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Observations on *Buteo swainsoni* in Argentina, 1984 with Comments on Food, Habitat Alteration and Agricultural Chemicals

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ABSTRACT

Between 27 December 1983 and 22 January 1984, 6,613 km were travelled by car in Argentina between Buenos Aires and the northern Argentine towns of Salta and Resistencia. All raptors seen were catalogued by time and mileage. More than 2,500 individual raptors were seen. Swainson's Hawks were seen at 10 different locations, usually 1-3 birds except at 3 overnight roosts to be discussed, as follows: Province of Cordoba (3 locations, 200 plus and 2 single birds); Province of Chaco (1 location, 1 bird); Province of Corrientes (3 locations, 1, 2, and 1 bird); and Province of Entre Rios (1 location, 2 birds). The large roost of 200+ birds was in exotic eucalyptus trees planted as a wind break. Habitat used was either in land converted to agriculture or grasslands. Over 400 regurgitated pellets, gathered at roost sites, all contained orthopterans and bits of grass except one that contained a rodent. Previously, Straneck had seen them in 5 locations in the Provinces of Cordoba and Buenos Aires. Museum specimen locations and band recovery locations are discussed. Food habits and distribution are discussed relative to data from North America.

INTRODUCTION

Recent observations on the Swainson's Hawk *(Buteo swainsoni)* in Argentina confirm earlier reports on their biology on their austral non-breeding grounds. Certain aspects of that biology are important. Recent hypotheses generated to explain the hawk's numerical status change on the boreal breeding grounds suggest that the austral non-breeding grounds are responsible for this increased mortality. We do not attempt a review of the hawk's distribution in Argentina, nor do we attempt an extensive literature review of the status on the breeding grounds. For the latter, one should consult the 1985 Workshop on Swainson's Hawk status from the Raptor Research Meetings, Sacramento, California. Basically, literature data varied from impressions of no decline or change over historical records (Schmutz 1984; Craig *et al. 1984)* to a decline or loss of breeding pairs locally (Schlorff *et al.* ms.; Littlefield *et al.* 1984). Causes of the decline, especially in California and Oregon, have been linked, among other things, to pesticide contamination or loss of non-breeding habitat in South America. Our remarks are oriented to address these hypotheses. It should be noted that overall the historical data upon which impressions of status are based is generally quite poor.

MATERIALS AND METHODS

Between December 1983 and January 1984 we travelled 6,613 km by car within Argentina looking for raptors. We mapped previously unpublished sightings of Swainson's Hawks and checked collecting locations on specimens in the Museo Argentino de Ciencias Naturales, Buenos Aires, to determine if distributional patterns occurred. We evaluated band recovery records and literature sources for Argentina to determine patterns of occurrence. Apart from using all Argentine band returns, only other recovered bands between November and February were considered. We recognise that some of the band returns may be in error and patterns are thus only general. In this analysis, the papers of Senner (in press) and Fish (in press) were invaluable.

RESULTS

Our 1983-84 field work.

In all, we counted over 2,500 individual raptors. We found Swainson's Hawks in 10 localities as follows: *Cordoba Province*--one roost of over 200 birds, a second roost of an undetermined number (dozens), and a third roost of 8 birds all within 40 km of Marcos Jaurez; one dead bird on the road in the town of Marcos Jaurez; one, 147 km NW of Bell Ville; one, 86 km N of Cordoba. *Chaco Province*--one, 60 km NW of Resistencia. *Corrientes Province*--one, 133 km E of Corrientes; one, 159 km E of Posadas; one, 65 km S of Paso de los Libres. *Entre Rios Province*--two 29 km S of the Corrientes-Entre Rios Province boundary. These sightings, together with those of Straneck, are shown in Figure 1.

Except for the roost site, they were seen singly or in pairs. All observations occurred in the known range of the species in Argentina. Their distribution was clearly clumped, and we travelled great distances between sightings. Brown and Amadon (1968) commented on the fact that many observers in Argentina have failed to see them and this was certainly the case with Wetmore (1926). This we believe is because of their clumped distribution and because they spend a considerable amount of time foraging on the ground in inconspicuous situations.

All 3 roosts were found in windbreak rows or plantations of exotic eucalyptus trees. Their use of eucalyptus trees for roosting was commented on as early at 1919 (Ambrosetti 1919). Roost sites we found were surrounded by agricultural fields. Many of the other sightings occurred in areas of native vegetation, but not necessarily grasslands.

