

Curriculum Vitae

Name: Lars Olof Ebbe Ebbesson
 Nationality: Swedish and USA
 Born date: January 17, 1966
 Private address: Pärongatan 7, 234 37 Lomma, Sweden
 Present position: **Chief Scientist**, NORCE Norwegian Research Centre, Grimstad, Norway
Program Director Sustainable Ocean Harvesting, EDIH Oceanopolis, Norway



Education

2000 Ph.D. in Zoology/Functional Morphology, Lund University, Lund, Sweden "Temporal dynamics of brain and hormone changes during parr-smolt transformation in salmon."
 1994 M.Sc. in Neuroscience, University of Alaska Fairbanks, Fairbanks, Alaska, USA
 1990 B.Sc. in Chemistry: Biochem./Mol. Biol., University of Alaska Fairbanks, USA

Professional experience

2024-present Chief Scientist & Senior Aquaculture Advisor, Technology Division
 2024-present Program Director Sustainable Ocean Harvesting, EDIH Oceanopolis, Norway
 2016-2022 Director, Centre for Sustainable Aquaculture Innovations, NORCE & UoB
 2018-2023 Research Professor (Forsker I), Department of Environment, NORCE
 2015-2019 Adjunct Professor (Full), Department of Biology, University of Bergen
 2015-2018 Head of Department, Fish Production and Welfare, SFI-CtrlAQUA, Uni Research AS
 2011-2018 Group Leader, Integrative Fish Biology, Uni Environment, Uni Research AS
 2009-2014 Research scientist (permanent), Uni Environment, Uni Research AS
 2013-2014 Adjunct Associate Professor, Department of Biology, University of Bergen
 2006-2008 Research Scientist, Department of Environmental Research, UNIFOB AS
 2003-2006 Research Scientist, Department of Biology, University of Bergen
 2002-2003 Associate Professor, Dept. of Fisheries and Marine Biology, University of Bergen, (9 month term position)
 2000-2002 Postdoc scientist, Dept. of Fisheries and Marine Biology, University of Bergen
 1996-2000 Research Assistant, Dept. of Functional Morphology, Lund University, Sweden
 1994-2004 Research Assistant, University of Alaska Fairbanks (UAF), AK Med Res Program,
 1994-1995 Graduate Research Assistant, Institute of Arctic Biology UAF
 1990-1994 Graduate Research Assistant, Dept. of Chem/Biochem and Molecular Biology, UAF
 1989-1991 Teaching Assistant University of Alaska Fairbanks, Dept. of Chemistry, UAF
 1988 & 1989 Undergraduate Research Assistant, Dept. of Chem/Biochem and Molecular Biology.

Teaching experience

2015-2017 Nijmegen University, The Netherlands, Advanced Summer School "Zebrafish: from gene, brain to behaviour"
 2014 University of Bergen, Department of Biology, BIO104 Biology.
 2013 University of Bergen, Department of Biology, BIO291 Fish Physiology.
 Nov 2012 University of Bergen, Department of Biology, Neuroanatomical Techniques, Organised and taught a week PhD course including lectures.
 2009-2016 Uni Research, Fish Neuroscience Network in Bergen, Established and organiser
 2008-2011 University of Bergen, Department of Biology, one lecture/year BIO304,
 2002-2003 University of Bergen, Dept. of Fisheries and Marine Biology, Associate Professor, (9 month term teaching position; BIO204 Welfare and Ethics)
 1999-2000 Lund University, Dept. of Functional Morphology, Responsible for teaching a one-week course (8 hours per day) on histological techniques within the course of Developmental and Evolutionary Vertebrate Biology. Prepared lectures and laboratories.
 1989-1991 University of Alaska Fairbanks, Dept. of Chemistry, Teaching Assistant,.

Supervision

Present

- I-Hao Chen, Supervisor, PhD Student, 2021-2024, Digital fish and smart feeding

Past

- Patrik Tang, co-supervisor, UiB, PhD student, 2018-2023, salmon postsmolt robustness
- Elsa Denker, supervisor, Uni Research, Postdoc 2015-18, Deiodinase and neural plasticity salmon
- Mariann Eilertsen, co-supervisor, UiB, Postdoc 2014-15, Salmon brain activation
- Bernat Morro, co-supervisor, Uni Research, PhD (2018) trout physiology
- Sara Cabrese, , co-supervisor, UiB, PhD student, (2018), brain stress physiology
- Ragnhild Valen, co-supervisor, UiB, PhD student 2009-16, Fish brain photoreception
- Angelico Madaro, co-supervisor, UiB, PhD student, 2013-15, salmon brain stress
- Cairsty Grassie, co-supervisor, Penn State, (PhD 2013), Brain stress plasticity
- Mariann Eilertsen, co-supervisor, UiB, (PhD 2014), Halibut brain opsins
- Mari Sandbacken, co-supervisor, UiB, (PhD 2011), Salmon brain melanopsins
- Tom Ole Nilsen, co-supervisor, UiB (PhD 2007). Molecular and endocrine aspects of hypo-osmoregulatory development in Atlantic salmon (*Salmo salar* L.).
- Igor Gaidukov, co-supervisor, UiB, M.Sc. 2016-18, temperature stress physiology
- Ingrid Gamlem, co-supervisor, UiB, M.Sc. 2016-18, Fish endocrinology of growth
- Øyvind Grøner Moe, co-supervisor, UiB, M.Sc. 2016-18, Exercise on muscle fiber development
- Lee Hoang Dung, co-supervisor, UiB, M.Sc. 2012-present, appetite regulation in cod brain
- Einar Bye-Ingebrihtsen, co-supervisor, UiB, M.Sc. 2011-2013, spectral biological response
- Tom Nilsen, co-supervisor, UiB, M.Sc. 2003, salmon osmoregulation
- Børge Takvam, co-supervisor, UiB, M.Sc. 2004, salmon thyroid hormones and development

