

# Fish Health Section



## FHS NEWS – July 2022

**Fish Health Section website:** <https://units.fisheries.org/fhs/>

**Fish Health Section Facebook Site:** <https://facebook.com/FishHealthSectionAFS>

**Fish Health Section Twitter feed:** @AFSFishHealth

## People of the Fish Health Section: Commemorating 50 years

Dear Fish Health Section members,

I am pleased to feature another one of our members this month. I want to present a representative sample of the many roles of our membership. This month I am pleased to feature one of our members from private industry.

Submitted by Gary Marty, FHS President ([Gary.Marty@gov.bc.ca](mailto:Gary.Marty@gov.bc.ca))

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Hello from **Jim Thompson** and the beautiful Snake River Canyon in Buhl, ID. I'm the new Fish Pathologist at Riverence. After spending over twenty years on the laboratory/regulatory side of fish health at the Washington Animal Disease Diagnostic Laboratory, I am now in a fish health management role for 17 commercial farms in southern Idaho, raising rainbow trout as food fish. I joined the Fish Health Section in 2004 as a job requirement to be a Fish Health Inspector and more importantly, for the collegial relationships. There are always new and different ways to approach a problem and learning from a colleague's experience is an exciting way to expand your skillset. Over the years, I've learned a lot about fish medicine, laboratory diagnostics and melding the two from many people, but none more than my time working at WADDL with my friend, mentor and former boss, **Kevin Snekvik**. Our many years of networking and building strong relationships with our clients and colleagues not only led me to a professional opportunity with **Sean Nepper** and **Jesse Trushenski** at Riverence, but it also shaped my approach to fish health management and continues to guide me in the decisions I make daily.



## QA/QC Committee Update

QA/QC Committee has changed the deadline for Tier 1 and Tier 2 applications to September 1 for current and future applications. The hope is this adjustment allows most applicants to work through the busiest part of their field seasons and still have time to address applications. Please contact Wade Cavender [wadecavender@utah.gov](mailto:wadecavender@utah.gov) for more information.

## Call for Content

Do you have a puzzling diagnostic case? Or do you have a new diagnostic finding that might interest others? How about newly published research? I am starting a new feature to highlight Fish Health Section Members' current conundrums and accomplishments. Think about what you could submit

and contact me at [stacy.a.strickland@odfw.oregon.gov](mailto:stacy.a.strickland@odfw.oregon.gov) with your ideas. Limit to be around 1 page including graphs/pictures. Especially during these virtual meeting and conference times, let's share our work and keep our peers up-to-date on what's happening in the world of fish health!

Thanks in advance for your submissions!

Stacy Strickland, AFS-FHS Newsletter Editor

## MEETINGS, WORKSHOPS AND COURSES

### 2022 Health and Colony Management of Laboratory Fish (short course)

September 18-23, 2022

MDI Biological Laboratory

Bar Harbor, Maine

<https://mdibl.org/course/health-and-colony-management-of-laboratory-fish-2022/>

See attached .pdf for more information.

### 9<sup>th</sup> International Symposium on Aquatic Animal Health (ISA AH)

Santiago, Chile

September 5-8, 2022

With continued complications and COVID related restrictions on travel, the Abstract Submission Deadline for Virtual Presentations for [ISA AH9](#) has been extended to August 1<sup>st</sup>.

For our friends and colleagues unable to attend in-person, there is the virtual option to participate. All attendees (both in person) will have access to a live stream of the in-person program (attached) and the virtual presentations.

Submit your abstracts here: [Abstract Submission](#)

For virtual registration: <https://www.isaah9.com/registration>

To upload your virtual presentation: [ISA AH Virtual Presentation Upload](#)

Example Virtual Presentations can be found here: <https://vimeo.com/showcase/9394576>

Password: isaah9#2022chile

|                                                                                                                                                |                                                                 |                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <br>ISA AH<br>9 <sup>th</sup><br>Sept, 2022 Santiago, Chile | <i>"Enhancing Aquatic Animal Health<br/>towards One Health"</i> |  |
| <b>Registration before June 15th (full/student):</b>                                                                                           |                                                                 | <b>\$425/\$225</b>                                                                   |
| <b>Registration after June 15th (full/student):</b>                                                                                            |                                                                 | <b>\$550/\$350</b>                                                                   |
| <b>Virtual Registration:</b>                                                                                                                   |                                                                 | <b>\$150</b>                                                                         |

See attached Program Schedule for conference details.

We look forward to hearing from you and hope to see you in Santiago!

### **The Organizing Committee**

Fernando Mardones, School of Veterinary Medicine, Pontifical Catholic University, Chile  
Marilia Salgado Caxito, School of Veterinary Medicine, São Paulo State University, Brazil  
Romina Ramos Ríos, School of Veterinary Medicine, Pontifical Catholic University, Chile  
Francisca Córdova Bührle, School of Veterinary Medicine, Pontifical Catholic University, Chile  
Natalia Zimin-Veselkoff, School of Veterinary Medicine, Pontifical Catholic University, Chile  
Esteban Soto, School of Veterinary Medicine, UC Davis, USA  
Matt Griffin, College of Veterinary Medicine, Mississippi State University, USA.

## **JOBS/GRADUATE ASSISTANTSHIPS**

### **Research Veterinary Medical Officer**

#### **USDA-ARS, Aquatic Animal Health Research Unit**

Auburn, Alabama

Closes 8/26/2022

Link: <https://www.usajobs.gov/job/667360100>

In this position, you will conduct research on control and prevention of diseases of fish, including designing and conducting systematic research for determining microbial virulence factors, disease pathogenesis, immune responses, and for the development of in vitro and in vivo models, diagnostics and vaccines.