At one roost site, 400+ pellets were collected. All, except one with rodent jaws, contained orthopteran or coleopteran remains and bits of grass. The pellets were deposited in the Museo Argentino for taxonomic identification, but unfortunately they have been misplaced. Orthoperans most frequently cited as being eaten are *Schistocerca paranensis* and *Elaochlora trilineata* (Zotta 1931; Liebermann 1935).

Straneck's and other pertinent observations.

Sightings by Straneck follow the same pattern as White's and Boyce's and published literature. He either saw them in large feeding flocks or as singles or 2-3 individuals. One large flock of about 245 was seen in the mountains in Cordoba Province at 1,200 m on 30 November 1975. His other observations were made in lowlands of either Buenos Aires or Cordoba Provinces. In one case 2 were seen with Caracaras (*Polyborus plancus*) eating carrion of a dead cow. In another case a flock of 430 was seen over fields in Buenos Aires Province eating grasshoppers (Acrididae). His observation locations are included in Figure 1.

In January and February 1980, White, J.L.B. Albuquerque and R. Brimm travelled 2,000 km within Buenos Aires, Santa Fe and Cordoba Provinces looking for raptors. They saw one Swainson's Hawk. They passed through Marcos Jaurez and failed to see any Swainson's Hawks.

Museum specimens.

In the Museo Argentino de Ciencias Naturales there are 10 specimens from Argentina, the earliest from 1901. They are either from the Buenos Aires (8 specimens), Cordoba (1) or Santa Fe (1) Provinces. Their distribution is shown in Figure 2. There is nothing remarkable about this sample in terms of sex, age or distribution. These specimens may reflect only areas where collectors traditionally went.

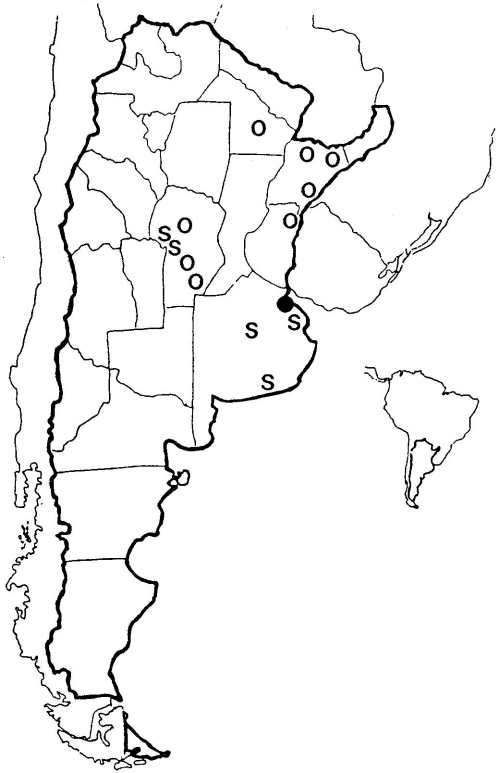

Figure 1. Sightings of Swainson's Hawks made by authors in Argentina. Open circles are locations of observations made by White and Boyce in 1984. S's are locations of observations made by Straneck over several years. Solid circle is location of Buenos Aires.

Figure 2. Distribution of the origin of Swainson's Hawk specimens from Argentina in the Museo Argentino de Ciencias Naturales, Buenos Aires. Solid circle is location of Buenos Aires.

Argentine literature sources.
Several points from the literature are germane to our emphasis. (1) Swainson's Hawks are named "aguila langostera" or grasshopper eagle because of their predominant food habits in Argentina (Ambrosetti 1919; Liebermann 1935; Pereyra 1937, 1938; Giai 1950; Olrog 1967). (2) Actual stomach contents contain mainly orthopterans (Zotta 1931). (3) Hawks were not uniformly distributed over their Argentine range but rather were clumped and usually were seen in large flocks (Pereyra 1937; Delius 1953; Olrog 1967). (4) They seemingly favour large trees for roosting, with eucalyptus mentioned most often (Ambrosetti 1919; Pereyra 1938; Delius 1953).