Institutional Responsibilities

2019-2023	Leader, Sustainable Aquaculture-Digital Fish & Aquaculture strategic area
2016-2022	Director, Centre for Sustainable Aquaculture Innovations (CSAI) NORCE & University of Bergen
2015-2018	Head of Department, Fish Production and Welfare, SFI-CtrlAQUA, Uni Research AS
2011-2018	Group Leader, Integrative Fish Biology, Uni Environment, Uni Research AS

Organisation of scientific meetings

2024	Co-Organizer AquaNext- Digitalization program, Stavanger, Norway
2017	Organizer, 10 th International Workshop on Salmon Smoltification, Bergen, Norway
2016	Organising Committee, 8th International Symposium on Fish Endocrinology
2014	Organiser, International Workshop in Functional Neuroanatomy of Fish, Lisbon, Portugal
2012	Organiser, Nordforsk workshop in Functional Neuroanatomy of Fish, Bergen, Norway,

Funding

Present

Horizon Europe: BlueRemediomics: Harnessing the marine microbiome for novel sustainable biogenics and ecosystem services (WPL, 2022-2026, 94 millNOK)

HorizonEurope: FishEUTRUST: European integration of new technologies and social-economic solutions for increasing consumer trust and engagement in seafood products (2022-24, 51 mill NOK)

NFR-LIGHTBIOTRANS: Non-visual light regulation of biological rhythms and life history transformation (LIGHTBIOTRANS) (2022-2025, 12 millNOK).

NFR-KSP, RAS4.0: The balancing act: Biologically driven rapid-response automation of production conditions in recirculating aquaculture systems (RAS). (2021-2024, 20.5 millNOK)

EEA-InFishMix

NFR-INTPART, ExcelAQUA2.0: Norway-Japan Partnership for Excellent Education and Research in Aquaculture -Phase 2 (2020-2023, 6 millNOK)

NFR-FORNY, PRESTIIS – Predicting Stress in Salmon. (2020- 2022, 4.992 mill NOK)

H2020- Intelligent Fish feeding through Integration of ENabling technologies and Circular principle

(iFishIENCi). (70 mill NOK, scientific and technical coordinator, 2018-2022)
 NFR-SFI, Centre for Research-based Innovations in Controlled-environment Aquaculture” (CtrlAQUA). (195.7 mill NOK, Co-PI, 2015-2023)
 NFR-FORNY. Predict-*fit*: intelligent predictive tool for value creation in aquaculture (6.3 mill NOK, partner, 2018-2020)
 NFR-Capacity building for sustainable and innovative seafood production (55 mill NOK 2018-2023, partner)

Past

NFR.FRIMEDBIO, Cost of life-history adaptations: Multiple-trait consequences of fisheries-induced evolution (10 mill NOK, partner, 2018-2021)
 NFR-HAVBRUK2, The effect of narrow banded LED light on development and growth performance (Partner, 10.6 mill NOK, 2016-2020)
 NFR-RFFV, Development of a season independent protocol for intensive production of rainbow trout (*O. Mykiss*). (12.5 mill NOK, Co-PI, 2016-2018)
 NFR-RFFV, Utvikling av en sesonguavhengig protokoll for intensiv produksjon av regnbueørret (*O. Mykiss*). (12.5 mill NOK, Co-PI, 2016-2018)
 NFR-FRIMEDBIO, Light & Salt - Thyroid hormone deiodinase paralogues & the evolution of complex life-history strategy in salmonids. (11 mill NOK, Co-PI, 2015-2018)
 NFR 233870- SalmoFutura: Welfare of Atlantic salmon postsmolts in closed-containment production systems, using a function-based approach. (9 mill NOK, Co-PI, 2014-2017)
 NFR-FORNY2020, SalmonProbe: en ny og innovative metode for å angi smoltstatus (6.8 mill NOK, Co-PI, 2014-2015).
 NFR-FRIMEDBIO, The smolt brain model: Unraveling nature’s regulation of neural plasticity. (7.7 mill NOK, Co-PI, 2014-2017).
 NFR/NSF GROW- Uncovering the role of the melanocortin system in salmon smoltification. (100 kNOK, Co-PI, 2014)
 EU, FP7-KBBE, 265957, ‘COPEWELL-A new integrative framework for the study of fish welfare based on the concepts of allostasis, appraisal and coping styles’, (4.7 mill EUR, Co-PI, 2011-2015)
 NFR 217502- Optimalisert Postsmolt: et paradigmeskifte for norsk lakseindustri (OPP), Partner 2012-2016
 NFR 190469 ‘Fish welfare assessment through brain function: Impacts of environmental stress on brain plasticity and behaviour’, PI, 2009-2011
 NORDFORSK-BIFINE: Behavioral Fish Neuroscience Network’, co-PI, 2010-2012
 NFR 199482 ‘Cod Development CODE’, Partner, 2010-2013
 EU, FP7-KBBE-2007-2A, 222719, ‘LIFECYCLE—Building a biological knowledge-base on fish lifecycles for competitive, sustainable European aquaculture’ 2009-2013
 NFR 172504 ‘Nitric oxide regulation of development in fish: emphasis on the light-brain-pituitary axis and gill during salmon smoltification’, PI, 2006-2008
 NFR 165331 ‘Environmental impact and molecular regulation of the osmoregulatory gill during parrsmolt transformation in Atlantic salmon’, Partner 2005 – 2007
 NFR 153230/122 ‘Environmental control of smolt brain development’, PI, 2003-2005

