Summary of Regional Population Data for Four Focal Raptor Species

During the February meeting of the Scientific Review Committee (SRC) the issue of annual variation in regional bird abundance was discussed relative to its potential influence on avian mortality estimates from the Altamont Pass Wind Resource Area (APWRA). The Monitoring Team is currently in the process of correlating avian mortality estimates with bird abundance data from the APWRA during the first two years of the three-year study. To supplement this effort with background information on regional bird abundance trends, the SRC recommended a review of several avian population data sources that may provide some insight into the possible changes in annual abundance of the four target species over a broader regional area and over a longer timeframe.

The following presents data from the following three sources:

- migration data from the Golden Gate Raptor Observatory (GGRO),
- breeding bird data from the USGS Breeding Bird Survey, and
- wintering bird data from National Audubon Society's Christmas Bird Count

This information can be used to generally characterize annual changes in the regional abundance of red-tailed hawks, golden eagle, and American kestrel during the breeding and non-breeding seasons. Data on burrowing owl abundance is limited from these sources and insufficient to draw any inferences.

Raptor Migration Data from Golden Gate Raptor Observatory

The Golden Gate Raptor Observatory (GGRO) was established in the early 1980s to study raptor migration along the central California coast, particularly at the Marin Headlands, part of the Golden Gate National Recreation Area, north of San Francisco Bay. Thousands of raptors of numerous species migrate along the California coast each year. The Marin Headlands has proven to be an excellent location for observing and monitoring these migrating populations.

A staff of experienced volunteers collects data on a daily basis during the fall migration from August through December of each year. Over 20 species have been documented. The most abundant species include red-tailed hawk, turkey vulture, sharp-shinned hawk, Cooper's hawk, northern harrier, and American kestrel.

Data are compiled each year by number of observations per species on a daily, monthly, and seasonal basis. The total number of observer hours is variable each year for a variety of reasons including cancellation due to heavy fog days, but over the last 18 years has ranged from 446 to 621 hours.

Table 1 below provides GGRA data from 1990 to 2007 by total number of annual sightings, and to correct for the variability in observer hours, by total number of annual sightings per hour. I included only the data for red-tailed hawk, golden eagle, and American kestrel. Burrowing owls do not use the California coast as a migratory route. Figures 1 through 3 graphically illustrate the change in sightings per hour of each species during this period.

Table 1. Number of RTHA, GOEA, and AMKE sightings and sightings per hour, 1990-2007 at Marin Headlands (GGRO)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
RTHA (total #)	5,508	4,102	6,223	6,413	8,123	6,174	9,787	10,551	7,246	12,520	7,750	8,353	12,194	6,986	13,303	7,272	11,411	11,872
RTHA (#/hour)	9.8	8.6	12.4	12.4	17.0	12.2	19.0	17.0	13.6	23.7	14.1	18.7	23.3	14.3	24.8	16.0	23.1	22.7
GOEA (total #)	26	12	9	8	22	13	14	32	13	20	20	22	21	14	22	13	24	38
GOEA (#/hour)	0.045	0.025	0.018	0.016	0.046	0.026	0.027	0.052	0.024	0.038	0.036	0.049	0.040	0.029	0.041	0.029	0.049	0.073
AMKE (total #)	624	252	613	467	717	391	604	758	672	694	473	580	670	694	551	627	612	378
AMKE (#/hour)	1.07	0.53	1.23	0.91	1.50	0.77	1.17	1.22	1.26	1.31	0.86	1.30	1.28	1.42	1.03	1.38	1.24	0.72

