California-Nevada Golden Eagle Working Group Symposium

DISTRIBUTION, ABUNDANCE, AND POPULATION STATUS OF GOLDEN EAGLES IN CALIFORNIA AND NEVADA

McClellan, CA – December 11, 2012

Program Agenda: Moderator Jeff Smith

TIME	PRESENTERS	TOPIC
8:00-8:05	Facility rep	Building logistics, etc.
8:05-8:10	C. Battistone / H. Beeler	Coordinators' welcome & opening remarks
8:10-8:25	A. Pitts (USFWS) K. Hunting (CDFG) L. Richards (NDOW)	Sponsoring agency welcomes & opening remarks
8:25-8:45	G. Hunt	Overview of Golden Eagle Life History, Population Structure, Mortality Agents, and Population Trends
8:45-9:05	C. Thelander, P. Bloom, and L. Lapre	Summary of the Historical Distribution of Nesting Golden Eagles in California
9:05-9:25	B. Latta, C. Thelander, and P. Bloom	Results of 2012 Golden Eagle Nesting Surveys of the BLM's California Desert and Northern California Districts
9:25-9:45	D. Bittner et al.	Population Status of Golden Eagles in Southern California and Western Nevada
9:45-10:05	D. Bell, H. Wilson, and J. Didonato	Results from Spot Surveys of Golden Eagle Territories in the Vicinity of the Altamont Pass Wind Resource Area: 2005–2012
10:05-10:25	Coffee break	refreshments and poster viewing
10:25-10:45	J. Smith	Recent Golden Eagle Nest Surveys and Nesting History in Yolo, Solano, and San Luis Obispo Counties, California
10:45-11:05	B. Woodbridge and C. Cheyne	Population Characteristics of Golden Eagles in Butte Valley, California
11:05-11:25	S. Chinnici et al.	Golden Eagle Surveys, Habitat Characteristics, and Nest Monitoring in Del Norte and Humboldt Counties, CA
11:25-11:55	J. Boone and C. Tomlinson	Statewide Distribution of Golden Eagle Nests in Nevada
11:55-12:15	J. Everett, F. Isaacs, and B. Price	Oregon's Statewide Golden Eagle Inventory and Monitoring Effort: A Model for Broad-Scale Monitoring of Nesting Eagles
12:15-13:15	Lunch	refreshments and poster viewing

13:15-13:35	W. Erickson and R. Nielson (presenter J. Thompson)	Monitoring Abundance of Golden Eagles in Western North America
13:35-13:55	S. Slater and J. Smith	Golden Eagle Migration Monitoring in the Goshute Mountains of Nevada and Beyond
13:55-14:15	J. Bart et al.	Distribution, Trends, and Sustainable Take of Golden Eagles in California and Nevada
14:15-14:45	C. Eberly and R. Turner	Golden Eagles on Military Lands in the Western U.S.
14:45-15:00	K. Laing	A New National Wildlife Refuge System Inventory and Monitoring Initiative and Golden Eagles in California and Nevada: Mining Existing Data
15:00-15:20	Coffee break	refreshments and poster viewing
15:20-15:40	S. Phillips and M. Fuller	Current U. S. Geological Survey Research Supporting Golden Eagle Management
15:40-16:00	T. Katzner et al.	Monitoring Seasonal Movements and Ranging Behavior of Eagles in the Context of Energy Development
16:00-16:15	J. Pagel	Guidelines for Pre-Project Survey of Golden Eagles
16:15-16:30	D. Driscoll	Quality of Data from Renewable Energy Golden Eagle Nest Surveys
16:30-17:00	J. Smith	Wrap-up synthesis and general Q&A
17:00-18:00	poster presenters	Poster viewing and social hour

