

Program Sea Lice 2012

Sunday 20 May evening

18: 00 Registration and get together at Institute of Marine Research hosted by Pharmaq

Monday 21 May day program

08:00 Registration at Scandic Bergen

10: 00 Welcome Dr. **Karin Kroon Boxaspen** (conference manager, IMR)

10:10 Opening address **State Secretary Kristine Gramstad**, Norwegian Ministry of Fisheries and Coastal Affairs

10:30 **Torbjørn Forseth: Atlantic salmon – status and threats**

11:15 **Ian Denholm: Evolution in the fast lane: recent research on pesticide resistance in arthropod pests**

12:00 Lunch

13:00 GENERAL TOPICS chair **Tor Einar Horsberg**

13:00 Chair intro including poster address

13:15 **Jay Abolofia**, Frank Asche, Atle Guttormsen; The Economics of Salmon Lice: Putting a Price on Lice

13:30 **Fred Page**, Les Burridge, Jiselle Bakker, Bill Ernst, Randy Losier, Susan Haigh, Blythe Chang, Monica Lyons, David Wong; Transport and Dispersal of Sea Lice therapeutants used in salmon farms located in southwest New Brunswick, Canada

13:45 **David Jackson**, Deirdre Cotter, Pauline O'Donohoe, Sarah McEvoy, Frank Kane, Tom McDermott, Jonathan White, Suzanne Kelly & Alan Drumm: *Lepeophtheirus salmonis* infestations of migrating Atlantic salmon smolts at eight locations in Ireland with an analysis of sea lice induced marine mortality

14:00 **Les Burridge**, Fred Page, Monica Lyons, David Wong and Bill Ernst: Effects of therapeutants on non-target organisms in southwest New Brunswick, Canada.

14:15 **B. A. Venmathi** Maran, Seong Yong Moon, Sung-Yong Oh, and Jung-Goo Myoung: Sea louse *Lepeophtheirus elegans* Gusev, 1951 (Copepoda: Caligidae), a Pest on the Ratched Korean Rockfish *Sebastes schlegelii* in Korea

14:30 Coffee break in the poster room

15:00 EPIDEMIOLOGY chair **Peter Andreas Heuch**

15:00 Chair intro including poster address

15:10 **Crawford Revie: The plural of anecdote is data: Using 'Big Lice' to inform key research questions**

- 15:30 **Peder A. Jansen**, Daniel Jimenez, Anja B. Kristoffersen, Randi Grøntvedt and Peter Andreas Heuch: Effects of coordinated production of farmed salmon and sea lice interventions within zones, on sea lice control
- 15:45 **Maya L Groner**, Ruth Cox, George Gettinby and Crawford W. Revie: Individual-based models: A new approach to understanding the biological control of sea lice
- 16:00 **Mardones F.O.**, Valdes-Donoso, P., Yatabe, T., Carpenter, TE., Perez, AM.: Distribution, magnitude and directionality of sea lice infestations in southern Chile, 2007-2010
- 16:15 **E.E. Rees**, M. Krkosek, B. Hargreaves, H. Stryhn, S. Jones, C.W. Revie: Spatio-temporal analysis of sea lice infection in wild salmon, British Columbia, Canada
- 16:30 **Magne Aldrin** and Bård Storvik: Space-time modelling of the spread of sea-lice within and between fish farms

Monday 21 May evening program

18:00 Reception Fløyen/ Skansen outdoor/ tent (snack and drinks)

Tuesday 22 May day program

09:00 **Fred Whoriskey: Sea-cage farms, sea lice, and wild fish: international lessons from a common challenge**

09:45 INTERACTION BETWEEN HOST - PARASITE chair **Simon Wadsworth**

09:45 Chair intro including poster address

09:55 **Simon Jones: Global approaches to understanding diverse mechanisms of resistance to *Lepeophtheirus salmonis* among salmon species**

10:15 **M.D. Fast**, S.E. Friend, S. L. Purcell, J.F. Burka, R.J.F. Markham, A. Donkin, D.B. Groman, J. M. Covello: CPG ODN inclusion in feed induces transient inflammatory responses towards *Lepeophtheirus salmonis* and greater protection in Atlantic salmon (*Salmo salar*) following infection and re-infection.

