Name of indicator	4.13 Abundance index of beached birds
Type of Indicator	Pressure indicator
Author(s)	Ainars Auniņš, Leif Nilsson, Andres Kuresoo, Leho Luigujõe, Antra Stīpniece
Description of the indicator	This indicator reflects mortality of birds due to different reasons (mainly pollution and bycatch; Camphuysen 1989, Camphuysen, Heubeck 2001, Žydelis *et al.* 2006). It is expressed as relative abundance of stranded birds. The indicator can have single species and multi-species versions. Single-species version of the indicator is calculated separately for each species identified. This allows identifying changes in species-specific mortality as this parameter can vary among the species. The following species need to be considered: *Gavia arctica, Gavia stellata, Podiceps cristatus, Somateria mollissima, Polysticta stelleri, Clangula hyemalis, Melanitta nigra, Melanitta fusca, Alca torda.* Multi-species version of the indicator is calculated as a single measure for all waterbirds (i.e. all species pooled). This allows assessing changes in mortality in the whole waterbird community.
Relationship of the indicator to marine biodiversity	The indicator reflects impacts and pressures to birds in marine environment that cause their mortality. Pollution (including oiling) and bycatch have been described as main impacts that can be assessed by this kind of indicator (Camphuysen 1989, Camphuysen, Heubeck 2001, Žydelis *et al.* 2006
Relevance of the indicator to different policy instruments	MSFD descriptor 1 (habitat level/condition of typical species). Birds Directive (Article 12 requires reporting on existing impacts and threats to all regularly occurring wintering marine waterbird species).
Relevance to commission decision criteria and indicator	1.3. Population condition 1.3.1. Population demographic characteristics (e .g. body size or age class structure, sex ratio, fecundity rates, survival/ mortality rates) 1.6.1. Condition of the typical species and communities
Method(s) for obtaining indicator values	Field data collection**:** Data for this indicator should be collected using coastal surveys and recording all beached birds as well as possible cause of their death. Standard methodology has been suggested by Camphuysen (1989) and has successfully been adopted on the Baltic coast (Vaitkus *et al.* 1993, 1994, Kurochkin 1993, Žydelis *et al.* 2006 and others). The following information is recorded for each segment in each patrol: date, site, observer, length of the patrolled segment, length of segment with visible oil contamination. For each bird found stranded on the beach species, cause of death, type of body found are recorded. Indicator calculation**:** the indicator value is expressed as an abundance index, i.e. abundance of beached birds in a particular year relative to abundance of beached birds at base year (time period) or it is standardised as a density - number of counted beached birds (individuals) per route unit. Freeware program TRIM is available to produce annual indices based on loglinear models (Pannekoek & van Strien 1998). In addition to annual indices, TRIM allows the estimation of trends over the whole period.
Documentation of relationship between indicator and pressure	Relationship between number of stranded birds and pressures, especially pollution (including oiling) and bycatch have been described in a number of articles (Camphuysen 1989, 1998, Camphuysen, van Franeker 1992, Camphuysen, Heubeck 2001, Fleet, Reineking 2001, Vaitkus 1994, Wiese, Ryan 2003, Žydelis *et al.* 2006, Skov *et al*. 2011).
Geographical relevance of indicator	1. Local 2. Regional 3. National waters 4. Baltic Sea wide
How Reference Conditions (target values/thresholds) for the indicator were obtained?	GES target value and GES threshold for this indicator need to be defined yet. Meanwhile a trend based GES reference conditions can be used - if there is a significant increasing trend in the value of this indicator, the indicator cannot be at GES.
Method for determining GES	The GES target need to be set at value equal to value that could be obtained in beached bird surveys id only mortality caused by natural factors was playing a role. GES threshold values need to be set at values at which mortality is low enough for the population to be considered as sustainable (safe). To set ecologically justified targets for this indicator, more species and site-specific ecological studies are needed. The GES targets and thresholds might be site specific due to different levels of mortality among sites and varying base time of the indicator.