Band return data.
The suggestions that declines in some regions of North America may be linked to habitat alterations or chemical contamination in the austral grounds should find some support in band recovery data. There were 79 band recoveries available to us through 1985. Of these, we examined four categories of returns: (1) those from Argentina, (2) other December-February returns, (3) November returns, and (4) those from Colombia--presumably migrants.

Only 4 North American regions are represented in the Argentine recoveries, and these were birds banded in Colorado (3 returns), Wyoming (1), Alberta (7) and Saskatchewan (8). Distribution of recovery locations for each area is shown, respectively, on Figures 3-5. There was no pattern of hawks from North American regions selecting specific Argentine regions. In fact, there were January returns of Saskatchewan banded birds in both extreme NW and central Argentina. Birds banded in Colorado were recovered from nearly the entire Argentine range of Swainson's Hawk. In addition, birds colour-marked in the State of Washington were seen in Buenos Aires Province (Fitzner 1980).

December to February recoveries from non-Argentine areas were of interest as they were from areas north of Argentina and were from birds banded in North American locations south of where Argentina recovered birds were banded. One return from Brazil was of a bird banded in Oklahoma and two from Mexico were of birds banded in Arizona. November recoveries of Saskatchewan banded birds ranged from Texas to Uruguay. Recoveries from Columbia (N = 10), either still migrating or settled on non-breeding grounds, show no geographic pattern of banding locations.

Although the sample size is small, there appear to be no regional non-breeding areas for birds from regional breeding areas of North America, and while there were no returns of birds banded in California or Oregon for example, there is no *a priori* reason to assume that they show distribution patterns in South America different from other North America regions. It may be, however, that birds of more northern origins move to the southern part of the species' austral range as suggested by November returns.

One recovery from 1972 (Houston 1974), of a bird banded in Saskatchewan, came from near Marcos Jaurez where we found the large roosts. In November 1951 over 3,000 hawks were seen near Marcos Jaurez (Delius 1953) and it may be that, although the hawks are said to wander from area to area of high locust density, some places are used on a regular and historical basis.

DISCUSSION

We think the South American data are particularly relevant to understanding declines of Swainson's Hawks in local areas of the breeding range but we are not convinced that South America is particularly relevant as a causing factor for the declines. It is clear that Swainson's Hawks basically eat insects and invertebrates, especially during the non-breeding season. Although vertebrates are recorded as making up a large part of the diet during the breeding season (Thurow *et al.* 1980; Fitzner 1980; Schmutz *et al.* 1980; Bechard 1981), this may be in part a result of successful breeding in areas where invertebrates are not particularly abundant. Even during the "breeding season" Swainson's Hawks specialize in taking orthopterans.

In June, Mickerson and Bechard (ms) found large flocks of Swainson's Hawks in Idaho and Saskatchewan congregating in areas of grasshopper infestations. Pellet analysis showed that they consumed as many as 99 grasshoppers/day. In July, Woffinden (1986) and White (ms) found large flocks of hawks at various localities of grasshopper infestations in Utah.

Outside the breeding season but while still in North America, orthopterans appear to form the numerical bulk of their diet. Snyder and Wiley (1976) report that invertebrates made up 94% of

Figure 3. Distribution of banding returns from Swainson's Hawks collected in Argentina that were banded in Alberta, Canada. Symbols indicate month of return. N=November, D=December, J=January, M=March, Ju=June. Solid circle is location of Buenos Aires.

Figure 4. Distribution of banding returns of Swainson's Hawks collected in Argentina that were banded in Saskatchewan, Canada. Symbols indicate month of return. N=November, D=December, J=January, F=February, M=March, Ju=June. Solid circle is location of Buenos Aires.