10:30 **Linda Jensen**, Eivind Larsen, Kai Erik Uleberg, Daniela Pampanin and Fiona Provan: The use of proteomics in sea lice research

10:45 Coffee break in the poster room

11:15 **J. Pino**, J.L. González Vecino, J. Gonzalez, J. Troncoso, J. Mordue, M. Burkett, A. Quiroz, S.L. Wadsworth: The effect of masking compounds on the disruption and settlement of sea lice (*Lepeophtheirus salmonis* and *Caligus rogercresseyi* on Atlantic salmon (*Salmo salar*))

11:30 **Okechukwu O. Igboeli**, Sara Purcell, Heather Wotton, Jordan Poley, John F. Burka, Mark D. Fast: Host immunostimulation and its effects on *Lepeophtheirus salmonis* P-glycoprotein expression and subsequent emamectin benzoate exposure

11:45 **J.M. Covello**, S.L. Purcell, J. Pino, J.L. González Vecino, J. Gonzalez, J. Troncoso, M. Fast, S.L. Wadsworth: Effects of orally administered immune stimulants on Atlantic salmon (*Salmo salar*) transcriptional responses and subsequent sea lice (*Lepeophtheirus salmonis*)

12:00 Lunch

13:00 INTERACTIONS BETWEEN WILD - FARMED FISH chair Bengt Finstad

13:00 Chair intro including poster address

13:10 **P. Gargan:** Interaction of Sea Lice between Farmed and Wild Salmonids; Potential for Impact, Lessons Learnt and Future Prospects, a Wild Fish Perspective.

13:30 **Ove T. Skilbrei,** Bengt Finstad, Harald Sægrov, Kurt Urdal, Gunnar Bakke, Frode Kroglund and Rita Strand: Impact of early infestation with the sea louse (*Lepeophtheirus salmonis*) and variability in survival and marine growth of sea ranched Atlantic salmon (*Salmo salar*) smolts 1997 – 2009.

13:45 **Pål Arne Bjørn,** Ingrid Askeland Johnsen, Rune Nilsen, Rosa Maria Serra Llinares, Peter Andreas Heuch, Bengt Finstad, Karin Boxaspen & Lars Asplin: The effects of fallowing zones on the distribution and risks of salmon lice infection in wild salmonids in an intensively farmed Norwegian fjord system

14:00 **C.C. Pert,** and S. Middlemas: Identifying Variations In The Infection Pressure From Parasitic Sea Lice In A Scottish Sea Loch Containing Salmonid Aquaculture.

14:15 **Øyvind Knutsen,** Ingrid Ellingsen, Lionel Eisenhauer and Hans Bjelland: Modelling dispersion of sea lice (*L. salmonis*) in Romsdalsfjorden –implications for wild and farmed salmon

14:30 **I.P. Helland,** P. A. Bjørn, O. Diserud, B. Finstad, F. Hansen, P. A. Jansen, R. Nilsen, I. Uglem: Modelling sea lice on wild sea trout; effects of environmental variations and density of farmed fish

14:45 Coffee break

15:15 TREATMENT AND CONTROL chair Mark Fast

15:15 Chair intro including poster address

15:25 **Tor Einar Horsberg: Salmon lice: Treatment and resistance**

15:40 **P.G. Jones,** K.L. Hammell, G. Gettinby, C.W. Revie: Resistance development against emamectin benzoate in different life stages of sea lice (*Lepeophtheirus salmonis*) on farmed Atlantic salmon (*Salmo salar*)

15:55 **Trond Ove R. Hjelmervik,** Per Gunnar Espedal, Heidi Kongshaug, Ketil Malde, Tor Einar Horsberg, Frank Nilsen: Gene expression differences in emamectin benzoate resistant and sensitive salmon lice identified by use of microarray and QPCR

