spatio-temporal cluster analysis of sea lice (Lepeophtheirus salmonis) abundance in farmed Atlantic salmon in British Columbia, Canada, 2011-2022. Poster, 3rd International Aquatic Epidemiology Conference, Lucknow, India, November 2023*

Koepper S, Clark KF, Revie CW, Stryhn H, Thakur K. The healthy lobster shell microbiome: A diversity and community assessment. 30th Annual Conference of the Fishermen and Scientists Research Society, Halifax, NS, March 2023.*

Koepper S, Revie CW, Clark KF, Thakur K. Diversity and community composition of the shell microbiome of American lobster (H. americanus) in Atlantic Canada. Annual Conference for Research Workers in Animal Diseases (CRWAD), Chicago, January 2023*

Parent MI, Stryhn H, Hammell KL, Vanderstichel R. Time-series analysis of Lepeophtheirus salmonis among New Brunswick salmon farms (2016 to 2021). Aquaculture America, New Orleans, USA (Jan 2023)*

Fast MD. Genetic mechanisms for sea lice resistance in salmon. Aquaculture Europe, August 26-30, 2024, Copenhagen, Denmark.
Fast MD. Changing landscapes in salmon aquaculture alters disease focus. American Fisheries Society – Fish Health Section, Summer student seminar series, keynote, August 22, 2024, virtual.

Fast MD. Recent developments using mRNA vaccine strategies in fish. Aquatic organism health: To vaccinate or not to vaccinate. FAO headquarters, Rome Italy, June 20, 2024.

Fast MD. Understanding and combating the impacts of sea lice through genomics. Student American Veterinary Medical Association,

Invited virtual presentation, April 9, 2024.

Fast MD. Diversity of salmon responses to sea lice. 2nd Salmon Immunology Seminars – Pathovet. Fruitillar, Chile, November 15, 2023.

Caballero-Solares A, Eslamloo K, Xue X, Emam M, Katan T, Navaneethaiyer U, Cai WC, Parrish CC, Balder R, Fast MD, Rise ML. Diet and immunity: Enhancing health in farmed fish through nutrition. Aquaculture Europe, August 26-30, 2024, Copenhagen, Denmark (Oral presentation by ACS).

Ostbye T-KK, Breiland MSW, Krasnov A, Timmerhaus G, Dagnachew B, Gjerde B, Lillehammer M, Fast MD, et al. Challenging CRISPR gene edited fish with sea lice, results so far. Aquaculture Europe, August 26-30, 2024, Copenhagen, Denmark (Oral presentation by Ostbye and Breiland).

McGowan J, Bron JE, Bekaert M, Fields D, Browman H, Krasnov A, Salisbury S, DindialA, Horton D, Robledo D, Fast MD, Sveen L, Eziama N, Overgard A-C, Midtbo HMD, Robinson N, Monaghan SJ. Free-swimming copepodid salmon lice (Lepeophtheirus salmonis) transcriptomic shift when exposed to salmon host cues. Aquaculture Europe, August 26-30, 2024, Copenhagen, Denmark (Oral presentation by McGowan).

Sveen L, Fast MD, Tengs T, Timmerhaus G, Vaadal M, Houston RD, Bron JE, Monaghan SJ, Mohammed HH, Daniels RR, Salisbury S, Robledo D, Braceland M, Hansen M, Robinson N. Insights into lice resistance as evidenced by histology and spatial transcriptomics. Aquaculture Europe, August 26-30, 2024, Copenhagen, Denmark (Oral presentation by Sveen).

Krasnov A, Birkett M, Caulfield J, Foster S, Fields DM, Browman HI, Skiftesvik AB, Selander E, Fast MD, Robinson N. Chemical communication between the host and salmon louse. Aquaculture Europe, August 26-30, 2024, Copenhagen, Denmark (Oral presentation by Krasnov).

Gillard G, Podgorniak T, Torgerson J, Barson N, Fast MD, Kent M, Lien S. Comparative genomics to explore differential responses to sea lice in Atlantic salmon and coho salmon. Aquaculture Europe, August 26-30, 2024, Copenhagen, Denmark (Oral presentation by Torgerson).

