

Curriculum Vitae

Jon Helge Vølstad

Chief Scientist, Leader of the Fishery Dynamics Research Group

Address/Affiliation:

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Education:

- Dr.Scient. (Ph.D.) Quantitative Fisheries Biology (Biometrics), University of Bergen (Norway), 1990. (Dissertation: Some Aspects of the Design and Analysis of Marine Abundance Surveys).
- British Council Fellow, Biomathematics/Statistics, Oxford University (U.K.), 1987.
- Cand.real. (M.Sc.) Fisheries Biology including Management, University of Bergen, 1985.
- Cand.mag. (B.S.) Double majors in Mathematics/Statistics and Biology, University of Bergen, 1982.

Key Scientific Qualifications:

Statistical Methods to Assess Fisheries Resources and the Environment; Statistical Survey Sampling methods; Quantitative Fisheries Biology & Modeling with Quantification of Uncertainty; Methods for Fisheries Monitoring; Ecological and Environmental Statistics; Biological Indicators and Biocriteria for Environmental Assessments.

Languages:

- Norwegian - Mother tongue
- English - Full professional proficiency
- Portuguese - Speak and read with high proficiency, limited writing skills
- German - Speak some, read with high proficiency, limited writing skills

Active Membership in Professional Societies:

The American Fisheries Society
The American Statistical Association

Employment History:

- 2010- Chief Scientist, Research group leader, Fishery Dynamics, Institute of Marine Research, Bergen, Norway.
- 2007-2009 Senior Research Scientist, Institute of Marine Research, Bergen, Norway.
- 1999-2007 Principal Biometrician and Program Manager, Versar, Inc., Columbia, Maryland, USA.
- 2003-2006 Adjunct Faculty , University of Maryland, College Park, Graduate School, Department of Animal and Avian Sciences, Biometrics Group.
- 1996-1999 Scientific Advisor, Fisheries Research Institute (IIP), Maputo, Mozambique, & Senior Scientist, Institute of Marine Research, Bergen, Norway (On leave of absence from Versar, Inc.)
- 1994-1996 Senior Scientist, Versar, Inc., Columbia, Maryland, USA.
- 1992-1994 Post-doc. (Applied Mathematician/Statistician), Research group of Prof. Brian Rothschild, University of Maryland, Center for Environmental and Estuarine Studies, Chesapeake Biological Laboratory, Maryland, USA.
- 1990-1992 Senior Research Scientist, Institute of Marine Research, Bergen, Norway. (Fellowship from the Norwegian Research Council.)
- 1987-1990 Research Scholar, Institute of Marine Research, Bergen, Norway (PhD fellowship from the Norwegian Research Council.)
- 1985-1987 Research Scholar, Institute of Marine Research, Bergen, Norway.

Work Experience:

Over 25 years of post-doctoral international research and management experience in quantitative fisheries biology and ecological statistics, specializing in statistical survey methods. Broad experience in the development and optimization of fisheries-dependent and fisheries-independent monitoring programs to support stock assessments and ecosystem based fisheries management.

Recent International Committee Work:

The Workshop on Sampling Design and Optimization (WKSDO), chaired by Cristina Silva, Manuela Azevedo (IPMA-PT) and Jon H. Vølstad (IMR-NO), Lisbon, 17–20 November 2014. Focused on the analysis of the current Portuguese sampling designs under PNAB/DCF (Programa Nacional de Amostragem Biológica/Data Collection Framework)

Chair (with Mike Armstrong, UK), The Third Workshop on practical implementation of statistical sound catch sampling programs (WKPICS3), Copenhagen, Denmark, 19-22 November 2013

Convener (with Mike Armstrong, UK, and Paul Rago, USA). Theme Session J. What's the catch? Designing and implementing statistically sound fishery sampling schemes in the real world. ICES ASC, Reykjavik, September 23-27, 2013.

