7. References

Ahtiainen H (2016) Benefits of reduced eutrophication: evidence from Finland, the Baltic Sea areas, and Europe for policy making. Natural Resources and Bioeconomy Studies 6:49. http://urn.fi/URN:ISBN:978-952-326-176-1

Ahtiainen H, T Lankia, J Lehtonen, O Lehtonen, C Bertram, J Meyerhoff, K Pakalniete, K Rehdanz and E Pouta (2022) Welfare effect of substitute sites for coastal recreation – evidence from the Baltic Sea. Journal of Environmental Economics and Policy 11:375-395. https://doi.org/10.1080/21606544.2022.2043188

Anon (1895) Svensk fiskeritidskrift 1895, acc. HELCOM (2023) Population trends and abundance of seals – Grey seals. https://indicators.helcom.fi/indicator/grey-seal-abundance/

Aronson J and S Alexander (2013) Ecosystem Restoration is Now a Global Priority: Time to Roll up our Sleeves. Restoration Ecology 21: 293-296. https://doi.org/10.1111/rec.12011

ASCOBANS (2000) Agreement on the conservation of small cetaceans of the Baltic and North Seas. Proceedings of the third meeting of parties to ASCOBANS. Bristol, UK, 26–28 July 2000. https://www.ascobans.org/en/document/proceedings-third-meeting-parties-ascobans

Badry A, Treu G, Gkotsis G, Nika M-C, Alygizakis N, Thomaidis NS, Voigt CC and O Krone (2022) Ecological and spatial variations of legacy and emerging contaminants in white-tailed sea eagles from Germany: Implications for prioritisation and future risk management. Environment International 158: 106934. https://doi.org/10.1016/j.envint.2021.106934

Bayraktarov E, MI Saunders, S Abdullah, M Mills, J Beher, HP Possingham, PJ Mumby and CE Lovelock (2016) The cost and feasibility of marine coastal restoration. Ecological Applications 26:1055–1074. https://doi.org/10.1890/15-1077

Beaumont NJ, L Jones, A Garbutt, JD Hansom and M Toberman (2014) The value of carbon sequestration and storage in coastal habitats. Estuarine, Coastal and Shelf Science 137:32-40. https://doi.org/10.1016/j.ecss.2013.11.022

Belkin IM (2019) Rapid warming of large marine ecosystems. Progress in Oceanography 81:207–213. https://doi.org/10.1016/j.pocean.2009.04.011

Bellebaum J, A Diederichs, J Kube, A Schulz and G Nehls (2006) Flucht-und meidedistanzen überwinternder seetaucher und meeresenten gegenüber Schiffen auf see. Ornithologischer Rundbrief Mecklenburg-Vorpommern 45:89–90. https://www.bioconsult-sh.de/fileadmin/user_upload/Publikationen/2006/Flucht-_und_Meidedistanzen_ueberwinternder_Seetaucher_und_Meeresenten_gegenueber_Schiffen_auf_See.pdf

Berggren P (1994) Bycatches of the harbour porpoise (Phocoena phocoena) in the Swedish Skagerrak, Kattegat and Baltic Seas 1973–93. Report of the International Whaling Commission (Special Issue) 15:211–216. https://eprints.ncl.ac.uk/file_store/production/217510/3702978B-04EE-438E-962D-B3DD8FA8EA98.pdf

Bergman A (1999) Health condition of the Baltic grey seal (Halichoerus grypus) during two decades. Gynaecological health improvement but increased prevalence of colonic ulcers. Acta Pathologica, Microbiologica et Immunologica Scandinavica 107: 270–282. https://doi.org/10.1111/j.1699-0463.1999.tb01554.x

Bergström A, Tatarenkov A, Johannesson K, Jonsson RB and L Kautsky (2005) Genetic and morphological identification of Fucus radicans sp. nov. (Fucales, Phaeophyceae) in the brackish Baltic Sea. Journal of Phycology 41: 1025-1038. https://doi.org/10.1111/j.1529-8817.2005.00125.x

Bergström L, Karlsson M, Bergström U, Pihl L and P Kraufvelin (2018) Relative impacts of fishing and eutrophication on coastal fish assessed by comparing a no-take area with an environmental gradient. Ambio 48: 565-579. https://doi.org/10.1007/s13280-018-1133-9

Bergström L, J Dainys, O Heikinheimo, E Jakubaviciute, E Kruze, A Lappalainen, L Lozys, A Minde, L Saks, R Svirgsden, K Ådjers and J Olsson (2016) Long term changes in the status of coastal fish in the Baltic Sea. Estuarine Coastal and Shelf Science 169: 74-84. https://doi.org/10.1016/j.ecss.2015.12.013

Black K (Ed) (2001) Environmental impacts of aquaculture. Sheffield Academic Press, Sheffield, UK, 219 pp. ISBN 1–84127–041–5.

Blenckner T, M Llope, C Möllmann, R Voss, MF Quaas, M Casini, M Lindegren, C Folke and NC Stenseth (2015) Climate and fishing steer ecosystem regeneration to uncertain economic futures. Proceedings of the Royal Society B 282:20142809. https://doi.org/10.1098/rspb.2014.2809

Brander LM, P van Beukering, L Nijsten, A McVittie, C Baulcomb, FV Eppink and JAC van der Lelij (2015) The global costs and benefits of expanding Marine Protected Areas. Marine Policy 116:103953. https://doi.org/10.1016/j.marpol.2020.103953

Brandt MJ, A Diederichs, K Betke and G Nehls (2009) Responses of harbour porpoises to pile driving at the Horns Rev II offshore wind farm in the Danish North Sea. Marine Ecology Progress Series 421:205-216. https://doi.org/10.3354/meps08888

Broman D, C Näuf, I Lundbergh and Y Zebühr (1990) An in situ study on the distribution, biotransformation and flux of polycyclic aromatic hydrocarbons (pahs) in an aquatic food chain (seston-Mytilus edulis L.-Somateria mollissima L.) from the baltic: An ecotoxicological perspective. Environmental Toxicology and Chemistry 9:429-442. https://doi.org/10.1002/etc.5620090404

Bryhn A, Kraufvelin P, Bergström U, Vretborn M and L Bergström (2020) A model for disentangling dependencies and impacts among human activities and marine ecosystem services. Environmental Management 65:575-586. https://doi.org/10.1007/s00267-020-01260-1

Cardinale M, J Hagberg, H Svedäng, V Bartolino, T Gedamke, J Hjelm, P Börjesson and F Norén (2009) Fishing through time: population dynamics of plaice (Pleuronectes platessa) in the Kattegat–Skagerrak over a century. Population Ecology 52: 251–262. https://doi.org/10.1007/s10144-009-0177-x

Carstensen J, Andersen JH, Gustafsson BG and D Conley (2014a) Deoxygenation of the Baltic Sea during the last century. Proceedings of the National Academy of Sciences, USA 111:5628–5633. https://doi.org/10.1073/pnas.1323156111

Carstensen J, D Conley, E Bonsdorff, B Gustafsson, S Hietanen, U Janas, T Jilbert, A Maximov, A Norkko, J Norkko, J. D Reed, C Slomp, K Timmermann and M Voss (2014) Hypoxia in the Baltic Sea: Biogeochemical cycles, benthic fauna, and management. Ambio 43:26–36. https://doi.org/10.1007/s13280-013-0474-7

Casini M, Blenckner T, Moellmann C, Gardmark A, Lindegren M, Llope M, Kornilovs G, Plikshs M and NC Stenseth (2012) Predator transitory spillover induces trophic cascades in ecological sinks. Proceedings of the National Academy of Sciences 109:8185–8189. https://www.pnas.org/doi/pdf/10.1073/pnas.1113286109

Casini M, J Hjelm, J-C Molinero, J Lövgren, M Cardinale, V Bartolino, A Belgrano and G Kornilovs (2009) Trophic cascades promote threshold-like shifts in pelagic marine ecosystems. Proceedings of the National Academy of Sciences 106:197. https://doi.org/10.1073/pnas.0806649105

Casini M, J Lövgren, J Hjelm, M Cardinale, J-C Molinero and G Kornilovs (2008) Multi-level trophic cascades in a heavily exploited open marine ecosystem. Proceedings of the Royal Society B 275:1793-1801. https://doi.org/10.1098/rspb.2007.1752

Clausen KK and P Clausen (2014) Forecasting future drowning of coastal waterbird habitats reveals a major conservation concern. Biological Conservation 171:177-185. https://doi.org/10.1016/j.biocon.2014.01.033

