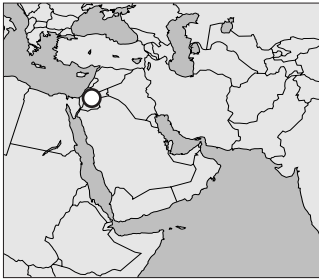


Colonisation of the Middle East by the invasive Common Myna *Acridotheres tristis* L., with special reference to Israel

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The Common Myna *Acridotheres tristis* L. is a tropical and subtropical Asian bird that has been introduced into many regions of the world. The species quickly established thriving feral populations following introduction into the Gulf region. Since the 1990s it began to appear in nearly all Middle Eastern countries and has spread in some parts of the region. This species is listed as one of the 100 worst invading species globally and is known to have negative effects on native bird biodiversity and to cause other problems. However, up to now there has been no synthesis of current information on distribution, colonization, and range expansion of the Common Myna in the Middle East. For example, after a first single observation in 1987, the species has been increasingly noted in Israel starting from 1997 and has dramatically increased in range and population size since then. Currently the Common Myna still has

its stronghold in a single location (about 70% of the national population 2003), the population originating from escapes from a local bird zoo or deliberate releases. The initial stages of invasion from this and other unknown locations are documented here. A map of distribution range and spread of the Common Myna throughout the Middle East is provided and the changes in distribution range in Israel are discussed in more detail. This paper aims at providing an important baseline for further work on understanding future changes in the species' range.

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Biological invasion by non-native species is recognized as one of the major threats to native species and ecosystems (Pimentel *et al* 2000, Sala *et al* 2000). Such invasions into native communities are among the prime global change factors contributing to biodiversity decline (Sala *et al* 2000). Invasive species have played a role in the majority of bird extinctions since 1800 and are considered a major threat to endangered birds today (BirdLife International 2004). Work that focuses on mapping bird introductions and on understanding the causes, results, impacts and extent of the process of spread is receiving increasing research emphasis in recent years (Blackburn & Duncan 2001, Duncan *et al* 2003). An advantage for the study of bird species is that birdwatchers are collecting substantial amounts of data that permit reliable description of distribution changes and their timing to be made. Recently, there has been a large increase in the numbers and range of non-native birds in the Mediterranean Basin, but relatively limited work has been done to record and track the process (but see Reino & Silva 1996). A recent study by Kark & Sol (in press) suggests that, relative to other Mediterranean climate regions around the world (*eg* in California, Australia and the South African Cape), non-native birds in the Mediterranean Basin have been very successful in establishing breeding populations. This is apparent for birds introduced into both the Western and Eastern Basins, and especially into Iberia and Israel. In Israel alone, over ten non-native alien bird species are currently establishing breeding populations, most of them first being recorded in the 1990s (Sapir 2000).

An integral part of the growing international problem of global change is land-use change. This, resulting from increasing human mobility, is the main catalyst for



Plate 1: Common Myna *Acridotheres tristis* in Park HaYarkon, Tel Aviv, Israel. © Martina Petrů, 12 December 2003.



Plate 2: Typical Common Myna habitat in Israel. The first free-nesting pairs used this date palm plantation in Park HaYarkon, Tel Aviv, Israel. © Claus Holzapfel, 27 June 2002.

invasion of non-native organisms, including birds (Vitousek 1994). Both trends enable non-native species to move, or be moved, and colonize new areas. Species that thrive in disturbed habitats, especially those that are have become commensal with humans, are strong candidates for invaders. This ongoing process is demonstrated by the case of the Common Myna *Acridotheres tristis*, a species that is showing recent dramatic increases in its global distribution range, mostly resulting from introduction into new areas (Feare & Craig 1998). The Common Myna has been nominated among 100 of the "World's Worst" invaders by the Invasive Species Specialist Group (Lowe *et al* 2000). Some members of the starling family (Sturnidae), and mynas in particular, have proved to be particularly successful in colonisation of new areas (Feare & Craig 1998, Long 1984). The Common Myna is spreading fast in the Middle East. Many first state records have been published recently, indicating a current colonization process all over the region (Bara 2002, Bilgin 1996, Millington 2000, Nation *et al* 1997, Sapir 2003). The natural range of the Common Myna spans from Central Asia and Afghanistan through India to south-eastern Asia (Feare & Craig 1998). The species showed a seemingly natural range expansion northwards in Central and Southwest Asia (Sagitov *et al* 1990, Sperl 1992) and has been deliberately introduced into various parts of the world (*eg* southern United States, South Africa, Australia and New Zealand, (see Long 1984). The species has been found in Western Palearctic areas beyond the Middle East and Central Asia, for instance in Western Europe in northern France (Hars 1991) and in Central Europe in Germany (Moritz 1975). These occurrences lasted several years at a time, indicating that individuals can survive in cooler climates, but this does not necessarily indicate that they can establish self-sustaining populations there.