16:10 **Sonja Saksida,** Diane Morrison, Peter McKenzie, Barry Milligan, Elan Downey, Brad Boyce and Alexandra Eaves: Evaluation of SLICE® efficacy on farmed Atlantic Salmon (*Salmo salar*) in British Columbia

16:25 **J.L. Webb,** J. Vandenbor, B. Pirie, S.F. Cross, S.R.M. Jones, S.M.C. Robinson, and C.M. Pearce: Effects of temperature, diet, and bivalve size on the ingestion of *Lepeophtheirus salmonis* larvae by filter-feeding shellfish

16:40 **Myron Roth,** Randolph H. Richards, Christina Sommerville and Gordon Rae: Toxicity and sub-lethal effects of chemotherapeutants to chalimus stages of the salmon louse, *Lepeophtheirus salmonis*.

16:55 Poster session (light refreshments and bar)

19:00 Conference banquet with host Harald Gjein (CEO, NFSA)

Wednesday 23 May day

09:00 ADVANCES IN SEA LICE MANAGEMENT chair Gordon Richie

09:00 Chair intro including poster address

09:10 **Randi Grøntvedt: Integrated pest management to control sea lice - are we there yet?**

09:30 **Kari Olli Helgesen**, Tor E. Horsberg: Single dose field bioassay for resistance testing in sea lice (*Lepeophtheirus salmonis*): Development of a rapid diagnostic tool

09:45 **M.D. Fast**, J. Poley, O.O. Igboeli, A. Donkin, D.B. Groman, H. Wotton, S. L. Purcell: Combinatorial effects of administration of immunostimulatory compounds in feed prior to triple dose Slice® (emamectin benzoate) on Atlantic salmon (*Salmo salar*) infection with *Lepeophtheirus salmonis*.

10:00 **Erik Høy**, Frode Oppedal, Pascal Klebert, Per Rundtop, Ole Folkedal: Mixing of delousing agent in sea cages closed by tarpaulin

10:15 **Randi Nygaard Grøntvedt**, Bjørn Bjøru, Frode Finne-Fridell, Rune Stigum Olsen, Puntharika Barkved, Vidar Moen and Solveig Gåsø: Delousing in well boats – distribution studies with tracers and pyrethroids

10:30 Coffee break in the poster room

11:00 GENETICS AND GENOMIC chair Frank Nilsen

11:00 Chair intro

11:10 Ben Koop: Genomics in Lice and Salmon (GiLS)

11:30 **Rasmus Skern-Mauritzen**, Ketil Malde, Tomasz Furmanec, Richard Reinhardt, Ben F. Koop, Frank Nilsen: The Salmon Louse Genome Project

11:45 **Christiane Eichner**, Torbjørn Munkejord Pedersen, Marius Hamre, Ketil Malde, Heidi Kongshaug, Sussie Dalvin, Rasmus Skern-Mauritzen, Lars Are Hamre, Frank Nilsen: Gene regulation in the salmon louse during settlement: similarities in the ecdysteroid regulated gene cascade to other arthropods

12:00 **Laura M. Braden**, Ben F. Koop, Duane E. Barker, Simon R. M. Jones: Development of a skin injection model for studying local and systemic responses to *Lepeophtheirus salmonis* in salmon.

12:15 **Jan Heumann**: ABC transporters as factors affecting emamectin-susceptibility of salmon lice (*Lepeophtheirus salmonis*).

12:30 Lunch

13:30 **Ben J G Sutherland**, Kim W Koczka, Simon R M Jones, Ben F Koop: Stressed lice and refractory responses: Host-parasite transcriptomics

13:45 **Rolf B. Edvardsen**, Stig Mæhle, Tomasz Furmanek, Ketil Malde, Bjørn Olav Kvamme, Sussie Dalvin, Rasmus Skern-Mauritzen: Transcriptomic analysis of the salmon louse

14:00 EMERGING ISSUES chair Sonja Saksida

14:00 Chair intro

14:10 **Frank Nilsen: Novel experimental approaches to facilitate development of new control measure towards sea lice.**

14:30 **Marit Stormoen**, Brad Schofield: Salmon Lice Population Dynamics Modeling with Applications to Treatment Strategies