### **Post-doctoral Scientist**

#### **Pisces Molecular**

Boulder, CO

Pisces Molecular has an immediate opening for a full-time postdoctoral scientist position for a project to genetically engineer Kokanee salmon (*Oncorhynchus nerka*) for resistance to the gill lice parasite, *Salmincola californiensis*. The project will utilize a variety of molecular genetic techniques including phage-display libraries, next generation sequencing and gene editing to identify, then alter, the gene(s) in Kokanee responsible for the host specificity of *S. californiensis* for Kokanee (and conversely the preference of a second *Salmincola* species, *S. edwardsii*, for *Salmo* and *Salvelinus* trout species).

The ultimate goal of the project will be to ensure survival of the Kokanee population in Blue Mesa Reservoir, Colorado, which has been seriously impacted by gill lice parasitism. The project is expected to take two years. Funding for this project has been secured. The successful applicant for this position is expected to have wide and robust training in molecular genetics and will perform on a relatively independent basis all phases of project investigations, to include being responsible to the Co-Principal Investigator in planning, developing, and carrying out experiments. Starting date is flexible but ideally as soon as possible.

Applicants must have a PhD degree with a record of innovative scientific accomplishment in graduate and/or post-graduate studies. Pisces Molecular is a small but long-established company in Boulder, CO focusing on innovative molecular genetic approaches to a wide variety of wildlife and conservation issues, including determining the identity and purity of the endangered Greenback Cutthroat trout, developing and using environmental DNA qPCR assays for detecting endangered and invasive species, and sex identification assays for a wide-range of species, including Osprey and Komodo Dragons.

Pisces Molecular is an Equal Opportunity, Affirmative Action Employer of all protected classes, including veterans and individuals with disabilities. Women, racial and ethnic minorities, individuals with disabilities, and veterans are encouraged to apply. Hiring is contingent upon eligibility to work in the United States. Salary range is \$55,00 to \$75,00 per year. If interested contact John Wood ([jwood@pisces-molecular.com](mailto:jwood@pisces-molecular.com); 303-546-9300)

### **Zebrafish Related Job Announcements**

<https://wiki.zfin.org/display/jobs/Zebrafish-Related+Job+Announcements>

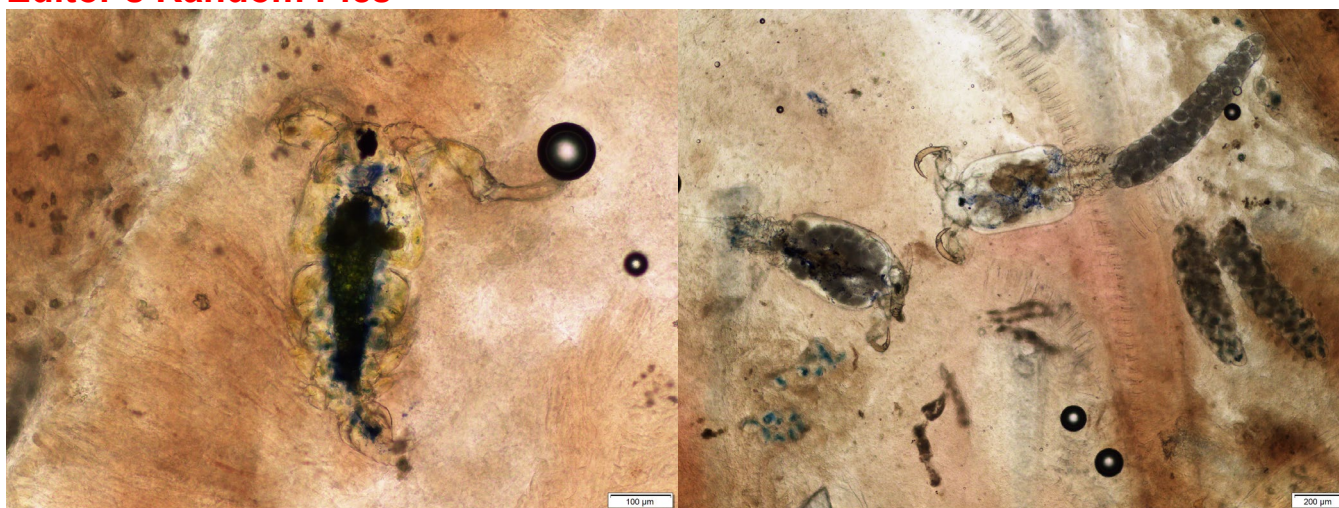
## **RESOURCES/NEWS**

**Aquatic Animal Drug Approval Partnership (AADAP) Updates are now available online (new link):** <https://www.fws.gov/library/collections/aquatic-animal-drug-approval-partnership-update>

### **AFS Job Board changes**

Check out the new AFS [Career Center](#) with new and improved features for both job seekers and employers. Job hunters now benefit from improved search functions and email alerts. While employers can peruse candidate applications and submit jobs more quickly and easily through an online submission form with a credit card payment system. Individual AFS members can still advertise for assistants and internship positions at no charge. See the AFS member employer [pricing options](#).

### **Editor's Random Pics**



Scroll down for photo caption

Attached two images from a fish kill on Honeoye Lake in central NY. The *Ergasilus* (gill lice) was noted on a few of the bluegills. Photos courtesy of Rod Getchell.