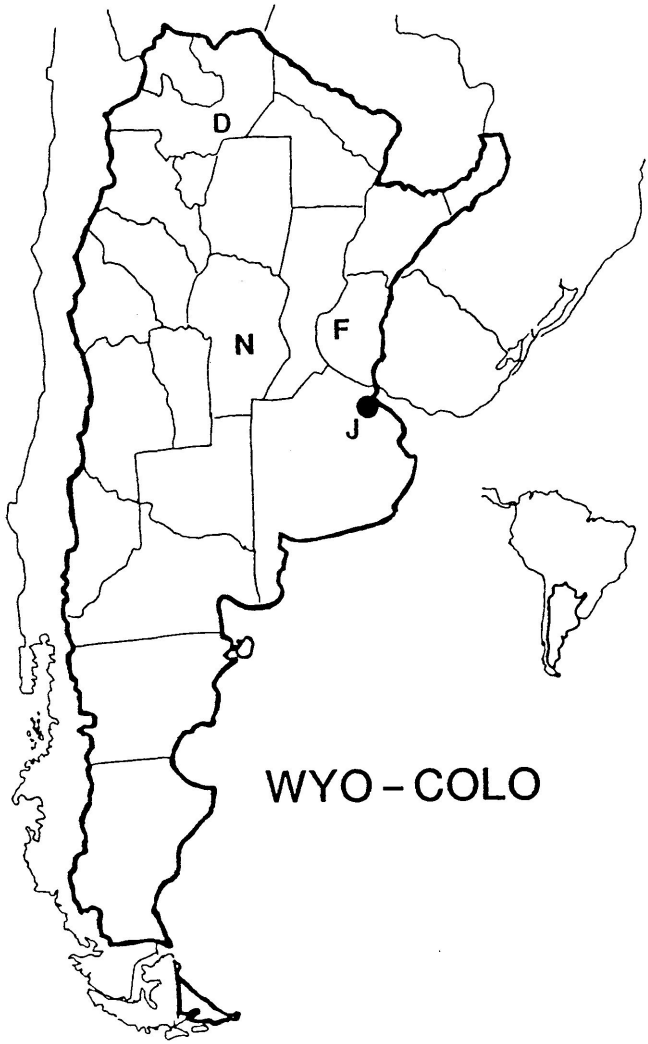

Figure 5. Distribution of banding returns from Swainson's Hawks collected in Argentina that were banded in Wyoming and Colorado, U.S.A. Symbols indicate month of return. The Wyoming bird is a January (J) return. The remaining three are from Colorado. Solid circle is location of Buenos Aires.

3,428 food items recovered from Swainson's Hawks' stomachs. One September bird from Kansas had 98 crickets *(Acheta sp.)* in the crop and 132 in the stomach when collected (White 1966). David Fischer (pers comm. 1987) saw large flocks of Swainson's Hawks in January-February in Texas following ploughs, eating invertebrates exposed by the plough in the fashion so frequently seen by gulls *(Laridae)*.

Such aforementioned data, together with that of Argentina (see in particular Zotta's 1931 report of 40-50 grasshoppers *(Elaochlora)* in each stomach of hawks examined), leaves little doubt that the Swainson's Hawk has evolved, at least in the recent past, as an invertebrate eater, primarily of orthopterans. In its food regimen, of vertebrates during the nestling period and then principally

invertebrates the remainder of the year, it parallels the Eleonora's *(Falco eleonorae)* and Red-footed Falcon *(Falco verspertinus)* (Brown, Urban & Newman 1982). It may be that all these species cannot acquire sufficient energetic biomass from invertebrates alone to successfully raise young and so "switch" to abundant vertebrates during that brief reproductive period.

During the Swainson's Hawk stay in Argentina, it overlaps the Chimango *(Milvago chimango)* (a Caracara) spatially, ecologically and trophically, although the overlap is probably not in the competitive sense. A South American component affecting the Swainson's Hawk should likewise have similar effects on the Chimango yet it remains abundant. We do not, however, have data on pesticide residues from Chimangos, nor are these good base line data from which to assess Chimango numbers historically.

We do not find it particularly surprising that Swainson's Hawk egg samples contain low organochlorine residues, considering their feeding habits. Henny and Kaiser (1979) remarked that residue levels were not as high as anticipated considering that the hawk spent the non-breeding season in Latin America, particularly Argentina, where it could be exposed to considerable contaminants. Henny *et al.* (1984) reported total average DDE levels in Oregon eggs of 0.98 ppm (wet wt.) and eggshell thickness values that were about 4% thinner than 1945 California eggshells. Schlorff *et al.* (ms) found similar shell thinning values for California eggs, and while DDE residue levels in eggs were generally less than 1 ppm (wet wt.), they did find as much as 7 ppm (wet wt.) in eggs from southern California. Washington eggs, like southern California, had residues of nearly 9 ppm (wet wt.) (Fitzner 1980).