Chair (with Mike Armstrong, UK), The Second Workshop on practical implementation of statistical sound catch sampling programs (WKPICS2), Copenhagen, Denmark, 6-9 November 2012

Chair (with Mike Armstrong, UK), The Workshop on practical implementation of statistical sound catch sampling programs (WKPICS1), Bilbao, Spain, 8-10 November 2011

Convener (with David A. Van Voorhees, U.S. , Claus Reedtz Sparrevohn, Denmark , Jeremy Lyle, Australia, Maggie Sommer, Scotland). Symposium: Improving Survey Methods for Monitoring Recreational Fishing Effort and Catch, American Fisheries Society Annual Meeting 2011, Seattle, USA.

Co-chair (with Mike Armstrong, UK), The Joint ICES-STEFCF Workshop on methods for merging fleet métiers for fishery based sampling [WKMERGE], ICES HQ, January 19-22, 2010.

Chair (with Sondre Aanes, Norway), Workshop on Methods to Evaluate and Estimate the Precision of Fisheries Data used for Assessment (WKPRECISE), ICES HQ, 8–11 September 2009.

Co-Chair (with Michael Pennington, Norway), Workshop on Methods to Evaluate and Estimate the Accuracy of Fisheries Data used for Assessment (WKACCU), 27–30 October 2008, Bergen, Norway.

Convener (with Dave Van Voorhees, USA, and Patrick Berthou, France), Symposium on Small-scale & Recreational Fisheries Surveys, Assessment, and Management at the 2008 ICES annual science conference in Halifax.

Peer Reviews:

Reviewer for scientific journals:

Aquatic Living Resources; Bull. Mar. Sci.; Can. J. Fish. Aquat. Sci.; Fish. Bull.; Fish. Res.;

ICES J. Mar. Sci.; ICES Mar. Sci. Symp.; Marine Biology Research; Nature; New Zealand Journal of Marine & Freshwater Research; North Am. J. Fish Management; Sequential Analysis; Trans. Am. Fish. Soc.; Journal of the American Benthic Society (JNABS)

Reviewer for agencies:

- Contracted by the Center of Independent Experts (CIE) as reviewer on SEDAR (South East Data, Assessment and Review) workshop to evaluate assessments of the Status of the Stocks of Red Snapper, and Gery Triggerfish from the south east of the U.S. in 2016. Charleston, SC, March 15-18, 2016.
- CIE panel member , Review of Sea Scallop Survey Methodologies and Their Integration for Stock Assessment and Fishery Management. Review organized by the Northeast Fisheries Science Center, Woods Hole. The data from the surveys being reviewed supports the most valuable single species fishery in the U.S. March, 2015.
- Member of review panel, Northeast Fisheries Science Center Science (NEFSC), Program Review of Stock Assessment Program. The focus was on the overall process including data preparation, assessment modeling, peer review process and communication. The Northeast Fisheries Science Center, Woods Hole, Massachusetts, USA, May 19-23, 2014.
- CIE panel member, Review of the Joint Pacific Sardine and Pacific hake (SaKe) acoustic-trawl survey. The Northwest Fisheries Science Center in Seattle, Washington, on January 21-24, 2014.
- Member of review panel, Northeast Fisheries Science Center Science (NEFSC) Data Collection Program Review. The review focused on fishery-independent and fishery-dependent data, data management, and quality control as they relate to stock assessments for which the NEFSC has jurisdiction.. The Northeast Fisheries Science Center, Woods Hole, Massachusetts, USA, August 5-9, 2013.
- CIE panel member, review of the eastern Bering Sea crab and groundfish bottom trawl surveys conducted by the Alaska Fisheries Science Center (AFSC). The data from this survey are used in more than 25 stock assessments conducted by the AFSC as well as the State of Alaska and the International Pacific Halibut Commission. April, 2012.
- CIE panel member of a joint Canada-U.S. Pacific hake / whiting Stock Assessment Review (STAR) Panel meeting, Seattle, Washington, February 3-6, 2009. The Panel operated under the U.S. Pacific Fishery Management Council's Terms of Reference for the Groundfish Stock Assessment and Review Process.
- Contracted by ICES as an expert reviewer of the EU COST project, 'Common tool for raising and estimating properties of statistical estimates derived from the Data Collection Regulation Studies and Pilot projects for carrying out the common fisheries policy', Project no SI2.467814. May 2009.

