



Department for Energy Security & Net Zero

Recent Papers from DESNZ Offshore Energy SEA funded projects

Since 1999, the UK's Department for Energy Security & Net Zero (DESNZ) and its forerunner departments Offshore Energy SEA (OESEA) programme has funded a significant number of marine surveys and research projects to improve the information base for strategic assessment and activity specific consenting. The reports of, and data from, these studies are publicly available and deposited in the SEA data archive hosted by the [British Geological Survey](#).

The authors and researchers involved in DESNZ SEA studies have been encouraged to submit papers for peer reviewed publication. A list of recent publications is given below arranged chronologically under 4 headings: Birds, Marine mammals (and noise), Seabed and water column, and Other. Where available, links to the paper or journal are included. The OESEA programme has solely or jointly funded a number of PhD studentships. In addition to the papers arising from their research, the PhD candidates, thesis titles and institutions are listed under a separate heading towards the end of this document.

Birds

1. Thaxter CB, Quinn L, Atkinson P, Booth Jones KA, Clark NA, Clewley GD, Green RMW, O'Hanlon NJ, Johnston DT, Masden EA, Ross-Smith VH, Sage E, Scragg E, Taylor R, Burton NKH & Humphreys EH (2025). Breeding and foraging habitat are important in determining foraging ranges of sympatric generalist species. *Ibis* **168**: 259-292. <https://doi.org/10.1111/ibi.13446>
2. O'Hanlon NJ, Clewley GD, Johnston DT, Thaxter CB, Lopez SL, Quinn LR, Boersch-Supan PH, Masden EA, Daunt F, Wilson J, Burton NHK & Humphreys EM (2025). Partial Niche Partitioning in Three Sympatric Gull Species Through Foraging Areas and Habitat Selection. *Ecology and Evolution* **15**: e71577. <https://doi.org/10.1002/ece3.71577>
3. Niven HI, Jeglinski JWE, Aarts G, Wakefield ED & Matthiopoulos J (2025). Towards biologically realistic estimates of home range and spatial exposure for colonial animals. *Methods in Ecology and Evolution* **16**: 1002-1014. <https://doi.org/10.1111/2041-210X.70019>
4. Green RMW, Cook ASCP, Burton NHK, Franks SE & Green JA (2025). Framework for assessing species vulnerability whilst on migration to a spatially explicit anthropogenic

- pressure. *Biological Conservation* **307**: 111118.
<https://doi.org/10.1016/j.biocon.2025.111118>
5. Jeglinski JWE, Lane JV, Votier SC, Furness RW, Hamer KC, McCafferty DJ, Nager RG, Sheddian M, Wanless S & Matthiopoulos J (2024). HPAIV outbreak triggers short-term colony connectivity in a seabird metapopulation. *Scientific Reports* **14**: 3126.
<https://doi.org/10.1038/s41598-024-53550-x>
 6. Jeglinski JWE, Niven HI, Wanless S, Barrett RT, Harris MP, Dierschke J, & Matthiopoulos J (2024). Past and future effects of climate on the metapopulation dynamics of a Northeast Atlantic seabird across two centuries. *Ecology Letters* **27**:e14479 <https://doi.org/10.1111/ele.14479>
 7. Lane JV, Jeglinski JWE, Avery-Gomm S, Ballstaedt E. Banyard AC, Barychka T, Brown IH, Brugger B, Burt TV, Careen N, Castenschiold JHF, Christensen-Dalsgaard S, Clifford S, Collins SM, Cunningham E, Danielsen J, Daunt F, D'entremont KJN, Doiron P, Duffy S, English MD, Falchieri M, Giacinti J, Gjerset B, Granstad S, Grémillet D, Guillemette M, Hallgrímsson GT, Hamer KC, Hammer S, Harrison K, Hart JD, Hatsell C, Humpidge R, James J, Jenkinson A, Jessopp M, Jones MEB, Lair S, Lewis T, Malinowska AA, McCluskie A, McPhail G, Moe B, Montevecchi WA, Morgan G, Nichol C, Nisbet C, Olsen B, Provencher J, Provost P, Purdie A, Rail J-F, Robertson G, Seyer Y, Sheddian M, Soos C, Stephens N, Strøm H, Svansson V, Tierney TD, Tyler G, Wade T, Wanless S, Ward CRE, Wilhelm SI, Wischniewski S, Wright LJ, Zonfrillo B, Matthiopoulos J & Votier SC (2023). High pathogenicity avian influenza (H5N1) in Northern Gannets (*Morus bassanus*): Global spread, clinical signs and demographic consequences. *Ibis*. <https://doi.org/10.1111/ibi.13275>.
 8. Grémillet D, Ponchon A, Provost P, Gamble A, Abed-Zahar M, Bernard A, Courbin N, Delavaud G, Deniau A, Fort J, Hamer KC, Jeavons R, Lane JV, Langley L, Matthiopoulos J, Poupart T, Prudor A, Stephens N, Trevaill A, Wanless S, Votier SC, Jeglinski JWE (2023). Strong breeding colony fidelity in northern gannets following high pathogenicity avian influenza virus (HPAIV) outbreak. *Biological Conservation* **286**. 110269. <https://doi.org/10.1016/j.biocon.2023.110269>.
 9. Johnston DT, Thaxter CB, Boersch-Supan PH, Davies JG, Clewley GD, Green RMW, Shamoun-Baranes J, Cook ASCP, Burton NHK & Humphreys EM (2023). Flight heights obtained from GPS versus altimeters influence estimates of collision risk with offshore wind turbines in Lesser Black-backed Gulls *Larus fuscus*. *Movement Ecology* **11**: 66
<https://doi.org/10.1186/s40462-023-00431-z>
 10. Jeglinski JWE, Wanless S, Murray S, Barrett RT, Gardarsson A, Harris MP, Dierschke J, Strøm H, Lorentsen S-H & Matthiopoulos J (2023). Metapopulation regulation acts at multiple spatial scales: Insights from a century of seabird colony census data. *Ecological Monographs* **93**: e1569. <https://doi.org/10.1002/ecm.1569>.
 11. Clewley GD, Cook ASCP, Davies JG, Humphreys EM, O'Hanlon NJ, Weston E, Boulinier T & Ponchon A (2022). Acute impacts from Teflon harnesses used to fit bio-