Abraham TN, Nguyen DT, Tazdi Z, Bell H, Tdgham AE, Adkinson M, Johnson RC, Jeffres C, Foott S, Fangue NA, Fast MD, Rinchard J, Ludwig J, Soto E. Immune response to columnaris disease in chinook salmon (Oncorhynchus tshawitscha) offspring from thiamine deficient and thiamine replete females. 63rd Western Fish Disease Workshop, July 30-August 1, Boise, Idaho, USA. (Oral presentation by Soto)

Reynolds K, Jia BB, McKenzie P, Whittaker P, Fast MD, Saksida S. The importance of utilizing local fish health professionals (FHP) when investigating emerging disease in aquaculture. 17th Internation symposium on veterinary epidemiology and economics, November 11-15, Sydney, Australia (Oral presentation by Jia).

Jia BB, Reynolds K, Fast MD, McKenzie P, Whittaker P, Saksida S. Challenges and opportunities using retrospective data for emerging diseases – assessing risk factors for complex gill disease (CGD) of Atlantic salmon farms. 17th International symposium on veterinary epidemiology and economics, November 11-15, Sydney, Australia (Poster presentation).

Soto-Davila M, Purcell SL, Whyte SK, Groves L, von Ronge F, Swanson A, Fast MD. mRNA vaccine: a potential therapeutic strategy against ISAv in Atlantic salmon (Salmo salar). BioAqua 2024, May 26-30, Havana/Vardero, Cuba. (Oral presentation by Soto-Davila)

Fast MD, Østbye TK, Krasnov A, Salisbury S, Ruiz Daniels R, Soto Davila M, Sveen L, Edvardsen RB, Bizuayehu TT, Houston RD, Robinson N, Robledo D. Applying comparative genomic technologies to combat sea lice infection in salmon. BioAqua 2024, May 26-30, Havana/Vardero, Cuba. (Oral presentation)

Fast MD, Østbye TK, Krasnov A, Salisbury S, Ruiz Daniels R, Soto Davila M, Sveen L, Edvardsen RB, Bizuayehu TT, Houston RD, Robinson

N, Robledo D. Integration of Comparative Genomics with CRISPR: Applications for sea lice resistance. The 47th Annual Eastern Fish Health Workshop, March 23-27, 2024. Gulfport, Mississippi, US (Oral presentation)

Ghanizadeh-Kazerouni E, Caballero-Solares A, Wilson JM, Jones SRM, Rise ML, Frasca S, Fast MD, Brauner CJ. Characteristics of gill regeneration in Atlantic salmon (Salmo salar). International Conference on Integrative Salmonid Biology, March 11-14, 2024, Seattle, WA, USA. (Oral presentation by FGK).

c) National conferences:
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Jyoti S, Jia B, Thakur K. Spatio-Temporal Patterns of Health and Mortality Events of Farmed Atlantic Salmon (Salmo salar L.) in British Columbia. Poster, Canadian Association of Veterinary Epidemiology and Preventive Medicine (CAVEPM) Conference. Guelph, Ontario, May 2023.*

Sea Lice Identification Industry Workshops: Cape Breton, NS – May 2024; St. Albans, NL – Mar 2024

Hammell KL. One Health for Global Aquaculture (35 attendees), Newfoundland Aquaculture Industry Association Cold Harvest Fish Health Conference, St. John's NL, Sep 2024

Koepper S, Clark KF, Revie CW, Stryhn H, Thakur K. Bacterial interactions and diversity patterns in the shell microbiome of American lobster (H. americanus) in Atlantic Canada. Canadian Association of Veterinary Epidemiology and Preventive Medicine (CAVEPM) Conference. Guelph, Ontario, May 2023.*

Hammell KL. Aquatic Animal Health and One Health, One Health Webinar (150 attendees), Canadian Food Inspection Agency and Dept of Fisheries & Oceans, May 2024

Hammell KL. Aquatic Food Animal Health (Global & Canadian), Special Presentation to Canadian Food Inspection Agency (28 attendees), Ottawa, Canada, May 2024

Fast MD, Østbye TK, Krasnov A, Salisbury S, Ruiz Daniels R, Soto Davila M, Sveen L, Edvardsen RB, Bizuayehu TT, Houston RD, Robinson N, Robledo D. 20 years of research: Applying comparative genomic technologies to combat sea lice infection in salmon. Aquaculture Association of Canada Meeting, research award seminar, June 17, 2024, Charlottetown, PEI.