# ISAAH

9<sup>th</sup>

Sept, 2022

Santiago, Chile



## SCIENTIFIC PROGRAM

**9<sup>th</sup> International Symposium on Aquatic Animal Health (ISAAH 9<sup>th</sup>)**  
***“Enhancing aquatic animal health towards One Health”***

Centro de Extensión, Universidad Católica de Chile  
5-8 de Septiembre, 2022



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# Partners



# Monday, September 5<sup>th</sup>

## Main Ballroom

### Keynote Address

9:15 AM **Dr. Alicia Gallardo**

### General Session I: Matt Griffin/Sherri Kasper

10:15 AM **Johnsen:** The OIE Aquatic Animal Health Strategy (2021-2025)

10:30 AM **Algüerno:** Strengthening Veterinary and Aquatic Animal Health Services: The Contribution of the World Organization for Animal Health

10:45 AM **Piñeros-Duque:** Perception of Tilapia Farm Workers about Knowledge of Fish Diseases with a One Health Approach in Five Departments of Colombia during 2019

11:00 AM **Jensen:** A Comparison of Two Fish Health Indices Applied to Freshwater Species of the Chesapeake Watershed

11:15 AM **Kohli:** Red Sore Disease of American Eels in Chesapeake Bay: Etiology and Epidemiology

11:30 AM **Kasper:** Harmful Algal Blooms Effects, Diagnosis and Mitigation in Aquaculture

11:45 AM **Kasper:** Increasing Threat of Harmful Algal Blooms Caused by Global Climate Change and Increased Migration

### Virology: Esteban Soto/Eva Quijano Cardé

1:00 PM **Soto:** Susceptibility of Lake Sturgeon (*A. fulvescens*) to Acipenserid Herpesvirus 2, White Sturgeon Iridovirus, and Ranaviruses

1:15 PM **Quijano Cardé:** Design and Validation of a qPCR Assay for Diagnosis of Acipenserid Herpesvirus 2 in White Sturgeon (*Acipenser transmontanus*) Tissues

1:30 PM **Soto:** Susceptibility of Acipenserid Herpesvirus 2, White Sturgeon Iridovirus, and Ranaviruses to Buffered Povidone-Iodine Complex, Chlorine and Virkon Aquatic®

1:45 PM **Hawke:** Factors Influencing the Pathogenesis of White Spot Syndrome Virus (WSSV) in Louisiana Red Swamp Crayfish *Procambarus clarkii*

2:00 PM **Getchell:** Viral Hemorrhagic Septicemia Endemic in St. Lawrence River Round Goby and Lake Ontario Gizzard Shad

2:15 PM **Patel:** Infectious Salmon Anemia Virus Directly Modulates the Red Cell Surface

2:30 PM **Zawisza:** CEV-Infection Induced Cortisol Release and Immunosuppression Are Associated With High Mortality of Susceptible Koi Carp

### Microbiomes: Matt Griffin/Divya Rose

3:15 PM **Coca Rives:** Intestinal Microbiota Characterization in *Salmo salar* With Clinical Signs of *Piscirickettsia salmonis* in Chilean Salmon Farming

3:30 PM **Coca Rives:** Characterization of the Intestinal Microbiota of *Salmo salar* Smolt During an Infectious Outbreak of *Aeromonas salmonicida* subsp. *salmonicida*

3:45 PM **Jimenez-Lopez:** Microbial Communities of Salmonids, a Meta-Analysis

4:00 PM **Morales-Rivera:** Nanopore Sequencing Applied to Evaluate the Health Status of Atlantic salmon (*Salmo salar*) Recirculating Aquaculture Systems in Chilean Farming

4:15 PM **Kent:** Intestinal Lesions and Microorganisms Associated With Senescence and Prespawn Mortality in Chinook Salmon *Onchorynchus tshawtscha*

## Monday, September 5<sup>th</sup>

### Breakout Room A

**Flavobacterium:** Tom Loch/Ben LaFrentz

10:15 AM **Loch:** Enhancing Bacterial Coldwater Disease Diagnosis and Prevention by Elucidating the Predominant *Flavobacterium psychrophilum* Serovariants in the USA

10:30 AM **LaFrentz:** Columnaris Disease is Caused by *Flavobacterium columnare* and Three Newly Described *Flavobacterium* spp.

10:45 AM **Heckman:** Flavors of Flavobacteriales: Characterizing Atypical Flavobacterial Pathogens in Aquaculture

11:00 AM **Valdés:** Phenotypic, Serological and Genetic Characterization of *Tenacibaculum* Strains Isolated from Chilean Salmon Farms

11:15 AM **Poblete:** Expert Elicitation to Identify Risk Factors for tenacibaculosis Outbreaks in Farmed Atlantic Salmon in Chile

11:30 AM **Illardi:** Intraspecific Diversity of *Flavobacterium psychrophilum* Isolated from Salmonids Farms in Chile

11:45 AM **Illardi:** Flavobacteria Isolated From BCWD Outbreaks in Chilean Salmon Farms

**Tilapia Health and Biosecurity:** Paola Barato/ Inácio Assane

1:00 PM **Adamek:** Nile Tilapia Strain Resistant to Tilapia Lake Virus Disease – Immunological and Implementation Considerations

1:15 PM **Vela:** Acute Toxicity Evaluation of Practical Diets with *Erythrina edulis* as a source of adhesion glycooinhibitors for *Streptococcus agalactiae* in tilapia (*Oreochromis* sp.)