- Contracted by the National Marine Fisheries Services (USA) to serve on the expert review panel for the Ground fish Assessment Review Meeting (GARM III). Northeast Fisheries Science Center, Woods Hole, USA, October 29-Nov 2, 2007.
- Member of expert panel invited by Northeast Fisheries Science Center (NEFSC) to review planned experiments to calibrate NOAA research vessel R/V Henry B Bigelow relative to R/V Albatross IV. Woods Hole, MA, April 25-27, 2007
- Member of an expert panel to review the Atlantic States Cooperative Statistics Program in the US. This review, conducted in Baltimore from September 19-21, 2006, was by invitation from the American Fisheries Society, Marine Fisheries Section.
- CIE reviewer on the Stock Assessment Review (STAR) Panel assembled to review new assessments for US West Coast stocks of English sole, petrale sole, and starry flounder. Northwest Fisheries Science Center, Seattle, WA, 18-22 April 2005
- CIE reviewer on SEDAR (South East Data, Assessment and Review) workshops on Gulf and South Atlantic King mackerel (SEDAR 5), SEFSC Laboratory in Miami Florida, February 16-19, Miami, USA, 2004.
- CIE reviewer on SEDAR (South East Data, Assessment and Review) workshops to evaluate assessments of the Status of the Stocks of Vermilion Snapper, and Black Sea Bass from the south east of the U.S. in 2003. Raleigh, NC, February 25-28, 2003.
- Reviewed the Artisanal Fisheries Monitoring Program conducted by IIP-Instituto Nacional de Investigação Pesqueira (Mozambican Fisheries Research Institute), contracted by IIP. Maputo, Mozambique, August 29 to September 13, 2004.
- Member of an expert review team selected by the American Fisheries Society's Marine Fisheries Section to assess Atlantic States Cooperative Statistics Program (ACCSP) pilot survey of for-hire fisheries (i.e., charter and party/head boats) on the U.S. Atlantic Coast. 2002.
- CIE reviewer on the first Groundfish Assessment Review Meeting (GARM) for 20 northeast USA stocks managed under the Northeast Multispecies Fishery Management Plan (Multispecies FMP). Woods Hole, Massachusetts from October 8-11, 2002

Student supervision (*Since 2007*)

Main supervisor for Keno Ferter, University of Bergen, M.Sc., 09/2009 – 06/2011; PhD, 2011-2015 (Defended June 26, 2015)

Co-supervisor for Alf Ring Kleiven, University of Tromsø, PhD, Defended 2010.

Co-supervisor for Andre Moan, University of Oslo, 09/2015-

Contracts and grants

Norwegian Fisheries Research Council

- Norwegian Fisheries Research Council Research Fellowship (1990-1991).
- Norwegian Fisheries Research Council. Dr.Scient. fellowship (1987-1989).

Institute of Marine Research, Bergen, Norway

- Norwegian Research Council. Uncertainty Assessments Related to Opening New Areas for Petroleum Activity, UnCap. 2011-2013. NOK 6,567,000. Project leader: Jon Helge Vølstad.
- Norwegian Research Council. RECFISH. 2008. Workshop on survey methods for estimating catch, effort and economic value of widely dispersed marine recreational fisheries in Europe. 2010. 210,000 NOK.
- Norwegian Fisheries Research Council Competitive Travel Stipend in support of research visits at NOAA, NEFSC, Woods Hole Laboratory, USA (1988, 1989, 1990, 1991, 1992).
- University of Bergen Competitive travel grant in support of research visit at NOAA, NEFSC, Woods Hole Laboratory, USA (1989).
- British Council Fellowship, Biomathematics/Statistics, Oxford University (U.K.) (1987)

University of Maryland, USA.