- logging devices to Black-legged Kittiwake *Rissa tridactyla*. *Ringling & Migration* **36**: 69-77. <https://doi.org/10.1080/03078698.2022.2151065>
12. Johnston DT, Thaxter CB, Boersch-Supan PH, Humphreys L, Bouten W, Clewley GD, Scragg ES, Masden EA, Barber LJ, Conway G, Clark NA, Burton NHK & Cook ASCP (2022). Investigating avoidance and attraction responses in Lesser Black-backed Gulls *Larus fuscus* to offshore wind farms. *Marine Ecology Progress Series* **686**: 187-200. <https://doi.org/10.3354/meps13964>
13. Duckworth J, O'Brien S, Petersen IK, Petersen A, Benediktsson G, Johnson L, Lehtikoinen P, Okill D, Väisänen R, Williams J, Williams S, Daunt F & Green JA (2022). Winter locations of red-throated divers from geolocation and feather isotope signatures. *Ecology and Evolution* **12**: e9209 <https://doi.org/10.1002/ece3.9209>
14. Lane JV, Pollock CJ, Jeavons R, Sheddian M, Furness RW & Hamer KC (2021). Post-fledging movements, mortality and migration of juvenile northern gannets. *Marine Ecology Progress Series* **671**: 207–218 <https://doi.org/10.3354/meps13804>
15. Pollock CJ, Lane JV, Buckingham L, Garthe S, Jeavons R, Furness RW & Hamer KC (2021). Risks to different populations and age classes of gannets from impacts of offshore wind farms in the southern North Sea. *Marine Environmental Research* **171**: 105457 <https://doi.org/10.1016/j.marenvres.2021.105457>
16. Duckworth J, O'Brien S, Petersen IK, Petersen A, Benediktsson G, Johnson L, Lehtikoinen P, Okill D, Väisänen R, Williams J, Williams S, Daunt F & Green JA (2021). Spatial and temporal variation in foraging of breeding red-throated divers. *Journal of Avian Biology* **52**: 1–12 <https://doi.org/10.1111/jav.02702>
17. Green RMW, Burton NHK & Cook ASCP (2021). Migratory movements of British and Irish Common Shelduck *Tadorna tadorna*: a review of ringing data and a pilot tracking study to inform potential interactions with offshore wind farms in the North Sea. *Ringling & Migration* **34**: 71-83 <https://doi.org/10.1080/03078698.2019.1887670>
18. Martín-Vélez V, van Leeuwen CHA, Sánchez MI, Hortas F, Shamoun-Baranes J, Thaxter CB, Lens L, J. Camphuysen CJ & Green AJ (2021). Spatial patterns of weed dispersal by wintering gulls within and beyond an agricultural landscape. *Journal of Ecology* **109**: 1947-1958. <https://doi.org/10.1111/1365-2745.13619>
19. Masden EA, Cook ASCP, McCluskie A, Bouten W, Burton NHK & Thaxter CB (2021). When speed matters: The importance of flight speed in an avian collision risk model. *Environmental Impact Assessment Review* **90**: 106622 <https://doi.org/10.1016/j.eiar.2021.106622>
20. Clewley GD, Clark NA, Thaxter CB, Green RM, Scragg ES & Burton NHK (2021). Development of a weak-link wing harness for use on large gulls (Laridae): methodology, evaluation and recommendations. *Seabird* **33**: 18-34.
21. Brown JM, van Loon EE, Bouten W, Camphuysen KCJ, Lens L, Müller W, Thaxter CB & Shamoun-Baranes J (2021). Long-distance migrants vary migratory behaviour as much

