

## RELATIVE ABUNDANCE OF RAPTORS OUTSIDE THE APWRA

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At its meeting of 12-14 February 2008, the Alameda County Scientific Review Committee (SRC) requested data on relative bird abundance recorded in other parts of California. The reason for this request was because the SRC wants additional information on trends in raptor abundance, which can be used to help interpret the inter-annual variation in estimated mortality caused by wind turbines in the Altamont Pass Wind Resource Area (APWRA). Relative abundance data were collected in the APWRA as part of the mortality monitoring effort, but the SRC is still waiting for the monitoring team to produce results. Until these data are prepared, the SRC would like to use other sources of information on the annual abundance of various bird species, particularly of the target species, namely golden eagle, red-tailed hawk, American kestrel and burrowing owl. Herein, I provide results of monitoring I have been performing in California's Central Valley, which is immediately adjacent and to the east of the APWRA.

### METHODS

#### Road Survey

In February 1990 I initiated a road survey for wildlife in the Sacramento Valley, principally directed to quantifying associations between wildlife and agricultural management practices and elements of the agricultural landscape. I rode as a passenger, and recorded observations in to a voice recorder. The records were later transcribed and entered as data in an electronic spreadsheet. Records included species, number of individuals, behavior, auto odometer readings to the nearest tenth mile, side of the road, and associated land use. Perches were recorded to type, and land uses were mapped during each survey.

The earliest surveys were weekly, but the survey frequency eventually was reduced to monthly. Most of the first year of surveys were regarded as developmental, and were omitted from most subsequent data analyses. Also, the length of the survey transect was increased over the first year, and most comparisons herein were restricted to the full extent of the survey, which was along 126 miles divided into 6 routes.

The survey routes were selected to represent the major crop production systems in the Sacramento Valley portion of the Central Valley. Crop production systems included field crops with an alfalfa rotation, rice, irrigated pasture, dry pasture, and orchards. I monitored the status of each crop, such as general growth stage, irrigation, harvest, and post-harvest soil management (e.g., disced, set in furrows, crop residue left on ground). The survey routes also intercepted natural areas such as wildlife refuges and riparian and riverine vegetation, urban and rural residential, commercial businesses, and industrial land uses. Details on the research objectives and methods, as well as some results can be found in Smallwood (1995), Smallwood et al. (2006), and Erichsen et al. (2006).

Surveys were stopped in 1995 due to work demands and family obligations. They were continued in 2005 to record the impact of West Nile Virus (WNV) on bird species, especially on corvids, which are known to be more susceptible to WNV. As WNV began noticeably killing large numbers of corvids in California in 2005, concern was raised that pre-epidemic data were lacking, so the biological impact of WNV might not be measurable. My surveys of the 1990s could serve as pre-epidemic data, so I renewed the surveys. However, the surveys since 2005 were restricted to the fall and winter months, spanning dates from September 1 to March 10. This portion of the year corresponded with the greatest abundances of most of the monitored bird species in the Central Valley.

### **Burrowing owls**

*Lemoore.*--Since 2000 Michael Morrison and I have mapped animal burrows across a 43-hectare grassland at Naval Air Station Lemoore. We also mapped burrows used by burrowing owls. These burrows were not distinguished as nest burrows because only one visit was made to each. Counts of these burrows might be useful as an indicator of relative abundance, but this indicator is undoubtedly weaker than would be a count of nest burrows.

During each mapping effort we walked transects across the field at 12-15 m intervals. Burrows were mapped using a Trimble GPS with sub-meter accuracy. Maps were made each spring and fall, and sometimes during summer. Vegetation was mechanically cleared to various degrees just prior to fall 2001, and control burns were performed in springs of 2002 and 2005.

*Dixon.*--In springs 2006 and 2007 I mapped nest sites of burrowing owls at the Naval Radio Transmitter Facility (NRTF), Dixon, which is a 1,280 acre US Navy facility. Dixon NRTF is in Solano County, 8 miles southeast of Dixon and within eyesight of the Solano wind farms to the south. The principal land use of the area is livestock grazing, and secondarily it is field crop production. The burrowing owls at Dixon NRTF nest in concrete half-rounds placed over antenna cables on the ground, as well as in artificial burrow structures, under concrete and asphalt surfaces such as roads and lined ditches, and in ground squirrel burrows excavated into fill soil covering buried cable and pipelines.