This paper aims primarily to document the current status and spread of Common Myna in Israel until the end of 2003. It also provides information on the Middle East in general in order to describe the spread of this invasive bird species in the region.

METHODS

We collected as many currently available records as we could reliably confirm for Israel to document the introduction and spread of Common Myna in this region. The data are largely based on information published in the Internet (private birder websites and mailing lists) and personal observations. Such records were deemed verified if the observers were known to be reliable. Sightings of observers unknown to us were followed up and included in the data base only when confirmed. We solicited

additional information from the Israeli bird watching community through "IsraBirdnet", a private domain mailing list of experienced birders dedicated to the flow of information on birds in Israel. From these data we reconstructed the spread of Common Myna in Israel. Systematic counts have been conducted since 2001 by various observers in the Park HaYarkon area, a large public park in Tel Aviv city. These counts focused on the main roosting site, a dense growth of evergreen, exotic trees. Here birds flying into roost sites were counted roughly every fortnight from 2001 to 2003. These counts were conducted starting about one hour before dusk and (in most cases) two to three observers were positioned at opposite sides of the roost, thereby ensuring that all birds were counted and double counts were minimized.

RESULTS

The earliest records of the species in the Middle East region are from the early 1970s in various locations in the Gulf States, where the species has been introduced in large numbers to serve as a potential agent of biological pest control (Porter *et al* 1996). This area remains the centre of the species' introduced range in the Middle East (Bundy & Warr 1980, Jennings 1995, Nightingale & Hill 1993, Richardson 1992). However, the species has now been recorded in virtually every Middle Eastern country (Fig 1). Apparently, some countries have been colonized by 'vanguard' individuals only very recently, as demonstrated by many documented first records: *eg* Iraq in 1997 (Salim 1998), Egypt in 1998 (Millington 2000), Lebanon in 1999 (Bara 2002), and Jordan in 2001 (Kilburn *in litt*). However, the possibility that this species has been overlooked in the past prior to the surge in birdwatching activity cannot be disregarded.

The range in Israel (up to 2003)

Apparently, the first Common Myna was seen by J. Riihimaki (*in litt*) in Eilat at the northern end of the Red Sea on 3 April 1987. This record remained the only observation for Israel until 1997, when small numbers were discovered in Park HaYarkon, a large urban park in northern Tel Aviv. Since then there has been a rapid increase both in numbers and distribution (see Figs 2 and 3). The first nesting was confirmed in Park HaYarkon and Mikve Yisrael in 2000 (Sapir 2003). By 2003 these mynas had been seen widely across Israel. The focus of distribution in terms of population density is still in the central coastal area, especially in Tel Aviv. However, small numbers of

