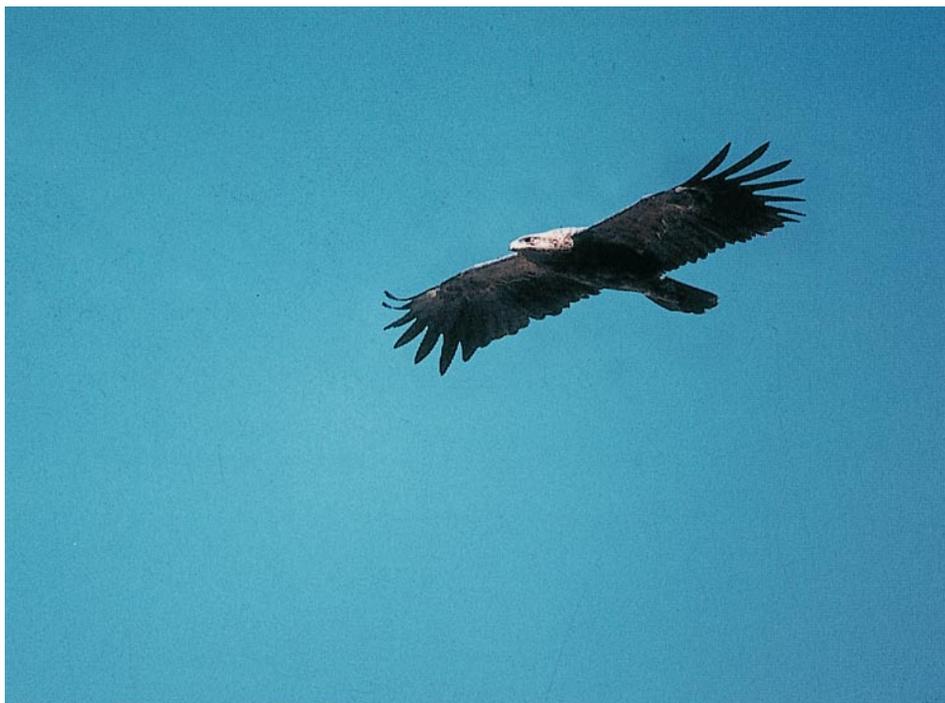


Satellite-tracked Lesser Spotted Eagle avoids crossing water at the Gulf of Suez

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ABSTRACT To date, most of the Lesser Spotted Eagles *Aquila pomarina* that we have tracked by satellite telemetry migrated in autumn along a direct route from Israel to Africa, via Suez (Egypt). In both 1997 and 1998, however, one adult female was tracked to the southern tip of the Sinai Peninsula, and from there flew north again to Suez. Only one other adult eagle is known to have flown south over the Sinai Peninsula, but from there crossed the Gulf of Suez. The possible reasons for this behaviour, involving a 500-km detour and a flight of about three and a half days, are discussed.

The migratory pathways of most birds are influenced by oceans, lakes and even rivers, but raptors in particular have been characterised as reluctant to cross water barriers. Few studies have been conducted on the behaviour of migrating raptors when crossing water bodies (e.g. Kerlinger 1985). Like many other large birds of prey, Lesser Spotted Eagles *Aquila pomarina* use gliding flight for migration, which depends on rising thermals of warm air, and avoid crossing open sea as much as possible. For many years, Lesser Spotted Eagles have been counted at points of concentration such as the Bosphorus (Turkey), but the extent to which they avoid narrow sea crossings and, if necessary, circumvent them has not so far been studied. With satellite telemetry, this is now possible, and the migration routes of larger raptors can be more accurately tracked. Shirihi *et al.* (2000) confirm that little is known about Lesser Spotted Eagle 'route behaviour' in the Sinai Peninsula, and here we describe in detail the surprising autumn route of one individual in 1997 and 1998.

Methods

An adult female Lesser Spotted Eagle was trapped near the nest in northern Germany on

6th June 1997, and fitted with a solar-powered satellite transmitter weighing 35 g. This was programmed so that, given sufficient light, it could send signals continuously. We received regular co-ordinates from this transmitter until 27th January 1999. For technical details of satellite telemetry, and the results obtained to date for Lesser Spotted Eagle, see Meyburg *et al.* (1993, 1995a, 1995b, 1996, 2000, 2001).