Each spring I repeatedly surveyed the antenna field and surrounding area held by the Navy. I used binoculars to survey ahead of my walking surveys, and I relied on sign of burrow use, presence of burrowing owl pairs, and seasonal persistence of the pairs to determine nest locations. I used Trimble GPS units with sub-meter accuracy to record burrow locations.

*Vasco Caves Regional Preserve, Altamont Pass.*—Nesting pairs were counted by Jack Barclay in 2006 and 2007. I feel it is premature to provide more details on the burrowing owls at Vasco Caves because the report has not yet been released. Details and methods will be summarized in the report, which should be released later this spring or summer. Here I only report the percent change in nesting pairs between 2006 and 2007.

## RESULTS AND DISCUSSION

### Road Survey

Golden eagles and burrowing owls were so rarely seen along my road transect that no trends could be revealed. The last time I observed burrowing owls along my transect over the fall and winter months was in 1990.

The data I collected along the road transect produced seasonal trends that mirrored the trends noted several times in the APWRA (Figures 1 and 2). American kestrels and red-tailed hawks pile into the Central Valley each winter, when they are also abundant in the APWRA.

Red-tailed hawk abundance increased slightly 2005 through 2007, and since the 1990s (Figure 3), but not to the same degree the monitoring team estimated mortality increased from 2006 to 2007. The number of red-tailed hawks seen per 100 miles was 39.6 in 1990-95, 40.8 in 2005, 57.3 in 2006, and 66.9 in 2007. The increase was 17% from 2006 to 2007. Similarly, the trend in abundance for all Buteo hawks (Figure 4) did not correspond strongly with the reported increase in mortality of red-tailed hawks reported between 2006 and 2007. American kestrel abundance did not increase from 2006 to 2007 along my survey transect, nor did since the early 1990s (Figure 5). The number of American kestrels seen per 100 miles was 32.5 in 1990-1995, 26.7 in 2005, 28.7 in 2006, and 25.3 in 2007. American kestrels decreased 12% from 2006 to 2007.

### Burrowing owls

*Lemoore.*—The number of burrows used by burrowing owls varied considerably through 8 years at Naval Air Station, Lemoore (Figure 6).

*Dixon.*--There were 43 nesting pairs of burrowing owls in 2006, and 24 in 2007. Thus, the nesting population at Dixon NRTF declined 44% between 2006 and 2007.

*Vasco Caves Regional Preserve, Altamont Pass.*—From 2006 to 2007, the number of nesting pairs at Vasco Caves Regional Preserve in the Altamont Pass declined 16%.

### References

- Erichsen, A. L., K. S. Smallwood, A. M. Commandatore, D. M. Fry, and B. Wilson. 1996. White-tailed Kite movement and nesting patterns in an agricultural landscape. Pages 166-176 *in* D.M. Bird, D.E. Varland, and J.J. Negro, eds., *Raptors in human landscapes*. Academic Press, London.
- Smallwood, K. S. 1995. Scaling Swainson's hawk population density for assessing habitat-use across an agricultural landscape. *J. Raptor Research* 29:172-178.
- Smallwood, K. S., B. J. Nakamoto, and S. Geng. 1996. Association analysis of raptors on an agricultural landscape. Pages 177-190 *in* D.M. Bird, D.E. Varland, and J.J. Negro, eds., *Raptors in human landscapes*. Academic Press, London.