- as short-distance migrants: an individual level comparison from a seabird species with diverse migration strategies. *Journal of Animal Ecology* **90**: 1058-1070
<https://doi.org/10.1111/1365-2656.13431>
22. Lane JV, Jeavons R, Deakin Z, Sherley RB, Pollock CJ, Wanless RJ & Hamer KC (2020). Vulnerability of northern gannets to offshore wind farms; seasonal and sex-specific collision risk and demographic consequences. *Marine Environmental Research* **162** <https://doi.org/10.1016/j.marenvres.2020.105196>
23. Carroll MJ, Wakefield ED, Scragg ES, Owen E, Pinder S, Bolton M, Waggitt JJ & Evans PGH (2019). Matches and mismatches between seabird distributions estimated from at-sea surveys and concurrent individual-level tracking. *Frontiers in Ecology and Evolution* **7**:333. <https://doi.org/10.3389/fevo.2019.00333>.
24. Thaxter CB, Ross-Smith VH, Bouten W, Clark NA, Conway GJ, Masden EA, Clewley GD, Barber LJ & Burton NHK (2019). Avian vulnerability to wind farm collision through the year: Insights from lesser black-backed gulls (*Larus fuscus*) tracked from multiple breeding colonies. *Journal of Applied Ecology* **56**:2410-2422.
<https://doi.org/10.1111/1365-2664.13488>
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26. Langston R & Teuten (2018). Ranging behaviour of northern gannets. *British Birds* **111**: 131-143.
27. Thaxter CB (2017). Chapter 15: Tracking and telemetry of marine birds. In: Perrow, M. (ed.) *Wildlife and Wind Farms: Offshore Volume 2: Conflicts and Solutions*. Conservation Handbooks. Pelagic Publishing.
28. Thaxter CB, Ross-Smith VH, Bouten W, Masden EA, Clark NA, Conway GJ, Barber L, Clewley GD & Burton NHK (2018). Dodging the blades: new insights into three dimensional space use of offshore wind farms by lesser black-backed gulls *Larus fuscus*. *Marine Ecology Progress Series* **587**: 247-253.
<http://dx.doi.org/10.3354/meps12415>
29. Shamoun-Baranes J, van Gasteren H & Ross-Smith V (2017). Sharing the Aerosphere: Conflicts and Potential Solutions. In: Chilson P, Frick W, Kelly J & Liechti F (eds) *Aeroecology*. Springer, Cham, pp.465-497.
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31. Ross-Smith V, Thaxter C, Clark N, Shamoun-Baranes J, Bouten W & Burton N (2016). GPS telemetry reveals differences in the foraging ecology of breeding lesser black-