Clausen KK, M Stjernholm and P Clausen (2013) Grazing management can counteract the impacts of climate change-induced sea level rise on salt marsh-dependent waterbirds. Journal of Applied Ecology 50: 528-537. https://doi.org/10.1111/1365-2664.12043

Cook ASCP, NHK Burton (2010) A review of the potential impacts of marine aggregate extraction on seabirds. 34 Marine Environment Protection Fund (MEPF) Project 09/P130. ISBN: 978 0 907545 35 4 https://www.bto.org/sites/default/files/shared_documents/publications/research-reports/2010/rr563.pdf

Darwiche-Criado N, R Sorando, SG Eismann and FA Comín (2017) Comparing two multi-criteria methods for prioritizing wetland restoration and creation sites based on ecological, biophysical and socio-economic factors. Water Resources Management 31: 1227–1241. https://doi.org/10.1007/s11269-017-1572-2

Dayton PK, SF Thrush, MT Agardy and RJ Hofman (1995) Environmental effects of marine fishing. Aquatic Conservation 5: 205-232. https://doi.org/10.1002/aqc.3270050305

Derraik JGB (2002) The pollution of the marine environment by plastic debris: a review. Marine Pollution Bulletin 44:842–852. https://doi.org/10.1016/s0025-326x(02)00220-5

Dias MP, R Martin, EJ Pearmain, IJ Burfield, C Small, RA Phillips, O Yates, B Lascelles, PG Borboroglu, JP Croxall (2019) Threats to seabirds: A global assessment, Biological Conservation 237:525–537. https://doi.org/10.1016/j.biocon.2019.06.033

Dierschke V, K-M Exo, B Mendel and S Garthe (2012) Threats for red-throated divers Gavia stellata and black-throated divers G. arctica in breeding, migration and wintering areas: a review with special reference to the German marine areas. Vogelwelt 133: 163-194. (In German).

Dierschke V, RW Furness and S Garthe (2016) Seabirds and offshore wind farms in European waters: Avoidance and attraction. Biological Conservation 202: 59-68. https://doi.org/10.1016/j.biocon.2016.08.016

Dähne M, A Gilles, K Lucke, V Peschko, S Adler, K Krügel, J Sundermeyer and U Siebert (2013) Effects of pile- driving on harbour porpoises (Phocoena phocoena) at the first offshore wind farm in Germany. Environmental Research Letters 8:025002. http://stacks.iop.org/ERL/8/025002

EC (1992) Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:1992L0043:20070101:EN:PDF

EC (2000) Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy https://eur-lex.europa.eu/eli/dir/2000/60/oj

EC (2008) Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy (Marine Strategy Framework Directive) http://data.europa.eu/eli/dir/2008/56/oj

EC (2008) Directive 2008/105/EC of the European Parliament and of the Council of 16 December 2008 on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC of the European Parliament and of the Council. http://data.europa.eu/eli/dir/2008/105/2013-09-13

EC (2013) Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 and (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC http://data.europa.eu/eli/reg/2013/1380/oj

EC (2017a) Commission Decision (EU) 2017/848 of 17 May 2017 laying down criteria and methodological standards on good environmental status of marine waters and specifications and standardised methods for monitoring and assessment, and repealing Decision 2010/477/EU http://data.europa.eu/eli/dec/2017/848/oj

EC (2017b) Commission Directive (EU) 2017/845 of 17 May 2017 amending Directive 2008/56/EC of the European Parliament and of the Council as regards the indicative lists of elements to be taken into account for the preparation of marine strategies http://data.europa.eu/eli/dir/2017/845/oj

EC (2020a) Communication from the Commission to the European Parliament, The Council, The European Economic and Social Committee and the Committee of the Regions. An EU Strategy to harness the potential of offshore renewable energy for a climate neutral future. COM/2020/741 final. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2020:741:FIN&qid=1605792629666

EC (2020b) Proposal for a regulation of the European Parliament and of the Council on nature restoration. COM/2022/304 final https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0304

EC (2020c) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee for the Regions: EU Biodiversity Strategy for 2030: Bringing nature back into our lives. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020DC0380

EC (2022) European Commission. MSFD CIS Guidance Document No. 19, Article 8 MSFD, May 2022. https://circabc.europa.eu/d/d/workspace/SpacesStore/d2292fb4-ec39-4123-9a02-2e39a9be37e7/GD19%20-%20MSFDguidance_2022_Art.8Assessment(1).pdf

EEA (2022) European Environmental Agency. Arctic and Baltic sea ice. Arctic and Baltic sea ice (europa.eu) December 2022.

Eero M, FW Köster and BR MacKenzie (2008) Reconstructing historical stock development of Atlantic cod (Gadus morhua) in the eastern Baltic Sea before the beginning of intensive exploitation. Canadian Journal of Fisheries and Aquatic Sciences 65: 2728–2741. https://doi.org/10.1139/F08-176

Eero M, J Dierking, C Humborg, E Undeman, BR MacKenzie, H Ojaveer, T Salo and FW Köster (2021) Use of food web knowledge in environmental conservation and management of living resources in the Baltic Sea. ICES Journal of Marine Science 78:2645-2663. https://academic.oup.com/icesjms/article/78/8/2645/6355112

Einberg H, R Klais G Rubene G Kornilovs, I Putnis and H Ojaveer (2019) Multidecadal dynamics of the Arctic copepod Limnocalanus macrurus in relation to environmental variability in the Baltic Sea. ICES Journal of Marine Science 76:2427-2436. https://doi.org/10.1093/icesjms/fsz101

Eklöf JS, G Sundblad, M Erlandsson, S Donadi, BK Eriksson and U Bergström (2020) A spatial regime shift from predator to prey dominance in a large coastal ecosystem. Communications Biology 3:459. https://doi.org/10.1038/s42003-020-01180-0

Emeis KC, U Struck, T Blanz, A Kohly and V Maren (2003) Salinity changes in the central Baltic Sea (NW Europe) over the last 10 000 years. The Holocene 13: 411-421. https://doi.org/10.1191/0959683603hl634rp

Eriksson BK, K Sieben, JS Eklöf, L Ljunggren, J Olsson, M Casini and U Bergström (2011) Effects of altered offshore food webs on coastal ecosystems emphasize the need for cross-ecosystem management. Ambio 40:786–797. https://doi.org/10.1007/s13280-011-0158-0

Eurostat (2022) Population connected to urban wastewater collecting and treatment systems, by treatment level (env_ww_con) https://ec.europa.eu/eurostat/databrowser/view/ten00020/default/table?lang=en

Finneran JJ (2015) Noise-induced hearing loss in marine mammals: A review of temporary threshold shift studies from 1996 to 2015. Journal of the Acoustic Society of America 138:1702-1726. https://doi.org/10.1121/1.4927418

Fliessbach KL, K Borkenhagen, N Guse, N Markones, P Schwemmer and S Garthe (2019) A ship traffic disturbance vulnerability index for northwest European seabirds as a tool for marine spatial planning, Frontiers in Marine Science 6:192| https://doi.org/10.3389/fmars.2019.00192

Ford HV, NH Jones, AJ Davies, BJ Godley, JR Jambeck, IE Napper, CC Suckling, GJ Williams, LC Woodall and HJ Koldewey (2022) The fundamental links between climate change and marine plastic pollution. Science of the Total Environment 806:150392. https://www.sciencedirect.com/science/article/pii/S0048969721054693

Fox AD, JE Jónsson, T Aarvak, T Bregnballe, TK Christensen, K Kuhlmann Clausen, P Clausen, L Dalby, TE Holm, D Pavón-Jordan, K Laursen, A Lehikoinen, S-H Lorentsen, AP Møller, M Nordström, M Öst, P Söderquist and OR Therkildsen (2015) Current and Potential Threats to Nordic Duck Populations — A Horizon Scanning Exercise. Annales Zoologici Fennici 52:193-220. https://doi.org/10.5735/086.052.0404

Fox AD, RD Nielsen and IK Petersen (2019) Climate-change not only threatens bird populations but also challenges our ability to monitor them. Ibis 161:467-474. https://doi.org/10.1111/ibi.12675

Fraschetti S, C McOwen, L Papa, N Papadopoulou, M Bilan, C Boström, P Capdevila, M Carreiro-Silva, L Carugati, E Cebrian, M Coll, T Dailianis, R Danovaro, F De Leo, D Fiorentino, K Gagnon, C Gambi, J Garrabou, V Gerovasileiou, B Hereu, S Kipson, J Kotta, J-B Ledoux, C Linares, J Martin, A Medrano, I Montero-Serra, T Morato, A Pusceddu, K Sevastou, CJ Smith, J Verdura and G Guarnieri (2021) Where is more important than how in coastal and marine ecosystems restoration. Frontiers in Marine Science 8. https://doi.org/10.3389/fmars.2021.626843

Galgani F, G Hanke and T Maes (2015). Global distribution, composition and abundance of marine litter. In: Bergmann M et al. (eds): Marine anthropogenic litter. Springer Open. pp 29-56.

