and Wanless[4], who have thoroughly searched the ledges of part of the Isle of May colony for ringed birds. Over 1,000 of their own have been identified, together with 72 individuals from other colonies and four ringed outside Britain. One of these was not identifiable as an individual, but the other three were rehabilitated oiled birds, two from the Netherlands and one from Germany.

These results[1,2] are the first from extensive and long-term data in Europe. In an analysis of records in the United States, however, Sharp[5] came to the same conclusion for guillemots (median survival of 6 days for cleaned guillemots, as against 216 days for healthy birds), and for two other species: western grebe *Aechmorphorus* sp. (11 and 624 days) and a sea-duck, the velvet scoter *Melanitta fusca* (7 and 466 days). Sharp was also able to assess the chances of oiled birds being cleaned and released for different incidents, and found that they varied widely (from 9% to 60%). Such data are not readily available from the European sources — given the chaotic circumstances when enthusiastic volunteers rally together in the face of an environmental disaster, it is impossible to find out how badly affected and what treatment birds that survived to release had undergone. However, Camphuysen (personal communication) considers that the Dutch birds had probably benefited from a longer period of recuperation than those from Britain, which may partly explain their better survival rates.

These results show that the best efforts to clean up oiled birds are not very successful. Nonetheless, bird welfare organizations would claim that it is their job to do what they can and that, even if only 1% survive, the work is worthwhile. Wernham *et al.*[1] also point out that there are happier cases. In Britain, mute swans (*Cygnus olor*) are often treated successfully, as are the penguins *Spheniscus demerus*, with up to 84% of rehabilitated birds later being seen in their South African colonies[6].

ENVIRONMENTAL IMAGES

Figure 1 **What hope? A victim of the *Sea Empress* disaster.**

Much may depend on the type of pollutant, for various sorts of oil have various effects on seabirds and waterfowl, and different treatments may be appropriate. The long-term toxic effect of oil ingested after preening from the plumage may be responsible for many deaths; other birds may not have regained fully effective waterproofing — the bird may perform well over a two- or three-hour test but not really be fit for continuous swimming. The oils involved in the incidents affecting *S. demerus* may account for the apparently better success rate with these birds — the oils are usually not as thick as those at higher latitudes, and they are quickly degraded as the warmer weather evaporates light fractions. Penguins also have particularly robust plumage.

What else can be done? The oil that causes the problem in the first place comes from illegal release or accidental spillage from ships. Better detection of covert tank cleaning operations, of the fuel tanks of ordinary vessels as well as tankers, should be an international priority (perhaps involving better use of satellite technology to identify and track the guilty ships). Recommendations for the improved management of accidents should come from the enquiry into the *Sea Empress* disaster, which occurred in South Wales in spring 1996; double-hulled tankers, the design of which contains oil after a collision, are also being phased in by international agreement.

The new results[1,2] could be taken to mean that cleaning programmes are simply not worth it, and it is true that the conservation value is minimal for the guillemot population of more than a million birds in the North Sea. But while volunteers are prepared to put in the time and effort to try to save oiled birds, they will continue. Procedures could be improved. Accurate records of individual birds need to be kept from the moment they are found, so that the efficacy of different treatments can be properly assessed. Each bird thought to be suitable for release should then be identified with long-lasting metal rings, and annual ringing of wild, healthy birds should also continue — in part for comparative purposes, in part to identify the colonies involved in the oiling incidents that will sadly continue to occur. □

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**Daedalus**

## The ultimate Sun-block

**A solar eclipse, the passage of the Moon across the face of the Sun, is a rare and exciting event. The Moon's shadow brings a sort of momentary night; the blue of the sky vanishes as sunlight is no longer scattered by the atmosphere; the stars come out. Daedalus now suggests a way of making an artificial solar eclipse.**

**His idea is to obstruct the Sun's disk with a high-flying circular shutter. To block most of the blue atmospheric scattering above a given point, it needs to be about 20 km across. It would subtend the Sun's diameter at some 2,000 km altitude — its upper limit of height. Clearly, it has to be in orbit. Daedalus recalls the scheme for a 'solar sail' spacecraft deploying a vast sail of aluminized polymer film. The pressure of solar radiation on its sail would propel it. His 'Eclipsat' will draw on much the same technology.**

**Eclipsat will resemble the inner tube for a bicycle tyre 20 km across, folded up small and immersed in a special viscous monomer fluid. Released in orbit, the toroidal tube will inflate under its internal pressure, and will slowly unfold into true circular form. The viscous monomer will be spread out like a soap-film as the tube unfolds, ultimately forming a perfect disk within it, 20 km across and a few micrometres thick. Solar radiation will soon polymerize it to a solid film. Sadly, no dye in the polymer could make such a thin film opaque. It will have to be coated with metal, possibly from a nearby pyrotechnic evaporator released from the same rocket.**

**The ideal orbital height for Eclipsat is perhaps 1,000 km. It will then produce a solar eclipse every 105 minutes along a track about 5 km across and maybe 8,000 km long. At any point on the track, each eclipse will last only 2 seconds; but their steady repetition will soon yield detailed information on solar prominences and their evolution with time, starlight shifts, and so on. Observers will see a giant shadow racing towards them at about 7 km per s, engulfing them in a brief night.**

**At other points of its orbit, the metallized disk of Eclipsat will act as a mirror. It will reflect the Sun down onto a narrow track on the dark side of the Earth, giving the novel phenomenon of an 'anti-eclipse'. Observers will see a band of brightness racing through the night towards them; for 2 seconds it will be bright, dazzling, sunlit day; then darkness will descend again. It will be an awe-inspiring spectacle.**

**David Jones**