Research Collaborators (selected)

Profs. Vidar Helvik, Ivar Rønnestad, Sigurd Stefansson, Anne Gro Salvenes at **Dept of Biology, UiB**;
 Drs. Geir-Lasse Taranger, Anna Wargelius, Eva Andersson, Tore Kristiansen, **IMR, Bergen**;
 Drs. Åsa Espemark, Jelena Kolarevic, Aleksei Krasnov, **Nofima, Sunndalsøra & Ås**;
 Prof. Clive Bramham, **Dept of Biomedicine Mental Health Research Center, UiB**;
 Prof. David Hazlerigg and Even Jørgensen, **University of Tromsø**
 Prof. Simon Mackenzie, **Stirling University, Scotland**;
 Prof. Gert Flik and Dr. Marnix Gorissen, **Radboud University, Nijmegen The Netherlands**;
 Dr Nikos Papandroulakis, **HCMR, Crete, Greece**
Industry Partners: **MOWI, Lerøy Seafood Group, Grieg Seafood, Philips Lighting Innovations, Aqua Biotech, OxyGuard, Bioceanor**

Referee assignments

Journal of Comparative Neurology, Journal of Chemical Neuroanatomy,
 General and Comparative Endocrinology, Journal of Experimental Biology,
 Comparative Physiology and Biochemistry, Journal of Fish Biology,
 PLoS ONE, Fish Physiology and Biochemistry, Aquaculture,
 Hormones and Behaviour, Functional Ecology, BBSRC,
 Canadian Journal of Fisheries and Aquatic Sciences,
 Proceedings of the Royal Society B,
 Brain Behavior and Evolution,
 Molecular Ecology

Publications in Peer-Reviewed Journals (Total 82, h-index 45)

1. Chen I-H, Georgopoulou DG, Ebbesson LOE, Voskakis D, Lal P, Papandroulakis N (2023) Food anticipatory behaviour on European seabass in sea cages: activity-, positioning-, and density-based approach. *Frontiers in Marine Science*, DOI=10.3389/fmars.2023.1168953
2. Calabrese S, Imsland AKD, Nilsen TO, Kolarevic J, Ebbesson LOE, Hosfeld KD, Fivelstad S, Pedrosa C, Terjesen BF, Stefansson SO, Takle H, Sveier H, Mathisen F, Handeland SO (2023) Water Flow Requirements of Post-smolt Atlantic Salmon (*Salmo salar* L.) Reared in Intensive Seawater Flow-through Systems: A Physiological Perspective. *Fishes* 2023, 8(6), 285; <https://doi.org/10.3390/fishes8060285>
3. Tang PA, Gharbi N, Nilsen TO, Gorissen M, Stefansson SO and Ebbesson LOE (2022) Increased Thermal Challenges Differentially Modulate Neural Plasticity and Stress Responses in Post-Smolt Atlantic Salmon (*Salmo salar*). *Frontiers in Marine Science* 9:926136. doi: 10.3389/fmars.2022.926136
4. Tang PA, Stefansson SO, Nilsen TO, Gharbi N, Lai F, Tronci V, Balseiro P, Gorissen M, and Ebbesson LOE (2022) Exposure to cold temperatures differentially modulates neural plasticity and stress responses in post-smolt Atlantic salmon (*Salmo salar*). *Aquaculture* <https://doi.org/10.1016/j.aquaculture.2022.738458>
5. Cui Cui W, Takahashi E, Morro B, Balseiro B, Albalat A, Pedros C, Mackenzie S, Nilsen TO, Sveier H, Ebbesson LOE, Handeland SO, Shimizu M (2022) Changes in circulating insulin-like growth factor-1 and its binding proteins in yearling rainbow trout during spring under natural and manipulated photoperiods and their relationships with gill Na⁺, K⁺-ATPase and body size. *Comp. Bio. Chem Phys Part A* 268:111205. <https://doi.org/10.1016/j.cbpa.2022.111205>
6. Eilertsen M, Clokie BGJ, Ebbesson LOE, Tanase C, Migaud H, Helvik JV (2021) Neural activation in photosensitive brain regions of Atlantic salmon (*Salmo salar*) after light stimulation. *PLoS ONE* 16(9): e0258007. <https://doi.org/10.1371/journal.pone.0258007>
7. Ytrestøyl, T, H Takle, J Kolarevic, S Calabrese, G Timmerhaus, BO Rosseland, Hans C Teien, TO Nilsen, SO Handeland, SO Stefansson. LOE Ebbesson, BF Terjesen (2020) Performance and welfare of Atlantic salmon, *Salmo salar* L. post-smolts in recirculating aquaculture systems: Importance of salinity and water velocity. *J of World Aquaculture Society* DIO: 10.1111/jwas.12682.
8. Denker E, LOE Ebbesson, DG Hazlerigg, DJ Macqueen (2019) Phylogenetic Reclassification of vertebrate melatonin receptors to include Mel1d. *G3-Genes Genomes Genetics* 9(19):g3.400170.2019.
9. Mes D, R van Os, M Gorissen, LOE Ebbesson, B Finstad, I Mayer, MA Vindas (2019) Effects of environmental enrichment on forebrain neural plasticity and survival success of stocked Atlantic salmon. *JEB* 222 (23):jeb212258
10. Morro B, P Balseiro, A Albalat, S MacKenzie, C Pedrosa, TO Nilsen, S Suzuki, M Shimizu, H Sveier, M Gorissen, LOE Ebbesson, SO Handeland (2019) Effects of temperature and photoperiod on rainbow trout (*Oncorhynchus mykiss*) smoltification and haematopoiesis. *Aquaculture*
11. Morro B, P Balseiro, A Albalat, C Pedrosa, S MacKenzie, S Nakamura, M Shimizu, TO Nilsen,