Mean (90% CI) red-tailed hawks per 100 miles  
along full survey transect

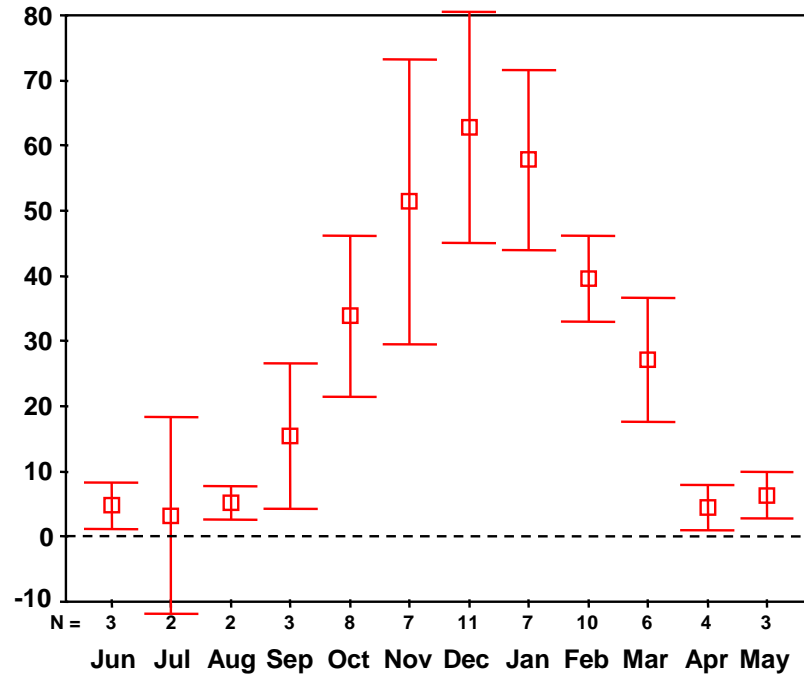


Figure 1. Seasonal trend of red-tailed hawk abundance in the Sacramento Valley.

Mean (90% CI) American kestrels per 100 miles  
along full survey transect

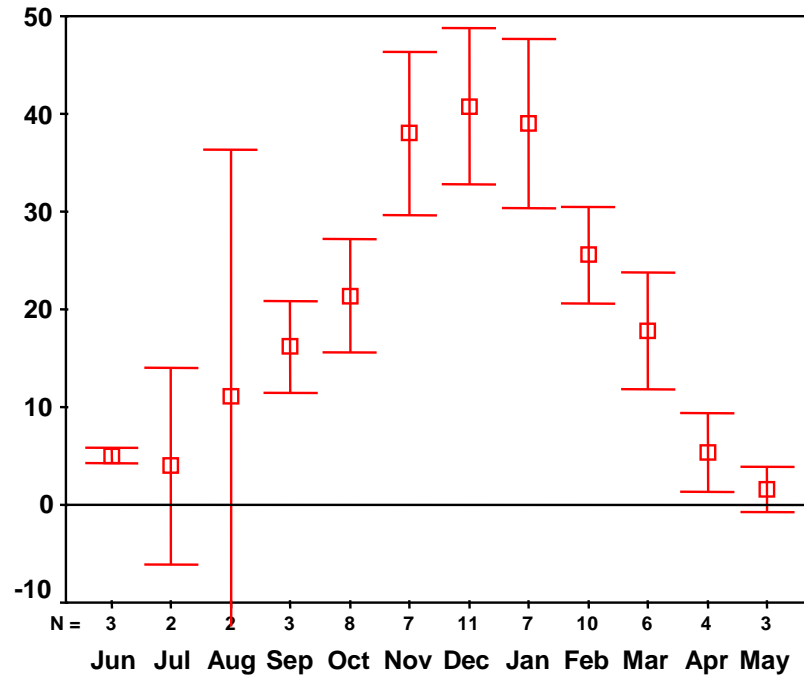


Figure 2. Seasonal trend of American kestrel abundance in the Sacramento Valley.

Mean (90% CI) red-tailed hawks per 100 miles along full survey transect, September through early March