Galgani F, JP Leaute, P Moguedet, A Souplet, Y Verin, A Carpentier, H Goraguer, D Latrouite, F Andral, Y Cadiou, JC Mahe, JC Poulard and P Nerisson (2010) Litter on the sea floor along European coasts. Marine Pollution Bulletin 40: 516-527. https://doi.org/10.1016/S0025-326X(99)00234-9

Goldberg ED (1994) Diamonds and plastics are forever? Marine Pollution Bulletin 28:466. https://doi.org/10.1016/0025-326X(94)90511-8

Gordon J, C Blight, E Bryant and D Thompson (2015) Tests of acoustic signals for aversive sound mitigation with harbour seals. Report to Scottish Government Marine Mammal Scientific Support Research Programme MMSS/001/11. (SMRU, St. Andrews).

Gunnarsson G, J Waldenström and T Fransson (2012) Direct and indirect effects of winter harshness on the survival of 17 Mallards Anas platyrhynchos in northwest Europe. Ibis 154: 307-317. https://doi.org/10.1111/j.1474-919X.2011.01206.x

Hansson M and L Viktorsson (2023) Oxygen Survey in the Baltic Sea 2022 - Extent of Anoxia and Hypoxia, 1960-2022. SMHI Report Oceanography 74. ISSN: 0283-1112

Harding KC and TJ Härkönen (1999) Development in the Baltic grey seal (Halichoerus grypus) and ringed seal (Phoca hispida) populations during the 20th century. Ambio 28:619-627. https://www.jstor.org/stable/4314968

Harff J, S Björck and P Hoth (2011) The Baltic Sea Basin. Heidelberg, Dordrecht, London, New York: Springer, 449 pp. https://link.springer.com/book/10.1007/978-3-642-17220-5

Harwood L. TG Smith and H Melling (2000) Variation in reproduction and body condition of the ringed seal (Phoca hispida) in western Prince Albert Sound, NT, Canada, as assessed through a harvest-based sampling program. Arctic 53:422-431 https://www.jstor.org/stable/40512255

Heide-Jørgensen M-P and T Härkönen (1988) Rebuilding seal stocks in the Kattegat-Skagerrak. Marine Mammal Science 4: 231-246. https://doi.org/10.1111/j.1748-7692.1988.tb00204.x

Helander B, A Bignert and L Asplund (2008) Using raptors as environmental sentinels: monitoring the white-tailed sea eagle Haliaeetus albicilla in Sweden. Ambio 37:425-431. http://dx.doi.org/10.1579/0044-7447(2008)37[425:URAESM]2.0.CO;2

Helle E (1980) Lowered reproductive capacity in female ringed seals (Pusa hispida) in the Bothnian Bay, northern Baltic Sea, with special reference to uterine occlusions. Annales Zoologica Fennici 17: 147-158. http://www.jstor.org/stable/23734045

HELCOM (2010) Ecosystem Health of the Baltic Sea 2003-2007. HELCOM Initial Holistic Assessment. Baltic Sea Environment Proceedings 122. https://helcom.fi/wp-content/uploads/2019/08/BSEP122.pdf

HELCOM (2013a) HELCOM Monitoring and Assessment Strategy. https://helcom.fi/wp-content/uploads/2020/02/Monitoring-and-assessment-strategy.pdf

HELCOM (2013b) HELCOM Red List of Baltic Sea species in danger of becoming extinct. Baltic Sea Environment Proceedings 140. https://helcom.fi/wp-content/uploads/2019/08/BSEP140.pdf

HELCOM (2013c) Red List of Baltic Sea underwater biotopes, habitats and biotope complexes. Baltic Sea Environment Proceedings 138. https://helcom.fi/wp-content/uploads/2019/10/BSEP138.pdf

HELCOM (2018) State of the Baltic Sea – Second HELCOM holistic assessment 2011-2016. Baltic Sea Environment Proceedings 155. https://helcom.fi/wp-content/uploads/2019/06/BSEP155.pdf

HELCOM (2019) HELCOM Monitoring Programme on continuous noise. https://helcom.fi/wp-content/uploads/2020/10/MM_Continuous-noise.pdf

HELCOM (2020a) HELCOM Checklist 2.0 of Baltic Sea Macrospecies. Baltic Sea Environment Proceedings 174 https://helcom.fi/wp-content/uploads/2020/12/BSEP174.pdf

HELCOM (2020b) Depositing of dredged material in the Baltic Sea. Baltic Sea Environmental Fact Sheet. https://helcom.fi/wp-content/uploads/2022/08/BSEFS-on-depositing-of-dredged-material-2020_final.pdf

HELCOM (2020c) Status of coastal fish communities in the Baltic Sea during 2011-2016 – the third thematic assessment. Baltic Sea Environment Proceedings 161. https://helcom.fi/wp-content/uploads/2018/11/BSEP161.pdf

HELCOM (2020d) HELCOM Indicator Manual. Version 2020-1. Baltic Sea Environment Proceedings 175. https://helcom.fi/wp-content/uploads/2021/01/BSEP175.pdf

HELCOM (2020e) Atmospheric deposition of Heavy Metals on the Baltic Sea. HELCOM Baltic Sea Environment Fact Sheet (BSEFS), 2020 https://helcom.fi/wp-content/uploads/2020/11/BSEFS_HM_dep_2018.pdf

HELCOM (2021a) Baltic Sea Action Plan 2021 update. https://helcom.fi/wp-content/uploads/2021/10/Baltic-Sea-Action-Plan-2021-update.pdf

HELCOM (2021b) Inputs of hazardous substances to the Baltic Sea. Baltic Sea Environment Proceedings 179. https://helcom.fi/wp-content/uploads/2021/09/Inputs-of-hazardous-substances-to-the-Baltic-Sea.pdf

HELCOM (2023a) HELCOM Thematic assessment of biodiversity 2016-2021. Baltic Sea Environment Proceedings 191. https://helcom.fi/post_type_publ/holas3_bio/

HELCOM (2023b) HELCOM Thematic assessment of eutrophication 2016-2021. Baltic Sea Environment Proceedings 192. https://helcom.fi/post_type_publ/holas3_eut/

HELCOM (2023c) HELCOM Thematic assessment of hazardous substances, marine litter, underwater noise and non-indigenous species 2016-2021. Baltic Sea Environment Proceedings 190. https://helcom.fi/post_type_publ/holas3_haz/

HELCOM (2023d) Thematic assessment of economic and social analyses 2016-2021. Baltic Sea Environment Proceedings 188. https://helcom.fi/post_type_publ/holas3_esa/

HELCOM (2023e) HELCOM Thematic assessment on Spatial Distribution of Pressures and Impacts Assessment 2016-2021. Baltic Sea Environment Proceedings 189. https://helcom.fi/post_type_publ/holas3_spa/

HELCOM (2023f) Inputs of nutrients (nitrogen and phosphorus) to the sub-basins (1995-2020). https://indicators.helcom.fi/wp-content/uploads/2023/04/HELCOM-Core-indicator-on-nutrients-1995-2020_Final_April_2023-2.pdf

HELCOM (2023g) Cumulative impact from physical pressures on benthic biotopes (CumI). https://indicators.helcom.fi/indicator/shallow-water-oxygen/

HELCOM (2023h) Shallow water oxygen. https://indicators.helcom.fi/wp-content/uploads/2023/04/Shallow-water-oxygen_Final_April_2023-1.pdf HELCOM (2023) Number of drowned mammals and waterbirds in fishing gear. https://indicators.helcom.fi/wp-content/uploads/2023/04/Bycatch-indicator_Final_April_2023-2.pdf

HELCOM ACTION (2021a) Restoration measures for coastal habitats in the Baltic Sea: cost-efficiency and areas of highest significance and need. https://helcom.fi/wp-content/uploads/2021/11/Restoration-measures-for-coastal-habitats-in-the-Baltic-Sea.-cost-efficiency-and-areas-of-highest-significance-and-need.pdf