Poster Presentations

AUTHORS	**TOPIC**
L. Dunn et al.	Records of Golden Eagle Observed in the Desert Renewable Energy Conservation Plan Area
W. Erickson	Golden Eagle Risk and Fatality Prediction
A. Fish et al.	A Quarter-Century of Golden Eagle Fall Migration Counts in the Marin Headlands, California
K. Jacobson	Results of Golden Eagle Nest Surveys in Arizona's Portion of Bird Conservation Region 33
C. Farmer and L. Nagy	The Bayesian Eagle-Risk Model: Input Implications, Study Design, and Fatality Estimates
L. Nordstrom	Movements of Baja California Golden Eagles into California
S. Phillips et al.	Golden Eagle Data from the Midwinter Bald Eagle Survey
B. Accord and S. Schoenig	Golden Eagle Occurrence in the California Natural Diversity Data Base
J. Schwartz and D. Leslie	Altamont Golden Eagle Fatalities and Monitoring: Ramifications for Population Modelling
J. Smith	Satellite Tracking of Golden Eagles from Autumn Migration Sites in Nevada and Neighboring Areas
S. Stock and C. Barnes	Protecting Active Golden Eagle Nests in Yosemite National Park

ORAL PRESENTATION ABSTRACTS

OVERVIEW OF GOLDEN EAGLE LIFE HISTORY, POPULATION DYNAMICS, AND HUMAN-RELATED MORTALITY

HUNT, GRAINGER (grainger@peregrinefund.org), The Peregrine Fund, McArthur, CA

Golden Eagle populations are predisposed to long-term stability under natural conditions. They are limited by the distribution of nest sites with access to food, and still further by territorial behavior. Tree-nesting populations may form mosaics of contiguous territories, whereas pairs in drier regions are distributed according to the availability of serviceable cliffs. Healthy populations thus stabilize and generate a reservoir of non-breeding adults (floaters) that fill territory vacancies as they occur. Eagle pairs in California and Nevada tend to stay on or near their territories year round, although in dry regions, aestivating or hibernating prey, as well as lows in jackrabbit cycles, may temporarily influence occupancy. Long-delayed maturation (5 years from egg to incubating adult) and small broods (average <1 fledgling per pair) are largely an evolutionary response to intense competition for territories. Stressful interactions between breeders and younger eagles are mitigated by areas suitable for foraging but unsuitable for breeding. Eagle populations are particularly sensitive to adult mortality, and the numerous human-related mortality agents apparent in the modern world are worrisome to the extent that they are additive in their impact upon eagle numbers. A first warning of population instability is a trend of increase in the proportion of subadult pair members, suggesting a deficiency of floaters.

SUMMARY OF THE HISTORICAL DISTRIBUTION OF NESTING GOLDEN EAGLES IN CALIFORNIA

CARL G. THELANDER (ct@biorc.com), BioResource Consulants, Inc., Ojai, CA, PETER H. BLOOM, Bloom Biological, Inc., Santa Ana, CA, and LARRY LAPRE, California Desert District, Bureau of Land Management, Moreno Valley, CA.

Early naturalists (late 1800s) and egg collectors provided the first scientific/literature records of nesting Golden Eagles in California. The results of several regional studies began appearing in the literature in the ~1930s. As the public's interest in raptors increased from the 1950s to the present day, a gradual increase in the recording and reporting of nesting records also occurred. By the 1960s, the California Department of Fish and Game (CDFG) began collecting incidental nesting records, largely out of the personal interest of some of their regional personnel. In the 1970s, the CDFG undertook statewide surveys for several key raptor species, using federal funds, to assess which species might require legal protection. In 1974, the first statewide survey was undertaken to collect and summarize the available information on Golden Eagles nesting in California. Around this period, federal agencies (BLM primarily) began to take an interest in surveying and recording the distribution of eagles and other raptors on federal lands in California. These efforts have continued and significantly expanded to the present, though no single database of these records has been developed or maintained. In this paper, we summarize the wide range of efforts undertaken to document the nesting range of the Golden Eagle in California.

