

tobacco and beans are the primary crops produced in the area. A wintering population was located, and a roost site and foraging areas identified. Numerous groups of Swainson's hawks were observed foraging in the recently cultivated fields, often in kettles and feeding on the ground, with 100+ birds grouped together. Mechanized cultivation (tractors) is wide-spread in the area, and an obvious attractant to Swainson's hawks.

La Barca includes an extensive valley of intense agricultural development enclosed by foothills. The primary crop grown in the area is corn, although a large amount of wheat had recently been planted. Mechanized cultivation predominates. Investigators located numerous roost sites, but observed few Swainson's hawks using the roosts. The minimal survey time available allowed investigators to determine that Swainson's hawks are using the area, but indications are that the species does not occur in this area in numbers equivalent to the Santiago area.

The Cuautla area also includes a very large agricultural valley surrounded by foothills. Corn and sugar cane are dominate crops. The roost in the area (as indicated by night location data) was located in the hills on the southeast edge of the valley, but was not observed due to its remote location. The most recent day location data indicate that the tagged bird was in rolling hill habitat adjacent to the main agricultural valley, which was dominated by dry land farming (corn) and grasslands.

One Swainson's hawk was observed in the area, but no kettles of Swainson's hawks were positively identified. A mixed kettle of hawks, vultures, and crested caracaras, which included as many as 40 Swainson's hawks, was observed in the valley. The raptors were actively foraging a harvested corn field that as being burned. There appears to be much less mechanized cultivation in this valley, so burning may be the greater attractant to Swainson's hawks. Indications are that the Cuautla area does not attract as many Swainson's hawks as the Santiago area.

### Discussion

Although only a small portion of the area was surveyed, indications are that it is the wintering grounds for a significant number of Swainson's hawks, and potentially a significant percentage of the California birds. It is not yet known if these areas are being used by Swainson's hawks from nesting populations outside the Central Valley, but to date there are no data to support this. In addition, we observed the high ratios of darker morph hawks that are consistent with the Central Valley population. The Santiago area was converted from thorn forest to agriculture within the last 100 years, so the use of this

specific area of Mexico by Swainson's hawks is likely a recent adaptation.

The specific crops grown in the wintering areas are not likely as important as the cropping patterns. During the winter, from November through February, a large percentage of the crops is harvested, fields are burned and/or disced, and the following year's crop is planted (Ag personnel pers. comm.). The continuous cultivation of a large percentage of each area's fields is the probable attractant for wintering Swainson's hawks; this hypothesis was supported by numerous observations of Swainson's hawks foraging fields that were in transition.

Initial information gathered from knowledgeable sources has resulted in great optimism for the welfare of wintering Swainson's hawks in Mexico. Because Mexico is in its winter (unlike Argentina which is in the midst of summer), and night temperatures are low, crop pests, especially insects, occur in minimal numbers. In addition, winter months are defined by harvest, cultivation, and planting, a period in which pest control is of minimal concern to farmers.

The conclusion, which was supported by agricultural consultants in Mexico, is that there is little use of pesticides in these areas during the overwintering period. It is probable that Mexico is a relatively safe location for wintering Swainson's hawks compared to Argentina, given the differences in cropping patterns, and thus pesticide use, in the two areas. Additionally, Mexico's cropping patterns and resulting cultivation practices tend to expose what insects and small mammals there are in the fields, likely resulting in excellent foraging opportunities for raptors such as Swainson's hawks.

Given that the six tagged birds used at least five different areas (and probably others throughout the winter), it is likely that Central Valley Swainson's hawks use many different areas over a large portion of Mexico, Central America, and northern South America. As the migration study progresses, investigators hope to better define the quantity and quality of land area used, and to identify potential threats to the species in those areas, if any exist.

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