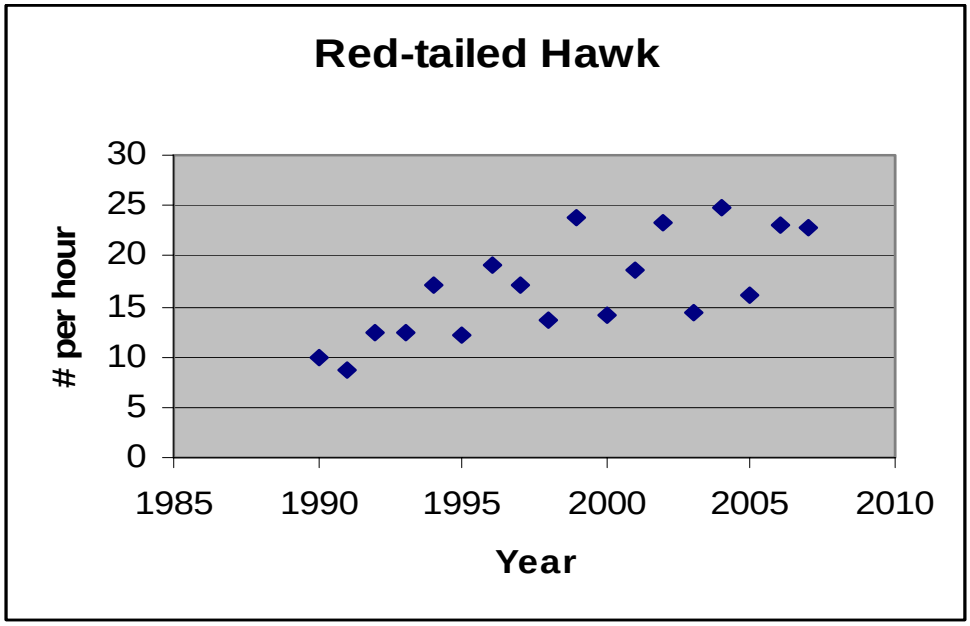

Figure 1. Red-tailed hawk sightings (# per hour) at Marin Headlands, 1990-2007.

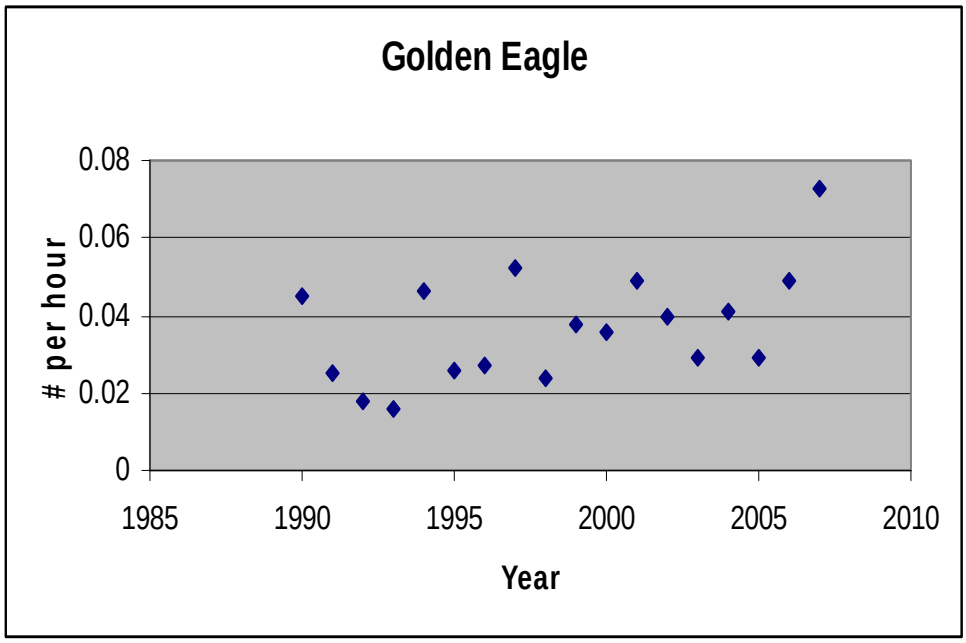

Figure 2. Golden eagle sightings (# per hour) at Marin Headlands, 1990-2007.