- National Oceanographic and Atmospheric Administration (NOAA): "Abundance estimation and Stock Assessment of the Blue Crab in the Chesapeake Bay". Principal investigators: B.J. Rothschild and J.H. Vølstad (FY-1993). \$138,703
- Renewal of Development and Implementation of the Chesapeake Bay Fishery-Independent Multispecies Survey (CHESFIMS), National Oceanic and Atmospheric Administration/ National Marine Fisheries Service/ Chesapeake Bay Program Office, awarded May 2000, PIs: T. J. Miller, E. D. Houde, M. Christman, A. Sharov, J. Vølstad, Chesapeake Biological Laboratory, Jan – Dec 2003. \$ 299,000
- Improving methods for estimating dredge catching efficiency in the Chesapeake Bay fishery-independent bluecrab surveys in support of improved stock assessment and fisheries management (funded by NOAA). PIs: Drs. John Hoenig, Rom Lipcius (VIMS), Dr. J.H. Vølstad (UMD), Dr. Mary Christman (University of Florida), Dr. Alexei Sharov, and Glen Davis (Maryland DNR). 2004-2005. \$ 30,000

Versar, Inc. Maryland, USA. (Selected Projects)

- Blue Crab Target-Setting, U.S. Environmental Protection Agency, Chesapeake Bay Program Office, PIs: J.H. Vølstad (Versar, Inc.), E. Houde, and T. Miller (University of Maryland). May 1995 to November 1996. \$ 20,000
- Analytical and Statistical Review of Procedures for Collection and Analysis of Commercial Fishery Data Used for Management and Assessment of Groundfish Stocks in the U.S. Exclusive Economic Zone off Alaska, U.S. Department of Commerce, National Marine Fisheries Service, Alaska Fisheries Science Center. PI: J.H. Vølstad. September 1995 to October 1997. \$ 142,000
- Development and selective implementation (as a pilot study) of a survey of the blue crab fishery in Maryland, Maryland Department of Natural Resources Fisheries Service, March 29, 2001 to December 13, 2001. PI: J.H. Vølstad \$14,394
- Development and Implementation of the Chesapeake Bay Fishery-Independent Multispecies Survey (CHESFIMS), National Oceanic and Atmospheric Administration/ National Marine Fisheries Service/ Chesapeake Bay Program Office, awarded May 2000, PIs: T. J. Miller, E. D. Houde, M. Christman, A. Sharov, J. Vølstad, Chesapeake Biological Laboratory, Jan – Dec 2001. \$ 310,000
- Renewal of Development and Implementation of the Chesapeake Bay Fishery-Independent Multispecies Survey (CHESFIMS), National Oceanic and Atmospheric Administration/ National Marine Fisheries Service/ Chesapeake Bay Program Office, awarded May 2000, PIs: T. J. Miller, E. D. Houde, M. Christman, A. Sharov, J. Vølstad, Chesapeake Biological Laboratory, Jan – Dec 2002. \$ 240,000
- Design and Implementation of a Survey of Commercial Blue Crab Effort in the Maryland Portion of the Chesapeake Bay, awarded May 2002, Maryland Department of Natural Resources, May 2002- March 2003. P.I.s: Mary C. Christman and J.H. Vølstad. \$ 213,003
- Delaware River and Estuary Creel Survey of Recreational Fishing, The Pennsylvania Fish and Boat Commission/Delaware River Basin Fish and Wildlife Management Cooperative, March 15 2002 to April 30, 2003. PI: J.H. Vølstad \$ 279,371
- Literature Search And Data Synthesis Of Biological Information For Use In Management Decisions Concerning Decommissioning Of Offshore Oil And Gas Structures In The Gulf Of Mexico. Contract from Minerals Management Service, January 2005-December 2007. PI: J.H. Vølstad \$300,000
- Lead scientist at Versar for obtaining a \$5 million, five-year contract from the National Oceanic & Atmospheric Administration for scientific and technical support at the National Marine Fisheries Services Chesapeake Bay Office (2005-2009). Under the contract Versar helped NOAA conducting habitat surveys, environmental modeling and

educational outreach, and contracted scientific staff to National Marine Fisheries Services office in Oxford, Md..

