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Identifying, assessment and adaptive environmental management of environmental effects between UK dredging areas and herring *Clupea harengus* spawning habitat

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Abstract:

Review of UK marine aggregate licence applications identified that herring *Clupea harengus* spawning habitat was consistently requiring environmental impact assessment, upon advice from ICES herring assessment working group (HAWG). The authors developed a 2 stage methodology to strategically assess potential impacts between UK dredging areas and defined spawning habitat. Stage 1 screened receptor-exposure-effect pathways between dredging direct and indirect impact zones, and seabed areas likely to support herring spawning (using: areas of ‘preferred’ spawning seabed sediment type; UK fish spawning data; interpolated ICES international herring larval spawning data; herring fishing vessel monitoring system data; and Inshore Fisheries and Conservation Authority data). A confidence score based on five parameters (method, vintage, positioning, resolution, quality standards) was applied. A higher scoring data layer indicated higher confidence that it was representative of spawning locations. The pathways were analysed using GIS, and the greater the number of overlapping data layers the greater the ‘heat’ mapped, and the higher the confidence that the seabed may be suitable for spawning. Aggregate areas overlapping the ‘heat’ map proceeded to Stage 2 assessment: cumulative impact assessment at a regional-scale. The methodology resulted in robust assessment of magnitude of effects. All licences were renewed/licensed without spawning season dredging bans. The results were presented to ICES in December 2014, and in 2015 HAWG adapted its environmental management advice: “activities that have a negative impact on the spawning habitat of herring should not occur, unless the effects of these activities have been assessed and shown not to be detrimental.”

Keywords: herring, *Clupea harengus*, North Sea, spawning area, aggregate dredging, gravel beds, geography, data, knowledge, information, environmental impact

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