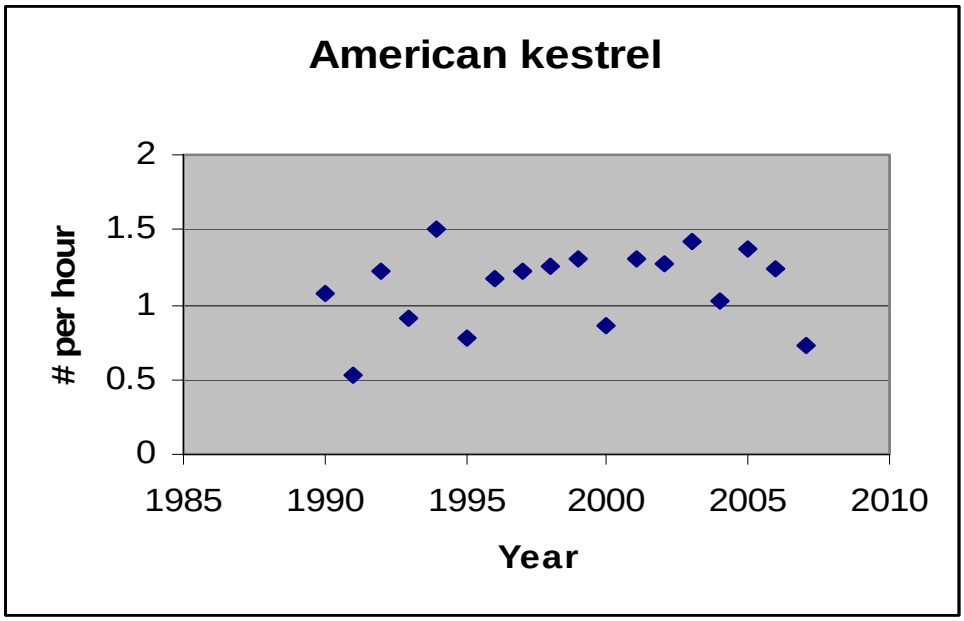

Figure 3. American kestrel sightings (# per hour) at Marin Headlands, 1990-2007

Table 1 and Figure 1 indicate that there is fairly substantial annual variation in the number of red-tailed hawk sightings during fall migration over this eighteen-year period (from 4,102 to 13,303 sightings per year and 8.6 to 24.8 sightings per hour). Golden eagle and American kestrel sightings also fluctuate annually, but to a lesser extent. This suggests that there may also be a fairly substantial difference in the annual abundance of migrating and wintering red-tailed hawks throughout the region and within the APWRA. Note, however, that these data are collected for purposes of long-term trends. Even this 18-year data set is insufficient to draw definitive conclusions regarding non-breeding season abundance within the APWRA in the absence of trend data from other nearby migratory and wintering areas such as the Central Valley. Birds that migrate through the Central Valley may also occupy the APWRA during the non-breeding season.

Audubon Christmas Bird Count

Conducted between December 14 and January 5 of each year, the annual Audubon Christmas Bird Count collects data on wintering bird populations. Each year since 1900, thousands of volunteer birders have participated in CBC counts. Teams are assigned to established routes and survey areas, each of which is surveyed during a single day. Long-term trend data on wintering bird populations are compiled and published by the National Audubon Society and the Cornell Lab of Ornithology. CBC data provide a broad view of long-term regional or national trends in bird populations.

Correcting for differences in effort, CBC data are standardized by the number of birds reported per party hour, a measure of the amount of time spent searching for birds or the amount of effort expended. Audubon also expresses the need for caution in interpreting these results, particularly at the route level.

The most representative CBC area is Contra Costa County. Figures 4, 5, and 6 indicate the CBC data for red-tailed hawk, golden eagle, and American kestrel between 1985 and 2000. Insufficient CBC data are available for burrowing owl from any potentially representative CBC survey area in the region. These data also suggest a fairly high potential for annual variation in winter season abundance of these species.