RESULTS OF 2012 GOLDEN EAGLE NESTING SURVEYS OF THE BLM'S CALIFORNIA DESERT AND NORTHERN CALIFORNIA DISTRICTS

LATTA, BRIAN, and CARL G. THELANDER (ct@biorc.com), BioResource Consultants, Inc., Ojai, CA, and PETER H. BLOOM, Bloom Biological, Inc., Santa Ana, CA.

The Bureau of Land Management (BLM) in California contracted BioResource Consultants, Inc. (BRC) to collect new field data and report on the current breeding status of Golden Eagles in a significant portion of California. The purpose of this survey was to contribute to a wider North American effort that is underway to document Golden Eagle habitat use and population demographics. The primary study area was the BLM's California Desert District. After the contract was awarded, the BLM requested that surveys also be conducted in its Northern California District. BRC subcontracted this portion of the survey to Pete Bloom, based on his extensive historical knowledge of Golden Eagles nesting in northeastern California, especially in the BLM's Susanville District. BRC conducted surveys of the Desert District from 21 December 2011 through 31 August 2012. The BLM database provided to BRC contained 412 historical Golden Eagle nesting locations in this district. We determined that some of these sites were not on BLM lands, leaving 350 unique locations that met the criteria for inclusion in this study. BRC visited 256 of the 350 sites by helicopter only (167.8 helicopter hours), 61 sites by ground survey only, and 33 sites by helicopter and ground surveys. We visited some locations more than once to meet the survey protocol requirements. During the surveys of suitable habitat, we located 47 previously unknown Golden Eagle nesting sites, finding 46 of these sites by helicopter and 1 during ground surveys. Therefore, we surveyed a total of 397 Golden Eagle nesting sites in 2012 within the Desert District, using helicopter and/or ground survey methods. Pairs of adult eagles occupied 74 of the 397 sites surveyed. Forty-four nests were active (eggs laid) and 32 nests were successful (young produced). Twelve nests failed during incubation or chick rearing. The 32 successful nests produced 39 chicks, yielding a mean brood size of 1.22 young per successful nest and 0.53 young produced per occupied breeding territory in the Desert District. On 28 and 30 May 2012, Pete Bloom and Chris Niemela flew 19.5 hours of helicopter surveys in northeastern California. From a database of approximately 110 historical Golden Eagle nesting locations maintained by Pete Bloom, a sample of 27 nesting sites was selected for surveys, including 20 sites on cliffs and 7 in trees. Thirteen of the 27 sites were active with Golden Eagles present during the 2012 nesting season. Common Ravens occupied 2 sites, Red-tailed Hawks 1 site, and Bald Eagles 1 site. Five of 13 active Golden Eagle nest sites failed to fledge young. Six nests produced 11 chicks, for an average of 0.46 young produced per active nest and a mean brood size of 1.83 young per nest in the Northern California District.

POPULATION STATUS OF GOLDEN EAGLES IN SOUTHERN CALIFORNIA AND WESTERN NEVADA

BITTNER, JOHN D. (dbittner@wildlife-research.org), JOHN OAKLEY, CHRIS MEADOR, JIM HANNAN, RENÉE RIVARD, JAMES NEWLAND, KATIE QUINT, AND MARCUS COLLADO, Wildlife Research Institute, Inc., Ramona, CA, and JEFF WELLS, United States Forest Service, Ramona, CA