1:30 PM **Peña:** Histological and Molecular Biomarkers Applied to the Study of Vaccine Immune Modulation and Hepatic Function to Diets in Nile Tilapia

1:45 PM **Cruz:** Characterization of Polyclonal Antibodies Generated Against Interferon Gamma in Nile Tilapia (*Oreochromis niloticus*) by Western Blot, ELISA and Flow Cytometry

2:00 PM **Delphino:** Economic Appraisal of Using Genetically Selected Nile Tilapia Fingerlings to Control *Streptococcus agalactiae* Under Cage and Pond Farming System

2:15 PM **Assane:** Phenotypic and Genotypic Characterization of *Aeromonas jandaei* Involved in Mass Mortalities of Cultured Nile tilapia, *Oreochromis niloticus* (L.) in Brazil

2:30 PM **Assane:** *Enterogyrus* spp. (Monogenea Ancyrocephalinae) and *Aeromonas jandaei* Co-infection Associated with High Mortality Following Transport Stress in Cultured Nile Tilapia

## Monday, September 5<sup>th</sup>

### Breakout Room B

**Virtual Microscopy:** Dave Groman

10:15 AM **Groman:** Introduction to the Virtual Microscopy Session

10:30 AM **Groman:** Overview of digital Pathology's Current State: With Comments on Use in Aquatic Diagnostics

11:00 AM **Sandoval:** Practical Operation of a Digital Fish Pathology Service - How it works

11:30 AM **Ildefonso:** Advantages and Disadvantages of using Digital Pathology vs Traditional Histopathology

1:00 PM **Practical Session:** Virtual Laboratory Session I

3:15 PM **Practical Session:** Virtual Laboratory Session I

## Tuesday, September 6<sup>th</sup>

### Main Ballroom

#### Keynote Address

8:30 AM **Dr. Irene Salinas:** “The Hidden Sophistication of Teleost Mucosal Immune Systems”

#### World Organization for Animal Health Session on Antibiotic Use and Resistance: Alicia Gallardo/Dante Mateo

9:30 AM **Mateo:** Contribution of the World Organization for Animal Health (WOAH) to Prevent AMR on Aquatic Animals

9:45 AM **Gallardo:** New WOAH Collaborating Center for Antimicrobial Stewardship in Aquaculture

10:00 AM **Lara:** Health Management in Aquaculture Program (PGSA): Strengthening Responsible and Prudent Use of Antimicrobials (AMU) in Salmon Production.

10:15 AM **Burgos:** An Experience in the Implementation of Title 6 of Aquatic Animal Health Code: The Chilean Case

10:45 AM **Contreras-Lynch:** Research Program for Monitoring Bacterial Resistance in Chilean Salmon Farming

11:00 AM **Navarro:** Implementing Effective Monitoring and Surveillance of Antimicrobial Use from Farmed Salmon in Chile

11:15 AM **Ojasanya:** Antimicrobial Susceptibility Patterns of Bacteria Commonly Isolated from Farmed Salmonids in Atlantic Canada (2000–2021)

11:30 AM **Fernandez:** Antimicrobial Susceptibility Profile of Bacterial Isolates from Nile Tilapia from Different Regions of Brazil

11:45 AM **San Martin:** Closing Remarks and Discussion

#### Emergent Diseases: Al Camus/Taylor Heckman

1:00 PM **Camus:** Viral Discoveries in Elasmobranch Fishes

1:15 PM **Kannimuthu:** Temporal Dynamics of Piscine Orthoreovirus-1 (PRV-1) Infection During Pre-smolt Stages of Atlantic Salmon (*Salmo salar*)

1:30 PM **Solano:** First Detection of Infectious Spleen and Kidney Necrosis Virus (ISKNV) and the Parasite *Centrocestus* sp. in Chile: Co-Infection in the Ornamental Fish Platy (*Xiphophorus maculatus*)

1:45 PM **Wargo:** Exacerbated Infectious Hematopoietic Necrosis Disease and Virus Transmission After Microplastic Exposure in Salmonids

2:00 PM **Rodger:** Complex Gill Disease (CGD) of Atlantic salmon (*Salmo salar*): Our Current State of Knowledge

2:15 PM **Dale:** Infectious Salmon Anemia Causes New Challenges in Norway

2:30 PM **Darling:** Is Viral Hemorrhagic Septicemia Virus (Family Rhabdoviridae) Contributing to Recruitment Declines in Great Lakes Lake Whitefish (*Coregonus clupeaformis*)?

2:45 PM **Johnston:** Characterization of a Novel Acipenserid Herpesvirus (Family Alloherpesviridae) Recently Recovered from Great Lakes Lake Sturgeon (*Acipenser fulvescens*)

3:15 PM **Heckman:** For *Lac* of a better name: Redefining Piscine Lactococcosis

3:30 PM **Hawke:** *Streptococcus dysgalactiae*: A Pathogen of Feral Populations of Silver Carp *Hypophthalmichthys malitrix*

3:45 PM **Ness:** Emerging Variants of *Moritella viscosa*

4:00 PM **Mora-Salas:** Interlaboratory Ring Trial to Evaluate a Real-Time PCR Assay for the Detection of *Renibacterium salmoninarum* in Chile

4:15 PM **Ortega:** Case Report: Strawberry Disease in Rainbow Trout (*Onchorynchus mykiss*) in Puno, Peru

4:30 PM **Godoy:** Macroscopic and Histopathological Morphological Spectrum of Muscle Melanosis in Salmon Farming in Chile

4:45 PM **Adamek:** When Sleep Meets Death - How Gill Disease Can Induce Secondary Pathology in the Brain

5:00 PM **Gaete-Carrasco:** Epidemiological Analysis and Determination of Risk Factors for Tenacibaculosis in the Chilean Salmon Farming