Full Bibliography:

Book Chapters:

Sandersen, H., Mikkelsen, E., Moksness, E. and Vølstad, J. H. (2013) Knowledge Issues in ICZM and EBM Applied on Small Geographic Scales: Lessons from a Case Study in Risør, Norway, in *Global Challenges in Integrated Coastal Zone Management* (eds E. Moksness, E. Dahl and J. Støttrup), John Wiley & Sons, Ltd, Oxford, UK. doi: 10.1002/9781118496480.ch10

Pennington, Michael, Mikhail S. Shevelev, Jon Helge Vølstad and Odd Nakken. 2011. Chapter 10.3 Bottom trawl surveys. In: *The Barents Sea. Ecosystem, resources, management. Half a century of Russian-Norwegian cooperation*, pp. 570-584. Ed. by T. Jakobsen. and V.K. Ozhigin, V.K. Tapir Academic Press, Trondheim.

Sokolov, Konstantin M., Jon Helge Vølstad. 2011. Chapter 13.d. Marine Tourism. In: *The Barents Sea. Ecosystem, resources, management. Half a century of Russian-Norwegian cooperation*, pp. 678-686. Ed. by T. Jakobsen. and V.K. Ozhigin, V.K. Tapir Academic Press, Trondheim.

Peer-Reviewed Publications:

Nøttestad, L., Utne, K. R., Óskarsson, G. J., Jonsson, S., Jacobsen, J. A., Tangen, Ø., & Debes, H. 2016. Quantifying changes in abundance, biomass and spatial distribution of Northeast Atlantic (NEA) mackerel (*Scomber scombrus*) in the Nordic Seas from 2007 to 2014. *ICES Journal of Marine Science*. Doi: 10.1093/icesjms/fsv218.

Dankel, D. J., Vølstad, J. H., & Aanes, S. 2015. Communicating uncertainty in quota advice: the case for Confidence Interval Harvest Control Rules (CI-HCRs) for fisheries. *Canadian Journal of Fisheries and Aquatic Sciences*, 73 (999): 1-9. Doi: 10.1139/cjfas-2015-0078

Aanes, S. and J.H. Vølstad. 2015. Efficient statistical estimators and sampling strategies for estimating the age-composition of fish. *Can. J. Fish. Aquat. Sci.* 72: 1-16.

Fangel, K., Ø. Aas, J.H. Vølstad, K. Magnus Bærum, S. Christensen-Dalsgaard, K. Nedreaas, M. Overvik, L.C. Wold, T. Anker-Nilssen. 2015. Assessing incidental bycatch of seabirds in Norwegian coastal 2 commercial fisheries: empirical and methodological lessons. *Global Ecology and Conservation* 4: 127-136.

Ferter, K., Weltersbach, M. S., Humborstad, O. B., Fjellidal, P. G., Sambraus, F., Strehlow, H. V., & Vølstad, J. H. 2015. Dive to survive: effects of capture depth on barotrauma and post-release survival of Atlantic cod (*Gadus morhua*) in recreational fisheries. *ICES Journal of Marine Science: Journal du Conseil*, 72(8): 2467-2481. doi:10.1093/icesjms/fsv102