HELCOM ACTION (2021b) Bycatch in Baltic Sea commercial fisheries: High-risk areas and evaluation of measures to reduce bycatch. https://helcom.fi/wp-content/uploads/2021/11/Bycatch-in-Baltic-Sea-commercial-fisheries.pdf

HELCOM ACTION (2021c) Methodology, test case and recommendations for assessing the management effectiveness of the Baltic Sea Marine Protected Area (MPA) network. https://helcom.fi/wp-content/uploads/2021/11/Methodology-management-effectiveness-Baltic-Sea-Marine-Protected-Area-MPA-network.pdf

HELCOM and Baltic Earth (2021) Climate Change in the Baltic Sea 2021 Fact Sheet. Baltic Sea Environment Proceedings 180. https://helcom.fi/wp-content/uploads/2021/09/Baltic-Sea-Climate-Change-Fact-Sheet-2021.pdf

Helenius LK, E Leskinen, H Lehtonen and L Nurminen (2017) Spatial patterns of littoral zooplankton assemblages along a salinity gradient in a brackish sea: A functional diversity perspective. Estuarine, Coastal and Shelf Science 198:400-412. https://doi.org/10.1016/j.ecss.2016.08.031

Helle E, M Olsson and S Jensen (1976) PCB levels correlated with pathological changes in seal uteri. Ambio 5: 261–263. https://www.jstor.org/stable/4312230

Helle E (1980) Lowered reproductive capacity in female ringed seals (Pusa hispida) in the Bothnian Bay, northern Baltic Sea, with special reference to uterine occlusions. Annales Zoologici Fennici 17: 147-158. https://www.jstor.org/stable/23734045

Hjerne O, S Hajdu, U Larsson, AS Downing and M Winder (2019) Climate driven changes in timing, composition and magnitude of the Baltic Sea phytoplankton spring bloom. Frontiers in Marine Science 6. https://doi.org/10.3389/fmars.2019.00482

Humborg C, M Geibel, X Sun, M McCrackin, C-M Mörth, C Stranne, M Jakobsson, B Gustavsson, A Sokolov, A Norkko and J Norkko (2019) High emissions of carbon dioxide and methane from the coastal Baltic Sea at the end of a summer heat wave. Frontiers in Marine Science 6. https://doi.org/10.3389/fmars.2019.00493

Huss M, M Lindmark, P Jacobsson, RM van Dorst and A Gårdmark (2019) Experimental evidence of gradual size-dependent shifts in body size and growth of fish in response to warming. Global Change Biology 25: 2285-2295. https://doi.org/10.1111%2Fgcb.14637

Huss M, RM van Dorst and A Gårdmark (2021) Larval fish body growth responses to simultaneous browning and warming. Ecology and Evolution 11: 15132– 15140. https://doi.org/10.1002/ece3.8194

Härkönen T and E Isakson (2011) Historical and current status of harbour seals in the Baltic proper. NAMMCO Scientific Publications 8: 71-76. https://doi.org/10.7557/3.2673

ICES (2015) HELCOM/OSPAR Registry of impulsive underwater noise events. https://www.ices.dk/data/data-portals/Pages/impulsive-noise.asp

ICES (2022) Baltic Sea ecoregion – fisheries overview. ICES Advice: Fisheries Overviews. Report. https://doi.org/10.17895/ices.advice.21646934.v2

ICES (2023) Workshop on pathways to climate-aware advice (WKCLIMAD). ICES Scientific Reports 5:25. http://doi.org/10.17895/ices.pub.22196560

IPBES (2019) Global assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. Brondízio ES, J Settele, S Díaz, HT Ngo (eds). IPBES secretariat, Bonn, Germany. 1144 pages. ISBN: 978-3-947851-20-1. https://doi.org/10.5281/zenodo.3831673

IPCC (2023) Sections. In: Climate Change (2023): Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647

Jacobs SR and JM Terhune (2002) The effectiveness of acoustic harassment devices in the Bay of Fundy, Canada: seal reactions and a noise exposure model. Aquatic Mammals 28:147-158 https://www.aquaticmammalsjournal.org/share/AquaticMammalsIssueArchives/2002/AquaticMammals_28-02/28-02_Jacobs.pdf

Johannesson K and C André (2006) Life on the margin – genetic isolation and loss of variation in a peripheral marine ecosystem. Molecular Ecology 15: 2013-2030. https://doi.org/10.1111/j.1365-294x.2006.02919.x

Jones JB (1992) Environmental impact of trawling on the seabed: a review. New Zealand Journal of Marine and Freshwater Research 26: 59-67. https://doi.org/10.1080/00288330.1992.9516500

Jüssi M, T Härkönen, I Jüssi and E Helle (2008) Decreasing ice coverage will reduce the reproductive success of Baltic grey seal (Halichoerus grypus) females. Ambio 37: 80–85. https://doi.org/10.1579/0044-7447(2008)37[80:DICWRT]2.0.CO;2

Kahru M and R Elmgren (2014) Multidecadal time series of satellite-detected accumulations of cyanobacteria in the Baltic Sea. Biogeosciences 11:3619-3633. https://doi.org/10.5194/bg-11-3619-2014

Kahru M, R Elmgren and OP Savchuk (2016) Changing seasonality of the Baltic Sea. Biogeosciences 13:1009-1018. https://doi.org/10.5194/bg-13-1009-2016

Kahru M, R Elmgren, J Kaiser, N Wasmund and O Savchuk (2020) Cyanobacterial blooms in the Baltic Sea: Correlations with environmental factors. Harmful Algae 92:101739. https://doi.org/10.1016/j.hal.2019.101739

Kaiser MJ, KR Clarke, H Hinz, MCV Austen, PJ Somerfield and I Karakassis (2006) Global analysis of response and recovery of benthic biota to fishing. Marine Ecology Progress Series 311: 1-14. https://www.int-res.com/articles/feature/m311p001.pdf

Kastelein RA, Helder-Hoek L, Janssens G, Gransier R and T Johansson (2015) Behavioral responses of Harbor Seals (Phoca vitulina) to sonar signals in the 25-kHz Range. Aquatic Mammals 41:388-399. http://dx.doi.org/10.1578/AM.41.4.2015.388

Katsanevakis S, I Wallentinus, A Zenetos, E Leppäkoski, ME Çinar, B Oztürk, M Grabowski, D Golani and AC Cardoso (2014) Impacts of invasive alien marine species on ecosystem services and biodiversity: a pan-European review. Aquatic Invasions 9: 391–423. https://doi.org/10.3391/ai.2014.9.4.01

Keenleyside K, N Dudley, S Cairns, CM Hall and S Stolton (2012) Ecological Restoration for Protected Areas: Principles, Guidelines and Best Practices. Gland: IUCN. p. 120. Available online at: https://portals.iucn.org/library/sites/library/files/documents/PAG-018.pdf

Kinze CC (1995) Danish whale records 1575–1991 (Mammalia, Cetacea). Review of whale specimens stranded, directly or incidentally caught along the Danish coasts. Steenstrupia 21:155–196. https://nmbl.org/cgi-bin/koha/opac-detail.pl?biblionumber=148964

Koehler B, M Erlandsson, M Karlsson and L Bergstrom (2022) Species richness and functional attributes of fish assemblages across a large-scale salinity gradient in shallow coastal areas. Biogeosciences 19:2295–2312. https://doi.org/10.5194/bg-19-2295-2022

Kotta J, T Wernberg, H Jänes, I Kotta, K Nurkse, M Pärnoja and H Orav-Kotta (2018) Novel crab predator causes marine ecosystem regime shift. Scientific Reports 8:4956. https://doi.org/10.1038/s41598-018-23282-w

Kotta J, K Nurkse K, R Puntila and H Ojaveer (2016) Shipping and natural environmental conditions determine the distribution of the invasive non-indigenous round goby Neogobius melanostomus in a regional sea. Estuarine, Coastal and Shelf Science 169: 15-24 https://doi.org/10.1016/j.ecss.2015.11.029

Kraufvelin P, Z Pekcan-Hekim, U Bergström, A-B Florin, A Lehikoinen, J Mattila, T Arula, L Briekmane, EJ Brown, Z Celmer, J Dainys, H Jokinen, P Kääriä, M Kallasvuo, A Lappalainen, L Lozys, P Möller, A Orio, M Rohtla, L Saks, M Snickars, J Støttrup, G Sundblad, I Taal, D Ustups, A Verliin, M Vetemaa, H Winkler, A Wozniczka and J Olsson (2018) Essential coastal habitats for fish in the Baltic Sea, Estuarine, Coastal and Shelf Science 204:14-30. https://doi.org/10.1016/j.ecss.2018.02.014