Results

By mid October 1997, the bird had reached the Middle East, spending the night of 11th-12th October about 22 km northeast of Nāblus ($32^{\circ}23'N$, $35^{\circ}22'E$; see fig. 1). On 12th October, in spite of a headwind, it flew c. 303 km through Palestine, Israel and Egypt to reach the central part of Sinai, c. 110 km ENE of Suez ($30^{\circ}10'N$, $33^{\circ}40'E$). This was the longest confirmed daily migration distance between $34^{\circ}N$ and $27^{\circ}N$. On 13th October, it continued southwest to arrive at the east coast of the Gulf of Suez around midday, some 50 km southeast of Suez, and then followed the coastline southeast. After spending the night of 13th-14th October about 100 km southeast of Suez ($29^{\circ}13'N$, $33^{\circ}07'E$), it flew 167 km parallel with the coast on 14th October, reaching the southern point of

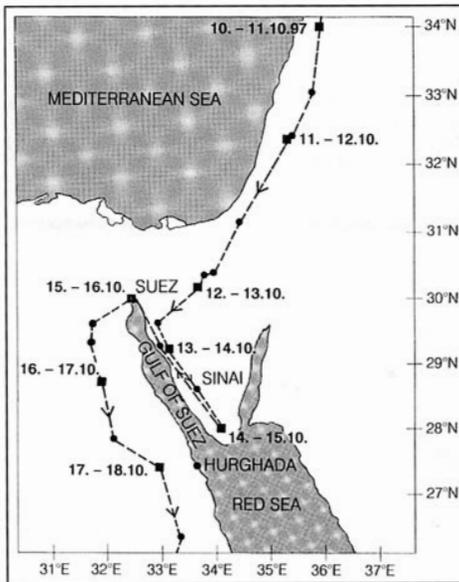


Fig. 1. Daily flight distances covered by a satellite-tracked Lesser Spotted Eagle *Aquila pomarina*, during 11th-18th October 1997, showing overnight stops (squares) and daytime locations (circles).

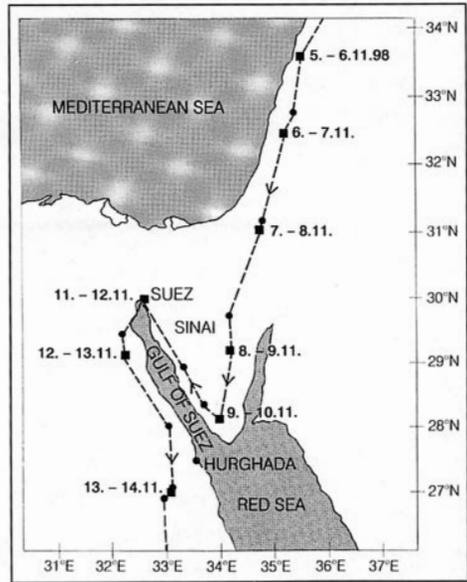


Fig. 2. Daily flight distances covered by a satellite-tracked Lesser Spotted Eagle *Aquila pomarina*, during 5th-14th November 1998, showing overnight stops (squares) and daytime locations (circles).

235. (Left) Lesser Spotted Eagle *Aquila pomarina*, northern Germany. B.-U. Meyburg



B.-U. Meyburg

236. Meadow landscape, northern Germany. Typical hunting habitat for Lesser Spotted Eagles *Aquila pomarina*.



B.-U. Meyburg

237. Adult female Lesser Spotted Eagle *Aquila pomarina*, with half-grown nestling. Eastern Slovakia, July 1968.

the Sinai Peninsula. From here, it changed direction abruptly. On 15th October, it flew 280 km northwest along the coast and at 12.57 hrs (local time) it was more or less at the spot where it had passed the previous night. It then spent the night of 15th-16th October 11.5 km west of Suez. From here, it flew southwest over a range of low hills, then along the west side of the range, through the desert to the south. On 16th October it covered 179 km, and continued roughly southwards on 17th October when at 14.00 hrs it had travelled as far south as the southernmost point it reached on the Sinai Peninsula. The daily distance covered by the eagle between latitudes 34°N and 27°N varied between 144 and 303 km, with a mean of 209 km per day.

In spring 1998, on its northward migration, the eagle flew over Suez on 3rd April and continued north. It bred successfully in Germany, at the same site and with the same mate as in the previous year.