- Stenevik, E. K., Vølstad, J. H., Høines, Å., Aanes, S., Óskarsson, G. J., Jacobsen, J. A., & Tangen, Ø. 2015. Precision in estimates of density and biomass of Norwegian spring-spawning herring based on acoustic surveys. *Marine Biology Research*, (ahead-of-print), 1-13. Doi: 10.1080/17451000.2014.995672
- Vølstad, J.H., P. Santana Afonso, A. P. Baloi; N. de Premegi; J. Meisfjord, and M. Cardinale. 2014. Probability-based monitoring of catch and effort in coastal small-scale fisheries. *Fish. Res.* 151: 39– 46.
- Cardinale, M, O. Chacate, M. Casini, I. Chaúca, and J.H. Vølstad. 2014. Trend analysis of the coastal marine resources exploited by the artisanal fisheries in Mozambique using daily-trip based catch data during 1997-2009. *Scientia Marina* 78(1). doi: <http://dx.doi.org/10.3989/scimar.03826.06C>
- Ferter, K., M.S. Weltersbach, H.V. Strehlow, J.H. Vølstad, J. Alós, R. Arlinghaus, M. Armstrong, M. Dorow, M. de Graaf, T. van der Hammen, K. Hyder, H. Levrel, A. Paulrud, K. Radtke, D., C. Reedtz Sparrevohn and P. Veiga. 2013. *ICES Journal of Marine Science* 70: 1319-1329. doi: 10.1093/icesjms/fst104
- Ferter, K., T. Borch, J. Kolding, and J.H. Vølstad. 2013. Angler behavior and implications for management – Catch-and-Release among marine angling tourists in Norway. *Fisheries Management and Ecology* 20: 137-147.
- Weber, Edward D., Jon Helge Vølstad, Mary C. Christman, Danny Lewis & Jodi R. Dew-Baxter. 2013. Application of a Demographic Model for Evaluating Proposed Oyster-Restoration Actions in Chesapeake Bay, *Human and Ecological Risk Assessment: An International Journal*, DOI:10.1080/10807039.2013.767110
- Hirst, D., Storvik, G., Rognebakke, H., Aanes, S., and Vølstad, J.H. 2012. A modeling approach to the estimation of catch-at-age of commercial fish species. *Canadian Journal of Fisheries and Aquatic Sciences* 69: 1–13. doi:10.1139/CJFAS-2012-0075
- Ring Kleiven, A., E. Moland Olsen, J.H. Vølstad. 2012. Total catch an order of magnitude above reported catches for a red-listed marine species. *PLoS ONE* 7(2): e31216. doi:10.1371/journal.pone.0031216
- Kleiven, A. R., Olsen, E. M. and Vølstad, J. H. 2011. Estimating recreational and commercial fishing effort for European lobster *Homarus gammarus* by strip transect sampling. *Marine and Coastal Fisheries* 3: 383–393. Link: <http://www.tandfonline.com/doi/full/10.1080/19425120.2011.638798>
- Moksness, E., J. Gjørseter, G. Lagaille, E. Mikkelsen, E. Moland Olsen, H. T. Sandersen, and J. H. Vølstad. 2011. Effects of fishing tourism in a coastal municipality: a case study from Risør, Norway. *Ecology and Society* 16(3): 11. <http://dx.doi.org/10.5751/ES-04290-160311>
- Vølstad, J. H., Korsbrekke, K., Nedreaas, K. H., Nilsen, M., Nilsson, G. N., Pennington, M., Subbey, S., and Wienerroither, R. 2011 Probability-based surveying using self-sampling to

estimate catch and effort in Norway's coastal tourist fishery. – *ICES Journal of Marine Science*, 68: 1785-1791. <http://dx.doi.org: 10.1093/icesjms/fsr077>

Llansó, R.J, J.H.Vølstad, D.M. Dauer, and J.R. Dew. 2009. Assessing benthic community condition in Chesapeake Bay: does the use of different benthic indices matter? *Environmental Monitoring and Assessment* 150:119–127

Llansó, R.J., D.M. Dauer, and J.H. Vølstad. 2009. Assessing ecological integrity for impaired waters decisions in Chesapeake Bay, USA. *Marine Pollution Bulletin* 59: 48–53.