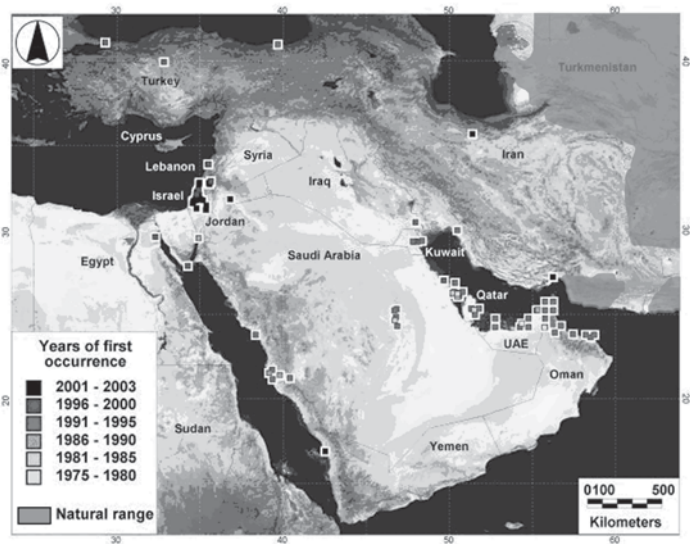


Fig 1: The spread of Common Myna *Acridotheres tristis* in the Middle East. The delineation of the native range (hatched) follows Feare & Craig (1998). The non-native range map is based on unpublished (see text) and published information: (Aspinall 1996; Balmer & Betton 2002, 2003; Bara 2002; Bilgin 1996; Boyla Eken 1998; Bundy *et al* 1989; Bundy & Warr 1980; Davidson & Kirwan 1995, 1996, 1998; Jennings 1995, 2004; Khaleghizadeh & Sehhati 2004; Kirwan 1993, 1997, 1999, 2001; Kirwan *et al* 2003; Millington 2000; Nation *et al* 1997; Nightingale & Hill 1993; Rahmani *et al* 1994; Ramadan-Jaradi 1988; Richardson 1992; Salim 1998; Sperl 1992; Stagg 1991; Warr 1993). Satellite image from Global Land Cover Facility, <http://glcf.umiacs.umd.edu>.

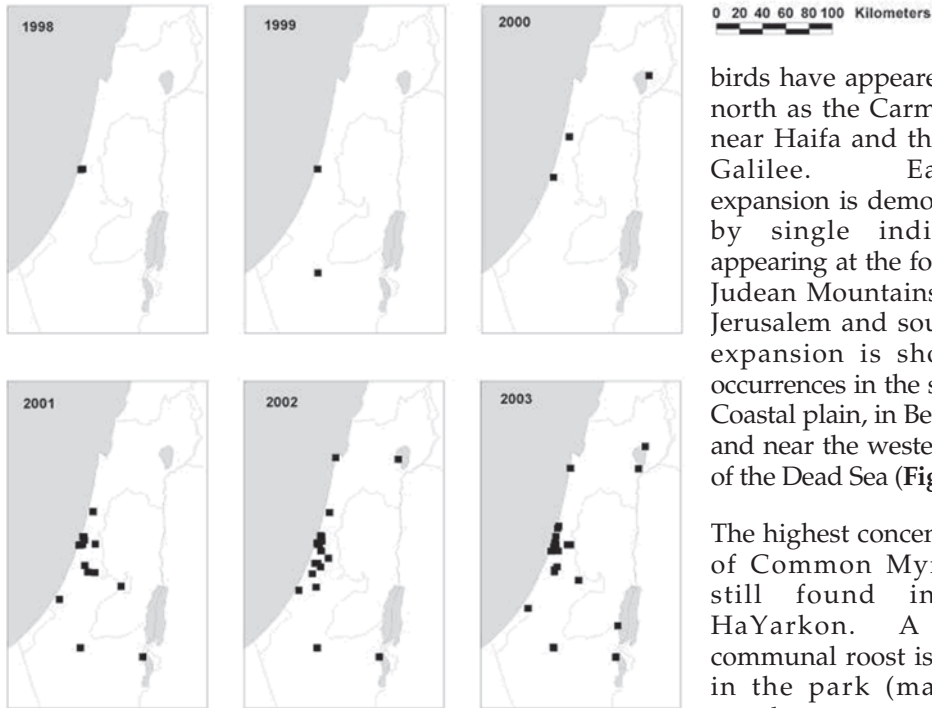


Fig 2: Spread of Common Myna *Acridotheres tristis* in Israel 1998 to 2003.

birds have appeared as far north as the Carmel coast near Haifa and the Sea of Galilee.

Eastward expansion is demonstrated by single individuals appearing at the foot of the Judean Mountains and in Jerusalem and southward expansion is shown by occurrences in the southern Coastal plain, in Beer Sheba and near the western shore of the Dead Sea (Fig 2).

The highest concentrations of Common Mynas are still found in Park HaYarkon. A large communal roost is present in the park (maximum number counted in November 2002:

380 individuals). The number of birds during roost flights peaked in the winter (outside the breeding season, which occurs between May and August) but has been substantial even in spring and early summer (eg 200 in June 2002). Seventeen nests were found in the park in 2002. However, since this number is not based on a systematic nest search and because a larger number of pairs were observed, the breeding population is expected to be larger. At this stage only rough estimates of the total population size in Israel can be made. A conservative estimate for the whole country is 500 birds (end of 2003), c70% being in the Tel Aviv area (see Figs 3 and 4).

The main habitats of the species in Israel are urban and suburban parks with irrigated grass lawns and native trees (often date palms) or traffic structures. In some cases also building structures (shopping malls, fuel stations) are colonized. Nest sites have been found in palm trees, woodpecker holes, traffic lights, electricity utility poles, and in crevices in buildings.