Kraufvelin P, A Bryhn and J Olsson (2020) Erfarenheter av ekologisk restaurering i kust och hav (Experiences from ecological restoration in coast and sea- In Swedish). Havs- och Vattenmyndighetens Rapport 2020:28 https://www.havochvatten.se/data-kartor-och-rapporter/rapporter-och-andra-publikationer/publikationer/2021-12-10-erfarenheter-av-ekologisk-restaurering-i-kust-och-hav.html

Köster FW, B Huwer, HH Hinrichsen, V Neumann, A Makarchouk, M Eero, BV Dewitz, K Hüssy, J Tomkiewicz, P Margonski, A Temming, JP Hermann, D Oesterwind, J Dierking, P Kotterba and M Plikshs (2017) Eastern Baltic cod recruitment revisited—dynamics and impacting factors. ICES Journal of Marine Science 74: 3-19. https://doi.org/10.1093/icesjms/fsw172

Larsson K and L Tydén (2005) Effects of oil spills on wintering long-tailed ducks Clangula hyemalis at Hoburgs bank in central Baltic Sea between 1996/97 and 2003/04. Ornis Svecica 15: 161-171. https://doi.org/10.34080/os.v15.22740

Lehikoinen P, M Alhainen, M Frederiksen, K Jaatinen, R Juslin, M Kilpi, N Mikander and S Nagy (compilers) (2022) International Single Species Action Plan for the conservation of the common eider Somateria m. mollissima (Baltic, North & Celtic Seas, and Norway & Russia populations) and S. m. borealis (Svalbard & Franz Josef Land population). AEWA Technical Series No. 75, Bonn, Germany. https://

www.unep-aewa.org/en/publication/international-single-species-action-plan-conservation-common-eider

Lehikoinen A, K Jaatinen, AV Vähätalo, P Clausen, O Crowe, B Deceuninck, R Hearn, CA Holt, M Hornman, V Keller, L Nilsson, T Langendoen, I Tománková, J Wahl and AD Fox (2013) Rapid climate driven shifts in wintering distributions of three common waterbird species. Global Change Biology 19:2071-2081, https://doi.org/10.1111/gcb.12200

Lehikoinen A, M Kilpi and M Öst (2006) Winter climate affects subsequent breeding success of common eiders. Global Change Biology 12:1355-1365. https://doi.org/10.1111/j.1365-2486.2006.01162.x

Leppäranta M and K Myrberg (2009) Physical oceanography of the Baltic Sea. Springer Praxis books. Springer Berlin, Heidelberg. https://doi.org/10.1007/978-3-540-79703-6

Lewison RL, LB Crowder, BP Wallace, JE Moore, T Cox, R Žydelis, S McDonald, A DiMatteo, DC Dunn, CY Kot, R Björkland, S Kelez, C Soykan, KR Stewart, M Sims, A Boustany, AJ Read, P Halpin, WJ Nichols, and C Safina (2014) Global patterns of marine mammal, seabird, and sea turtle bycatch reveal taxa-specific and cumulative megafauna hotspots. Proceedings of the National Academy of Sciences 111:5271-5276. https://doi.org/10.1073/pnas.1318960111

Lindegren M, Blenckner T and NC Stenseth (2012) Nutrient reduction and climate change cause a potential shift from pelagic to benthic pathways in a eutrophic marine ecosystem. Global Change Biology 18:3491-3503. https://doi.org/10.1111/j.1365-2486.2012.02799.x

Lindmark M, A Audzijonyte, JL Blanchard and A Gårdmark (2022) Temperature impacts on fish physiology and resource abundance lead to faster growth but smaller fish sizes and yields under warming. Global Change Biology 28:6239– 6253.https://doi.org/10.1111/gcb.16341

Lockwood JL, MF Hoopes and MP Marchetti (2007) Invasion Ecology. Wiley-Blackwell, Malden, MA, USA, 456 pp. ISBN: 978-1-444-33364-0

Lucke K, U Siebert, PA Lepper and MA Blanchet (2009) Temporary shift in masked hearing thresholds in a harbor porpoise (Phocoena phocoena) after exposure to seismic airgun stimuli. Journal of the Acoustic Society of America 125:4060-4070. https://doi.org/10.1121/1.3117443

Mack RN, D Simberloff, WM Lonsdale, H Evans, M Clout and FA Bazzaz (2000) Biotic invasions: causes, epidemiology, global consequences, and control. Ecological Applications 10:689–710. https://doi.org/10.1890/1051-0761(2000)010[0689:BICEGC]2.0.CO;2

MacKenzie BR, H Gislason, C Möllmann and FW Köster (2007) Impact of 21st century climate change on the Baltic Sea fish community and fisheries. Global Change Biology 13: 1348–1367. https://doi.org/10.1111/j.1365-2486.2007.01369.x

Madsen PT, M Wahlberg, J Tougaard, K Lucke and PL Tyack (2006) Wind turbine underwater noise and marine mammals: Implications of current knowledge and data needs. Marine Ecology Progress Series 309:279-295 http://dx.doi.org/10.3354/meps309279

Marcos C, D Díaz, K Fietz, A Forcada, A Ford, JA García-Charton, R Goñi, P Lenfant, S Mallol, D Mouillot, M Pérez-Marcos, O Puebla O, S Manel and A Pérez-Ruzafa (2021) Reviewing the Ecosystem Services, Societal Goods, and Benefits of Marine Protected Areas. Frontiers in Marine Science 8. https://doi.org/10.3389/fmars.2021.613819

Martin-Ortega J, RC Ferrier, IJ Gordon, S Khan (2015) Water ecosystem services: a global perspective. Cambridge University Press, p187. ISBN: 9781107496187

Mauritsson K, J-P Desforges and KC Harding (2022) Maternal transfer and long-term population effects of PCBs in Baltic grey seals using a new toxicokinetic-toxicodynamic population model. Archives of Environemntal Contamination and Toxicology 83:376–394. https://doi.org/10.1007/s00244-022-00962-3

Meier HEM, M Kniebusch, C Dieterich, M Gröger, E Zorita, R Elmgren, K Myrberg, MP Ahola, A Bartosova, E Bonsdorff, F Börgel, R Capell, I Carlén, T Carlund, J Carstensen, OB Christensen, V Dierschke, C Frauen, M Frederiksen, E Gaget, A Galatius, JJ Haapala, A Halkka, G Hugelius, B Hünicke, J Jaagus, M Jüssi, J Käyhkö, N Kirchner, E Kjellström, K Kulinski, A Lehmann, G Lindström, W May, PA Miller, V Mohrholz, B Müller-Karulis, D Pavón-Jordán, M Quante, M Reckermann, A Rutgersson, OP Savchuk, M Stendel, L Tuomi, M Viitasalo, R Weisse and W Zhang (2022) Climate change in the Baltic Sea region: a summary. Earth System Dynamics 13:457–593. https://doi.org/10.5194/esd-13-457-2022

Mercker M, Dierschke V, Camphuysen K, Kreutle A, Markones N, Vanermen N and S Garthe (2021) An indicator for assessing the status of marine-bird habitats affected by multiple human activities: A novel statistical approach. Ecological Indicators 130: 108036. https://doi.org/10.1016/j.ecolind.2021.108036

Micheli F, BS Halpern, S Walbridge, S Ciriaco, F Ferretti, S Fraschetti, R Lewison, L Nykjaer and AA Rosenberg (2013) Cumulative human impacts on Mediterranean and Black Sea marine ecosystems: assessing current pressures and opportunities. PLoS ONE 8:e79889. https://doi.org/10.1371/journal.pone.0079889

Momigliano P, GPJ Denys, H Jokinen and J Merilä (2018) Platichthys solemdali sp. nov. (Actinopterygii, Pleuronectiformes): A new flounder species from the Baltic Sea. Frontiers in Marine Science 5. https://doi.org/10.3389/fmars.2018.00225

Montero-Serra I, J Garrabou, DF Doak, L Figuerola, B Hereu, JB Ledoux and C Linares (2018) Accounting for life-history strategies and timescales in marine restoration. Conservation Letters 11:e12341. https://doi.org/10.1111/conl.12341

Mooij JH (2005) Protection and use of waterbirds in the European Union. Beiträge zur Jagd- und Wildforschung 30:49-76.