Southerland, M.T., J.H. Vølstad, E.D. Weber, R.J. Klauda, C.A. Poukish, and M.C. Rowe. 2009. Application of the Probability-based Maryland Biological Stream Survey to the State's Assessment of Water Quality Standards. *Environmental Monitoring and Assessment*, *Environmental Monitoring and Assessment* 150:65–73

Vølstad, J.H., J. Dew, and M. Tarnowski. 2008. Estimation of annual mortality rates for eastern oysters (*Crassostrea virginica*) in Chesapeake Bay based on box counts and application of those rates for projection of population growth of both *C. virginica* and the Asian oyster (*C. ariakensis*). *J. Shellfish Research* 27:1-9.

Slacum, Ward Jr., J.H. Vølstad, E.D. Weber, W.A. Richkus, R. J. Diaz, and C.O. Tallent. 2008. The Value of Applying Commercial Fisher's Experience with Designed Surveys to Identify Characteristics of Essential Fish Habitat for Adult Summer Flounder (*Paralichthys dentatus*). *North American Journal of Fisheries Management* 28:710–721.

Vølstad, Jon H., Mary C. Christman, Danny Lewis, Edward D. Weber, and Jodi Dew. 2007. A Demographic Model of Oyster Populations in the Chesapeake Bay to Evaluate Proposed Oyster-Restoration Alternatives. 224 pp. Report to Maryland Department of Natural Resources.

Vølstad, J.H, Pollock, K. H., and Richkus, W. 2006. Comparing and combining effort and catch estimates from aerial-access designs, with applications to a large-scale angler survey in the Delaware River. *North American Journal of Fisheries Management* 26:727–741

Southerland, M.T., R.E. Jung, D.P. Baxter, I.C. Chellman, G. Mercurio, and J.H. Vølstad. 2004. Streamside salamanders as indicators of stream quality in Maryland. *Applied Herpetology* 2:1-24.

Vølstad, J.H., N.E. Roth, G. Mercurio, M.T. Southerland, and D. Strebel 2003. Using environmental stressor information to predict the ecological status of Maryland non-tidal streams as measured by biological indicators. *Environmental Monitoring and Assessment* 84 (3): 219-242.

Vølstad, J.H., N.K. Neerchal, N.E. Roth and M.T. Southerland. 2003. Combining biological indicators of watershed condition from multiple sampling programs - A case study from Maryland, USA. *Ecological Indicators* 3: 13-25.

Sharov, A.F., J.H. Vølstad, G.R. Davis, B.K. Davis, R.N. Lipcius, and M.M. Montane. 2003. Abundance and exploitation rate of the blue crab (*Callinectes sapidus*) in Chesapeake Bay. *Bulletin of Marine Science* 72 (2): 543–565.

Llansó, R. J., D.M. Dauer, J.H. Vølstad, and L.C. Scott. 2003. Application of the benthic index of biotic integrity to environmental monitoring in Chesapeake Bay. *Environmental Monitoring and Assessment* 81:163-174.

Vølstad, J.H., A.F. Sharov, G. Davis, and B. Daugherty. 2000. A method for estimating dredge catching efficiency for blue crabs, *Callinectes sapidus*, in Chesapeake Bay. *Fishery Bulletin* 98: 410-420.

Heimbuch, D.G., H.T. Wilson, S.B. Weisberg, J.H. Vølstad, and P.F. Kazyak. 1997. Estimating fish abundance in stream surveys by using double-pass removal sampling. *Transactions of the American Fisheries Society* 126: 795-803.

Strand, Ø. and J.H. Vølstad. 1997. The Molluscan Fisheries and Culture of Norway, p. 7-24. In *The history, present condition, and future of the molluscan fisheries of North and Central America and Europe, Volume 3, Europe*. Edited by Clyde L. MacKenzie, Jr., Victor G. Burrell, Jr., Aaron Rosenfield, and Willis L. Hobart. NTIS number: PB97-164859. U.S. Dep. Commer., NOAA Tech. Rep. NMFS 129.