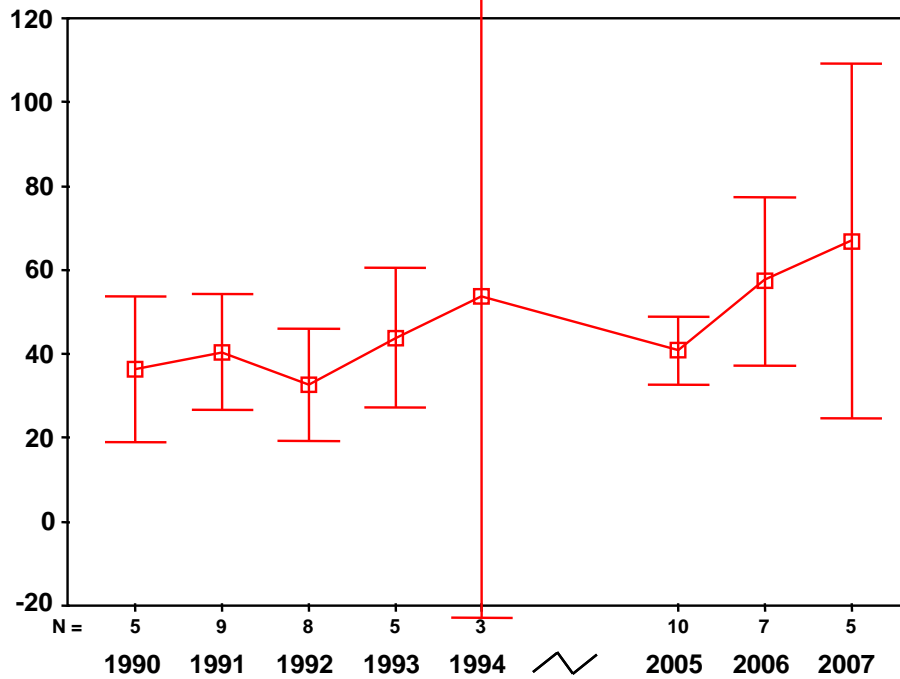


Figure 3. Trend in red-tailed hawk abundance in the Sacramento Valley.

Mean (90% CI) Buteo hawks per 100 miles along full survey transect, September through early March

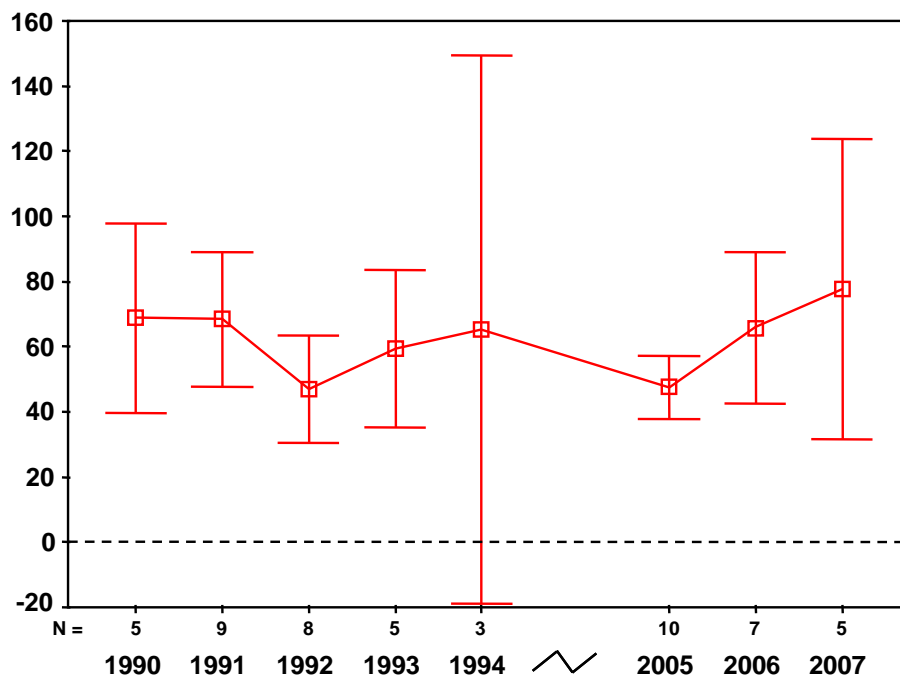


Figure 4. Trend in Buteo hawk abundance in the Sacramento Valley.