Mordecai G, PA Tyler, DG Masson and VAI Huvenne (2011). Litter in submarine canyons off the west coast of Portugal. Deep Sea Research Part II 58: 2489.

Moret-Ferguson S, KL Law, G Proskurowski, EK Murphy, EE Peacock and CM Reddy (2010). The size, mass, and composition of plastic debris in the western North Atlantic Ocean. Marine Pollution Bulletin 60:1873–1878. https://doi.org/10.1016/j.marpolbul.2010.07.020

Morkūnas J, S Oppel, M Bružas, Y Rouxel, R Morkūnė and D Mitchell (2022) Seabird bycatch in a Baltic coastal gillnet fishery is orders of magnitude larger than official reports. Avian Conservation and Ecology 17:31. https://doaj.org/article/86fe88f300b5423784e0633b632e5039

Moyano M, B Illing, A Akimova, A.... and P Polte (2022) Caught in the middle: bottom-up and top-down processes impacting recruitment in a small pelagic fish. Reviews in Fish Biology and Fisheries. https://doi.org/10.1007/s11160-022-09739-2

Murphy S, GJ Pierce, RJ Law, P, Bersuder, PD Jepson, JA Learmonth, M Addink, W Dabin, MB Santos, R Deaville, BN Zegers, A Mets, E Rogan, V Ridoux, RJ Reid, C Smeenk, T Jauniaux, A López, JM Alonso Farré, AF González, A Guerra, M García-Hartmann, C Lockyer, and JP Boon (2010) Assessing the effect of persistent organic pollutants on reproductive activity in common dolphins and harbour porpoises. Journal of Northwest Atlantic Fishery Science 42:153–173. http://dx.doi.org/10.2960/J.v42.m658

Möllmann C, Diekmann R, Müller-Karulis B, Kornilovs G, Plikshs M and P Axe (2009) Reorganization of a large marine ecosystem due to atmospheric and anthropogenic pressure: a discontinuous regime shift in the Central Baltic Sea. Global Change Biology 15:1377-1393. https://doi.org/10.1111/j.1365-2486.2008.01814.x

NAMMCO & IMR, 2019. Report of the Joint IMR/NAMMCO International Workshop on the Status of Harbour Porpoises in the North Atlantic. Tromsø, Norway. North Atlantic Marine Mammal Commission, Tromsø and Norwegian Institute of Marine Research, Bergen, Norway https://nammco.no/wp-content/uploads/2020/03/final-report_hpws_2018_rev2020.pdf

Newman S, E Watkins, A Farmer, P ten Brink and JP Schweitzer (2015) The economics of marine litter. Chapter 14 in: Marine Anthropogenic Litter, Eds. Bergmann M, L Gutow and M Klages, Eprint ID 37207 of the Alfred-Wegener-Institut Helmholtz-Zentrum für Polar- und Meeresforschung, Springer Open Publication, 447pp.

Niiranen, S et al. (2013) Combined effects of global climate change and regional ecosystem drivers on an exploited marine food web. Global Change Biology 19:3327-3342. https://doi.org/10.1111/gcb.12309

Nilsson L and F Haas (2016) Distribution and numbers of wintering waterbirds in Sweden in 2015 and changes during the last fifty years. Ornis Svecica 26:3–54. https://doi.org/10.34080/os.v26.21854

Nordström M, J Dierking and EU BONUS XWEBS team (2021) BONUS XWEBS policy brief No. 2.: A perspective for Baltic Sea food web research – How food web knowledge can be integrated in adaptive ecosystem-based management of marine resources. EU BONUS project XWEBS, Kiel, Germany, 5 pp. https://oceanrep.geomar.de/id/eprint/51439/

Ojaveer H and J Kotta (2015) Ecosystem impacts of the widespread non-indigenous species in the Baltic Sea: literature survey evidences major limitations in knowledge. Hydrobiologia 750:171–185. https://doi.org/10.1007/s10750-014-2080-5

Ojaveer H, J Kotta, O Outinen and H Einberg (2021) Meta-analysis on the ecological impacts of widely spread non-indigenous species in the Baltic Sea. Science of the Total Environment 786:147375. https://doi.org/10.1016/j.scitotenv.2021.147375

Olsgaard F, MT Schaanning, S Widdicombe, MA Kendall and MC Austen (2008) Effects of bottom trawling on ecosystem functioning. Journal of Experimental Marine Biology and Ecology 366: 123-133. https://doi.org/10.1016/j.jembe.2008.07.036

Olsson J (2019) Past and Current Trends of Coastal Predatory Fish in the Baltic Sea with a Focus on Perch, Pike, and Pikeperch. Fishes 4: 7. https://doi.org/10.3390/fishes4010007

Olsson J, L Bergström and A Gårdmark (2012) Abiotic drivers of coastal fish community change during four decades in the Baltic Sea. ICES Journal of Marine Science 69:961-970. https://doi.org/10.1093/icesjms/fss072

Olsson J, MT Tomczak, H Ojaveer, A Gårdmark, A Põllumäe, B Müller-Karuli, D Ustups, GE Dinesen, H Peltonen, I Putnis, L Szymanek, M Simm, O Heikinheimo, P Gasyukov, P Axe and L Bergström (2015) Temporal development of coastal ecosystems in the Baltic Sea over the past two decades. ICES Journal of Marine Science 72:2539–48. https://doi.org/10.1093/icesjms/fsv143

Pace R, M Dimech, M Camilleri, PJ Schembri and F Briand (2007). Litter as a source of habitat islands on deepwater muddy bottoms. Rapport du Congres de la Commission Internationale pour l'Exploration Scientifique de la Mer Mediterranee 38: 567. https://www.um.edu.mt/library/oar//handle/123456789/21502

Pansch C, M Scotti, FR Barboza, B Al-Janabi, J Brakel, E Briski, B Bucholz, M Franz, M Ito, F Paiva, M Saha, Y Sawall, F Weinberger and M Wahl (2018) Heat waves and their significance for a temperate benthic community: A near-natural experimental approach. Global Change Biology 24:4357-4367. https://doi.org/10.1111/gcb.14282

Pavón-Jordán D, P Clausen, M Dagys, K Devos, V Encarnaçao, AD-Fox, T Frost, C Gaudard, M Hornman, V Keller, T Langendoen, Ł Ławicki, LJ Lewis, S-H Lorentsen, L Luigujoe, W Meissner, B Molina, P Musil, Z Musilova, L Nilsson, J-Y Paquet, J Ridzon, A Stipniece, N Teufelbauer, J Wahl, M Zenatello and Aleksi Lehikoinen (2019) Habitat- and species-mediated short-and long-term distributional changes in waterbird abundance linked to variation in European winter weather. Diversity and Distributions 25:225-239. https://doi.org/10.1111/ddi.12855

Pavón-Jordán D, W Abdou, H Azafzaf, M Balaž, T Bino, JJ Borg, L Božič, SHM Butchart, P Clausen, L Sniauksta, M Dakki, K Devos, C Domsa, V Encarnaçao, K Etayeb, S Faragó, AD Fox, T Frost, C Gaudard, V Gorgiev, A Lehikoinen (2020) Positive impacts of important bird and biodiversity areas on wintering waterbirds under changing temperatures throughout Europe and North Africa. Biological Conservation 246:108549. https://doi.org/10.1016/j.biocon.2020.108549

Pecuchet L, A Törnroos and M Lindegren (2016) Patterns and drivers of fish community assembly in a large marine ecosystem. Ma-

rine Ecology Progress Series 546:239-248. https://doi.org/10.3354/meps11613

Pereyra RT, L Bergström, L Kautsky and K Johannesson (2009) Rapid speciation in a newly opened postglacial marine environment, the Baltic Sea. BMC Evolutionary Biology 9,:70. https://doi.org/10.1186/1471-2148-9-70

Petersen IK, M MacKenzie, F Rexstad, MS Wisz and AD Fox (2011) Comparing pre- and post- construction distributions of long-tailed ducks Clangula hyemalis in and around the Nysted offshore wind farm, Denmark: a quasi-designed experiment accounting for imperfect detection, local surface features and autocorrelation. CREEM Tech Report 2011: 1. https://tethys.pnnl.gov/sites/default/files/publications/Petersen-et-al-2011.pdf