## Tuesday, September 6<sup>th</sup>

### Breakout Room A

#### General Session II: Matt Griffin/Fanny Giudicelli

- 9:30 AM **Okwuosa:** Diets Influencing Hematological Profile as Fitness and Genetic Bioindicator of Fish health
- 9:45 AM **Salazar:** Expression Analysis of Estrogen Receptors Genes, Immune Response Genes and Immune Selected miRNAs, in a *Salmo salar* Cell Line Induced with Xenoestrogens: 17 $\alpha$ -Ethinyl Estradiol and 4-Nonyphenol.
- 10:00 AM **Schumann:** Physiological Stress Response Induced by Different Hydrodynamic Conditions with Varying Group Size in *Telestes multicellus*
- 10:15 AM **Jungers:** Pharmacokinetic Analysis of Ceftazidime in Signal Crayfish (*Pacifastacus leniusculus*) Following Intravascular and Intramuscular Administration
- 10:45 AM **Quidel:** Severity Classification of Salmonid Rickettsial Syndrome Outbreaks on Atlantic Salmon Reared in Chilean Aysén Region. A Predictor Model
- 11:00 AM **Curotto:** Biosecurity Characterization of Rainbow trout (*Oncorhynchus mykiss*) Production Farms in Puno, Peru
- 11:15 AM **Michnowska:** Horizontal Transmission of Disseminated Neoplasia in the Widespread Clam *Macoma balthica* from Southern Baltic Sea
- 11:30 AM **Michnowska:** Novel Study of Metabolism of Bivalve Transmissible Neoplasia (BTN) Mitochondrial Respiration and Free Amino-acids Profile of Contagious Cancer Cells in *Macoma balthica*

#### Microbiology/Bacteriology: Tim Bruce/Allison Wise

- 1:00 PM **Barato:** Advance in phage therapy to control *Weisselosis* by *Weissella ceti* in rainbow trout (*Oncorhynchus mikiis*) in Colombia
- 1:15 PM **Fernandez-Espinel:** Characterization and Preliminary Vaccine Trial Against *Yersinia ruckeri* in Cage-Reared Rainbow Trout in Peru
- 1:30 PM **Patel:** Pasteurellosis; a Serious, Emerging Disease in Atlantic Salmon Farmed in the North-Atlantic
- 1:45 PM **Medina:** Biochemical and Molecular Identification of *Aeromonas* spp. Isolated from Diseased Amazon Fish Cultured in Peru
- 2:00 PM **Mora-Salas:** New PCR Method for Lineage Typing of Epidemic *Renibacterium salmoninarum* in Chilean Salmon Farms
- 2:15 PM **Fernandez-Espinel:** Isolation and primary characterization of *Chryseobacterium* spp. in outbreaks in farmed rainbow trout in Peru
- 2:30 PM **Omeje:** Drug resistant profiles of *Aeromonas hydrophila* isolated from cultured African catfish *Clarias gariepinus* in the Kainji Lake area, Nigeria.
- 2:45 PM **Medina:** Susceptibility of *Colossoma macropomum* to Experimental Infection with *Aeromonas* Species Isolated from Ornamental Fish
- 3:15 PM **Divya:** Phenotypic, Genotypic and Serological Comparison of *Edwardsiella ictaluri* Isolates Derived from Catfish and Ornamental Fish Species
- 3:30 PM **Wise:** Polymicrobial Infection Dynamics with *Edwardsiella ictaluri* and *Flavobacterium covae* in Channel Catfish *Ictalurus punctatus*
- 3:45 PM **Dubytzka:** *Edwardsiella ictaluri* T3SS Effector EseN is Involved in Regulation of Apoptosis in Infected Head-Kidney-Derived Macrophages
- 4:00 PM **Hanson:** Microcystin-LR Exposure Predisposes Channel Catfish to Bacterial Diseases

## Tuesday, September 6<sup>th</sup>

### Breakout Room B

**World Aquatic Veterinary Medical Association/American Association of Fish Veterinarians:** Nora Hickey

9:30 AM **Soto:** Phenotypic and Genetic Diversity Amongst the Etiological Agents of Columnaris Diseases: *Flavobacterium columnare*, *F. cova*, *F. davisii* and *F. oreochromis*

10:45 AM **Reichley:** Successes and Failures of Combating Columnaris Disease at a Large-Scale Rainbow Trout Farm

1:00 PM **Bruce:** An Overview of Columnaris Disease in Cultured U.S. finfish: Experimental Infections, Disease Diagnostics, and Current Treatments

2:00 PM **Kasper:** Columnaris Disease: Prevalence, Prevention and Treatment of Non-Food Species

3:15 PM **Onofryton:** Vaccination for Columnaris Disease: A Brief History and Future Prospects

4:15 PM **Stilwell:** Pathology of Columnaris Disease in Catfish and Ornamental Fish

# Wednesday, September 7<sup>th</sup>

## Main Ballroom

### Keynote Address

8:30 AM **Dr. Ian Gardner** “qPCR Tests for Animal Pathogens Never Make Mistakes, Until They Do: Rigorous Validation Studies, Adherence to Quality Standards, Peer Review, and Proficiency Testing Reduce Risk of Errors”

**Big Data:** Ian Gardner/Grace Kerreman/Jon Grant

9:30 AM **Grant:** Big Data and the Implementation of Precision Fish Farming

10:00 AM **Vanderstichel:** Longitudinal Dissolved Oxygen Patterns in Atlantic salmon Aquaculture Sites in British Columbia, Canada

10:15 AM **Midtlyng:** A Proposed Improvement of Real-time Monitoring of Cause-specific Mortality and Losses in Industrial Salmon Farming

10:45 AM **Nygren:** Fishing for Answers: Using Big Data Analytics to Predict and Manage Environmental Risks at BC Salmon Farms

11:00 AM **Frisch:** Data-Driven Fish Health Management

11:15 AM **Burciaga:** Connect, Digitize and Exchange of Information: Creating Better Producer to Consumer Outcomes in Aquaculture. What Can We Learn from the Feedlot Industry?