- H Sveier, LOE Ebbesson, SO Handeland (2019) Effects of different photoperiod regimes on the smoltification and seawater adaptation of seawater-farmed rainbow trout (*Oncorhynchus mykiss*): Insights from Na⁺, K⁺-ATPase activity and transcription of osmoregulation and growth regulation genes. *Aquaculture* 507:
12. Damsgård B, TH Evensen, Ø Øverli, M Gorissen, LOE. Ebbesson, S Rey and E Höglund (2019) Proactive avoidance behaviour and pace-of-life syndrome in Atlantic salmon. *Royal Society Open Science* 6(3):181859
 13. McCormick, SD, JM Shrimpton, TO Nilsen, LOE Ebbesson, LO (2018) Advances in our understanding of the parr-smolt transformation of juvenile salmon: a summary of the 10th International Workshop on Salmon Smoltification. *Journal of Fish Biology* **93**: 437-439.
 14. Vindas, MA, S Fokos, M Pavlidis, E Höglund, S Dionysopoulou, LOE Ebbesson, N Papandroulakis, CR Dermon, (2018) Early life stress induces long-term changes in limbic areas of a teleost fish: the role of catecholamine systems in stress coping. *Scientific Reports* **8**:5638-
 15. Balseiro, P, Ø Moe, I Gamlem, M Shimizu, H Sveier, TO Nilsen, N Kaneko, LOE Ebbesson, C Pedrosa, V Tronci, A Nylund, SO Handeland (2018) Comparison between Atlantic salmon *Salmo salar* post-smolts reared in open sea cages and in the Preline raceway semi-closed containment aquaculture system. *Journal of Fish Biology* **93**:567-579
 16. Samaras, A, CE Santo, N Papandroulakis, N Mitrizakis, M Pavlidis, E Höglund, TNM Pelgrim, J Zethof, TFA Spanings, MA Vindas, LOE Ebbesson, G Flik, M Gorissen (2018) Allostatic load and stress physiology in European Seabass (*Dicentrarchus labrax* L.) and Gilthead Seabream (*Sparus aurata* L.). *Frontiers in Endocrinology* 9:451-
 17. Brignon, WR, MM Pike, LOE Ebbesson, HA Schaller, JT Peterson, CB Schreck (2018) Rearing environment influences boldness and prey acquisition behavior, and brain and lens development of bull trout. *Environmental Biology of Fishes* **101**:383-401
 18. Eilertsen, M, R Valen, Ø Drivenes, LOE Ebbesson, JVH Helvik (2018) Transient photoreception in the hindbrain is permissive to the life history transition of hatching in Atlantic halibut. *Developmental Biology* **444**:129-138.
 19. Vindas MA, M Gorissen, E Höglund, G Flik, V Tronci, B Damsgård, P-O Thörnqvist, TO Nilsen, S Winberg, Ø Øverli, LOE Ebbesson (2017) How do individuals cope with stress? Behavioural, physiological and neuronal differences between proactive and reactive coping styles in fish. *J Experimental Biology* doi: 10.1242/jeb.153213
 20. Calabrese S, TO Nilsen, J Kolarevic, LOE Ebbesson, C Pedrosa, S Fivelstad, C Hosfeld, SO Stefansson, BF Terjesen, H Takle, CIM Martins, H Sveier, F Mathisen, AK Imsland and SO Handeland (2017) Stocking density limits for post-smolt Atlantic salmon (*Salmo salar* L.) emphasis on production performance and welfare. *Aquaculture* 468:363-370.
 21. Le HTMD, AR Angotzi, LOE Ebbesson, Ø Karlsen, I Rønnestad (2016) The ontogeny and brain distribution dynamics of the appetite regulators NPY, CART and pOX in larval Atlantic cod (*Gadus morhua* L.) *PLoS ONE* DOI: 10.1371/journal.pone.0153743
 22. Sveen LR, G Timmerhaus, JS Torgersen, E Ytteborg, SM Jørgensen, SSO Handeland, SO Stefansson, TO Nilsen, S Calabrese, LOE Ebbesson, BF Terjesen, H Takle (2016) Impact of fish density and specific water flow on skin properties in Atlantic salmon (*Salmo salar* L.) post-smolts. *Aquaculture* 464: 629-637
 23. Macirella R, A Guardia, S Sesti, D Pellegrino, I Bernabò, V Tronci, LOE Ebbesson, S Tripepi, and E Brunelli (2016) Effects of two sublethal concentrations of mercury chloride on the morphology and metallothionein activity in the liver of zebrafish (*Danio rerio*). *Int. J. Mol. Sci.* 2016, 17, 361; doi:10.3390/ijms17030361
 24. Moltesen M, MA Vindas, S Winberg, LOE Ebbesson, ML Ruiz-Gomez, PV Skov, T Dabelsteen, Ø Øverli and E Höglund (2016) Cognitive appraisal of aversive stimulus differs between individuals with contrasting stress coping styles; evidences from selected rainbow trout (*Oncorhynchus mykiss*) strains. *Behaviour* DOI:10.1163/1568539X-00003405
 25. Lorgen M, E Casadei, E Król, A Douglas, M Birnie, LOE Ebbesson, TO Nilsen, WC Jordan, E Jørgensen, H Dardente, D Hazlerigg, SAM Martin. (2015) Functional divergence of type 2 deiodinase paralogues in the Atlantic salmon. *Current Biology* 25(7):936-41