Wildlife Research Institute, Inc. (WRI) has surveyed Golden Eagle nesting territories in Clark, Douglas, Washoe, and Storey Counties in Nevada (2009–present, *n* = 82) and in most of southern California, with a long-term core study area in San Diego County and environs (1988–present, *n* = 240). Methodologies for monitoring Golden Eagle activity and distribution have included banding, patagial tagging, installation of remote nest cameras, and telemetry marking via VHF-radio (*n* = 109) and satellite-GPS (*n* = 39) technologies. We documented and monitored territories for occupancy, nesting activity, and productivity, primarily via ground surveys from 1988–1995 and via annual or semi-annual aerial surveys with supplemental ground surveys since 1996. Increased human encroachment has correlated with declines of the Golden Eagle population in WRI's core study area in San Diego County. Historical and current data from the core study area indicate a 55% decline from 104 breeding pairs in 1895, and a threefold spike in the average annual rate of decline in the breeding population of Golden Eagles from 1995–2011 (1.5% per year) compared to 1950–1995 (0.5% per year). We have documented juveniles dispersing from San Diego County territories into Arizona, Colorado, Nevada, northern California, Utah, Wyoming, and Mexico, with surviving birds often returning back to the natal area before adulthood. Tagging data have revealed individual Golden Eagles first breeding at 6 years of age. Collectively, return data from telemetry, banding, patagial marking, and nest cameras have given insight to mortality issues for Golden Eagles, including siblicide in the nest and an array of natural and human-based threats thereafter ranging from starvation, secondary poisoning, electrocution, fire, wind-turbine blade strikes, power line strikes, predators, and intraspecific competition.

RESULTS FROM SPOT SURVEYS OF GOLDEN EAGLE TERRITORIES IN THE VICINITY OF THE ALTAMONT PASS WIND RESOURCE AREA (APWRA), 2005-2012

BELL, DOUGLAS A. (dbell@ebparks.org), East Bay Regional Park District, Oakland, CA, HARVEY WILSON, East Bay Regional Park District, Oakland, CA, and JOE DIDONATO, Alameda, CA

From 1994–2000, Hunt et al. performed a demographic study of Golden Eagles nesting within 30 km of the Altamont Pass Wind Resource Area (APWRA). Results from their study on this population, consisting of 58 Golden Eagle nesting territories, provided baseline estimates of eagle mortality rates due to wind-energy infrastructure in the APWRA and defined key indicators of population stability based on territory occupancy rates and pair composition. Given that the APWRA may represent a population sink for the region's Golden Eagles, the East Bay Regional Park District (EBRPD) conducted non-systematic, spot surveys of eagle territories from 2005–2012. This effort qualitatively assessed territory occupancy and nest use, with the goal of providing monitoring continuity and input for future demographic studies. Survey effort was not uniform, with 19–48 Golden Eagle territories surveyed each year. The number of surveyed territories for which occupancy status remained unknown ranged from 7% (2 of 34 territories) to 22% (8 of 36 territories), highlighting the need for more consistent survey effort. For occupied territories where nesting status was determined, 0–11% of the territories failed or were inactive each year. We demarcated a southwestern region in this eagle population where distances between nests averaged 3.3 km versus 7.7 km outside of this region. Geospatial data suggested that, proceeding away from the APWRA, eagle brood size increased from northeast to southwest. Investigation of nest-tree aspect revealed that 47 of 75 nests were located on slopes with northern, northwestern, or northeastern aspects. We discuss on-going management efforts by the EBRPD for Golden Eagles and make suggestions for improving survey outcomes. Finally, we offer guidelines for entering records to improve the utility of database management and data sharing among Golden Eagle researchers.

RECENT GOLDEN EAGLE NESTING SURVEYS IN YOLO, SOLANO, AND SAN LUIS OBISPO COUNTIES, CALIFORNIA

SMITH, JEFF P. (jsmith@harveyecology.com), H. T. Harvey & Associates, Los Gatos, CA