1:30 PM **Valdes Donoso:** What Does Big Data Mean for Aquaculture? Current Development, Limitations, and Future Challenges

1:45 PM **Bravo:** Big Data Analytics to Support Evidence-based Strategic Planning in Salmon Farming in Chile

2:00 PM **Panel Discussion**

**Modeling Applications in Aquatic Animal Health:** Ian Gardner/Bradley Richardson

2:15 PM **Romero:** Overview of a Simulation Framework for Evaluation of Mitigation Strategies to Reduce Waterborne Spread of Viral Diseases in Marine Aquaculture

2:45 PM **Grant:** Farming in Natural Systems (FINS): A Provincial-wide Modelling Tool for Environmental and Infectious Disease Risks in Farmed Atlantic salmon and Oysters in Nova Scotia, Canada (Part I)

3:15 PM **Grant:** Farming in Natural Systems (FINS): A Provincial-wide Modelling Tool for Environmental and Infectious Disease Risks in Farmed Atlantic salmon and Oysters in Nova Scotia, Canada (Part II)

3:30 PM **Richardson:** A Stochastic Model to Investigate Atypical *Aeromonas hydrophila* Disease Dynamics in Catfish Aquaculture Ponds

3:45 PM **Romero:** Use of Simulation Modelling for Cost-effectiveness Analysis of Infectious Disease Management Options in Marine Salmon Aquaculture

4:00 PM **McEachran:** Assessing the Risk of Fish Pathogen Induction via Illegal Release of Live Baitfish by Recreational Anglers

4:15 PM **Rivera:** Epidemiological Genetic Model through Bioassays with Genetically Improved Families in Atlantic Salmon (*Salmo salar*) in the Presence of SRS (*Piscirickettsia salmonis*)

4:30 PM **Gaete-Carrasco:** Identification of Risk Factors Associated with Piscirickettsiosis Outbreaks in *Salmo salar* in Chile

4:45 PM **Gardner:** Closing Remarks/Discussion

## Wednesday, September 7<sup>th</sup>

### Breakout Room A

#### **Zebrafish/Lab Animal Models:** Mike Kent

- 10:45 AM **Kent:** Common Laboratory Diets Differentially Impact Fitness, Health, and the Gut Microbiome in Zebrafish (*Danio rerio*)
- 11:00 AM **Sharpton:** Using Zebrafish to Disentangle the Impact of Environmental Exposure on Host-Microbiome Interactions
- 11:15 AM **Schuster:** Use of Occupancy Modeling to Understand Pathogen Diagnostic Efficacy in a Zebrafish Facility
- 11:30 AM **Rakus:** Tilapia Lake Virus Infection in Zebrafish: A Model to Study Antiviral Immune Response and Host-Pathogen Interaction in Fish
- 11:45 AM **Peterman:** Enhanced Immunity and Gut Nccrp-1+ and Mpeg-1+ Cell Populations in rag1<sup>-/-</sup> Zebrafish

#### **Parasitology:** Graham Rosser/Celene Slifka

- 1:30 PM **Nguyen:** A Morphological and Molecular Comparison of *Clinostomum Metacercariae* and Adults of the United States
- 1:45 PM **Slifka:** What's in the Water: Identifying *Planorbella trivolvis* and *Biomphalaria havanensis* DNA Using Real-Time qPCR
- 2:00 PM **Powell:** Overview and Future Research Directions of *Bolbophorus damnificus* Trematode Pathogenesis in Channel (*Ictalurus punctatus*) and Hybrid (Channel X Blue Catfish *Ictalurus furcatus*) Catfish
- 2:15 PM **Gardner:** An Evaluation of the Effects of the Parasite *Salmincola californiensis* on At-Risk Chinook Salmon Populations
- 2:30 PM **Marin:** Monitoring Sensitivity of *Caligus rogercresseyi* to Lufenuron Through Larval Bioassays: Preliminary Results
- 2:45 PM **Sáez-Vera:** Gene Polymorphisms Associated with Resistant Traits of *Caligus rogercresseyi* to Azamethiphos Delousing Drug
- 3:15 PM **Garcia:** Estimation of Genetic Parameters and Genetic Co-variation Between *Piscirickettsia salmonis* Resistance and Sea Lice (*Caligus rogercresseyi*) Susceptibility in Atlantic Salmon (*Salmo salar*) Using Genomic Information
- 3:30 PM **Benavente:** Molecular Characterization of *Caligus rogercresseyi* Vitellogenins Proteins
- 3:45 PM **Hauenstein:** Molecular Characterization of Prohithin (PBH) 1 and 2 in *Caligus rogercresseyi* and their Potential for Vaccine Development
- 4:00 PM **Leal:** Environmental Influence of MicroRNA-mRNA Interactome in the Sea Louse *Caligus rogercresseyi*
- 4:15 PM **Tomamichel:** The Effect of Temperature, Host, and Parasite Traits on Parasite-Induced Mortality in Fisheries: A Meta-Analysis

## Wednesday, September 7<sup>th</sup>

### Breakout Room B

#### **Pathology of Fish and Shellfish:** Paola Barato

- 9:30 AM **Barato:** Introduction and Opening Remarks
- 9:45 AM **Groman:** Histopathological Responses in Primary Organ Systems of Salmonids to Bacterial and Viral Disease Conditions
- 10:45 AM **Stilwell:** Infectious Disease Pathology of U.S. Catfish Aquaculture
- 1:30 PM **Camus:** Pathology of Main Diseases of Elasmobranchs
- 2:15 PM **Barato:** Select Diagnostic Cases of Tilapia
- 3:15 PM **Ildefonso:** Histoscore in Tilapia to Evaluate Substances and Vaccines
- 4:00 PM **Ferguson:** Selected Diagnostic Cases of Shellfish
- 4:45 PM **Sandoval:** Select Diagnostic Cases of Salmonids