26. Madaro A, RE Olsen, TS Kristiansen, LOE Ebbesson, G Flik, M Gorissen (2015) A comparative study of the response to repeated chasing stress in Atlantic salmon (*Salmo salar* L) parr and post-smolts. *Comparative Biochemistry and Physiology. Part A, Molecular & Integrative Physiology* DOI: 10.1016/j.cbpa.2015.11.005
27. Madaro A, , RE Olsen, TS. Kristiansen, LOE Ebbesson, TO Nilsen, G Flik, M. Gorissen (2015) Stress in Atlantic salmon: response to unpredictable chronic stress. *J Experimental Biology* DOI: 10.1242/jeb.120535
28. Manuel R, M Gorissen, M Stokkermans, J Zethof, LOE Ebbesson, H Vis, G Flik and R Bos (2015) The Effects of Environmental Enrichment and Age-Related Differences on Inhibitory Avoidance in Zebrafish (*Danio rerio* Hamilton). *Zebrafish*, DOI: 10.1089/zeb.2014.1045
29. Callol A, D Pajuelo, LOE Ebbesson, M Teles, S MacKenzie, C Amaro (2015) Early steps in the European eel (*Anguilla anguilla*)-*Vibrio vulnificus* interaction in the gills: role of the RtxA13 toxin. *Fish and Shellfish Immunology*, 10.1016/j.fsi.2015.01.009.
30. Tapia LC, JCL Alvarenga, SOE Ebbesson, LOE Ebbesso, ME Tejero (2015) Apo E isoforms 3/3 and 3/4 differentially interact with circulating stearic, palmitic, and oleic fatty acids and lipid levels in Alaskan Natives. *Nutrition Research Volume 35, Issue 4, April 2015, Pages 294-300*
31. Ebbesson SOE, VS Voruganti, PB Higgins, RR Fabsitz, LOE Ebbesson, S Laston, WS Harris, J Kennish, BD Umans, H Wang, RB Devereux, PM Okin, NJ Weissman, JW Maccluer, JG Umans, BV Howard (2015) Fatty acids linked to cardiovascular mortality are associated with risk factors. *International Journal of Circumpolar Health* 74:28055.
32. Manuel R, M Gorissen, J Zethof, LOE Ebbesson, H Vis, G Flik and R Bos (2014) Unpredictable chronic stress decreases inhibitory avoidance learning in Tuebingen Long-Fin zebrafish (*Danio rerio* Hamilton): stronger effects in the resting phase than in the active phase. *Journal of Experimental Biology*, DOI: 10.1242/jeb.109736.
33. Handeland SO, AK Imsland, TO Nilsen, LOE Ebbesson, CD Hosfeld, C Pedrosa, H Toften and SO Stefansson (2014) Osmoregulation in Atlantic salmon *Salmo salar* smolts transferred to seawater at different temperatures. *Journal of Fish Biology* DOI: 10.1111/jfb.12481
34. Eilertsen M, Ø Drivenes, RB Edvardsen, CA Bradley, LOE Ebbesson, and JV Helvik (2014) The exorhodopsin and melanopsin systems in the pineal complex and brain at early developmental stages of Atlantic halibut (*Hippoglossus hippoglossus*) *Journal of Comparative Neurology* DOI:10.1002/cne.23652
35. Lund I, E Höglund, LOE Ebbesson, PV Skov (2014) Dietary LC-PUFA deficiency early in ontogeny induces behavioural changes in pike perch (*Sander lucioperca*) larvae and fry. *Aquaculture* DOI: 10.1016/j.aquaculture.2014.05.039
36. Braithwaite VA and LOE Ebbesson (2014) Pain and stress responses in farmed fish. In: *Animal Welfare: focusing on the future. OIE Scientific and Technical Review*, 33: 245-253.
37. Nilsen TO, LOE Ebbesson, SO Handeland, F Kroglund, B Finstad, AR Angotzi, SO Stefansson (2013) Atlantic salmon (*Salmo salar* L.) smolts require more than two weeks to recover from acidic water and aluminium exposure. *Aquatic Toxicology* 142-143:33-44
38. Salvanes AGV, O Moberg, LOE Ebbesson, TO Nilsen, KH Jensen, VA Braithwaite (2013). Environmental enrichment promotes neural plasticity and cognitive behaviour in fish. *Proceedings of the Royal Society B* doi:10.1098/rspb.2013.1331
39. Grassie C, VA Braithwaite, J Nilsson, TO Nilsen, H-C Teien, SO Handeland, SO Stefansson, V Tronci, M Gorissen, G Flik, LOE Ebbesson (2013) Aluminum exposure impacts brain plasticity and behavior in Atlantic salmon (*Salmo salar*). *Journal of Experimental Biology*, doi:10.1242/jeb.083550
40. Handeland S, AK Imsland, LOE Ebbesson, TO Nilsen, CD Hosfeld, HCh Teien, SO Stefansson (2013) Osmoregulation and growth in offspring of wild Atlantic salmon at different temperatures *Environmental Biology of Fishes*, DOI 10.1007/s10641-013-0151-5
41. Handeland SO, AK Imsland, LOE Ebbesson, TO Nilsen, CD Hosfeld, G Baeverfjord, Å Espmark, T Rosten, OT Skilbrei, T Hansen, GS Gunnarsson, O Breck, SO Stefansson (2013) Low light intensity can reduce Atlantic salmon smolt quality. *Aquaculture* 384–387:19-24
42. Urke HA, T Kristensen, JV Arnekleiv, TO Haugen, G Kjærstad, SO Stefansson, LOE Ebbesson, TO Nilsen (2013). Seawater tolerance and post-smolt migration of wild Atlantic salmon *Salmo salar* x brown trout *S. trutta* hybrid smolts. *Journal of Fish Biology* 82: 206–227.
43. Ebbesson LOE and Braithwaite VA (2012). Environmental impacts on fish neural plasticity and