DISCUSSION

The current spread of the Common Myna in Israel and in most parts of the Middle East was likely triggered by deliberate introductions or by accidentally escaping cage birds and is not likely due to natural range expansion from adjacent areas. However, the larger geographical pattern of spread does resemble a natural range expansion process. In fact, differentiation is often difficult between natural range expansion and invasive spread of non-natives, as was the case with Cattle Egret *Bubulcus ibis* in the New World (Peterson 1954, Maddock & Geering 1994) and the Eurasian Collared Dove *Streptopelia decaocto*, a species which underwent a rapid range expansion throughout Europe in the 1900s and showed an almost comparable recent invasive spread through parts of North America after being introduced there (Hengeveld 1993). What is remarkable about the current spread of the Common Myna in Israel is the extremely short time-lag of just a few years from first occurrence to the rapid spread.

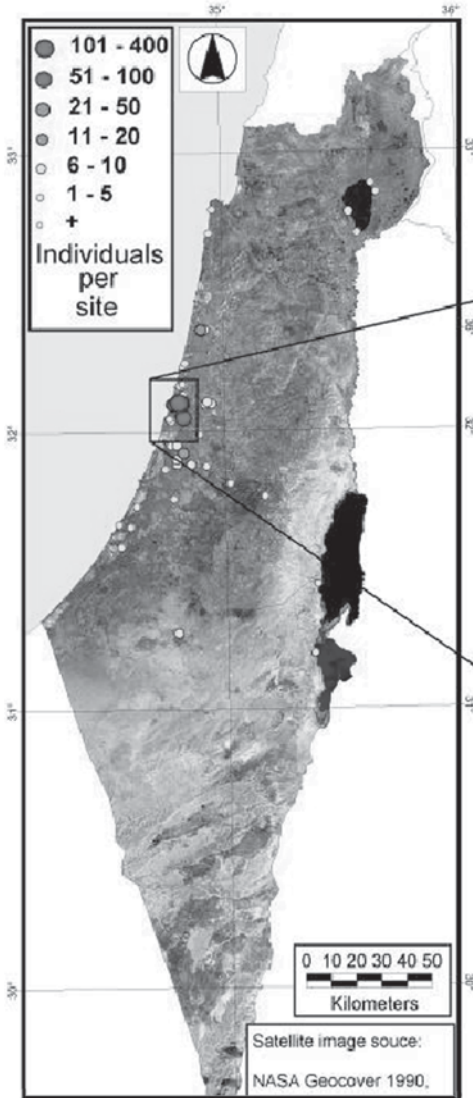


Fig 3: Abundance of Common Myna *Acridotheres tristis* in Israel 1998 to 2003. Satellite image from Global Land Cover Facility, <http://glcf.umiacs.umd.edu>.

The populations in Israel most likely originate from locally introduced stock and do not represent spread from other areas in the Middle East where the species was introduced prior to the rise of the Israeli Common Myna population. It is conceivable that the first Israeli birds in the Tel Aviv region were escapes from a bird zoo (Tzapari), which was established in the mid-1980s and holds many non-native species in the centre of Park HaYarkon. A number of non-native birds are free-flying in the park, including some sturnids, (Vinous-breasted

Starling *Sturnus (Acridotheres) burmannicus*, Black-collared Myna (Starling) *S. (Gracupica) nigricollis*, Superb Starling *Lamprolornis superbus*, Rüppell's (Glossy-) Starling *L. purpuroptera*), some of them now breeding freely in various numbers. All these species are likely escapees or deliberate releases from the bird zoo. Occurrences of the Common Myna and its spread in other Middle Eastern countries were generally blamed on escapees or deliberate introductions (Richardson 1992, Gregory 2002). Although we lack detailed information concerning the number of releases or escapes from the bird zoo given the fast rate of the park's population growth, we have assumed that it was a fairly larger number. Earlier observations of small numbers likely were of birds released by or escaped from private bird fanciers, because the Common Myna is a fairly popular cagebird in Israel and other Middle Eastern countries (eg see Gregory 2002)