Pham CK, E Ramirez-Llodra, CHS Alt, T Amaro, M Bergmann, M Canals, JB Company, J Davies, G Duineveld, F Galgani, KL Howell, VAI Huvenne., E Isidro, DOB Jones, G Lastras, T Morato, JN Gomes-Pereira, A Purser, H Stewart, I Tojeira, X Tubau, D Van Rooij and PA Tyler (2014) Marine litter distribution and density in European seas, from the shelves to deep basins. PLoS ONE 9:e95839. https://doi.org/10.1371/journal.pone.0095839

Piersma T and K Camphuysen (2001) What can peak mortality of eider tell us about the state of the Dutch wadden sea ecosystem? Wadden Sea Newsletter 1: 42–45. https://eurekamag.com/research/022/099/022099642.php

Pilarczyk, B, A Tomza-Marciniak, R Pilarczyk, K Kavetska, I Rzad, D Hendzel and A Marciniak (2012) Selenium status in sea ducks (Melanitta fusca, Melanitta nigra and Clangula hyemalis) wintering on the southern Baltic coast, Poland. Marine Biology Research 8: 1019-1025. https://www.tandfonline.com/doi/abs/10.1080/17451000.2012.706304

Polte P, T Gröhsler, P Kotterba, L von Nordheim, D Moll, J Santos, P Rodriguez-Tress, Y Zablotski and C Zimmermann (2021) Reduced Reproductive Success of Western Baltic Herring (Clupea harengus) as a Response to Warming Winters. Frontiers in Marine Science 8 https://doi.org/10.3389/fmars.2021.589242

Potschin M and R Haines-Young (2016a) Defining and measuring ecosystem services. In: Potschin M, R Haines-Young, R Fish and RK Turner (eds) Routledge Handbook of Ecosystem Services. Routledge, London and New York, pp 25-44. ISBN 9781315775302

Potschin M and R Haines-Young (2016b) Conceptual Frameworks and the Cascade Model. In OpenNESS Ecosystem Services Reference Book; Potschin, M. and Jax K., Eds. Available online: http://www.openness-project.eu/library/reference-book/cascade-model

Rainio K, T Laaksonen T, M Ahola, AV Vähätalo and E Lehikoinen (2006) Climatic responses in spring migration of boreal and arctic birds in relation to wintering area and taxonomy. Journal of Avian Biology 37:507-515. https://doi.org/10.1111/j.0908-8857.2006.03740.x

Read AJ, P Drinker and S Northridge, (2006) Bycatch of Marine Mammals in U.S. and Global Fisheries: Bycatch of Marine Mammals. Conservation Biology 20:163–169. https://doi.org/10.1111/j.1523-1739.2006.00338.x

Reneerkens J, T Piersma and B Spaans (2005) De waddenzee als kruispunt van vogeltrekwegen (he Wadden Sea as a crossroad of migratory pathways). NIOZ-rapport 2005-4. Koninklijk Nederlands Instituut voor Onderzoek der Zee. https://www.waddenzee.nl/thema/natuur/publicaties/vogels/rapport-waddenzee-kruispunt/

Rolff C, J Walve, U Larsson and R Elmgren (2022) How oxygen deficiency in the Baltic Sea proper has spread and worsened: The role of ammonium and hydrogen sulphide. Ambio 51:2308–2324. https://doi.org/10.1007/s13280-022-01738-8

Rubarth J, A Dreyer, N Guse, JW Einax, R Ebinghaus (2011) Perfluorinated compounds in red-throated divers from the German Baltic Sea: new findings from their distribution in 10 different tissues. Environmental Chemistry 8: 419-428. https://doi.org/10.1071/EN10142

Ruiz GM, JT Carlton, ED Grosholz and AH Hines (1997) Global invasions of marine and estuarine habitats by non-indigenous species: mechanisms, extent, and consequences. American Zoologist 37: 621–632. https://doi.org/10.1093/icb/37.6.621

Ruskule A, J Kotta, CR Saha, P Arndt, D Ustups, S Strāķe and L Bergström (2023) Testing the concept of green infrastructure at the Baltic Sea scale to support an ecosystem-based approach to management of marine areas. Marine Policy 147: 105374. https://doi.org/10.1016/j.marpol.2022.105374

Russell G (1985) Recent evolutionary changes in the algae of the Baltic Sea. British Phycological Journal 20: 87-104 https://doi.org/10.1080/00071618500650111

Saarinen A (2019) Restaurering av grunda kustmiljöer i Kvarken – Erfarenheter, metoder och framtida åtgärder med fokus på flador. Delrapport inom Interreg Botnia Atlantica projekt Kvarken Flada. p.57

Santulli A, A Modica, C Messina, L Ceffa, A Curatolo, G Rivas, G Fabi, and V D'Amelio (1999) Biochemical responses of European Sea Bass (Dicentrarchus labrax L.) to the stress induced by off shore experimental seismic prospecting. Marine Pollution Bulletin 38:1105-1114. https://doi.org/10.1016/S0025-326X(99)00136-8

Saraiva S, HEM Meier, H Andersson, A Höglund, C Dieterich, M Gröger, R Hordoir and K Eilola (2019) Baltic Sea ecosystem response to various nutrient load scenarios in present and future climates. Climate Dynamics 52:3369-3387. https://doi.org/10.1007/s00382-018-4330-0

Schwemmer P, B Mendel, N Sonntag, V Dierschke and S Garthe (2011) Effects of ship traffic on seabirds in offshore waters: implications for marine conservation and spatial planning. Ecological Applications 21: 1851-1860. https://doi.org/10.1890/10-0615.1

Scotti M, S Opitz, L MacNeil, A Kreutle, C Pusch and R Froese (2022) Ecosystem-based fisheries management increases catch and carbon sequestration through recovery of exploited stocks: The western Baltic Sea case study. Frontiers in Marine Science 9:879998. https://doi.org/10.3389/fmars.2022.879998

Skóra KE and I Kuklik (2003) Bycatch as a potential threat to harbour porpoises (Phocoena phocoena) in Polish Baltic waters. NAMCCO Scientific Publications 5:303–315. https://doi.org/10.7557/3.2831

Skov H, S Heinänen, R Žydelis, J Bellebaum, S Bzoma, M Dagys, J Durinck, S Garthe, G Grishanov, N Hario, JJ Kieckbusch, J Kube, A Kuresoo, K Larsson, L Luigujoe, W Meissner, HW Nehls, L Nilsson, IK Petersen, M Mikkola Roos, S Pihl, N Sonntag, A Stock and A Stipniece (2011) Waterbird populations and pressures in the Baltic Sea. TemaNord 2011:550. Nordic Council of Ministers, Copenhagen. https://doi.org/10.6027/TN2011-550

Slobodnik J, Gkotsis G, Nika M-C, Vasilatos K, Thomaidis N S, Alygizakis N, Oswald P, Rohner S, Siebert U, Reif F, Dähne M, Persson S, Galatius A, Pawliczka I, Künitzer A (2022) Screening study on hazardous substances in marine mammals of the Baltic Sea. UBA-Texte 36/2022. 122 pp. https://www.umweltbundesamt.de/en/publikationen/screening-study-on-hazardous-substances-in-marine

Smith TG and LA Harwood (2001) Observations of neonate ringed seals, Phoca hispida, after early break-up of the sea ice in Prince Albert Sound, Northwest Territories, Canada, spring 1998. Polar Biology 24:215–219 https://link.springer.com/article/10.1007/s003000000198

Snickars M, B Weigel and E Bonsdorff (2015) Impact of eutrophication and climate change on fish and zoobenthos in coastal waters of the Baltic Sea. Marine Biology 162:141 https://doi.org/10.1007/s00227-014-2579-3

Sonne C, U Siebert, K Gonnsen, J-P Desforges, JI Eulaers, S Persson, A Roos, B-M Bäcklin, K Kauhala, M Tange Olsen, KC Harding, G Treu, A Galatius, E Andersen-Ranberg, S Gross, J Lakemeyer, K Lehnert, SS Lam, W Peng and R Dietz (2020) Health effects from contaminant exposure in Baltic Sea birds and marine mammals: A review. Environment International 139:105725. https://doi.org/10.1016/j.envint.2020.105725

Sonntag N, H Scwemmer, HO Fock, J Bellebaum and S Garthe (2012) Seabirds, set-nets, and conservation management: assessment of conflict potential and vulnerability of birds to bycatch in gillnets. ICES Journal of Marine Science 69:578–589. https://doi.org/10.1093/icesjms/fss030

STECF (2022) European Commission, Joint Research Centre, Scientific, Technical and Economic Committee for Fisheries. Virtanen J, J Guillen, R Prellezo and E Sabatella (Eds). The 2022 annual economic report on the EU fishing fleet (STECF 22-06). Publications Office of the European Union, 2022. https://data.europa.eu/doi/10.2760/120462