Bogstad, B., Pennington, M. and J.H. Vølstad. 1995. Cost-efficient survey designs for estimating the food consumption by fish. *Fisheries Research* 23: 37-46.

Pennington, M. and J.H. Vølstad. 1994. Assessing the effect of intra-haul correlation and variable density on estimates of population characteristics from trawl surveys. *Biometrics* 50: 725-732.

Polacheck, T. and J.H. Vølstad. 1993. Analysis of spatial variability of George Bank haddock (*Melanogrammus aeglefinus*) from trawl survey data using a linear regression model with spatial interaction. *ICES Journal of Marine Science* 50: 1-8.

Pennington, M. and J.H. Vølstad. 1991. Optimum size of sampling unit for estimating the density of marine populations. *Biometrics* 47: 717-723.

Godø, O.R., M. Pennington and J.H. Vølstad. 1990. Effect of tow duration on length composition of trawl catches. *Fisheries Research* 9: 165-179.

Technical Reports and Published Abstracts:

S. Aanes, J.H. Vølstad og E.K. Stenevik. 2016. Usikkerhet i sildeberegningene – slik vet vi hva vi ikke vet (Uncertainty in the assessment of herring --- this is how we know what we don't know). Pp 110-112, Havforskningsrapporten 2016.

Nøttestad, Leif; Utne, Kjell Rong; Tangen, Øyvind; Anthonypillai, Valentine; Aanes, Sondre; Vølstad, Jon Helge; Bernasconi, Matteo; Holst, Jens Christian; Slotte, Aril. 2015. Increased

biomass indices, spatial distribution and density of Northeast Atlantic (NEA) mackerel (*Scomber scombrus*) in the Nordic Seas from 2007 to 2014. POLSHIFT conference; 2015-04-14 - 2015-04-15

ICES. 2014 . Report of the third Workshop on Practical Implementation of Statistical Sound Catch Sampling Programmes, 19-22 November 2013, ICES HQ, Copenhagen, Denmark. ICES CM2013/ACOM:54. 109pp. [Chaired by Jon Helge Vølstad and Mike Armstrong]

Kleiven, A.R., J.H. Vølstad, K. Ferter og E.M. Olsen. 2013. Store urapporterte fangster i hummerfisket. Side 79-81. Fisken og Havet. Særnummer 1-2013.

ICES. 2013. Report of the second Workshop on Practical Implementation of Statistical Sound Catch Sampling Programmes, 6 - 9 November 2012, ICES Copenhagen. ICES CM 2012 / ACOM:54 71 pp. [Chaired by Jon Helge Vølstad and Mike Armstrong]

David Hirst, Sondre Aanes, and Jon Helge Vølstad. 2013. Comparing model-based and design-based estimators for catch-at-age. ICES ASC 2013, J:03.

David Hirst, Sondre Aanes, and Jon Helge Vølstad. 2013. A simulation study to establish the relationship between sample sizes and the uncertainty in estimates of catch - at -age from multi - stage sampling programs. ICES ASC 2013/Session J, J:04.

Aanes, S., S. Subbey, and J.H. Vølstad. 2013. Assessing adequate level of catch- and survey-monitoring for stock assessment and estimation of biological reference points for Northeast Arctic Cod . ICES 2013 ASC/Session J, J:07.

Aanes, S. and J.H. Vølstad. 2013. Evaluating sampling strategies and comparing statistical estimators with the use of age-length keys to estimate age-distributions of Northeast Arctic Cod. ICES 2013 ASC/Session J, J:08.

Subbey, S., S. Aanes, J.H. Vølstad. 2012. Evaluating how precision in estimates of abundance indices by age from a fisheries-independent trawl survey affects the assessment of Northeast Arctic Cod. ICES 2012 ASC/ Session F.

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