	While precise GES threshold level cannot be set, a positive trend in this indicator suggest that the indicator can be considered as not being at GES, while negative trend suggests the opposite.
References	Camphuysen, C.J. 1989. Beached bird surveys in the Netherlands 1915–1988: seabird mortality in the southern North Sea since the early days of oil pollution. Technisch Rapport Vogelbescherming 1. Amsterdam: Werkgroep Noordzee. 308 pp. Camphuysen, C.J. & van Franeker, J.A. 1992. The value of beached bird surveys in monitoring marine oil pollution. Technisch Rapport Vogelbescherming 10. Zeist, Netherlands: Vogelbescherming, Netherlands. 191 pp. Camphuysen, C.J. 1998. Beached bird surveys indicate decline in chronic oil pollution in the North Sea. Marine Pollution Bulletin 36: 519–526. Camphuysen, C.J. & Heubeck, M. 2001. Marine oil pollution and beached bird surveys: the development of a sensitive monitoring instrument. Environmental Pollution 112: 443–461. Fleet, D.M. & Reinrking, B. 2001. What do systematic beached bird surveys tell us about oil pollution in the southern North Sea? Wadden Sea Newsletter 3: 21–23. Kurochkin, A. 1993. Late winter beached bird survey in Latvia. Acta Ornithologica Lituanica 7–8: 74–77. Skov. H., Heinänen S., Žydelis R., Bellebaum J., Bzoma S., Dagys M., Durinck J., Garthe S., Grishanov G., Hario M., Kieckbusch J.J., Kube J., Kuresoo A., Larsson K., Luigujõe L., Meissner W., Nehls H.W., Nilsson L., Petersen I.K., Roos M.M., Pihl S., Sonntag N., Stock A., Stipniece A., Wahl J. 2011. Waterbird Populations and Pressures in the Baltic Sea. Nordic Council of Ministers, Copenhagen, 201 pp. Van Strien, A.J., Pannekoek, J. et Gibbons, D.W. (2001): Indexing European bird population trends using results of national monitoring schemes: a trial of a new method. Bird Study 48: 200-213. Vaitkus, G., Petraitis, A. & Žydelis, R. 1994. Beached bird density trends in Lithuania during 1991–1994. Acta Ornithologica Lituanica 9–10: 73–77. Vaitkus, G., Dagys, M., Žydelis, R. & Kilesinskas, T. 1993. Preliminary report on winter-period beached bird densities in Lithuanian coastal waters. Acta Ornithologica Lituanica 7–8: 68–73. Wiese, F.K. & Ryan, P.C. 2003. The extent of chronic marine oil pollution in southeastern Newfoundland waters assessed through beached bird surveys 1984–1999. Marine Pollution Bulletin 46: 1090–1101. Žydelis R., Dagys M., Vaitkus G. 2006. Beached Bird Surveys in Lithuania Reflect Marine Oil Pollution and Bird Mortality in Fishing Nets. Marine Ornithology 34: 161 – 166.