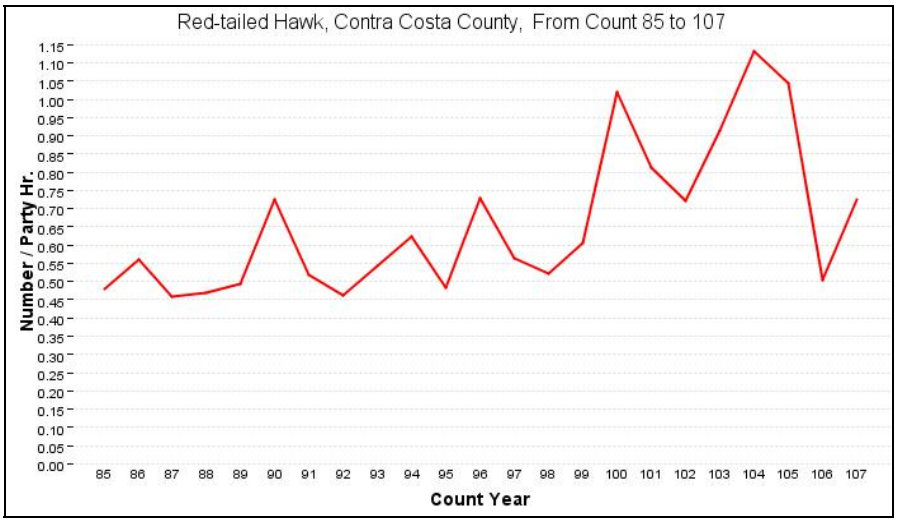

Figure 4. CBC data for red-tailed hawk in Contra Costa County, 1985-2007

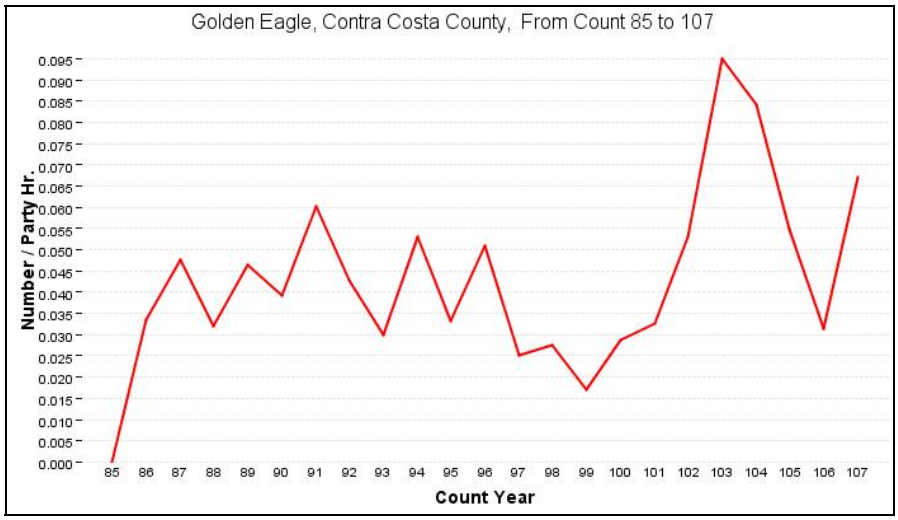

Figure 5. CBC data for golden eagle in Contra Costa County, 1985-2007

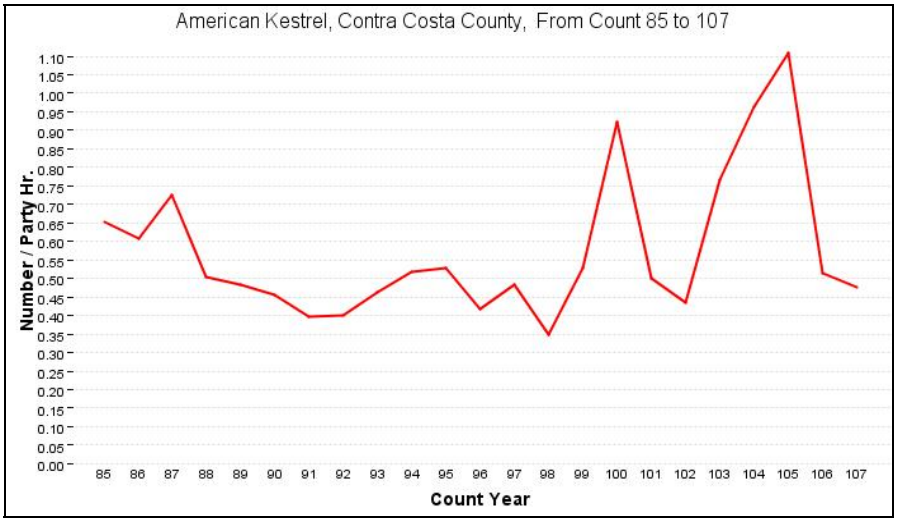

Figure 6. CBC data for American kestrel in Contra Costa County, 1985-2007

USGS Breeding Bird Survey Data

As its name indicates, the USGS Breeding Bird Survey (BBS) is focused on breeding populations. Like the CBC data, the BBS is a broad-scale annual survey of North American birds that has been ongoing since 1966. Conducted in June by experienced birders, it is a roadside survey with over 3,500 routes, primarily covering the continental United States and southern Canada.

BBS surveys are conducted during the peak of the nesting season. Each route is 24.5 miles long, with a total of fifty stops located at 0.5 mile intervals along the route. A three-minute point count is conducted at each stop, during which the observer records all birds heard or seen within 0.25 mile of the stop.