- backed gulls between three Special Protection Area colonies. [BOU Proceedings – Birds in time and space: avian tracking and remote sensing](#).
32. Ross-Smith V, Thaxter CB, Masden EA, Shamoun-Baranes J, Burton NHK, Wright LJ, Rehfish MM & Johnston A (2016). Modelling flight heights of lesser black-backed gulls and great skuas from GPS: a Bayesian approach. *Journal of Applied Ecology* **53**: 1635-1891. <https://doi.org/10.1111/1365-2664.12760>
33. Thaxter CB, Ross-Smith VH, Clark JA, Clark NA, Conway GJ, Masden EA, Wade HM, Leat EHK, Gear SC, Marsh M, Booth C, Furness RW, Votier SC & Burton NHK (2016). Contrasting effects of GPS device and harness attachment on adult survival of lesser black-backed gulls *Larus fuscus* and great skuas *Stercorarius skua*. *Ibis* **158**: 279-290. <https://doi.org/10.1111/ibi.12340>
34. Cleasby IR, Wakefield ED, Bearhop S, Bodey TW, Votier SC & Hamer KC (2015). Three-dimensional tracking of a wide-ranging marine predator: flight heights and vulnerability to offshore wind farms. *Journal of Applied Ecology* **52**: 1474-1482. <https://doi.org/10.1111/1365-2664.12529>
35. Thaxter CB, Ross-Smith VH, Bouten W, Clark NA, Conway GJ, Rehfish MM & Burton NHK (2015). Seabird-wind farm interactions during the breeding season vary within and between years: A case study of lesser black-backed gull *Larus fuscus* in the UK. *Biological Conservation* **186**: 347-358. <https://doi.org/10.1016/j.biocon.2015.03.027>
36. Thaxter CB, Ross-Smith VH, Clark NA, Bouten W & Burton NHK (2015). GPS telemetry reveals within-wind farm behavior of lesser black-backed gulls during the breeding season. In: Köppel J & Schuster E (eds.) Book of Abstracts (page 65). Conference on Wind energy and Wildlife impacts (CWW 2015), March 10-12, 2015. Berlin, Germany.
37. Thaxter CB, Ross-Smith VH, Clark JA, Clark NA, Conway GJ, Marsh M, Leat EHK & Burton NHK (2014). A trial of three harness attachment methods and their suitability for long-term use on lesser black-backed gulls and great skuas. *Ringling & Migration* **29**: 65-76. <https://doi.org/10.1080/03078698.2014.995546>
38. Wade HM, Masden EA, Jackson AC, Thaxter CB, Burton NHK, Bouten W & Furness RW (2014). Great skua (*Stercorarius skua*) movements at sea in relation to marine renewable energy developments. *Marine Environmental Research* **101**: 69-80. <https://doi.org/10.1016/j.marenvres.2014.09.003>
39. Thaxter C, Ross-Smith V, Burton N, Wade H, Masden E & Bouten W (2013). Connectivity between seabird features of protected sites and offshore wind farms: lesser black-backed gulls and great skuas through breeding, migration and non-breeding seasons. [BOU proceedings – Marine Renewables and Birds](#).
40. Wakefield ED, Bodey TW, Bearhop S, Blackburn J, Colhoun K, Davies R, Dwyer RG, Green J, Grémillet D, Jackson AL, Jessopp MJ, Kane A, Langston RHW, Lescroël A, Murray S, Le Nuz M, Patrick SC, Péron C, Soanes L, Wanless S, Votier SC & Hamer

KC (2013). Space partitioning without territoriality in gannets. *Science* **341**: 68-70.
<https://doi.org/10.1126/science.1236077>

Marine mammals (and noise)