The habitats used by Common Myna in Israel and other parts of the Middle East demonstrate its preference for areas undergoing major land-use change, typically such as large, irrigated grass lawns interspersed with trees and artificial structures like street and traffic lights, which choice mirrors in many ways the species' habitat preference in

its native tropical range (Feare & Craig 1998). In this context, we note that in the Middle East, the Common Myna is apparently most abundant in countries with higher GNPs, where large-scale landscaping is affordable (eg the Gulf States, Saudi Arabia, but also Israel). We hypothesize that in these semi-arid and arid countries the species is associated with high water consumption in luxurious areas, where the water use can recreate artificially sub-tropical and tropical habitats resembling those in its native range (Feare & Craig 2000). Urban and suburban landscaping – as a significant form of land-use change – appears to provide opportunities for colonisation by some bird species with appropriate biological attributes, as demonstrated by previous expansions of other predominantly subtropical birds into Mediterranean areas in Israel: both White-spectacled (Yellow-vented) Bulbul *Pycnonotus xanthopygos* and Palestine Sunbird *Cinnyris (Nectarinia) osea* are today abundant in irrigated gardens in central and northern Israel (Shirihai 1996). Urbanization bringing increased irrigation of parks and other grass lawns is expected to play also a major role in the spread of the tropical Great-tailed Grackle *Quiscalus mexicanus* into temperate zones of the US (Wehtje 2003).

So far, negative effects of the Common Myna are not known in Israel and data on negative interactions with other bird species are still only anecdotal (eg an observation of Common Mynas eating House Sparrow *Passer domesticus* chicks in Park HaYarkon in June 2004: Yotam Orchan pers comm). Aggressive behaviour towards Syrian Woodpecker *Dendrocopos syriacus* has also been noted in the vicinity of nesting holes. Similar competition for nesting holes between introduced mynas and native birds occurred in Australia (Pell & Tidemann 1997). However, to date it is unclear whether native birds might be affected by increasing numbers of Common Myna in Israel. Current work is focused on determining such patterns. Sapir (2003) states that the species is currently still restricted to urban parks and anticipates antagonistic effects on native birds once mynas colonise irrigated rural areas. Given the documented negative effects in other parts of the world, notably among island avifaunas (Byrd 1979, Grant 1982, Jones 1996, BirdLife International 2000), such potential effects need to be closely studied. The interaction between Common Myna and another recently introduced species, Vinous-breasted Starling is currently under investigation (Salit Kark & Yotam Orchan unpub). It would be prudent to be alert to future interactions of Common Myna with other native species, such as Tristram's Starling *Onychognathus tristramii*, a species that recently has shown some tendency to colonize urban environments in some parts of the Middle East, probably encountering the myna soon (Chris Feare pers comm)

It is interesting to note that the Common Myna has been implicated in the dispersal of non-native invasive shrub species in the Seychelles (Fleischmann 1997). Such facilitation of invasion of non-native plants by invasive birds appears to be to a widespread phenomenon (Richardson *et al* 2000). Other negative effects of introduced dense populations of Common Myna in many parts of the world have been as agricultural pests and as nuisance species (noise disturbance and droppings at urban roost sites) Kannan & James (2001).

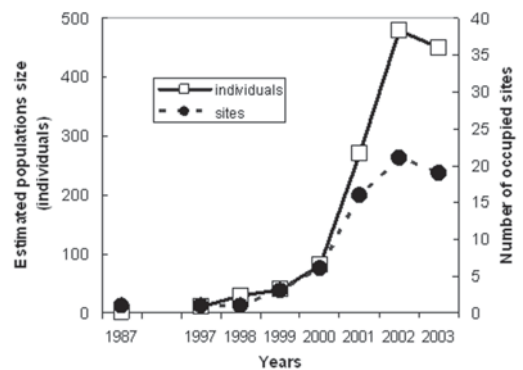


Fig 4: Increase in population size and occurrences of Common Myna *Acridotheres tristis* in Israel 1987 to 2003. The population estimates are based on available records and minimise double-counting. Occupied sites represent geographically distinct occurrences or populations.

The presented data describe the early stages of a remarkable population increase of the Common Myna in Israel and demonstrate the need for careful documentation and thorough monitoring of any new occurrence of non-native bird species. Such data are needed to facilitate predictions of future spread and to develop counterstrategies if deemed necessary. We do lack detailed information on the number of birds that were released or did escape. Success of invasion of non-native species is both a function of the number of individuals entering a new area and of the frequency of such introduction events (propagule pressure *sensu* Williamson 1996). Therefore, ornithologists and birdwatchers alike need to become aware of the numbers and species of non-native birds kept in captivity, to record sightings of introductions and to help discover why introductions have occurred, whether as escapes or deliberate releases, all as part of maintaining a heightened interest in non-native species. Data on such species have become increasingly important and the birding community should be encouraged to collect data in the same way as for the 'more attractive' native species.

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