## Wednesday, September 7<sup>th</sup>

### Breakout Room C

**Food Security Workshop:** Fernando Mardones

9:30 AM **Bouchon/Mardones/Szécáks:** Introduction and Opening Remarks

10:00 AM **Boden:** Role and Importance of Intangible Heritage on Food Security, Sustainable Development and Planetary Health

10:45 AM **Mardones:** Enhancing Aquatic Animal Health towards One Health

11:15 PM **Reichley:** Utilizing Biosecurity Practices to Increase Resilience

1:30 PM **Geers:** Global Seafood Sustainability

2:00 PM **Szécáks:** Environmental Safety and a Key to Food Safety

2:30 PM **Crossley:** Aquaculture: The Missing Contributor in the Food Security Agenda

3:15 PM **Gelcich:** Global Change and the Future of Fisheries Management

3:45 PM **Paredes:** Conserving and Sustaining Life Below Water; Critical Parts of The Global Health Paradigm

4.45 PM **Barcos:** Aquatic Animal Health Strategy in 2021

# Thursday, September 8<sup>th</sup>

## Main Ballroom

### Keynote Address

8:30 AM **Dr. Mark Fast** “Tackling Global Sea Lice Issues with Genomics”

### Genomic Applications in Fish Health: Phillip Dettleff/Sebastian Escobar

9:30 AM **Dettleff**: Introduction and Welcome

9:45 AM **Dettleff**: Transcriptomic Applied to Fish Health: Pathogen and Stress Response in Fish.

10:00 AM **Yáñez**: On the Use of Ultra-dense Genome-wide Information to Boost Host Response Against Diseases in Aquaculture

10:15 AM **Escobar**: CRISPR-Cas9: A Genetic Tool to Study Gene Functions in Fish.

10:45 AM **Valenzuela-Munoz**: Genomics Applied to Understand the *Caligus rogercresseyi*-Atlantic salmon Interaction.

11:00 AM **Valdés**: Functional Genomics Applied to Aquaculture and Teleost Muscle Growth

11:15 AM **Martínez**: Developing Genomic Resources of Non-model Species. The Case of the Diversification Program of *Seriola lalandi* for a Better Management of Fish Health.

11:30 AM **Dettleff**: Evaluating High Temperature Effects on Red Cusk-eel (*Genypterus chilensis*) Trough Gill De Novo Transcriptome Assembly.

11:45 AM **Roh**: Endogenous DNA Is Highly Dynamic Constituent of Skin Mucus in Atlantic Salmon

1:30 PM **Piña-Elgueda**: Description of the Genetic Basis of Sea Lice (*Caligus rogercresseyi*) Counts Using a Repeated Measures Genome-Wide Association Study (GWAS) in Atlantic Salmon

1:45 PM **Tapia**: Differential Gene Expression Patterns of Early Response Against Sea Lice Infestation in the Parasitized Skin of Coho and Atlantic Salmon

2:00 PM **Casuso**: Effect on Atlantic Salmon of Three *Caligus rogercresseyi* Prototype Vaccines: A Transcriptome Story

2:15 PM **Vidal**: Unveiling the Role of Differential Alternative Splicing Between Resistant and Susceptible Atlantic Salmon to Sea Lice, *Caligus rogercresseyi*

2:30 PM **Cáceres**: Meta-analysis of GWAS for Sea Lice Load in Atlantic salmon

2:45 PM **Núñez-Acuña**: Duplicated Genome Regions in *Caligus rogercresseyi* Associated with Pharmacological Resistance and Evaluation at Sea Lice Populations

3:15 PM **Marín-Nahuelpi**: Meta-analysis of GWAS for *Piscirickettsia salmonis* resistance in Atlantic salmon

3:30 PM **Tekedar**: Tad Operon Contributes to Virulence of Epidemic Isolate *Aeromonas hydrophila* ML09-119

3:45 PM **Chicoski**: Genomic Features of Fish Pathogens *Edwardsiella* spp. Isolated in Brazil Insight About Genomic, Antibiotic Resistance and Virulence Factors

4:00 PM **Dubytska**: *Edwardsiella ictaluri* T3SS Effector ESeN Modulates Expression of Host Genes Involved in the Immune Response

4:15 PM **Simpson**: Using Genomic Applications to Understand Wild Smallmouth Bass Immune Function

4:30 PM **Valdés**: Role of Mineralocorticoid and Glucocorticoid Receptors in Teleost Somatic Growth and Stress

4:45 PM **Gallardo**: Genome-Wide Association Study for Growth Traits Under Upper and Lower Thermal Rearing Conditions Using Genome-Wide Imputation, Multi-trait Analysis and Gene-Based Association Approach in Rainbow Trout (*Oncorhynchus mykiss*).