41. Carter M, Aarts G, Brasseur S, Hastie G, Moss S, Nabe-Nielsen J, Teilmann J, Thompson D, Thompson P, Vincent C & Russell D (2025). Scale-dependent foraging behaviour and habitat associations of two sympatric marine top predators. *Landscape Ecology* <https://doi.org/10.1007/s10980-025-02281-z>.
42. Carter MID, Aarts G, van Beest FM, Bivins M, Brasseur SMJM, Dietz R, Duck CD, Galatius A, Gilles A, Haelters J, Hastie GD, Jessopp M, Morris CD, Moss SEW, Nabe-Nielsen J, Nachtsheim DA, Schaffeld T, Schop J, Siebert U, Teilmann J, Thompson D, Thompson PM, Vincent C & Russell DJF (2025). At-sea distribution of seals on the Northwest European Shelf: Towards transboundary conservation and management. *Journal of Applied Ecology* **63**: e70236. <https://doi.org/10.1111/1365-2664.70236>.
43. McKnight JC, Solms B, Jensen M, Turnbull J, Balfour S, Laagland M, Bronkhorst M, Lee HJ, Kang G, Lee JY, Bell A, Hastie G & Ilardo M (2025). Diving behaviour and physiology of the Korean Haenyeo. *Current Biology* **35**: R7978–798. <https://doi.org/10.1016/j.cub.2025.06.066>.
44. Hall AJ, Russell DJF, Thompson PM, Milne R, Moss SE, Armstrong HC & Kershaw JL (2025). Clinical Chemistry Reference Intervals for Health Assessment in Wild Adult Harbour Seals. *Animals* **15**: 3429. <https://doi.org/10.3390/ani15233429>.
45. McKnight JC, Bønnelycke E-M, Balfour S, Milne R, Moss SEW, Armstrong HC, Downie C, Hall AJ & Kershaw JL (2025). Cognitive perception of circulating oxygen in seals is the reason they don't drown. *Science* **387**: 1276-1280. <https://doi.org/10.1126/science.adq4921>
46. Fernandez-Betelu O, Graham IM, Malcher F, Webster E, Cheong S-H, Wang L, Iorio-Merlo V, Robinson S & Thompson PM (2024). Characterising underwater noise and changes in harbour porpoise behaviour during the decommissioning of an oil and gas platform. *Marine Pollution Bulletin* **200**: 116083. <https://doi.org/10.1016/j.marpolbul.2024.116083>
47. Lepper PA, Cheong S-H, Robinson SP, Wang L, Tougaard J, Griffiths ET & Hartley JP (2024). In-situ comparison of high-order detonations and low-order deflagration methodologies for underwater unexploded ordnance (UXO) disposal. *Marine Pollution Bulletin* **199**: 115965. <https://doi.org/10.1016/j.marpolbul.2023.115965>
48. Ruesch A, McKnight JC, Fahlman A, Shinn-Cunningham BG & Kainerstorfer JM (2022). Near-Infrared Spectroscopy as a Tool for Marine Mammal Research and Care. *Frontiers in Physiology* **12**: 816701. <https://doi.org/10.3389/fphys.2021.816701>

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50. Fernandez-Betelu O, Graham IM & Thompson PM (2022). Reef effect of offshore structures on the occurrence and foraging activity of harbour porpoises. *Frontiers in Marine Science* **9**: 980388. <https://doi.org/10.3389/fmars.2022.980388>
51. Wyles HME, Boehme L, Russell DJF & Carter MID (2022). A Novel Approach to Using Seabed Geomorphology as a Predictor of Habitat Use in Highly Mobile Marine Predators: Implications for Ecology and Conservation. *Frontiers in Marine Science* **9**: 818635. <https://doi.org/10.3389/fmars.2022.818635>
52. Carter MID, Boehme L, Cronin MA, Duck CD, Grecian WJ, Hastie GD, Jessopp M, Matthiopoulos J, McConnell BJ, Miller DL, Morris CD, Moss SEW, Thompson D, Thompson PM & Russell DJF (2022). Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management. *Frontiers in Marine Science* **9**: 875869. <https://doi.org/10.3389/fmars.2022.875869>
53. McKnight JC, Ruesch A, Bennett K, Bronkhorst M, Balfour S, Moss SEW, Milne R, Tyack PL, Kainerstorfer J & Hastie GD (2021). Shining new light on sensory brain activation and physiological measurement in seals using wearable optical technology. *Philosophical Transactions of the Royal Society B* **376**: 20200224. <https://doi.org/10.1098/rstb.2020.0224>
54. McKnight JC, Mulder E, Ruesch A, Kainerstorfer J, Wu J, Hakimi N, Balfour S, Bronkhorst M, Horschig JM, Pernet F, Sato K, Hastie GD, Tyack P & Schagatay E (2021). When the Human Brain Goes Diving: Using NIRS to Measure Cerebral and Systemic Cardiovascular Responses to Deep, Breath-Hold Diving in Elite Freedivers. *Philosophical Transactions of the Royal Society B* **376**: 20200349. <https://doi.org/10.1098/rstb.2020.0349>
55. Nelms SE, Alfaro-Shigueto J, Arnould JPY, Avila IC, Bengtson Nash S, Campbell E, Carter MID, Collins T, Currey RJC, Domit C, Franco-Trecu V, Fuentes MMPB, Gilman E, Harcourt RG, Hines EM, Hoelzel AR, Hooker SK, Johnston DW, Kelkar N, Kiszka JJ, Laidre KL, Mangel JC, Marsh H, Maxwell SM, Onoufriou AB, Palacios DM, Pierce GJ, Ponnampalam LS, Porter LJ, Russell DJF, Stockin KA, Sutaria D, Wambiji N, Weir CR, Wilson B & Godley BJ (2021). Marine mammal conservation: over the horizon. *Endangered Species Research* **44**: 291-325 <https://doi.org/10.3354/esr01115>
56. Williamson BJ, Blondel P, Williamson LD & Scott BE (2021). Application of a multibeam echosounder to document changes in animal movement and behaviour around a tidal turbine structure. *ICES Journal of Marine Science* **78**: 1253-1266. <https://doi.org/10.1093/icesjms/fsab017>

