

Recent Occurrences and Potential for Establishment of Egyptian Goose and *Agapornis* Lovebirds in Yolo County, California

Peer-Reviewed Paper

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Pranty and Garrett (2011) noted that:

“Tens of millions of exotic birds, representing hundreds of species, have been imported into the ABA Area. Some exotics were released for aesthetics or to provide hunting opportunities, while others escaped from zoos, importation or quarantine facilities, or private owners. From accidental or intentional releases, several dozen species of exotics are presently breeding in one or more regions of the ABA Area. The number of exotics included in the *ABA Checklist* is only 18 species. It is likely that several exotics currently considered not established will eventually be ratified (“accepted”) by the ABA Checklist Committee if stable or increasing population trends continue and once they have passed the review of state records committees. The state-review process can take years, even decades, longer than necessary because of several factors, of which one is the general disinterest—loathing even—that many birders and committee members show toward exotic species.”

When birders encounter non-native (exotic) species, most commonly waterfowl or psittacids (parrot family), the tendency is often to dismiss these birds as escapees that are unlikely to survive in the wild and to not report the observations to eBird and regional birding listservs. As a result, the early stages of establishment of non-native species often are poorly documented. This note aims to offset this tendency by documenting the presence of a small flock of Egyptian Geese (*Alopochen aegyptiaca*) and a small flock of lovebirds (*Agapornis* sp.) recently discovered in Yolo County, California. We also consider the likelihood that these two flocks may become the founders of local breeding populations.

STUDY AREA

Our study area is in southern Yolo County in the Central Valley of California. The area is dominated by farmland including rice, other grains, field

crops, managed wetlands, ruderal lands, and urban areas. It also includes the City of Davis, Davis Wetlands (a wastewater disposal facility), and the California Department of Fish and Wildlife's Yolo Bypass Wildlife Area.

METHODS

We summarized information on the biology and both the native and non-native distribution of Egyptian Geese and *Agapornis* lovebirds from the peer-reviewed literature and also compiled information on the history of these taxa in Yolo County and surrounding areas from public sources (such as the Central Valley Birds listserv), eBird, and communications with local observers.

We compiled a minimum population estimate for each species across the U.S. and within California using eBird data (eBird 2016). We first determined the number of unique localities in each state of the U.S. and each county of California in which observers have reported the Egyptian Goose and *Agapornis* lovebirds (including the three species most commonly kept in captivity and therefore seen as escapees: *A. roseicollis*, *A. fischeri*, and *A. personata*). Each unique locality was separated from others by at least 1 km (0.6 mi) to minimize double-counting of individual birds. To estimate the minimum population for each taxon for each unique locality we took the largest count of individuals reported between 1 January 2015 and 31 August 2016 and summed those counts at both the county and state level, as approximations of abundance for 2015-2016.

The resulting totals are imprecise measures of total abundance for several reasons:

- Non-native birds are underreported to eBird.
- Not all localities within which the Egyptian Goose and lovebirds occur are reported in eBird.
- High counts may not represent the total number of individuals present at a site.
- Some individuals may be double-counted if those individuals move between localities.

Given these issues, we believe our estimates are, on average, underestimates of total abundance. Using eBird data, we also determined the total number of unique localities in California across all years from which Egyptian Goose and lovebirds have been reported at least once and summed these localities by county. This method highlights the geographic scope of occurrences for these species.

EGYPTIAN GOOSE

Overview of Biology, Distribution and Status

The Egyptian Goose is the only extant member of the genus *Alopochen*, within the "shelduck" subfamily (Tadorninae), a subfamily with a mostly

tropical distribution that contains no species native to North America. The Egyptian Goose is a medium-sized (63–73 cm long) waterfowl, about 20% larger than a Mallard (*Anas platyrhynchos*). When walking, the Egyptian Goose displays long legs and typically extends its long neck in a manner that recalls a goose (Figure 1).



Figure 1. Egyptian Geese at the Yolo Bypass Wildlife Area on 4 September 2016.

Photo by Diana Rebman

The native range of the Egyptian Goose includes most of Africa south of the Sahara. While most abundant in southern and eastern Africa, the range extends north through the Nile Valley into Egypt (del Hoyo et al. 1992, Kear 2005). The Egyptian Goose occurs in a variety of open land cover types, often near water, including marshes, meadows, riparian zones, agricultural areas, and parks. The species is absent from the most arid and densely forested areas and is frequently seen around humans, especially in agricultural areas (Kear 2005). The goose is non-migratory, but individual flocks have traveled irregularly up to 1,000 km (600 mi) in response to shifts in water and food availability (Eltringham 1974).