- cognition. Journal of Fish Biology 81, 2151-2174.
44. Sandbakken M, LOE Ebbesson, SO Stefansson, JV Helvik (2012) Isolation and characterization of melanopsin photoreceptors of Atlantic salmon (*Salmo salar*). J Comparative Neurology. 520:3727-44.
 45. Ebbesson SO, JC Lopez-Alvarenga, PM Okin, RB Devereux, ME Tejero, WS Harris, LO Ebbesson, JW MacCluer, C Wenger, S Laston, RR Fabsitz, J Kennish, WJ Howard, BV Howard, J Umans, AG Comuzzie (2012) Heart rate is associated with markers of fatty acid desaturation: the GOCADAN study. Int J Circumpolar Health. doi: 10.3402/ijch.v71i0.17343.
 46. Kroglund K, Finstad B, Pettersen K, Teien HC, Salbu B, Rosseland BO, Nilsen TO, Stefansson SO, Ebbesson LOE, Nilsen R, Bjørn PA, Kristensen T (2012) Recovery rates in Atlantic salmon smolts following aluminum exposure defined by changes in blood physiology and salmon lice resistance. Aquaculture. 362–363: 232-240.
 47. Finstad B, Kroglund K, Bjørn PA, Pettersen K, Rosseland BO, Teien HC, Nilsen TO, Stefansson SO, Salbu B, Nilsen R, Fiske P, Ebbesson LOE (2012) Salmon lice induced mortality of Atlantic salmon postsmolts experiencing episodic acidification and recovery in freshwater. Aquaculture. 362–363: 193-199.
 48. Stefansson SO, Haugland M, Björnsson BTh, McCormick SD, Holm M, Ebbesson LOE, Holst JC, Nilsen TO (2012) Growth, osmoregulation and endocrine changes in wild Atlantic salmon post-smolts during marine migration. Aquaculture, 127-136.
 49. Ebbesson LOE, Nilsen TO, Helvik JV, Tronci V and Stefansson SO (2011) Corticotropin-releasing factor neurogenesis during midlife development in salmon: genetic, environment and thyroid hormone regulation. J Neuroendocrinology. 23:733-741.
 50. Ebbesson SOE, Devereux RB, Cole S, Ebbesson LOE, Fabsitz RR, Haack K, Harris WS, Howard WJ, Laston S, Lopez-Alvarenga JC, MacCluer JW, Okin PM, Tejero ME, Voruganti VS, Wenger CR, Howard BV, Comuzzie AG (2010) Heart rate is associated with red blood cell fatty acid concentration: The Genetics of Coronary Artery Disease in Alaska Natives (GOCADAN) study. American Heart Journal. 159(6): 1020-5.
 51. Ebbesson SOE, Tejero ME, Lopez-Alvarenga JC, Harris WS, Ebbesson LOE, Devereux RB, MacCluer JW, Wenger C, Laston S, Fabsitz RR, Howard BV, Comuzzie AG (2010) Individual saturated fatty acids are associated with different components of insulin resistance and glucose metabolism: the GOCADAN study. Int J Circumpolar Health. 69(4): 344-51.
 52. Nilsen TO, LOE Ebbesson, OG Kverneland, F Kroglund, B Finstad, SO Stefansson (2010) Effects of acidic water and aluminum exposure on gill Na⁺, K⁺ ATPase – alpha subunit isoforms, enzyme activity, physiology and return rates in Atlantic salmon (*Salmo salar* L.). Aquatic Toxicology 97: 250-259.
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Book chapters

1. Stefansson SO, Björnsson BTh, Ebbesson LOE, McCormick SD. (2008) Smoltification. In Fish Larval Physiology (Finn & Kapoor, eds.). 639-681. ISBN 978-1-57808-388-6.
2. Holmqvist B, Ebbesson LOE, Alm P (2007). Nitric oxide in developmental neurobiology of zebrafish. Review. In "Nitric oxide", Advances in Experimental Biology series, Tota B and Trimmer B (eds). (Elsevier, Amsterdam), Vol 1. pp 229-274.

