



## Connecting Flights

Never mind the road map for peace. An unlikely marriage between bird conservation and military aviation is thriving on one of the most divisive pieces of real estate on Earth.

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By Frances Cairncross  
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It's just before eight o'clock in the morning at the end of August, and we have been driving deeper and deeper below sea level for the past 20 minutes. We are in Israel, headed east from Jerusalem toward the Dead Sea, the land growing ever more barren and dusty. As the sky grows lighter, we pass Bedouin shacks and flocks of sheep, their colors ranging from beige to taupe to caramel. Ahead, the cliffs of the Judean Desert begin to emerge in the dawn. In the back of the car, Imad suddenly lets out a whoop—"honey buzzards, Yossi!"—and the car swerves perilously to the side of the road.

We tumble out, binoculars and telescopes in hand. There, on an expanse of scrub ground, sit hundreds of honey buzzards (*Pernis apivorus*), a hawk that spends summers in Europe and western Asia and winters in Africa. As we swivel our lenses, they begin to take off, first a few and then gradually more and more. Within 30 minutes, the ground is almost clear and the air above us is thick with wheeling birds. "By one o'clock, they'll be in Sinai," says Yossi Leshem. "You ought to call the air force," says Imad Atrash, head of the Palestine Wildlife Society. How extraordinary, I reflect, that a Palestinian should think of telling the Israeli air force about bird migration.

That incongruity is emblematic of Yossi Leshem's 20-plus-year crusade to revolutionize the study and protection of bird migration through Israel. He is a connector—one of those people with an extraordinary gift for bringing together disparate worlds. Driven by his love of birds, he has orchestrated an unlikely marriage between ornithology and military aviation. What's more, he's done it on one of the most divisive pieces of real estate on earth.

In fact, the Israeli air force has provided the focus and the finance for much of what he has done. He has created what is probably the world's most sophisticated system for preventing that scourge of military aviation: collisions with large birds. Early on in his academic career (he is now at Tel Aviv University), Yossi spotted the implications of two incompatible facts about Israel. It is one of the world's busiest corridors for bird migration, and it has one of the densest concentrations of low-flying military aircraft.

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A great bear of a man, his *kippah* perched perilously on an untidy mop of graying curls, Yossi talks with exuberant enthusiasm about his passion for Israel's soaring migrant birds. As general director of the Society for the Protection of Nature in Israel, the country's premier conservation society, he founded the Israel Raptor Information Center. Today, he runs the International Center for the Study of Bird Migration at Latrun, midway between Tel Aviv and Jerusalem, and manages almost a dozen other projects. His driving is terrifying: his car is a mobile office in which he ceaselessly flicks through a contact book balanced precariously on the steering wheel, punches numbers into a cell phone, and shouts a stream of instructions and ideas to friends and colleagues. His contacts are phenomenal. On the rare occasions when the traffic police have pulled him over, he has usually been able to plead that he had just taken a call from a government minister whom it would have been rude to ignore. But all the energy, the contacts, and the passion go to one cause: preserving and promoting Israel's birds.

Israel is a bird-watcher's paradise. Its location at the junction of three continents—Europe, Asia, and Africa—means that it has an astonishing range of the birds of each land mass. Some, such as the wren and the tawny owl (*Strix aluco*), are at the southernmost limit of their range; some, such as the sooty falcon (*Falco concolor*) at their northernmost limit; and some, such as the striated scops owl (*Otus brucei*), are at their westernmost extremity. But its location also gives it a special importance to migrating birds, and this is what inspired Yossi Leshem when his work began in the early 1980s.

Israel sits astride the Great Rift Valley, that 7200-km crack in the earth's crust that stretches from Turkey to Mozambique. Twice a year, millions of birds fly along that giant fissure, traveling between their summer quarters in central and eastern Europe and western Asia to their winter grounds in Africa. The vast majority are small—passerines that sprint along, furiously flapping their wings and usually traveling at night, when temperatures are lowest and predators less common. These birds have typically spent the previous three or four weeks on an eating binge, sometimes almost doubling their weight. The accumulation of fat sustains them as they fly the most direct route possible between their summer and winter quarters.