## Thursday, September 8<sup>th</sup>

### Breakout Room A

**Myxozoa:** Jerri Bartholomew/Ethan Woodyard

- 9:30 AM **Bartholomew:** *Ceratonova shasta*: Biological and Artistic Insights on What Drives Host-Myxozoan Interactions in Large River Systems
- 9:45 AM **Walsh:** The Use of Histopathology and Laser Capture Microdissection (LCM) for Myxozoan Identification from Multiple Fishes in the Eastern United States
- 10:00 AM **Americus:** The Myxozoan Parasite *Ceratonova shasta* Uses a Minimal Genetic Repertoire to Infect Its Fish and Invertebrate Hosts
- 10:15 AM **Ghai:** Morphological and Molecular Identification of Myxozoan Parasites and Its Effect on Cultured Indian Major Carps in Panjab, India
- 10:45 AM **Kaur:** Diversity of Myxozoan Parasites Associated with Diseases in Aquaculture and Wild Fish Stocks in India
- 11:00 AM **Gorgoglione:** Discovery of *Tetracapsuloides bryosalmonae* Infecting Salmon in the Great Lakes
- 11:15 AM **Stilwell:** Massive Branchial Henneguyosis: A Distinctive Myxozoan-Induced Gill Disease of Catfish Caused by Massive Interlamellar Infection of *Henneguya exilis*
- 11:30 AM **Woodyard:** *Myxidium mollissimum* n. sp., a Novel Myxozoan from the Common Elder *Samoteria mollissima*
- 11:45 AM **Ferguson:** Proliferative Kidney Disease and Surveillance in Wild Alaska Salmon

**Immunology/Vaccinology:** Lora Petrie-Hanson/Beth Peterman

- 1:30 PM **Adamek:** Vaccination Protects the Skin Barrier and Gill Function from Disruption Caused by Cyprinid Herpesvirus 3
- 1:45 PM **Soto-Davila:** Effect of Feeding Strategy of Jameison® Probiotic on Growth Performance and Immune Response of Chinook Salmon (*Oncorhynchus tshawytscha*) Challenged with *Vibrio anguillarum*
- 2:00 PM **Liu:** Evaluating the Efficacy of New Oral Vaccine Feeds Against Salmonid Novirhabdovirus in Rainbow Trout (*Oncorhynchus mykiss*)
- 2:15 PM **Jones:** Evaluating a Novel Oral Vaccine Delivery Platform in Rainbow Trout *Oncorhynchus mykiss*
- 2:30 PM **Thorarinsson:** Effect of Vaccines Against Pancreas Disease in Atlantic Salmon Challenged with Salmonid Alphavirus, Subtype 2
- 2:45 PM **Thorarinsson:** Effect of Vaccines Against Pancreas Disease on Viral Shedding and Disease Transmission from Atlantic Salmon Challenged with Salmonid Alphavirus, Subtype 2
- 3:15 PM **Giudicelli:** Beneficial Effects of Marine Bacillus Multi-Strains Consortium Encapsulated in Algae on Growth Performance, Mucosal Microbiota Modulation, Density Stress Resistance and Immunity Gene Expressions of Atlantic Salmon *Salmo salar*
- 3:30 PM **Cortes:** The Phagosome–Lysosome Fusion Is the Target of a Purified Quilaja saponin Extract (PAQ-Xtract) in Reducing Infection of Fish salmon Macrophages by the Bacterial Pathogen *Piscirickettsia salmonis*
- 3:45 PM **Aedo:** Early Regulation of Immune-Related Genes Mediated by Cortisol in Rainbow Trout (*Oncorhynchus mykiss*) Gills
- 4:00 PM **Petrie-Hanson:** Epigenetic Changes Associated with Increased Phagocyte Functions Demonstrate Trained Immunity in Catfish Leukocytes
- 4:15 PM **Alejandro:** Evaluation of Iron Metabolism-Related Genes Post-Vaccination of Atlantic Salmon.
- 4:30 PM **Valenzuela-Miranda:** Reverse Vaccinology Approach for the Development of an Anti-microbiota Vaccine Against the Sea Lice *Caligus rogercresseyi*
- 4:45 PM **Casadei:** Antimicrobial Peptide Modulation in Rainbow Trout During Acute Stress

## Thursday, September 8<sup>th</sup>

### Breakout Room B

**Food Security Workshop:** Fernando Mardones

- 9:30 AM **Bouchon/Mardones/Szécáks:** Introduction and Opening Remarks
- 10:00 AM **Román:** Soil Security for Food Security
- 10:45 AM **Marquet:** Macroecology, Global Change, and Complex System Science
- 11:15 PM **Barja:** Food Security and Nutrition
- 1:30 PM **Villanueva:** Food Security: One Health beyond zoonoses
- 2:00 PM **Moreno:** Antimicrobial Resistance and One Health
- 2:30 PM **Varela:** Food Safety Towards Food Security
- 3:15 PM **Ferres:** Infectious Diseases, Zoonosis and Food Security
- 3:45 PM **Fellenberg:** Promoting Food Security in Rural Farmers
- 4.45 PM **Mardones:** Roundtable Discussion

## Thursday, September 8<sup>th</sup>

### Breakout Room C

**Myxozoa:** Jerri Bartholomew/Matt Griffin  
1:30 PM Roundtable Discussion



### Course Director

Michael Kent, Ph.D.  
*Oregon state University*

### Course Faculty

Rodman Getchell, Ph.D.  
*Cornell University*

Christian Lawrence,  
*SmartLabs*

Chris Whipps, Ph.D.  
*SUNY*

## Health and Colony Management of Laboratory Fish

**Spectember 18-23, 2022**

Health and Colony Management of Laboratory Fish is a short course to help colony managers, researchers, and veterinarians monitor and maintain the health of a colony of aquatic organisms. This course is broad and is appropriate for technical staff, students, postdocs, and investigators, as well as veterinary professionals and trainees.

The course consists of lecture, laboratory exercises and discussions. With a high faculty to student ratio, during the course there are ample opportunities for students to discuss unusual and/or unsolved diagnostic case experiences from their home laboratories as problem-solving exercises.

Topics covered include:

- Fish Disease: Pathogenesis, diagnostics, necropsy methods, treatment and control
- General Fish Biology: Anatomy, form and function
- General training: anatomy, histology and necropsy techniques
- Core management: breeding, nutrition, water quality, system design and biosecurity

Several species are discussed, but particular emphasis is given to zebrafish.

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