Popular science and reports

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2. Rønnestad, Ivar; Edvardsen, Rolf; Arukwe, Augustine; Hoang Le, M.T.D; Angotzi, Anna Rita; Ebbesson, Lars O.E.; Hamre, Kristin; Karlsen, Ørjan; van der Meeren, Terje; Jordal, Ann-Elise Olderbakk Hvordan kan appetitt og forinntak stimuleres hos torskelarver?. Norsk Fiskeoppdrett 2015. s. 28-30
3. Nilsen TO, Ebbesson LOE, Kverneland OG, Kroglund F, Finstad B, Stefansson SO (2010) Ny metode kan påvise skader hos laksesmolt som er utsatt for aluminiumsrikt surt vann. pH-status nr. 4:12-13.
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Scientific Presentations (Not updated since Dec 2013)

Invited and Keynote Presentations (last 2 years)

1. Institute of Biological and Environmental Sciences, University of Aberdeen, Nov 2013
2. Department of Biological and Environmental Sciences, University of Gothenburg, Nov 2013
3. Department of Animal Physiology, Radboud University, The Netherlands, Oct 2013
4. Marine Biotechnology Institute of Aquaculture, University of Stirling, Scotland June 2013
5. Department of Animal Physiology, Radboud University, The Netherlands, May 2013
6. International symposium The Physiology of Fish Behaviour, July 2012, Norwich, UK. Keynote.
7. 7th International Symposium on Fish Endocrinology, Buenos Aires, Argentina, Sept 2012

8. *Department of Neuroscience, Uppsala University, Sweden, March 2012*

Oral presentations

2013

9. Stefansson, S.O., Sundh, H., Andersen, Ø., Sundell, K., Handeland, S.O., **Ebbesson, L.O.E.**, Andersson, E., Jönsson E., Nilsen, T.O. (2013) Low salinity stress reduces growth and food conversion in Atlantic cod, *Gadus morhua*. *World Aquaculture Nashville, Tennessee, Nashville, February 21-25, 2013*

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10. Eilertsen M., **LOE Ebbesson**, JV Helvik (2012) Ontogeny and characterization of non visual photoreception in halibut. *3rd Nordic BiFiNe Meeting: Environmental modifications of the fish brain. Bergen, Norway Nov 12-14.*
11. **Ebbesson LOE** (2012) Chronic mild stress impairs learning and memory in salmon: neural and endocrine correlates. *3rd Nordic BiFiNe Meeting: Environmental modifications of the fish brain. Bergen, Norway Nov 12-14*
12. Salvenes AG, **LOE Ebbesson**, O Molberg, V Braithwaite (2012) Environmental enrichment promotes neural plasticity and spatial learning in fish. *3rd Nordic BiFiNe Meeting: Environmental modifications of the fish brain. Bergen, Norway Nov 12-14*
13. Moltesen M, **LOE Ebbesson**, E Höglund (2012) Brain activation and appraisal of hypoxia in two strains of rainbow trout (*Oncorhynchus mykiss*) displaying divergent stress coping styles. *3rd Nordic BiFiNe Meeting: Environmental modifications of the fish brain. Bergen, Norway Nov 12-14*
14. **Ebbesson LOE**, C. Grassie, V. Braithwaite, J. Nilsson, T.O. Nilsen, H-C. Teien, S.O. Handeland, N. Aubin-Horth, F. Kroglund, H. Hofmann, G.L. Taranger, T. Kristiansen, S.O. Stefansson (2012) Fish welfare assessment through brain function. *Norwegian Research Council Aquaculture program conference, Stavanger, Norway, 16-18, April, 2012.*
15. Stefansson, S.O., Nilsen, T.O., Handeland, S.O., **Ebbesson, L.O.E.**, McCormick, S.D. (2012). The smolt probe – novel tools for assessment of smolt quality and marine performance in Atlantic salmon. *Norwegian Research Council Aquaculture program conference, Stavanger, Norway, 16-18, April, 2012.*

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16. **Ebbesson LOE**, Grassie C, Nilsen TO, Braithwaite VA, Tronci V, Stefansson SO (2011) Environmental impacts on salmon brain plasticity. *Annual Nordforsk Integrative Fish Behavior Neuroscience Network Workshop, Helsinki, Finland*
17. Grassie, C., **Ebbesson, L. O. E.**, Braithwaite VA 2011. The effects of environmental stress on the behavior of Atlantic salmon (*Salmo salar*). *Presented for the American Fisheries Society Pennsylvania Chapter, USA*
18. Salvanes, A. G. V., **Ebbesson, L. O. E.**, Moberg, O., Nilsen, T.O., Jensen, K. H. & Braithwaite, V. A., (2011) "Immunisation impairs cognitive and neural development in fish" *The IVth Conference of The Scandinavian-Baltic Society for Parasitology*
19. Salvanes, A. G. V., **Ebbesson, L. O. E.**, Moberg, O., Nilsen, T.O., Jensen, K. H. & Braithwaite, V. A. (2011) "The trade off between immunity and cognition: immunized individuals learn less!", *EGI seminar, University of Oxford, Invited*
20. Salvanes, A. G. V., **Ebbesson, L. O. E.**, Moberg, O., Nilsen, T.O., Jensen, K. H. & Braithwaite, V. A., (2011) "Environmental enrichment promotes neural plasticity and improve learning ability in fish", *Molecular and behavioural techniques in fish neurobiology 24.- Annual Nordforsk Integrative Fish Behavior Neuroscience Network Workshop, Helsinki, Finland.*