But there is a second pattern of migration. Larger birds cannot travel by gaining weight and burning it up in a straight dash across the Mediterranean and the deserts of North Africa. Their bodies are simply too heavy relative to their wingspan. So they have evolved a different technique that conserves energy but follows a longer route. They seek out thermals, columns of rising air that form in the morning over rocks or patches of dry

ground that heat up more than the surrounding land. They glide round in the thermal, allowing the rising air current to bear them gradually aloft. As the warm air starts to disperse at higher altitudes, the birds soar out of the column and glide gently downward in search of the next updraft. Sometimes they locate an air current rising where a breeze hits a line of hills or cliffs. Because such currents of warm air form only over land, soaring birds cannot migrate across wide bodies of water. Unlike the tiny flapping migrants, they therefore have to follow the land around the Mediterranean rather than race across it, and they must travel by day and not by night. They typically travel in flocks, which greatly benefits this kind of migrant: when one bird finds a thermal, the others can flap across to soar in it as well.

Both flappers and gliders pour back and forth across Israel every autumn and spring. But it has been the soaring migrants that have always fascinated Yossi Leshem, with good reason. Israel is one of the world's narrowest land corridors on the route between the northern and southern hemispheres. Like Panama and the Strait of Gibraltar, it is a bottleneck through which soaring migrants must pass twice a year. Most of the migrating large birds of central and eastern Europe and of western Asia travel across Turkey, then Lebanon, to funnel down the narrow stretches of the Great Rift Valley that run north-south through Israel. Through Israel's skies pass, for instance, the world's entire population of lesser spotted eagles (*Aquila pomarina*) and of levant sparrowhawks (*Accipiter brevipes*) as well as all of Europe's white pelicans (*Pelecanus onocrotalus*). On average, half a million raptors (and maybe half a billion birds all together) fly south over Israel each autumn.

But also flying through Israel's skies are many hundreds of military aircraft. And therein lies a formidable conservation challenge.

Unlike commercial planes, which typically rise steeply to more than 10,000 meters, military aircraft typically fly low, often at high speed. Between the Six-Day War of 1967 and the peace agreement with Egypt in 1982, Israel occupied the Sinai, an area three times the size of the state of Israel itself. The air force did most of its training over that vast expanse of desert. But with the peace agreement, the jets had to leave. They ended up in a much more limited airspace that was concentrated in the middle of the birds' flight path. As the size of the air force continued to grow, so did the perils of bird strikes, especially during the period of migration when—as Yossi established—three-quarters of bird strikes occur. If a plane is flying at 1,000 km per hour, a one-kilogram black kite (*Milvus migrans*) hits it with a force of 15 metric tons—and a ten-kilogram pelican hits it with a force of 100 metric tons. It is, Yossi points out, “like taking two tanks and throwing them into the pilot's face.”

Exactly that happened in late October 1974, when an unfortunate pilot flying low over the Hula Valley in northern Israel was struck by a pelican and killed. He was not the only casualty. Since 1972, the Israeli air force has lost nine fighter aircraft and sustained serious damage to a further 30 planes. And there have been about 3,200 bird hits with fighter jets, 1,800 with helicopters, and 1,600 with transport planes and light aircraft, for a total of about 6,600 collisions.

Yossi has a gruesome collection of photographs and twisted metal shards as a reminder of those tragedies. The air force was losing more planes to bird strikes than to enemy action.

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Most studies of bird migration work from the ground up. But one thing that neither ground observers nor radar is good at is calculating the height of the bird flocks accurately. That's where Yossi first made his mark. His 1991 doctoral thesis left the examiners gasping. For the first time, he had mapped in detail the paths and heights of all major large soaring birds migrating across Israel.

To do it, he hired a motorized glider and rode with the pilot day after day in the same thermals as the soaring birds. Circling with the hawks, sometimes for up to 11 hours at a time, tried the stamina of the pilots. "I had to bring coffee and sweets to keep them going," Yossi recalls.

The birds generally follow one of three main routes, but the height at which they fly varies depending on conditions. Usually, soaring birds keep to an elevation of around 1,000 meters but can reach elevations of 5,000 to 6,000 meters.

