

The number of collected birds killed by the oil spill was 1750, but the estimated number is much higher – maybe tenfold. Local breeding birds show fast recovery one year after oil accident except for waders breeding at the most polluted sites (Bredemåde Hage).

The degree of vegetation coverage was notably different between the affected and the unaffected test sections at the salt meadow and in the reed layer. The eroding of the existing vegetation by the clean-up gave possibilities for several new annual species like marsh samphire (*Slicornia europaea*) and reflexed sea meadow grass (*Puccinellia distans*) to colonize the areas, whereas perennial species are of more frequent occurrence in the unaffected test sections. The more rare perennial species like the sea rush (*Juncus maritimus*) and the hard rush (*Juncus inflexus*) are not found in the affected test sections. However, the impact of oil and the clean-up caused no irreversible damage to the flora in the affected areas.

10.2 Further actions and recommendations

10.2.1 Further actions regarding improvement of safety on sea

In the light of the “Baltic Carrier” oil spill initiatives were taken to improve safety at sea. One such initiative was the HELCOM Copenhagen Declaration of 10 September 2001 identifying the following issues to be crucial:

- The Deep Water route southeast of Møn will be extended into the traffic separation scheme "South of Gedser"
- The use of pilots in the Sound and in the Great Belt will be increased
- The use of electronic chart display systems (ECDIS) will be increased
- No later than 2005, a land-based system for surveillance of the traffic in the entire

Baltic area will be established. It will be based on the Automatic Identification System (AIS)

- Single hull tankers will be phased out
- Port state control will be intensified

Denmark is the first country to carry out the Ministerial decisions from the HELCOM meeting. On July 2nd, 2002 an agreement was signed between the Danish Maritime Authority and the shipping industry to ensure quality shipping in the Baltic. The agreement thereby obliges the organisations to work actively to make considerations of safety an integral part of maritime activities. This implies among other things, the use of latest technology and use of vessel pilot according to international guidelines (Agreement between the Danish Maritime Authority and the Shipping Industry to ensure quality shipping, 2002).

On behalf of the Danish Maritime Authority and Royal Danish Administration of Navigation and Hydrography, a risk analysis was carried out to establish a basis for deciding on cost-effective measures that can reduce the risk of oil spills in Danish waters. The analysis points out various opportunities of improvement: Widening and dredging of channels, extension of the Vessel Traffic Service (VTS) Great Belt surveillance area



and introduction of a VTS centre for the area around the Drogden channel. The analysis and means of improvement are reported in: "Risk Analysis of Navigational Safety in Danish Waters" (Danish Maritime Authority and Royal Danish Administration of Navigation and Hydrography, 2002).

10.2.2 Further actions regarding clean-up, monitoring and legislation

On the 11th of April, 2002 the governmental part of the clean-up operations after the "Baltic Carrier" incident ended and the clean-up was continued by the municipalities until June 2001. Discovery of oil from "Baltic Carrier" beneath the Bogø Dam in July 2002, however, implies that further mapping of oil deposits and cleaning of oil-contaminated areas might be considered.

Presently, there are no plans for further oil- and PAH analyses of samples from the area. By the end of the present survey PAH levels in blue mussels and flounders were still considerably above background levels, and so was the concentration in sediment from the locations most affected by the oil. In this area (Bredemede Hage – Fanefjord) there still remain considerable amounts of oil, and a resuspension and recontamination of the water column cannot be excluded. It is therefore highly recommended to monitor further the levels of oil compounds in both abiotic and biotic samples from the area.

The areas fenced in at Hestehoved and Bredemede Hage will form the basis for several research projects carried out by the University of Roskilde (RUC) to investigate the future fate of the spilled oil. Funding of these projects is of special importance as the experiences revealed from other oil spills generally are from areas very different from the brackish shallow areas at Grønsund.

In the years to come numbers of breeding birds in the area will be monitored and long-term effects might thereby be assessed. Furthermore, the vegetation cover in the areas disturbed by the clean-up will be monitored.

The National Veterinary and Food Administration has started a project on risk analysis of the consequences of oil spill to fish for human consumption. This is a Nordic project, which includes work on plans for preparedness in such situations. Furthermore, risk assessment of some of the polycyclic aromatic hydrocarbons has been started in EUs Scientific Committee on Food.

10.2.3 Recommendations

Apart from the recommendations of the actions listed above, the following actions/items are highly recommended based on the experiences gained during this survey:

- Implement county-based survey on the coastline to map valuable habitats and human installations especially sensitive to oil contamination, and develop plans for protective measures for these areas in connection with oil spill situations.
- Establish basic contingency plans for environmental survey in connection with oil spill situations, and establish a standing advisory body with experts in modelling of oil drift and monitoring of oil and PAHs the environment.
- Develop more case-specific guidelines for clean-up methods, covering a broader range of different oil types and different impacted area types.
- Develop more robust and flexible contingency plans for disposal of oil waste.
- Establish a regulatory body to implement bans on fishing following major oil spills until surveillance shows acceptable concentrations of oil and oil components in affected seafood.
- Establish a national foundation providing funding of the initial monitoring phase in connection with oil spill situations.

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