Mean (90% CI) American kestrels per 100 miles along full survey transect, September through early March

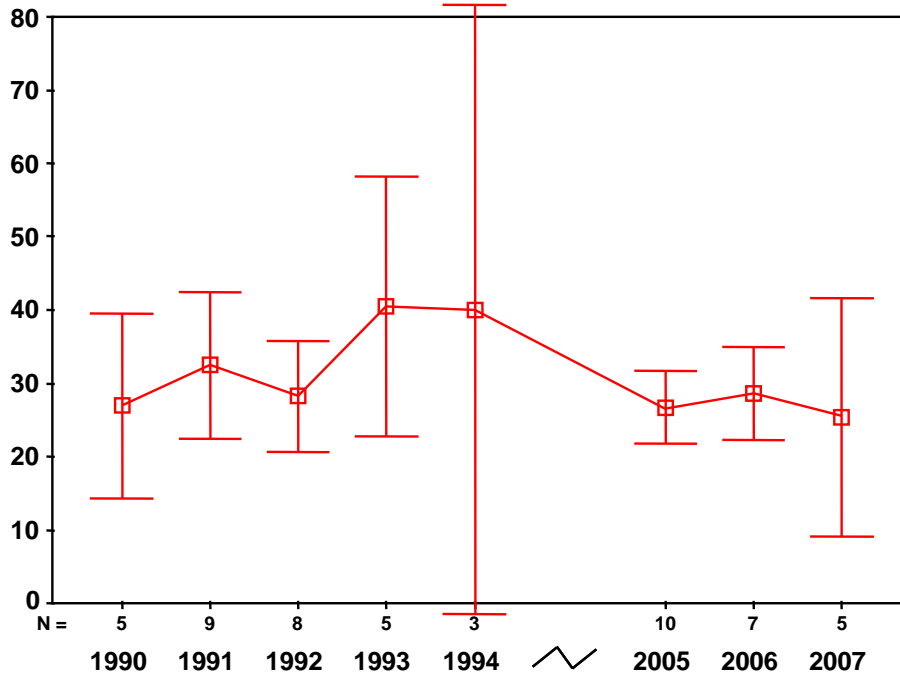


Figure 5. Trend in American kestrel abundance in the Sacramento Valley.

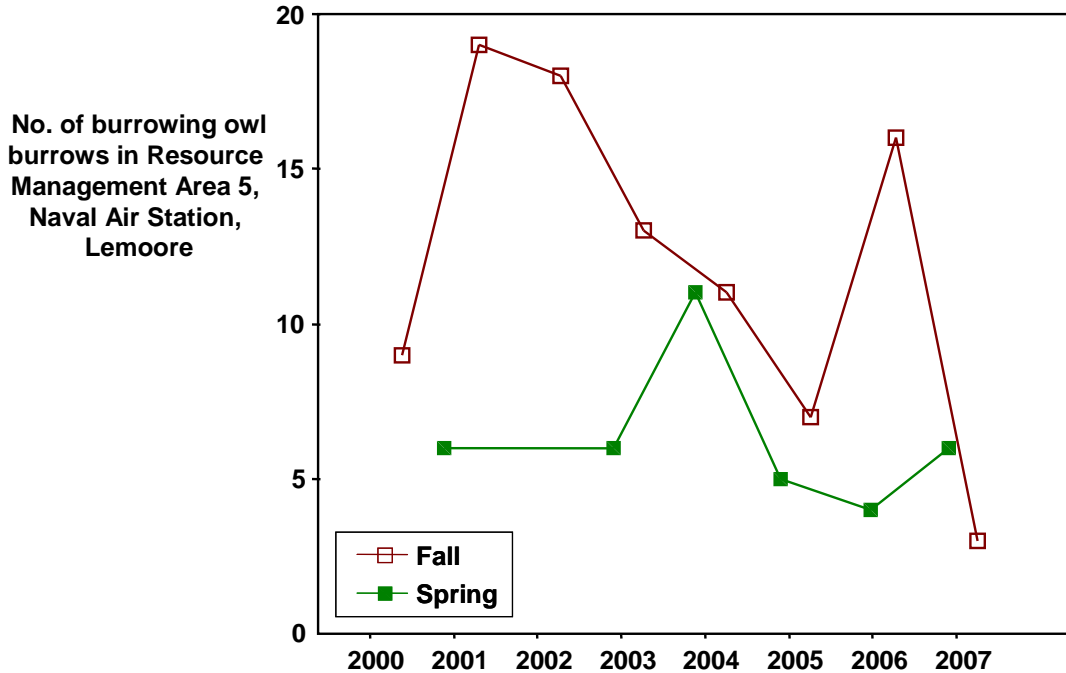


Figure 6. Inter-annual variation of burrowing owl burrows in 43-ha Resource Management Area 5, Naval Air Station, Lemoore.