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58. Trigg LE, Chen F, Shapiro GI, Ingram SN, Vincent C, Thompson D, Russell DJF, Carter MID & Embling CB (2020). Predicting the exposure of diving grey seals to shipping noise. *The Journal of the Acoustical Society of America* **148**: 1014 <https://doi.org/10.1121/10.0001727>
59. Whyte KF, Russell DJF, Sparling CE, Binnerts B & Hastie GD (2020). Estimating the effects of pile driving sounds on seals: Pitfalls and possibilities. *Journal of the Acoustical Society of America* **147**: 3948-3958. <https://doi.org/10.1121/10.0001408>
60. Hastie G, Merchant ND, Götz T, Russell DJF, Thompson P & Janik VM (2019). Effects of impulsive noise on marine mammals: investigating range-dependent risk. *Ecological Applications* **29**: e01906. <https://doi.org/10.1002/eap.1906>
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62. Arso Civil M, Quick N, Cheney B, Pirotta E, Thompson P & Hammond P (2019). Changing distribution of the east coast of Scotland bottlenose dolphin population and the challenges of area-based management. *Aquatic Conservation: Marine and Freshwater Ecosystems* **29**: 178-196. <https://doi.org/10.1002/aqc.3102>
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65. Sparling C, Lonergan M & McConnell B (2017). Harbour seals (*Phoca vitulina*) around an operational tidal turbine in Strangford Narrows: no barrier effect but small changes in transit behaviour. *Aquatic Conservation: Marine and Freshwater Ecosystems* **28**: 194-204. <https://doi.org/10.1002/aqc.2790>
66. Graham IM, Pirotta E, Merchant ND, Farcas A, Barton TB, Cheney B, Hastie GD & Thompson PM (2017). Responses of bottlenose dolphins and harbour porpoises to variations in piling noise during harbour construction. *Ecosphere* **8**: 1-16. <https://doi.org/10.1002/ecs2.1793>

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72. Lucke K, Hastie GD, Jurczynski K, McConnell B, Moss S, Russell DJF, Weber H & Janik VM (2016). Aerial low frequency hearing in captive and free-ranging harbour seals (*Phoca vitulina*) using auditory brainstem responses. *Journal of Comparative Physiology A* **202**: 859-868. <https://doi.org/10.1007/s00359-016-1126-8>
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74. Hastie GD, Russell DJF, McConnell B, Moss S, Thompson D & Janik VM (2015). Sound exposure in harbour seals during the installation of an offshore wind farm: predictions of auditory damage. *Journal of Animal Ecology* **52**: 631–640. <https://doi.org/10.1111/1365-2664.12403>
75. Jones EL, McConnell BJ, Smout S, Hammond PS, Duck CD, Morris CD, Thompson D, Russell DJF, Vincent C, Cronin M, Sharples RJ & Matthiopoulos J (2015). Patterns of space use in sympatric marine colonial predators reveal scales of spatial partitioning. *Marine Ecology Progress Series* **534**: 235-249. <https://doi.org/10.3354/meps11370>
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99. Nixon H (*in progress*). Developing the theory of disturbances in metapopulations: applications to seabirds and renewables. University of Glasgow.
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DESNZ Offshore Energy SEA

The SEA process aims to help inform licensing and leasing decisions by considering the environmental implications of a plan/programme and the activities which could result from its implementation. Since 1999, the Department has conducted a series of offshore energy SEAs, the latest covering wind, tidal stream and tidal range, carbon dioxide and hydrocarbon gas storage, and oil & gas.

Since the first SEA, the associated research programme has targeted key information gaps on the marine environment and potential industrial impacts, to inform the SEA process, developers, consenting bodies and others. Research priorities are discussed with the SEA Steering Group and a range of other stakeholders.

For more information on the OESEA programme, visit the offshore SEA web pages on <https://www.gov.uk/> or email oeep@energysecurity.gov.uk