The nearest representative BBS route is the Tracy Route, just east of the APWRA. Figures 7 through 10 present the result of BBS surveys along this route from 1992 to 2002. As expected, these data also suggest variability in annual detections of the four target species and a possible pattern of decline in red-tailed hawk, golden eagle, and particularly American kestrel, which has been reported elsewhere using BBS and CBC data.

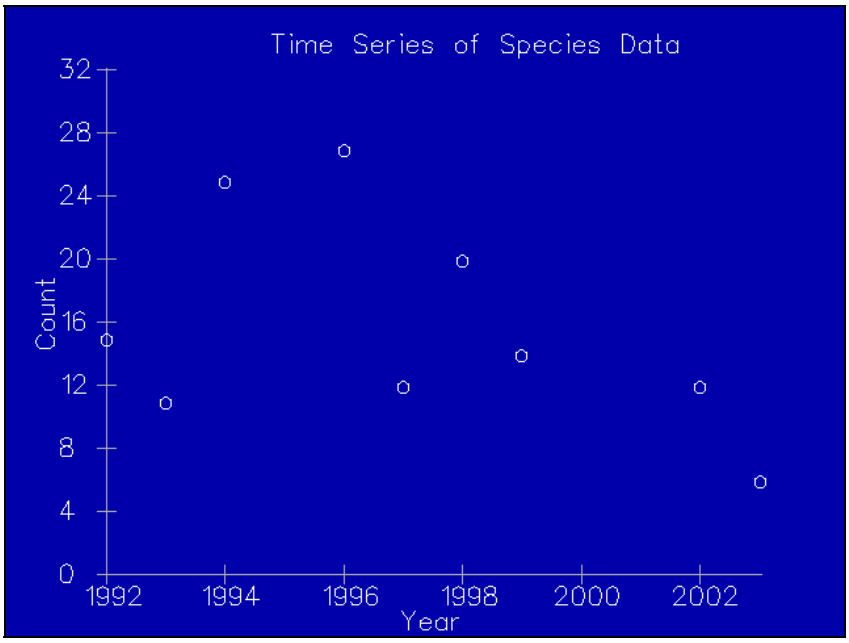

Figure 7. BBS data, Tracy Route, red-tailed hawk, 1992-2002.

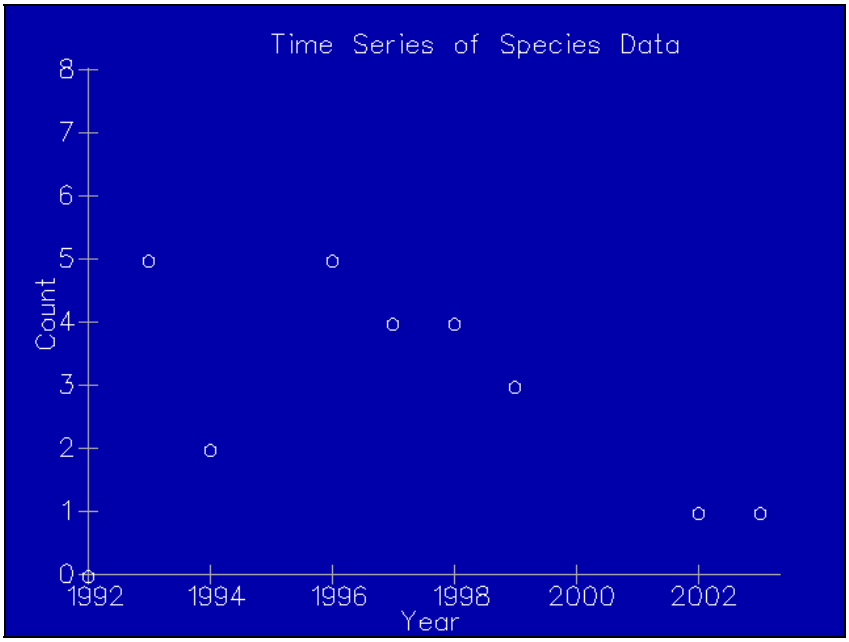

Figure 8. BBS data, Tracy Route, golden eagle, 1992-2002.