The Egyptian Goose forages primarily by grazing on terrestrial plants. Like many terrestrial-feeding waterfowl, Egyptian Geese may travel considerable

distances on a daily basis to forage (del Hoyo et al. 1992, Kear 2005). In Africa, most birds nest in depressions in the ground, similar to other waterfowl, but some nest in trees, or on cliffs, or man-made structures (Lensink 1999). In southern California, Egyptian Geese apparently prefer to nest in trees, either in former nests of corvids or raptors or in cavities (K. Garrett, pers. comm.).

Egyptian Geese have been raised in captivity for several centuries, primarily as an ornamental species. A feral population became established in Great Britain in the 18th century (Sutherland and Allport 1991). Currently, feral populations are established across Europe, including in the United Kingdom, France, and the Netherlands (Sutherland and Allport 1991, Lensink 1998). In the Netherlands, the Egyptian Goose population has grown exponentially since breeding was first confirmed in 1967, with 1,200 pairs in 1994 and more than 11,000 pairs in 2010 (Lensink 1998, Gyimesi and Lensink 2012).

In the U. S., records of non-captive Egyptian Geese date back to 1877 in New York and 1898 in Maryland (Kirkwood 1900). Records prior to the 1980s likely represent escaped birds rather than established feral populations, but the fact that these records date back more than a century suggest that captive individuals are relatively common and that the species has had numerous introductions via escaped or released birds. To date, breeding populations have been established in Florida, Texas, Arkansas, and California (Pranty and Garrett 2011, Smith and James 2012, Pranty and Ponzo 2014). The first nesting report of non-captive Egyptian Goose is from Florida in 1985 (Paul 1985) and the first successful breeding record is from Florida in 2002 (Braun 2004). By 2013, Pranty and Ponzo (2014) tallied more than 1,200 Egyptian Geese in Florida and suggested the actual population was several times that figure.

Locally, a small population (>30 individuals) of Egyptian Geese persisted and likely bred at Lake Greenhaven in Sacramento County during the 1980s (G. Ewing, pers. comm.); this population disappeared during the 1990s. Since then, sporadic sightings of one or two Egyptian Geese have been reported along the American River in Sacramento County in the past decade.

Population Estimates in the United States using eBird Data

Twenty-four states had at least one record of Egyptian Goose in 2015-16. eBird data showed four states had only a single record of one individual, six states had abundance estimates totaling more than 10 individual birds, and three states had abundance estimates of more than 100 individual birds: Florida (2840), Texas (2143), and California (932) (Figure 2). Within California, seven counties had records of Egyptian Goose in 2015-2016 (numbers in parentheses are our abundance estimates): Amador (1), Los Angeles (189), Orange (455), Riverside (2), Sacramento (11), San Bernardino (14), and Yolo (12). The Yolo County estimate almost certainly represents six individuals that moved between two localities (see subsequent section), thereby

demonstrating the coarseness of our method. Nonetheless, we believe this method provides the best approximation of relative abundance available for comparing of counties and states, at least until these populations are directly censused. Figure 3 displays the number of unique localities in each California county with Egyptian Goose reports. Fifteen counties had at least one locality with an Egyptian Goose record in the overall eBird database. (*Note: although eBird allows for historical data entry, data from before the mid-2000s are sparse and should be considered very incomplete*).

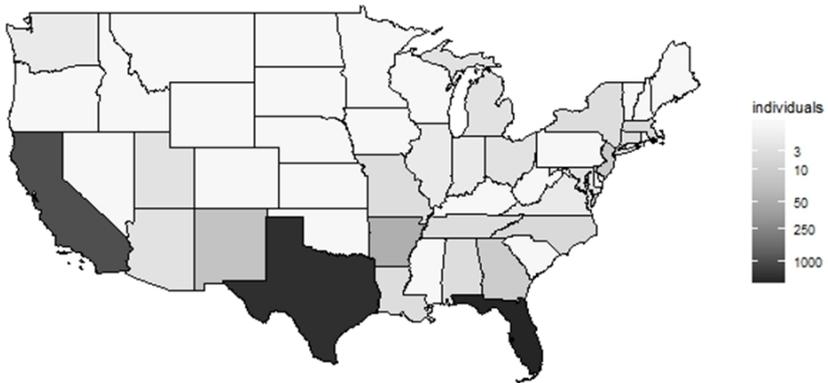


Figure 2. Estimated abundance of Egyptian Goose per state for 2015-2016 based on eBird data.

Recent Yolo County Records and Status

On 27 June 2016, Jim Thomas reported a flock of six Egyptian Geese in the ‘Waste Water Lagoon’ at the Davis Wetlands in Yolo County (map coordinates: 38.584057,-121.637316). All six birds were in adult plumage, not banded, showed no obvious signs of captivity (unusual feather wear, pinioning, or tame behavior toward humans), and exhibited normal flight. After the 27 June sighting, the flock was documented nearly weekly through 3 October 2016. On 11 July 2016, the flock was reported at the nearby Yolo Bypass Wildlife Area (38.541284,-121.620903) (Brice 2015), approximately three miles south of the Davis Wetlands. Initially, the flock was seen regularly (but not simultaneously) at each location, but by early September, was found primarily at Yolo Bypass Wildlife area, possibly a response to changes in surface water levels at each site.

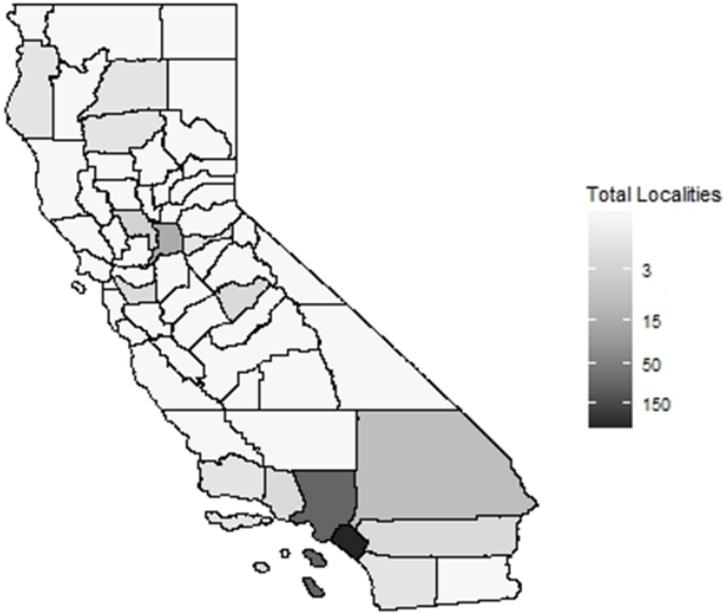


Figure 3. Number of localities with Egyptian Goose per county in California, based on all-time eBird records.

The provenance of the Egyptian Geese in Yolo County is undetermined, with several plausible explanations. First, the flock may have been recently released or escaped from captivity, possibly from a private collection. Alternatively, the flock may have consisted of individuals produced from a captive flock that were living wild prior to June 2016. The frequency of observers visiting the Davis Wetlands, coupled with the distinctive appearance and large size of Egyptian Goose, makes it unlikely that the birds were present at that site long before they were detected. However, given reports of Egyptian Goose from 15 different Sacramento area localities (Figure 3) and the likelihood that a small breeding population existed at Lake Greenhaven in Sacramento County in the 1980s (G. Ewing, pers. comm.), it is plausible that these individuals dispersed to the Davis Wetlands from a nearby area sometime in June 2016. Finally, the flock could have consisted of wild-produced individuals that dispersed from an existing breeding population. This last scenario seems the least likely, because most feral populations are considered sedentary and the nearest known breeding population is 570 km away in Orange County, but it cannot be ruled out given the species' history of moving substantial distances in search of water in its native range (Eltringham 1974).

At the Davis Wetlands, Fogarty observed Canada Geese (*Branta Canadensis*) behaving aggressively towards the Egyptian Geese on 20 July 2016. There and at the Yolo Bypass Wildlife Area, the Egyptian Geese associated closely with other waterfowl (Mallard, Gadwall [*Anas strepera*], and Canada Goose), gulls (Ring-billed Gull [*Larus delawarensis*], California Gull [*L. californicus*]), and wading birds (White-faced Ibis [*Plegadis chihi*], Great Egret [*Ardea alba*], and Snowy Egret [*Egretta thula*]). The Egyptian Geese typically remained in a tight group while foraging, even when mixed in with larger flocks of foraging waterfowl or waders.

Potential for Establishment and Impacts on Native Species

Few data exist on the sizes of the initial founding populations of Egyptian Geese in the U.S. The large number of apparent releases of Egyptian Goose across many states (Figure 2), compared with the small number of established populations (currently only in four states: Arkansas, California, Florida, and Texas), suggests that establishment may be a rare event. However, anecdotal evidence led Smith and James (2012) to claim that the Arkansas population originated from only a single pair, suggesting that a group of six individuals cannot be ruled out as too small to found a new breeding population.

Negative impacts of Egyptian Geese on native wildlife have not been documented in the United States. This may be because most Egyptian Geese in Arkansas and Florida, the two states for which studies have been published, typically are found in areas that are highly altered by humans (golf courses, parks, retention ponds, and agricultural areas; Smith and James 2012, Pranty and Ponzio 2014). However, K. Garrett (pers. comm.) reported that Egyptian Goose populations in southern California occur in areas managed to attract a greater variety of waterbird species, including the San Joaquin Wildlife Sanctuary in Orange County, suggesting that more work is needed to understand the potential impacts of Egyptian Geese on native wildlife.

In the United Kingdom, which has one of the largest feral Egyptian Goose populations, the species has been blamed for eutrophication, disruptive competition with local waterfowl, and other negative effects (Rehfishch et al. 2010). However, Rehfishch et al. (2010) found almost no data to support these claims and suggested that studies are needed to adequately assess the potential negative impacts of Egyptian Geese. In its native range, the Egyptian Goose aggressively defends nest sites from conspecifics and less frequently from other species (Lensink 1999), so it is possible that they may displace native nesting waterfowl if their breeding habitats overlap. The only published record of the Egyptian Goose disrupting nesting attempts of another species is the takeover of Black Sparrowhawk (*Accipiter melanoleucus*) nests in South Africa (Curtis et al. 2007). It may be significant that, while Black Sparrowhawk is native to sub-Saharan Africa, the population of this raptor studied by Curtis et al. (2007) had only recently colonized the study area by exploiting nesting

opportunities in non-native tree species that were also used by Egyptian Goose.

LOVEBIRDS

Background Information

The following information on lovebirds in their native Africa is drawn from Dilger (1962) and Radamaker and Corman (2011). Because more than one species appear to be represented among the Yolo County birds, we address the biology of lovebirds as a genus. The nine lovebird species are all from the genus *Agapornis* with eight species residing in sub-Saharan Africa and one in Madagascar. Lovebirds live near watercourses and breed colonially when seasonal rains are sufficient. They nest in crevices of rocky outcrops and cliffs. Lovebirds are non-migratory. The Rosy-faced Lovebird (*A. roseicollis*) is adapted to the cold winter nights common in its native range, mostly in Namibia.

Lovebirds have long been popular as cage birds, and they breed well in captivity. Virtually all lovebirds in captivity today come from captive breeding operations to supply the pet trade (Radamaker and Corman 2011). Escaped or released lovebirds are frequently observed outside of captivity, usually as single birds, especially in Arizona, Florida, California, Hawaii, and Puerto Rico (eBird 2016). Radamaker and Corman (2011) have documented the only established lovebird population in North America: Rosy-faced Lovebirds in and around Phoenix, Arizona. A 2010 census produced an estimate of at least 2,500 individuals in an area roughly 38 km in diameter, encompassing the Phoenix metropolitan area and outskirts to the southeast as far as Apache Junction, Chandler, Gilbert, and Queen Creek. The first breeding record in Phoenix was from 1987, and the population has been steadily growing as these birds have adapted to use saguaro cacti and fan palms in residential neighborhoods for food and nesting. Most of the Rosy-faced Lovebirds in the Phoenix area are of the natural phenotype, but some artificial color morphs are represented in the population.

Population Estimates in North America using eBird Data

According to eBird data, lovebirds were reported in nine states during 2015-16, but counts of 10 or more individuals were found only in Arizona. Within California, for all years, seven counties had lovebird records: Los Angeles (12 localities), Kern (3), San Diego (2), and one locality each in Fresno, Mendocino, Santa Barbara, and Yolo counties. Notably, San Luis Obispo County had no records, despite the report of “a small breeding population” there (McCaskie and Garrett 2003), which may have died out before eBird became widely used.

Yolo County Records and Status

On 7 September 2016, Dunford reported a flock of six lovebirds that appeared to be roosting in an ornamental fan palm (*Washingtonia filifera*) in a Davis neighborhood (38.5659567,-121.7490989). He initially identified all the birds in the flock as adult Rosy-faced Lovebirds (*A. roseicollis*; Figure 4).



Figure 4. Rosy-faced Lovebird (*Agapornis roseicollis*) in north Davis, CA on 8 September 2016. Photo by Roger Smith

It soon became apparent there were two types of lovebird in the Davis flock. One type displayed all the features of the natural phenotype Rosy-faced Lovebird. The other type showed plumage characteristics (white eye-ring, gray cheeks, and orange upper mandible—Figure 5) more like the hybrid of Rosy-faced and Fischer’s Lovebird (*A. fischeri*) illustrated by Dilger (1962), who reported that the two species hybridize easily in captivity, producing offspring that are healthy but sterile.

The flock continued through late October in the same four-block neighborhood bordering on one of north Davis’s largest greenbelts. Though wary of humans, the lovebirds were conspicuous because of their high-pitched, loud, metallic “kreek” calls, uttered especially while in flight. The

lovebirds were observed foraging on seeds and buds of valley oaks (*Quercus lobata*) and Japanese elm (*Acer palmatum*). They used the fan palm as a day roost and as a staging area before flying off to an unknown night roost.

On 25 September 2016, Walter Boyce (pers. comm.) witnessed an unsuccessful attempt by a Cooper’s Hawk (*Accipiter cooperii*) attack on the flock. One lovebird was found dead on 26 September; its wing was trapped between two dead fronds of the fan palm used for roosting, too high in the tree to retrieve the body for identification to species. The surviving lovebirds continued to use the same palm as a day roost.



Figure 5. A presumed mated pair of lovebirds composed of two “types”—right: Rosy-faced Lovebird (*Agapornis roseicollis*); left: apparent hybrid of Fischer’s Lovebird (*A. fischeri*) x Rosy-faced Lovebird—in north Davis on 9 September 2016. *Photo by Marsha Hand*

We later learned that a resident of the same Davis neighborhood (four blocks away) has kept lovebirds in captivity for several years. The captive flock was comprised of as many as 11 individuals of three species: Rosy-faced Lovebirds in the natural-phenotype and avicultural morphs of Fischer’s and Yellow-collared (*A. personata*) Lovebirds. During summer 2016, individuals from this flock began escaping their large cage when it was placed on an open patio. Eventually, all 11 birds escaped the cage, but they regularly returned to the open cage for food the owner continued to provide. Over time, these lovebirds ranged farther and farther across the local residential neighborhood

and returned with declining frequency. However, one lovebird pair (a Rosy-faced and a blue morph Yellow-collared) successfully produced three nestlings (from five eggs laid) in a nest box in the open cage. Through 11 October 2016, the pair continued to feed the nestlings, but a few days later, the nestlings were found dead in the nest box. Adult lovebirds soon ceased to return to the owner's yard for food, and lovebirds were last seen or heard in the neighborhood on 24 October 2016.

Potential for establishment and impacts on native species

The Davis flock of lovebirds offers an instructive example of how the transition from captivity to free living can occur in a way that might lead to establishment of a local wild population. Escaped birds were fed and even provided shelter for nesting without being held captive. These circumstances could allow an escaped flock to not only survive but to reproduce and grow in number, gradually becoming more and more independent of their human patrons and ranging farther and farther from their point of origin.

Although few introduced non-native species become invasive (i.e. having deleterious effects on the environment or economy), caution is warranted with any new introduction (Williamson 1996). Even if the Davis lovebirds do establish a local population, the Arizona experience offers some reassurance. Rademaker and Corman (2011) claim that "lovebirds have shown little to no negative impact on native bird populations or habitats. Their colonial nesting habits and propensity to nest in palms in urban areas reduce any widespread competition for nest sites." Moreover, they point out that even the Arizona population may be vulnerable: "Environmental conditions appear to favor a sustainable lovebird population, but psittacine beak and feather disease is always a looming threat." In addition, accidents and local predators, including Cooper's Hawks, may soon take their toll from the Davis lovebird flock.

CONCLUSION

It is uncertain whether the small flocks of Egyptian Geese and *Agapornis* lovebirds in Yolo County, California during 2016 will be isolated occurrences of the taxa in the Central Valley or contribute to the establishment of feral breeding populations in the region. These flocks have thus far offered more entertainment value for birders than imminent threat to the local ecology or economy. They also demonstrate, however, how established non-native and invasive species get their start from a founder pair or small flock. We strongly suggest that the presence of non-native bird species merits reporting to eBird and listservs (and any policies that discourage such reporting should be revisited) to document these events. Follow-up monitoring of these records may provide valuable insights into how non-native species become established, as well as help prevent damage from new invasive populations.

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