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23. **Ebbesson, L.O.E.**, Nilsen, T.O., Björnsson, B.Th., Tronci, V., Stefansson, S.O., (2009). Thyroid hormones and smolt development- new models reveal new roles in the brain and gill. *8th International Workshop on Salmonid Smoltification, Corvallis, Oregon, USA, September 24-25.*
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28. Stefansson, S.O., Nilsen, T.O., **Ebbesson, L.O.E.**, Wargelius, A., Madsen, S.S., Björnsson, B.Th., McCormick, S.D. (2005). Continuous light inhibits parr-smolt transformation in Atlantic salmon – molecular mechanisms. *7th International Workshop on Salmonid Smoltification, Tono, Iwate, Japan, July 24-29.*
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31. **Ebbesson, L.O.E.**, P. Ekström, S.O.E. Ebbesson, S.O. Stefansson, and B. Holmqvist. (2001) What's brain got to do with it?- neural circuits and their structural and chemical reorganization in the salmon during parr-smolt transformation. *6th International Workshop on Salmonid Smoltification. Westport, Ireland. Sept 3-7, 2001.*
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Posters

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33. Handeland, S.O., Imsland, A.K., Björnsson, B.Th., Stefansson, S.O., Nilsen, T.O., **Ebbesson, L.O.E.**, Porter M. (2013). Physiology during smoltification in Atlantic salmon: effect of melatonin implants. *World Aquaculture Nashville, Tennessee, Nashville, February 21-25, 2013*

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34. Nilsen, T.O., Sundh, H., Andersen, Ø., Sundell, K., Handeland, S.O., **Ebbesson, L.O. E.**, Jönsson, E., Stefansson, S.O. (2012). The repertoire of the Na, K,-ATPase system in Atlantic cod (*Gadus morhua* L.): tissue distribution and differential expression in response to altered salinity. *10th International Congress on the Biology of Fish, Madison, Wisconsin, July 15-19, 2012.*
35. Nilsen, T.O., Sundh, H., Andersson, E., Sundell, K., Taranger, G.L., Schulz R.W., **Ebbesson, L.O.E.**, Handeland, S.O., Prunet, P., Stefansson, S.O. (2012) Homeostasis in Atlantic salmon: adaptations to fresh- and seawater environments during important life stages (2012). *1st*

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36. **Ebbesson, L.O.E.**, Nilsen, T.O., Handeland, S.O., Stefansson, S.O. (2012). Environmental and Genetic Impacts on Brain Development During Parr-Smolt Transformation – Consequences for Neuroendocrine and Physiological Change. *1st Integrative Salmonid Biology conference, Oslo, Norway, June 17th – 20th, 2012.*

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37. Grassie, C., Braithwaite, V. A., Nilsson, J. and **Ebbesson, L. O. E.** (2011) Learning the hard way: Effects of environmental stress on fish behavior. *Poster presented at the Pennsylvania State University Annual Graduate Exhibition.*

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38. Grassie, C., Braithwaite, V. A., Nilsson, J. and **Ebbesson, L. O. E.** (2010) Quantifying the impact of environmental stress on learning and memory in Atlantic salmon (*Salmo salar*). *Poster presented at The 9th International Congress for the Biology of Fish, Barcelona, Spain.*

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39. Nilsen, T.O., **Ebbesson, L.O.E.**, Björnsson, B.Th., Holm, M., Haugland, M., Stefansson S.O. (2008). Endocrine and osmoregulatory system profiles in wild Atlantic salmon smolts and post-smolts during migration from the river, through the estuary, fjord, costal areas and in open ocean. *6th International Symposium on Fish Endocrinology, Calgary, Canada June 22-27.*
40. **Ebbesson, L.O.E.**, Nilsen, T.O., Stefansson, S.O. (2008). Neuroendocrine development during parr-smolt transformation – consequences for endocrine and physiological change. *6th International Symposium on Fish Endocrinology, Calgary, Canada June 22-27.*

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41. Pittman K, Sæle Ø & **Ebbesson L.O.E.** (2004) Control of metamorphosis is control of juvenile quality? Invited Keynote Lecture, European Aquaculture Society conference. *International Conference Aquaculture Europe 2004. Barcelona, Spain, October 20-23, 2004. EAS Special Publications No. 34, p60-64 (880 pp)*
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44. Kulczykowska, E., Sokolowska, E., Gozdowska, M., Kalamarz, H., Takvam, B., Stefansson, S., **Ebbesson, L.O.E.** (2004) Thyroxine and Ca²⁺: endo- and exogenous factors influencing the capacity of melatonin production in fish. *22nd Conference of European Comparative Endocrinologists, Uppsala, Sweden, August 24-48, 2004.*
45. Helvik, J., **Ebbesson, L.O.E.**, Eilertsen, M., Seo, H., Fjose, A., Drivenes, Ø. (2004) Early expression of VA opsin in Atlantic halibut. *34th Annual Meeting of the Society for Neuroscience, San Diego, CA, USA, November 4-9, 2004.*
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47. **Ebbesson, L.O.E.**, S.O. Stefansson, and B. Holmqvist. (2002). The salmon brain during parr-smolt transformation: a model of neural plasticity. *26th Annual Larval Fish Conference, Bergen, Norway, 22-26 July 2002.*
48. Drivenes, Ø, A. M. Søviknes, **L. O. E. Ebbesson**, A. Fjose, H-C. Seo and J. V. Helvik. (2002). A dual non-visual photoreception system consisting of two melanopsins found in teleosts. *26th Annual Larval Fish Conference, Bergen, Norway, 22-26 July 2002.*
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complement of Atlantic salmon (*Salmo salar*). *Annual Meeting of the Society for Integrative and Comparative Biology, Anaheim, California, 2-6 January 2002,*