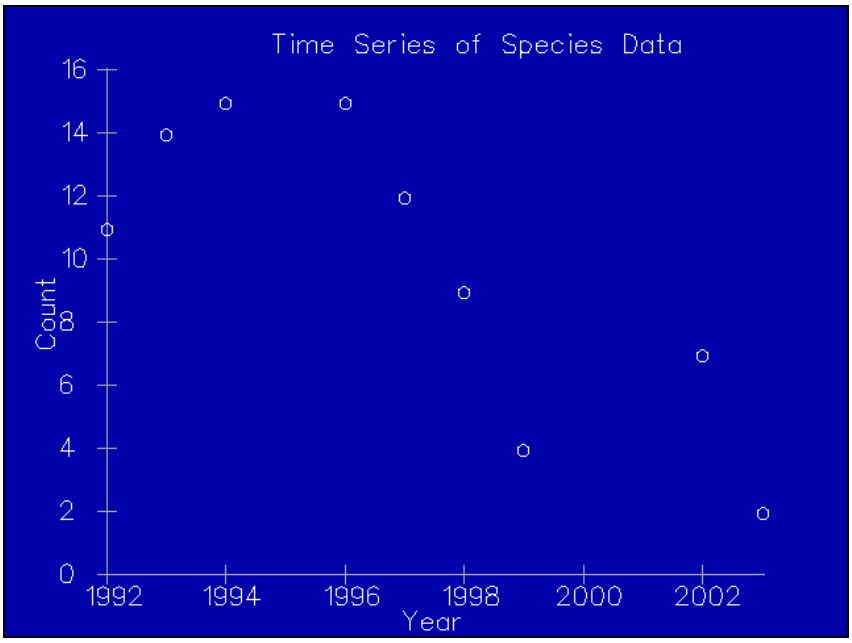

Figure 9. BBS data, Tracy Route, American kestrel, 1992-2002.

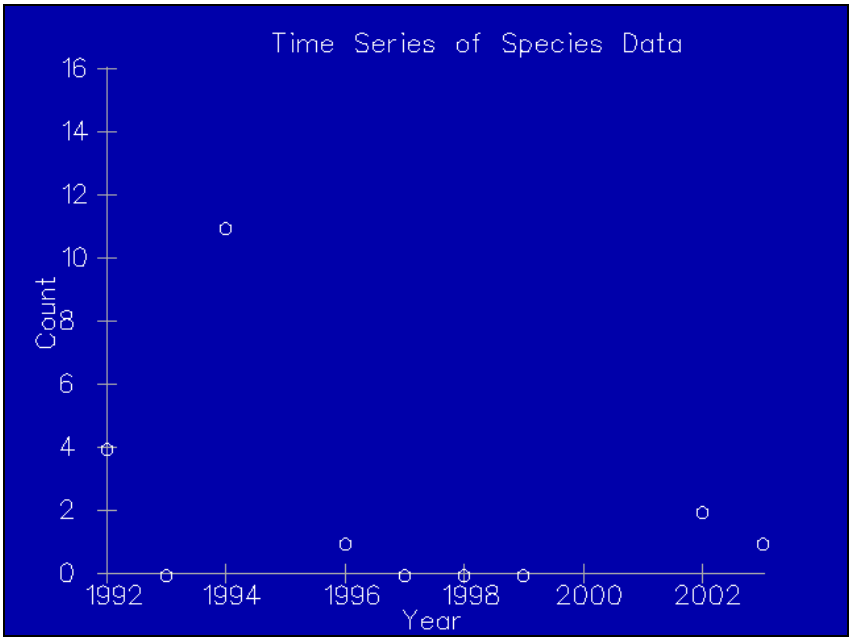

Figure 10. BBS data, Tracy Route, western burrowing owl, 1992-2002.

General Observations

- As expected, these data indicate that regional raptor populations fluctuate annually, particularly red-tailed hawk. These regional changes in annual abundance could influence use and mortality within the APWRA.

- GGRO data indicate that migratory populations fluctuate annually, suggesting that winter populations within the APWRA may be to some extent independent of conditions within and around the APWRA, such as prey population levels, decreasing habitat in the surrounding area, and other factors that affect raptor use and abundance.

- Little regional information is available on changes in annual burrowing owl population levels. The three sources used here do not provide sufficient burrowing owl data to draw inferences. Statewide burrowing owl surveys have not been conducted with sufficient frequency to assess trends or annual changes in abundance.