14:45 **P M Hayes** and G A Boxshall: Introducing Sealice Explorer – a diagnostic e-taxonomy system for sealice

15:00 **Christer R. Wiik-Nielsen**, Celia Ridaura and Søren Grove: Search of vaccine candidates against salmon louse

15:15 **Lina E.R. Ljungfeldt**, Kevin A. Glover, Per Gunnar Espedal and Frank Nilsen: Variability between full-sibling families of salmon lice (*Lepeophtheirus salmonis*) in common garden experiments

15:30 General discussions

Posters

GENERAL TOPICS

- 1) D. Jackson, F. Kane, P. O'Donohoe, T. McDermott, A. Drumm and S. Kelly: Sea lice levels on Atlantic salmon returning to the West Coast of Ireland
- 2) C. Tröbe, H. Kongshaug, L. A. Hamre and F. Nilsen: Characterisation of iron regulatory protein 1 and 2 in the salmon louse (*Lepeophtheirus salmonis* Krøyer 1837)
- 3) J. Bengtson, L. Asplin, P. A. Bjørn and S. Sundby: The salinity tolerance of *Lepeophtheirus salmonis* larvae
- 4) O. Samuelsen, A-L Agnalt, B.T. Lunestad, T. Tjensvoll, B. Holmelid, E. Grefsrud, E. Farestveit: The effect of the antiparasitic drug teflubenzuron on non-target species.
- 5) M. Beattie, A. Bartsch, S.M.C. Robinson, F. Page: Efficacy and Viability of sea lice post treatment with hydrogen peroxide and filtered from well boat discharge
- 6) S. M. Aaen, J. Bugge, M. French: Hatching of egg-strings exposed to hydrogen peroxide (Interox Paramove 50, Solvay)

EPIDEMIOLOGY

- 7) M. Nuñez; S. Bravo; M. T. Silva: Behaviour of *Caligus rogercresseyi* infecting Atlantic salmon (*Salmo salar*) in a farm located in a new fish farming location in Chile
- 8) P. Valdes-Donoso, F.O. Mardones, M. Jarpa, M. Ulloa, T.E. Carpenter, A.M. Perez: Co-infection patterns of two high-risk diseases affecting farmed Atlantic salmon in southern Chile (2007- 2009)
- 9) L. Asplin, A. D. Sandvik, I. A. Johnsen, V. Sundfjord, J. Albretsen, P. A. Bjørn, K. Boxaspen and J. Aure: Fluctuations in the physical climate of the Hardangerfjord and its influence on salmon lice distribution

- 10) L. Asplin, H. A. Svedberg, P. A. Bjørn, R. Nilsen, R. M. S. Llinares, A. D. Sandvik and M. Myksvoll: Validation of a salmon lice dispersion model in a northern Norwegian fjord

INTERACTION BETWEEN HOST – PARASITE

- 11) E. Jakob, T. Sweeten, W. Bennett and S. R. M. Jones: Susceptibility of juvenile sockeye salmon *Oncorhynchus nerka* to infection with *Lepeophtheirus salmonis*.
- 12) C. R. Wiik-Nielsen, C. Ridaura and S. Grove: Phage display – a method for identification of immune inhibitory factors in salmon louse
- 13) F. Benedikt, C. Dave, B. James, M. Herve: Comparative study of the susceptibility of triploid and diploid Atlantic salmon to infection with the sea louse (*Lepeophtheirus salmonis*).