Based on the data available to us, we suspect that the "Latin American chemical residue source" hypothesis as a cause of local declines in North America is not accurate. We also suspect that the sort of habitat alterations that have taken place in South America, particularly Argentina where they have occurred on a huge scale, have not been particularly harmful to Swainson's Hawks, although there is a poor historical data base from which to judge. Insects still appear to be incredibly abundant, especially locally, throughout Argentina. One some days of travel in Argentina over a distance of 100 km, insect abundance varied in plague proportions from orthopterans in one area, to lepidopterans in another and odonatans in yet another. Other North American migrants, such as the Barn Swallow *(Hirundo rustica)*, showed the same clumped distribution as Swainson's Hawks and were related to insect abundance. In one case, in Salta Province, we counted between 2,800-3,000 Barn Swallows in a distance of 1 km.

In order to give the "South American chemical residue" or "South American habitat alteration" hypotheses more credence, we can think of four kinds of data that would support these hypotheses:

1. Can it be shown that Swainson's Hawks feed on insects killed by spraying and thus contaminated?
2. Relative to the above, can Swainson's Hawks be shown to respond detrimentally, and thus differently from other raptors, to the low levels of chemical residues present in them as shown by their eggs? Or, alternatively, are organophosphates killing birds directly in their South American range?
3. Can it be shown that Swainson's Hawks feed on non-invertebrate sources in other regions where they are short-stopped to overwinter rather than going to their core non-breeding area in Argentina-Uruguay? If so, do these birds come predominantly from local regions in North America?
4. Relative to the above, did the opening of habitat that became new austral non-breeding areas north of the central Argentina-Uruguay core, correspond temporally with local North American declines?

These questions and those asked by Senner (in press) are relevant, we think, to understanding the North American status changes. But we think that the pattern of decline in North America is more a function of some local variable on the breeding grounds rather than from effects on migration routes or on the non-breeding grounds.

Before South America can be discounted as a major source of variation responsible for the decline of Swainson's Hawks, we see the need for a mark and recapture study at major Argentine roosting sites. Although we suspect no correlation between breeding and non-breeding (austral) site fidelity for localized breeding populations, it may be that individual fidelity to specific austral sites is extremely important. It is possible that during migration experienced adults lead inter-

mingling migrating young (from throughout North America) to optimal non-breeding austral habitat. Chance associations between experienced adults and juveniles during migration may dictate future winter fidelity patterns of juveniles. Even though communal roosts are probably composed of hawks from throughout the breeding range, there may be strong fidelity to the roost itself by birds returning annually to austral sites that become established only during random adult/juvenile associations that occurred during previous migrations. If strong individual fidelity to austral roosts exists, then this would be reflected in the results of a mark and recapture study conducted over several years. In such a scenario, hawks at specific roost sites would be vulnerable to localized habitat alterations or chemical contaminations. If a large roosting site or nearby foraging habitat were destroyed or severely altered, subsequent declines in breeding numbers would be imperceptible because the effect would be spread across the entire breeding range (and not just confined to localized zones).

A second major reason for studying austral roosts is to determine if the quality and quantity of food biomass used in agricultural areas differs in any significant way from roosts located in areas similar to conditions on the historical pampas. The following questions are important in addressing this issue.

1. What is the daily disperal pattern of hawks from large roosts (clumped or even)? An even disperal pattern might explain why many sightings are of only 1-3 individuals. How far do individuals disperse?
2. How much area is required to support an individual and how much biomass is consumed daily? Does prey biomass production differ among crop types such as between native grasslands and agricultural areas? If grasslands were more productive, then their conversion to agricultural use might explain some reduction in breeding numbers.
3. Do major roost sites shift location? If so, how far do they move and is it a regular movement? Do they move because local food supplies are patchy or because local evenly distributed sources are depleted? Do roosts move in conjunction with mass movements of their major prey - grasshoppers? Are the prey contaminated and, if so, to what extent?
4. If roosting birds do not widely disperse, what types of fields are selected for group feeding; are they (fields) used regularly or are different areas selected on a daily, weekly, biweekly, or random schedule? How important are adults in determining roost and foraging habitat use?
5. If natural habitat and agricultural habitat are both available to the roost, which is used more heavily and why?

In order to confidently reject the hypothesis that conditions on the austral non-breeding grounds affect breeding numbers, we need to better understand Swainson's Hawk roosting dynamics and biology. In conjunction, a study aimed at evaluating nesting and foraging habitat loss across North America is needed.

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