Early one morning, I glided in search of white storks. As we crossed the Sea of Galilee to look for flocks resting by the fishponds, the pilot pointed out the small jolts each time we crossed a thermal. "They are a glider's fuel," he said. Down below, we saw a few white shapes flapping away from the crowd, and soon hundreds were spiraling toward us in a rising column of warmth. "Of course, we're still below sea level," said the pilot. Nowhere else on earth could one look down 91 meters from a vantage point below the surface of the Mediterranean.

Based on Yossi's work with motorized gliders, radars, drones, and a network of bird-watchers, the Israeli air force changed its flight paths. The birds, Yossi gleefully points out, were certainly not going to change theirs. Harmful bird strikes have almost ceased: only two aircraft have been lost because of bird strikes in the past 15 years, whereas in the previous 15 years, the toll was seven planes. The entire number of collisions causing damage has dropped 76 percent since 1984. Fighter planes are now banned below 1,000 meters (except during take-offs and landings) during the migration season in what are now dubbed "bird-plagued zones," and the air force receives constantly updated information on the location of flocks. All told, the air force has saved US\$690 million in avoided damage since 1984.

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Yossi's strategy boils down to air traffic control. And that requires real-time information on a regional scale. So one of his latest endeavors is to develop an international network to predict bird movements and deliver real-time advisories to air bases in much the same way that weather forecasts work.

He bought a Russian radar system, previously used to monitor meteorological patterns in the former U.S.S.R. and installed it at the International Center for the Study of Bird Migration at Latrun. Fittingly, Latrun was one of the most important crossroads in the Middle East: here, the roads from Jaffa to Jerusalem and from Gaza to Ramallah and Damascus meet. It is also at the heart of the western migration route, which lies along the foothills of the Judean and Samarian Mountains. There, the MRL-5 weather radar is now used to monitor migration patterns and is manned by a retired Russian army general and meteorologist whose command of Hebrew is shaky but is offset by a phenomenal ability to discern bird migrations as well as weather.

Financed by the Israeli Ministry of Defense, a team of immigrant Russian scientists digitized the MRL-5 weather analogue radar. The idea for using weather radar to track bird movements for the air force came originally from The Netherlands, but Yossi built it into his complex system of monitoring by other means. Why not use the air force's own radar to watch out for birds? Air force systems are generally set to screen out slow moving objects such as cars—and thus birds. Yossi's weather radar, tuned to pick up the water content of clouds, easily spots the bodies of migrating birds. Initially, data covering 140 km across central Israel were supplied to the air force online. Later, two more air force radar systems created a network covering the entire country.

The next step in Yossi's vision is a real-time regional warning system that will connect countries in a kind of international relay. During autumn migration, Turkey will warn Jordan (and, hopefully, in the future Syria and Lebanon), which will then warn Israel of migrating flocks; Israel, in turn, will warn Egypt. During spring migration, the system will operate in reverse: Egypt-Israel-Jordan-Turkey. The countries hope to get this system up and running in the course of the coming year.

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in the past three years, Yossi has been pushing a new, even more ambitious plan: one that involves not cooperation with the air force but rather the far more difficult task of uniting 22 African countries in the name of ornithology. Yossi wants to declare the entire Great Rift Valley—the corridor from Mozambique to Turkey, up which humans first migrated north into Europe and Asia—a World Heritage Site.

Some Arab countries are apparently nervous that so majestic a scheme should come out of Israel. Undeterred and drawing on his irrepressible talent for publicity, Yossi is staging a series of concerts in the countries along the valley's path that will feature bird sounds by the American musician Paul Winter. As always, Yossi has assembled a formidable network of support: Shimon Peres, Israel's former vice-prime minister; former U.S. President Jimmy Carter (an enthusiastic bird watcher), Princess Takamado of Japan; and Wangari Maathai, Nobel-Prize-winning Kenyan environmentalist.

We always thought peace would come on the wings of a dove. Perhaps we were wrong. It may come crashing through the windshield with a honey buzzard.

For More Information

Visit “Migrating Birds Know No Boundaries” at [www.birds.org.il](http://www.birds.org.il)

About the Author

*Frances Cairncross was Management Editor of The Economist until 2004. She has reported for The Guardian, The Times of London, and The Observer. She is now Rector of Exeter College, Oxford University.*