INTERACTIONS BETWEEN WILD - FARMED FISH

- 14) T. Adams: Connectivity and population modelling of sea lice in a Scottish sea loch
- 15) K.V. Vollset, B.T. Barlaup, U. Pulg, S-E. Gabrielsen: Collection of pelagic stages of salmon lice in a Norwegian Archipelago
- 16) N.K.G. Salama, B. Rabe, A.G. Murray: Modelling sea lice dispersal in a Scottish fjordic system.
- 17) M. Foreman, D. Stucchi, M. Guo, P. Chandler, B. Kelly, S. Murphy: Modelling Inter-annual and Intra-seasonal Water Property Variations and their Impact on Sea Lice in the Broughton Archipelago, Canada

TREATMENT AND CONTROL

- 18) L.C.Hastie, C.Wallace, M.A.Birkett, O.Jones, A.J.Mordue, G.Ritchie, J.A.Pickett, J.L.Webster and A.S.Bowman: Effectiveness of a semiochemical for sea lice control: Results from small-scale trials
- 19) D.F. Jimenez, P.A. Heuch, G. Gettinby, C.W. Revie: A new approach for calculating the uncertainty in the effect of topical field treatments against sea lice in salmonids
- 20) P. Barría, S.L. Marín: Using the red neutral technique to classify *Caligus rogercresseyi* (Boxshall & Bravo, 2000) condition of live, moribund and dead after sensitivity bioassays to chemotherapeutants.
- 21) F. Finne-Fridell, S. Alexandersen, N. Steine, E. Wilkinson, B. Melgård and B. Martinsen: Optimizing sea lice treatment with tarpaulin in large cages.
- 22) R. Martin and O. Hardcastle: Use of Cypermethrin against Sea Lice *Caligus rogercresseyi* in Chile

ADVANCES IN SEA LICE MANAGEMENT

- 23) R. Stigum Olsen and J. G. McHenry: Betamax stewardship – The science of best practice
- 24) S.M.C. Robinson, A. Bartsch, M. Luitkus, K. Pee Ang, D. Cleaves, T.A. Lander, C.M. Pearce and J.L. Webb: Studying the early life-history of sea lice in the Bay of Fundy for the purpose of developing alternative strategies to reduce epidemic-level infestations

- 25) A. Elmoslemany, S. K. Whyte, K. L. Hammell, and C. W. Revie: Sea lice counts on Atlantic salmon farms: Comparing audit and farm staff counts.
- 26) A. Ingvarsdottir, F. Provan and H. Bredal: Seafarm Pulse Guard (SPG): Protecting farmed salmon from sealice.
- 27) F. Oppedal, P. Klebert, E. Høy, R. E. Olsen, L. H. Stien and O. Folkedal: Topical delousing in seacages – salmon behaviour, water movements and therapeutant mixing
- 28) A. M. Lien, Z. Volent, E. Lien and L. M. Sunde: Shielding skirt for prevention of sea lice infestation on salmon in cages - Experimental study on mooring loads and net deformation

GENETICS AND GENOMIC

- 29) S. Dalvin, B.O. Kvamme, Mæhle, S. and R. Skern-Mauritzen: Transmembrane proteins in the intestine of salmon louse
- 30) J. S. Leong and B. F. Koop: A Pacific Sea Lice Reference Genome
- 31) D. Minkley, B. Koop and J. Leong: Composition and high abundance of transposable elements in Atlantic and Pacific *Lepeophtheirus salmonis* genomes
- 32) S. Carmichael, A. Tildesley, J. Ireland, J. B. Taggart, P. Skuce, J. E. Bron and A. Sturm: A study of gene expression in Atlantic *Lepeophtheirus salmonis* populations with differing susceptibilities to emamectin benzoate.
- 33) S. R. M. Jones, B. J. G. Sutherland and B. F. Koop: Biological and transcriptional consequences of infection with *Facilispora margolisi* (Microsporidia: Crustaceacida) following vertical transmission among larval salmon lice *Lepeophtheirus salmonis*.

EMERGING ISSUES

- 34) M. Patricio, S. Rodrigo, M. Carlos, B. Catalina and T. Jaime: A new copepod-specific trypsin mutant as an antigen candidate for a vaccine against sea lice.
- 35) K. Olli Helgesen, R. Landsem and T. E. Horsberg: Influence of different materials on the concentration of delousing agents in seawater
- 36) O.O. Igboeli, M.D. Fast, J.F. Burka: Characterizing the interaction of emamectin benzoate with P-glycoprotein in sea lice, *Lepeophtheirus salmonis*
- 37) J. G. McHenry: Learning from the past and building for the future: The control of sea lice