Stigebrandt A (2001) Physical oceanography of the Baltic Sea. In: Wulff F.V., L.A. Rahm, & P.A. Larsson (Eds.) Systems Analysis of the Baltic Sea. Springer Berlin Heidelberg. https://link.springer.com/book/10.1007/978-3-662-04453-7

Stirling I and TG Smith (2004) Implications of warm temperatures and an unusual rain event on the survival of ringer seals on the coast of southeastern Baffin Island. Arctic 57:59–67. https://doi.org/10.14430/arctic483

Sundblad G and U Bergström (2014) Shoreline development and degradation of coastal fish reproduction habitats. Ambio 43: 1020–1028. https://doi.org/10.1007/s13280-014-0522-y

Sundqvist L, T Harkonen, CJ Svensson and KC Harding (2012) Linking climate trends to population dynamics in the Baltic ringed seal - Impacts of historical and future winter temperatures. Ambio 41:865-872. https://doi.org/10.1007/s13280-012-0334-x

Svedäng H and S Hornborg (2014) Selective fishing induces density-dependent growth. Nature Communications 5:4152. https://doi.org/10.1038/ncomms5152

Svensson F, E Karlsson, A Gårdmark, J Olsson, A Adill, J Zie, P Snoeijs and JS Eklöf (2017) In situ warming strengthens trophic cascades in a coastal food web. Oikos 126:1150-1161. https://doi.org/10.1111/oik.03773

SwAM (2021) Handbok för restaurering av ålgräs i Sverige (Handbook for restoration of eelgrass in Sweden – In Swedish). Havs- och vattenmynidghetens rapport 2016:9. https://www.havochvatten.se/data-kartor-och-rapporter/rapporter-och-andra-publikationer/publikationer/2016-09-19-handbok-for-restaurering-av-algras-i-sverige.html

Thompson RC (2006). Plastic debris in the marine environment: consequences and solutions. In: Krause JC, H Nordheim and S Bräger (Eds.), Marine Nature Conservation in Europe. Bundesamt für Naturschutz, Stralsund, Germany, 107–115.

Tomczak MT, L Szymanek, M Pastuszak, W Grygiel, M Zalewski, S Gromisz, A Ameryk, J Kownacka, I Psuty, E Kuzebski, R Grzebielec and P Margoński (2016) Evaluation of Trends and Changes in the Gulf of Gdańsk Ecosystem—an Integrated Approach. Estuaries and Coasts 39:593–604. https://doi.org/10.1007/s12237-015-0026-4

Tomczak MT, S Niiranen, O Hjerne and T Blenckner (2012) Ecosystem flow dynamics in the Baltic Proper-Using a multi-trophic dataset as a basis for food-web modelling. Ecological Modelling 230:123–147. https://doi.org/10.1016/j.ecolmodel.2011.12.014

Tomczak, MT, B Müller-Karulis, T Blenckner, E Ehrnsten, M Eero, B Gustafsson, A Norkko, SA Otto, K Timmermann and C Humborg (2021) Reference state, structure, regime shifts, and regulatory drivers in a coastal sea over the last century: The Central Baltic Sea case. Limnology and Oceanography 67: S266-S284. https://doi.org/10.1002/lno.11975

Tougaard J, J Carstensen, J Teilmann, H Skov, and P Rasmussen (2009) Pile driving zone of responsiveness extends beyond 20 km for harbour porpoises (Phocoena phocoena, (L.))., Journal of the Acoustic Society of America 126:11-14. http://dx.doi.org/10.1121/1.3132523

Tougaard J, LA Kyhn, M Amundin, D Wennerberg and C Bordin (2012) Behavioral reactions of harbour porpoise to pile-driving noise, in Effects of Noise on Aquatic Life, edited by A. N. Popper, and

A. D. Hawkins (Springer, New York), pp. 277-280. https://link.springer.com/book/10.1007/978-1-4419-7311-5

UBA (2022) (German Environment Agency) Screening study on hazardous substances in marine mammals of the Baltic Sea. Widescope target and suspect screening https://www.umweltbundesamt.de/publikationen/screening-study-on-hazardous-substances-in-marine

UN (2015) Transforming our world: the 2030 Agenda for Sustainable Development. A/RES/70/1. https://documents-dds-ny.un.org/doc/UNDOC/GEN/N15/291/89/PDF/N1529189.pdf?OpenElement

UNEP (2021) United Nations Environment Programme. Making Peace with Nature: A scientific blueprint to tackle the climate, biodiversity and pollution emergencies. Nairobi. https://www.unep.org/resources/making-peace-nature

Vainio RK, V Jormalainen, R Dietz, T Laaksonen, R Schulz, C Sonne, J Søndergaard, JP Zubrod and I Eulaers (2022) Trophic dynamics of mercury in the Baltic archipelago sea food web: the impact of ecological and ecophysiological traits. Environmental Science & Technology 56:11440–11448. https://doi.org/10.1021/acs.est.2c03846

van der Jeugd H P, G Eichhorn, KE Litvin, J Stahl, K Larsson, AJ van der Graaf and RH Drent (2009) Keeping up 2 with early springs: rapid range expansion in an avian herbivore incurs a mismatch between reproductive timing and 3 food supply. Global Change Biology 15:1057-1071. https://doi.org/10.1111/j.1365-2486.2008.01804

Van Dorst RM, A Gårdmark, R Svanbäck, U Beier, GA Weyhenmeyer and M Huss (2019) Warmer and browner waters decrease fish biomass production. Global change biology 25: 1395-1408.

https://doi.org/10.1111/gcb.14551

Vinther M (1999) Bycatches of harbour porpoises (Phocoena phocoena L.) in Danish set-net fisheries. Journal of Cetacean Research and Management 1:123–135. https://doi.org/10.47536/jcrm.v1i1.457

Vähätalo AV, K Rainio, A Lehikoinen and E Lehikoinen (2004) Spring arrival of birds depends on the North Atlantic Oscillation. Journal of Avian Biology 35:210-216. https://doi.org/10.1111/j.0908-8857.2004.03199.x

Waldeck P and K Larsson (2013) Effects of winter water temperature on mass loss in Baltic blue mussels: Implications for foraging sea ducks. Journal of Experimental Marine Biology and Ecology 444:24-30. https://doi.org/10.1016/j.jembe.2013.03.007

Wikström A, T Linders, M Sköld, P Nilsson and J Almén (2016) Bottentrålning och resuspension av sediment (Bottom trawling and resuspension of sediment – In Swedish) Länsstyrelsen i Västra Götalands län 2016:36. ISSN: 1403-168X.

Williams F, R Eschen, A Harris, D Djeddour, C Pratt, RS Shaw, S Varia, J Lamontagne-Godwin, SE Thomas and ST Murphy (2010) The economic cost of invasive non-native species on Great Britain. CABI Project No. VM10066.

Wysocky E, J Dittami and F Ladich (2006) Ship noise and cortisol secretion in European freshwater fishes. Biological Conservation 128: 501–508. https://doi.org/10.1016/j.biocon.2005.10.020

Ye S and AL Andrady (1991). Fouling of floating plastic debris under Biscayne Bay exposure conditions. Marine Pollution Bulletin 22:608–613. https://doi.org/10.1016/0025-326X(91)90249-R

Žydelis R, M Dagys and G Vaitkus (2006) Beached bird surveys in Lithuania reflect oil pollution and bird mortality in fishing nets. Marine Ornithology 34:161-166. http://www.marineornithology.org/article?rn=707

Žydelis R, J Bellebaum, H Österblom, M Vetemaa, B Schirmeister, A Stipniece, M Dagys, M van Eerden and S Garthe (2009) Bycatch in gillnet fisheries - an overlooked threat to waterbird populations. Biological Conservation 142:1269-1281. https://doi.org/10.1016/j.biocon.2009.02.025

Österblom H, BI Crona, C Folke, M Nyström and M Troell (2017) Marine ecosystem science on an intertwined planet. Ecosystems 20:54–61. https://doi.org/10.1007/s10021-016-9998-6

Östman Ö, A Lingman, L Bergström and J Olsson (2017) Temporal development and spatial scale of coastal fish indicators in reference sites in coastal ecosystems: hydroclimate and anthropogenic drivers. Journal of Applied Ecology 54: 557–566. https://doi.org/10.1111/1365-2664.12719

© Pekka Tuuri