During its southward journey in autumn 1998, this individual, astonishingly, repeated the detour to the southern tip of the Sinai Peninsula and back north to Suez in order to reach

Africa, flying this time in a straight line from Israel to the south of Sinai (fig. 2). On 6th November it reached the northern border of Israel around midday, and spent the night of 7th-8th November at 31°00'N, 34°42'E. Rather than flying southwest to Suez, it flew SSW until midday 011 the 8th, then south. On 9th, it arrived in the south of the peninsula, where it spent the night. On 10th November, it flew northwest, following the coast towards Suez. Along the old route of the previous year, it took two days to reach Suez. From here, on 12th-13th November, it followed the coastline, between 20 and 40 km inland, with a direct southward course from 28°N. At about midday on 13th November, it reached the same latitude as the southern tip of the Sinai Peninsula, where it had spent the night of 9th-10th November. The daily distance covered between latitudes 34°N and 27°N (determined on six of the eight days), varied between 126 and 265 km; overall, it covered an average of 159 km per day during those eight days.

Discussion

Water barriers are an important selective force shaping the migration pathways of raptors (Kerlinger 1989). Crossings may save considerable time and energy, but migrants risk being lost because of poor weather or fatigue, and very few species make crossings of more than 25 km. The mortality of raptors attempting even short water crossings is relatively well documented (Kerlinger 1985, 1989). For example, more than 1,300 raptors were found dead along one beach in Israel during April 1980, including seven Spotted *A. clanga* or Lesser Spotted Eagles and 124 unidentified *Aquila eagles* (Zu-Aretz & Leshem 1983).

With one exception, all other Lesser Spotted Eagles that we have tracked followed a direct line between Israel and Africa, via Suez. On 5th October 1994, however, a tracked adult male apparently flew from the southern tip of the Sinai Peninsula to Hurghada, on the west side of the Gulf of Suez (Meyburg *et al.* 1995a). The reason why the female discussed here did not cross the Gulf from the southern tip of Sinai (66 km wide at this point) remains unclear. The detour via Suez involved an extra 500 km and a



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238. Adult Lesser Spotted Eagle *Aquila pomarina*, with solar-powered satellite transmitter fitted, northern Germany, 7th July 1996.

time loss of up to three and a half days. We assume that it arrived in Sinai on its first autumn migration, possibly by following other species, such as White Storks *Ciconia ciconia*. Presumably it then opted not to risk crossing the Gulf and, having made a successful journey to Africa via Suez, adopted the same route in future years out of tradition, despite the extra distance involved. If adverse weather had prevented it crossing the Gulf, it would presumably have waited until conditions improved, but in both 1997 and 1998, after spending a night at the southern tip of Sinai, it flew northwest towards Suez the following day. Wind direction may have also played some part in the eagle's choice of route. For example, if it had wished to cross the Gulf from Sinai to Hurghada on 15th or 16th October 1997, it would have faced a headwind. Diverting to Suez meant that it had a tailwind instead. Furthermore, it had a tailwind when flying to the southern tip of the Sinai



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239. Adult Lesser Spotted Eagle *Aquila pomarina*, northern Germany, May 1995. This individual has just returned from its wintering quarters, having been tracked through the winter months with a satellite transmitter (the antenna of which is clearly visible).

Peninsula on 14th October. This does not, however, explain why, on 13th October, it did not fly straight to Suez. In addition, the greatest daily distance covered (303 km) was on a day when the eagle had a headwind.

Large migrant birds tend either to bypass the Gulf of Suez completely (at Suez in the north), or cross it from the southern point of Sinai to Hurghada on the west coast (Bruun 1985). The latter route is used by White Storks (Koch *et al.* 1966; Reed & Lovejoy 1969), although Attum (2000) argued that the majority of storks make the crossing farther northwest, from El Yora to Gebel El Zeita, where the Gulf is substantially narrower. The migration of raptors in autumn is much less well understood (Bijlsma 1987). The majority of vultures and eagles apparently avoid crossing the Gulf of Suez, and make a detour via Suez. Although Grieve (1996) considered that there was little evidence of a major routeway across the Gulf of Suez in autumn, maps in Shirihai *et al.* (2000) suggest that up to 100 Lesser Spotted Eagles may cross the Gulf in spring.

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