Illustrative material for indicator documentation

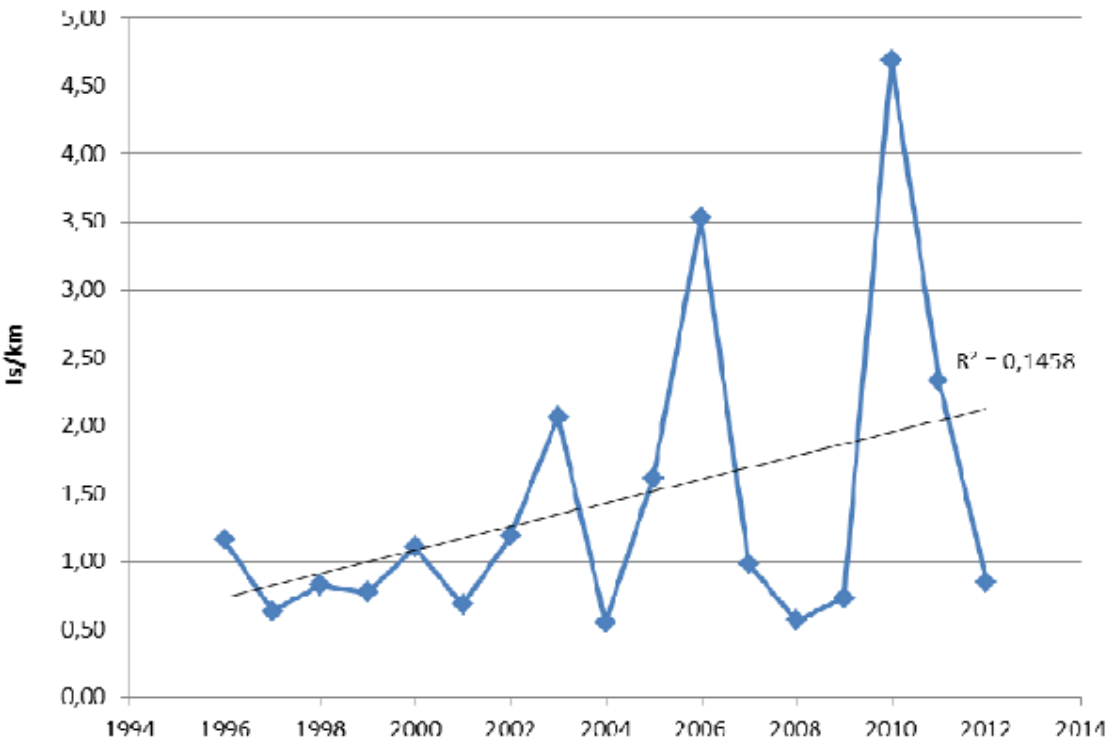

Figure 1. Density of beached waterbirds in north-western Estonia in the spring surveys (1996 - 2012) (Nellis 2013).

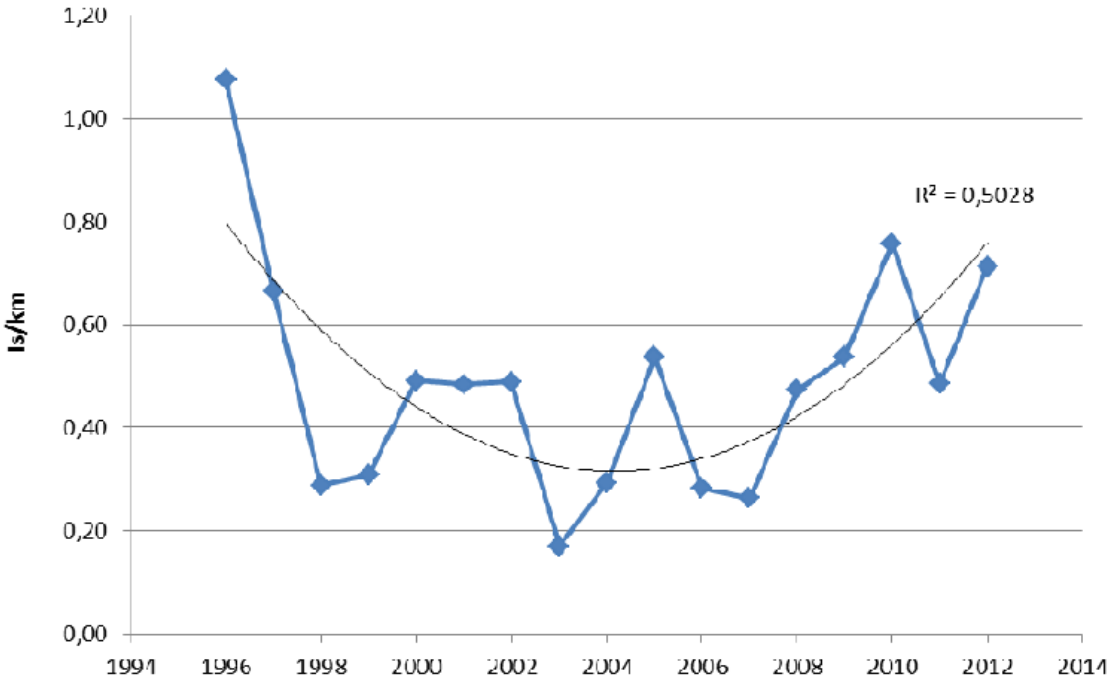

Figure 2. Density of beached waterbirds in north-western Estonia in the autumn surveys (1996 - 2012) (Nellis 2013).