Misk E, Groves L, Whyte SK, Purcell SL, Michaud D, Cai WC, Langille BL, Garber AF, Fast MD. Thermal modulation of genetic resistance to infectious salmon anemia virus: Differential gene expression analysis in Atlantic salmon families (Salmon salar) at 10oC and 20oC. Aquaculture Association of Canada Meeting, June 16-19, 2024, Charlottetown, PE, Canada. (Oral presentation by Misk)

Soto-Davila M, Purcell SL, Whyte SK, Groves L, von Ronge F, Swanson A, Fast MD. mRNA vaccine to prevent infectious salmon anemia in Atlantic salmon. Aquaculture Association of Canada Meeting, June 16-19, 2024, Charlottetown, PE, Canada. (Oral presentation by Soto-Davila)

Ghanei-Motlagh R, Feng Y, Purcell SL, Whyte SK, Garber A, Fast MD. Gene expression responses in the intestine of Atlantic salmon infected with the salmon louse (Lepeophtheirus salmonis) Aquaculture Association of Canada Meeting, June 16-19, 2024, Charlottetown, PE, Canada. (Poster presentation)

Ghanei-Motlagh R, Cai W, Whyte SK, Bridger C, Garber A, Fast MD. The effects of infection with sea lice on transcriptomic profiles of skin and head kidney of Atlantic salmon under normal and increased temperature. Aquaculture Association of Canada Meeting, June 16-19, 2024, Charlottetown, PE, Canada. (Poster presentation)

Soto-Davila M, Purcell SL, Whyte SK, Groves L, von Ronge F, Swanson A, Fast MD. mRNA vaccine to prevent infectious salmon anemia in Atlantic salmon. Aquaculture Association of Canada Meeting, June 16-19, 2024, Charlottetown, PE, Canada. (Oral presentation by Soto-Davila)

Soto-Davila M, Purcell SL, Whyte SK, Groves L, von Ronge F, Swanson A, Fast MD. mRNA vaccine to prevent infectious salmon anemia in Atlantic salmon. Aquaculture Association of Canada Meeting, June 16-19, 2024, Charlottetown, PE, Canada. (Oral presentation by Soto-Davila)

Fajei E, Whyte SK, Rivera L, Velazquez J, Dantagnan P, Soto-Davila M, Rodriguez-Ramos T, Dixon B, Carpio Y, Estrada M, Fast MD. Investigation of two different PACAP-38 (Pituitary adenlytae cyclase-activating polypeptide) formulated feeds in Atlantic salmon (Salmo salar) with enteric redmouth disease (Yersinia ruckeri). Canadian Society of Zoology Meeting, May 6-9, 2024, Moncton, NB, Canada. (Oral presentation by Fajei)

Ghanei-Motlagh R, Cai W, Whyte SK, Bridger C, Garber A, Fast MD. Transcriptome responses of Atlantic salmon of different families to sea lice infection under different temperature conditions. Canadian Society of Zoology Meeting, May 6-9, 2024, Moncton, NB, Canada. (Oral presentation by Ghanei-Motlagh)

Ghanei-Motlagh R, Feng Y, Purcell SL, Whyte SK, Garber A, Fast MD. Modulation of immune-inflammatory responses in the intestine of Atlantic salmon upon sea lice infestation. Canadian Society of Zoology Meeting, May 6-9, 2024, Moncton, NB, Canada. (Poster presentation)

d) Other (Provide website address or link to appropriate information):
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11. What have you done in the past year to advance your area of focus, e.g. updated technology?

12. Additional comments regarding your report: