The decline of the Aplomado Falcon in the United States

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ALTHOUGH THE APLOMADO FALCON (Falco femoralis) once nested regularly in parts of Arizona, New Mexico, and Texas, population declines in the early 20th century have essentially eliminated the species from the United States (Bailey 1928; Ligon 1961; Oberholser 1974; Murphy 1978; and Hector 1980). Aplomado Falcons are extremely rare, with a limited distribution in the United States on the gulf-coastal plain of Texas and in the desert grasslands to the west, where many birders search for them annually. Only recently, however, has the status of this species been called to the attention of management-oriented agencies (Bond 1972; Wildlife Habitat Management Staff Group 1975; Murphy 1978; Evans 1982; Millsap 1983; LeFranc and Millsap 1984). LeFranc and Millsap (1984) classified the Aplomado Falcon one of the most “sensitive” of North American raptors.

Reasons for the decline of the Aplomado Falcon are unknown. Ligon (1961:82) says that “considering the permanent source of their food and the abundance of suitable nesting places, the disappearance [of the Aplomado Falcon] from most of its former range remains somewhat of a mystery.” He felt that shooting pressure may have been a factor because Aplomado Falcons were very tame. Oberholser (1974: 257), however, says that “... none of the usual causes of bird decimation seem to apply to the Aplomado Falcon”

In 1976 I began a study of the ecology and behavior of the Aplomado Falcon in eastern Mexico. A long-term objective of the project was to provide information which might help to improve the status of the Aplomado Falcon in the United States. Management of any species requires some understanding of its basic ecological relationships and how these relate to any population declines that have occurred. Results of the initial ecological investigations dealing with feeding ecology and habitat selection have been completed (Hector 1981 and 1985). This paper presents a scenario which describes and attempts to explain the decline of the Aplomado Falcon in the United States.

METHODS

I solicited specimen records from 57 museums and private ornithological collectors in the United States and Canada. A total of 43 responded and 29 contained specimens from the United States. Specimens from the following collections (in order of appearance) are mentioned in this paper: San Diego Natural History Museum (SDNHM), United States National Museum (USNM), Cincinnati Museum of Natural History (CMNH), Museum of Vertebrate Zoology (MVZ), American Museum of Natural History (AMNH), National Museum of Natural History (NMNH), Virginia Polytechnical State University (VPSU), Western Foundation of Vertebrate Zoology (WFVZ), University of Michigan Museum of Zoology (UMMZ), Oklahoma State University Wildlife Collections (OSU). Nineteen collections contained only specimens collected by F.B. Armstrong (see Discussion) and are not referred to individually.

In addition, I attempted to locate all late 19th and early 20th century references to the Aplomado Falcon, and contact individuals who had seen the species in the United States or Latin America. Although my sample of specimen records and observations is surely incomplete, I have probably garnered collection dates and localities for over 90% of North American specimens of the Aplomado Falcon.

In the remainder of this paper numbers in parentheses (#1-#34) refer to locations on Figure 1.

RESULTS

Early History in New Mexico

In March 1852, Heermann (1854; Brewer 1856) collected the first U.S. Aplomado Falcon (#1) in southwestern New Mexico. Stephens added a third U.S. specimen (SDNHM) in August,
1875, when he shot an adult female (#2) near Silver City, New Mexico (Grant County). Anthony (1892) reported a pair of falcons (#3) near Hachita (Grant County) in June 1886. On the Jornada del Muerto (#4; Dona Ana County), Ligon discovered several nests with young in June 1908 and 1909 (Bailey 1928). In July of the same year, Goldman collected an adult (USNM) at Hachita, and observed a bird in August in the Playas Valley (#5; Hidalgo County; Bailey 1928).

In June 1917, Ligon collected an adult female (USNM) 45 miles north of Alamogordo (#6; Otero County). He observed a pair of adults 25 miles north of Engle (#7; Socorro County, #25) in August (Bailey 1928); and collected a pair of adults (USNM) in September near Nutt (#1; Luna County). In September of the next year, he observed one bird 20 miles southeast of Silver City (#2; Luna County, Bailey 1928), and in November Ligon (1961) and A.K. Fisher observed a pair of falcons near Engle (#7; Sierra County). In December 1918, Ligon observed a pair of Aplomado Falcons 10 miles north of Engle (#7; Bailey 1928). In May 1919, Ligon shot an adult male (CMNH) 30 miles southeast of Silver City.

In May 1924, Ligon took an adult male (YPM) 15 miles southeast of Cutter (#7; Sierra County). In June, Kellogg collected two adult males (CMNH) and an adult female (MVZ) on the Tadpole Ranch, 4 miles north of Separ (#8; Grant County). In September 1928, Ligon collected another falcon (CMNH) southeast of Silver City.

Toomey collected the last skin from New Mexico in October 1939. This was an immature male (CMNH) taken near Animas (#9, Hidalgo County) Arnold Bayne located the last documented United States nest site in May 1952 near Deming, New Mexico (#1; Luna County; Ligon 1961).

**Early History in Arizona**

Henshaw (1875) saw Aplomado Falcons several times near Ft. Bowie, Arizona (#10) in 1873-1874. Fourteen years later in April and May, Benson located five nesting pairs (#11) at Ft Huachuca, Arizona (Cochise County, Bendire 1887). In 1910, Lusk (Visher 1910), observed a bird near Tucson (#12; Pima County), and Willard (1910) saw one in February along the San Pedro River near Fairbanks (#11, Cochise County). Monson spotted a falcon in the Sulphur Springs Valley

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“Prairie Falcons” by Louis Agassiz Fuertes
“Peregrine Falcons” by Paul Donahue
habits oak and pine savannas (Hector 1981, 1985; Howell 1982), open grasslands, coastal deserts (Johnson 1963), riparian woodlands in the midst of desert grassland (Henshaw 1875), and marshes (Hector, pers. obs.).

Since the early 1900s much of the lower Rio Grande valley, gulf-coastal plain of Texas, and river floodplains of New Mexico and Arizona have been converted from grassland to farmland— principally cotton, sorghum, citrus, beans and corn. Farming activities have also altered much of the Rio Grande Valley, Texas coastal plain, and portions of New Mexico and Arizona. In addition, brush encroachment has congested much of the semi-open grassland once inhabited by the species (Bogusch 1952; Glendening 1952; Humphrey 1958; Hastings and Turner 1964; Harris 1966; York and Dick-Peddie 1969).

Unregulated grazing by livestock surely accelerated the spread of mesquite by opening up ground cover vegetation and by ingesting, scarifying and dispersing whole seeds (Hastings and Turner 1964; Harris 1966; York and Dick-Peddie 1969). As in other grasslands, control of range fires, especially on the coastal plain of Texas, probably further accelerated the spread of mesquite (Humphrey 1958).

According to Camp (in Brooks 1933), the area congested by mesquite near Brownsville had increased in coverage and encroached about 5 miles on the coastal prairie in 20 years. Buffington and Herbel (1965) described the brush encroachment on the Jornada del Muerto between 1858–1963; evidently this area contained the highest known nesting densities of Aplomado Falcons outside of south Texas. The Jornada Experimental Range may coincide with the area in which J.S. Ligon found birds nesting in 1908–1909 (Bailey 1928). In 1858, an estimated 83,625 acres of the 144,475 acre study site was free of woody vegetation (mesquite, creosote, or tarbush). By 1915, the grassland acreage had decreased to 35,459 acres, then to 32,833 acres by 1928. In 1963, the study site was completely encroached by woody vegetation, mostly mesquite; over one-half of the area was covered by high densities of brush (50–100% coverage).

In Mexico, trees at falcon nest sites averaged 46 meters apart and 9.5 meters in height (Hector 1981). Tree densities averaged 19/40 hectares (19/100 acres; Hector 1981). Ground cover tended to be less than 25 centimeters deep (Hector 1981). Pastures not maintained by burning or clearing rapidly became congested with thorny legumes (mostly Acacia farnesiana). Aplomado Falcons tended to abandon nesting territories where grassy ground cover had given way to brush (Hector 1981). When I carried out a statistical comparison of habitat structure measurements for a sample of eastern Mexican nesting territories, I found that although occupied sites tended to have greater overall ground cover density, ground cover at these sites was concentrated below 0.5 meter above the ground (Hector 1981). Abandoned sites tended to be more congested with vegetation between 0.5
and one meter above the ground (Hec-
tor 1987). A number of studies have de-
tected a relationship between raptor
habitat selection and structure of
ground cover vegetation (Howell et al.
1978; Bechard 1982; Hector 1987; and
using simple geometric models, has
shown how habitat structure should af-
fect prey detection ability and optimal
perch heights of raptors. Presumably,
capture efficiency should also be af-
ected by vegetation structure.

Although birds are the staple food of
the Aplomado Falcon (Hector 1985),
the species feeds on a variety of prey
including bats, rodents, lizards, and in-
sects (Brooks 1933; Ligon 1961; Mader
1981; Hector 1985). Many prey animals
are captured on the ground following
high-speed chases begun from vantage
posts in trees (Hector 1981, 1985, and
1986). Hunting falcons often force
fleeing birds to hide in limited patches
of thicker ground cover or in the crowns
of isolated trees. Aplomado Falcons,
however, are agile enough to corner and
capture such grounded prey. With prey
in continuous forest, dense brush, or
dense, deep grass, however, falcons
tended to quickly abandon pursuit.

Although grazing pressure could conceivably have improved hunting
success for Aplomado Falcons by mak-
ing prey more vulnerable to detection
and capture, lack of cover probably re-
duced populations of many prey species
by destroying food plants and protected
nesting situations (Brown 1900 and
1904). This may account for the de-
clines suffered by the Masked Bobwhite
(Colinus virginianus ridgwayi) (Brown
1900 and 1904; Ellis et al. 1977; Tom-
linson 1972), Scaled Quail (Callipepla
squamata) (Phillips et al. 1964),
Mearn’s Quail (Cyrtonyx montezumae)
(Brown 1900 and 1904; Phillips et al.
1964; Oberholser 1974), and a number
of open country fringillids such as
McCown’s Longspur (Calcarius mccoani),
and Botteri’s Sparrow (Aimophila botterii), Rufous-winged
Sparrow (Aimophila carpalis), and

Populations of the White-tailed
Hawk, Black-shouldered Kite (Elanus
leucurus) (Eisenmann 1971; Pruett-
Jones et al. 1980; Larson 1980), and
Ferruginous Hawk (Buteo regalis)
(Houston and Bechard 1984) have all
declined in portions of their ranges
where vegetational change has elimi-
nated open to semi-open grassland. Ef-
fects of brush encroachment on hunting
success and prey availability probably
account in part for these declines. This
is significant not only because the
Aplomado Falcon shares similar habitat
preferences with these species, but also
because Aplomado Falcons depend
largely on other raptors (as well as cor-
vids) for nesting platforms. In eastern
Mexico, most nest platforms were the
abandoned nests of the Brown Jay (Psil-
orrhinus morio), Black-shouldered Kite,
or Roadside Hawk (Buteo magnirostris)
(Hector 1981). I also found falcons in
old nests of the Crested Caracara (Po-
ylborus plancus). In the United States,
falcons used nests of the Chihuahuan
Raven (Corvus cryptoleucus) (Bendire
1887), Swainson’s Hawk (Buteo swain-
soni) (Strecker 1930), and probably also
those of the Black-shouldered Kite,
White-tailed Hawk and Caracara.

Populations of the Black-shouldered
Kite and White-tailed Hawk have re-
covered in coastal Texas. This seems
related to intensive brush clearing and
the use of prescribed burns to revert
rangeland to some semblance of its
former openness. Unlike these two ro-
dent-oriented species, however, the
Aplomado Falcon has failed to recover
despite increased availability of open
range.

The Effect of Pesticide Contamination

Aplomado Falcons occupy a feeding
niche similar to that occupied by the
Peregrine Falcon, a species whose pes-
ticide-related declines have been well-
publicized (Ratcliffe 1970). Kiff et al.
(1981) discovered that post-DDT (post-
1947) eggs of Aplomado Falcons from
eastern Mexico averaged 25% thinner than pre-DDT eggs of this species. This is
a greater degree of thinning than that
found in declining populations of the
Peregrine (Kiff et al. 1981).

Because of their dietary preferences
(Hector 1985), and evidence that the
species is heavily contaminated in
Mexico, it is reasonable to assume that
Aplomado Falcons surviving in the
United States past the 1940s may have
been further decimated by pesticide
contamination. According to Lehmann,
5–9 falcons inhabited one 12,000 acre
pasture on the northern part of the King
Ranch until the early 1950s. These birds
disappeared before brush encroachment
had an appreciable effect on this pas-
ture. Lehmann believed that pesticide
contamination may have caused their
disappearance. Furthermore, cotton
agriculture dominated most areas—the
Texas coast, and desert rivers of Arizona
and New Mexico—near areas where
Aplomado Falcons once occurred.

An obvious effect of pesticide-in-
duced reproductive problems would be
a reduction in the ability of a species to
colonize unoccupied patches of habitat.
Consequently, although brush clearing
activities are rapidly opening up south
Texas ranches, Aplomado Falcons may
not reoccupy their former range until
pesticide use abates in Latin America,
or some effort is made to artificially re-
establish the species.

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