Interest in developing renewable energy has led to recent surveys of nesting Golden Eagles in many areas of California to assess possible risks to the species. Currently, Yolo County does not support any large-scale renewable-energy facilities, but is being considered for development of wind energy. Golden Eagles have nested in the ranges surrounding Lake Berryessa in Napa and Yolo Counties since at least the 1970s. Surveys I conducted during spring 2011 confirmed at least three probable nesting territories in the ranges that border the east side of the lake. The Montezuma Hills Wind Resource Area (WRA) of Solano County has been operational since the early 1990s, but has expanded greatly in the past decade. Intermittent and spatially variable surveys have documented five Golden Eagle nest sites within the WRA since the late 1980s, comprising at least three separate territories, and five other territories within 16 km of the WRA. One historic WRA territory was last active in 2001, the second in 2005, and the third in 2007 (all nests in eucalyptus trees). From 2008–2011, no nesting occurred within the WRA, but a new nest site was discovered nearby in 2011. No comprehensive surveys were conducted in 2012, but a pair laid eggs (subsequently abandoned) in a new nest built within the WRA on an electrical transmission tower near where the most-active historic nest previously existed. On the Carrizo Plain in eastern San Luis Obispo County, two large, solar photovoltaic installations currently are under construction. In 2011, the U.S. Fish and Wildlife Service commissioned an initial survey of nesting Golden Eagles within a 16-km radius of these projects. In 2012, H. T. Harvey & Associates conducted the first of 5 years of additional annual surveys covering most of the same area as the 2011 survey. The 2012 survey revealed 16 occupied, 14 active (eggs laid), and 12 successful (1+ fledglings) territories in the foothills and ranges flanking the southern Carrizo Plain, with one additional territory known from the 2011 surveys but not resurveyed.

POPULATION CHARACTERISTICS OF GOLDEN EAGLES IN BUTTE VALLEY, CALIFORNIA

WOODBRIDGE, BRIAN (brian_woodbridge@fws.gov), U.S. Fish and Wildlife Service, Yreka, CA., and C. A. CHEYNE, USDA Forest Service, Klamath National Forest, Yreka, CA

We monitored the territory density, productivity, annual patterns of abundance and foraging behavior, and mortality sources of Golden Eagles occupying the Butte Valley and adjacent Klamath Basin in northern California. The Butte Valley population is characterized by high territory density and a high degree of reliance on specific agricultural practices. Nest sites are closely spaced around the valley margin, adjacent to irrigated fields supporting abundant Belding's ground squirrels. Annual productivity at 22 monitored territories ranged from 1.4 to 1.7 young per successful nest attempt. Results from point counts and line transect surveys highlighted dramatic seasonal shifts in density and habitat use of eagles. During spring, densities reach 1–7 eagles per km^2 in alfalfa fields; densities were much lower in winter when squirrels were unavailable. Power distribution poles associated with irrigation pumps constituted a significant source of mortality. From 1986 to 1992, we recorded electrocution mortality of 66 Golden Eagles (23 adult, 43 immature) and 24 bald eagles (9 adult, 15 immature) within a roughly 168 km^2 area. The popularity of squirrel shooting for sport and subsequent ingestion of lead fragments by scavenging eagles is an emerging issue for this population. Ecological conditions and Golden Eagle populations in Butte Valley may be considered representative of a larger geographic area within the Basin and Range Province, characterized by the Belding's squirrel, alfalfa production, juniper woodland, and sage steppe.

GOLDEN EAGLE SURVEYS, HABITAT CHARACTERISTICS, AND NEST MONITORING IN DEL NORTE AND HUMBOLDT COUNTIES, CALIFORNIA

CHINNICI, SAL, J. (schinnici@hrcllc.com), Humboldt Redwood Company, LLC, Scotia, CA, DANIEL R. DILL, Lower Trinity Ranger District, Six Rivers National Forest, Eureka, CA, DAVID BIGGER, Reston, VA, and DESIREE EARLY and LOWELL DILLER, Green Diamond Resource Company, Korbel, CA

The distribution and habitat use of Golden Eagles on the north coast of California is not well studied. Beginning in 1994, 72 ground-based surveys for Golden Eagles were conducted on Green Diamond's ownership of approximately 160,000 ha of coastal redwood and Douglas-fir forestlands in Del Norte and northern Humboldt Counties. However, the surveys developed in consultation with CDFG were only conducted for timber harvesting plans in areas with extensive open meadows and prairies. Although 1–5 eagles were seen during all years when surveys were conducted, no Golden Eagle nests have been found on Green Diamond's ownership. In 2002, surveys began for this species on 34,803 ha of Humboldt Redwood Company's coastal redwood and Douglas-fir forestlands in central and southern Humboldt County. The timberlands and adjacent prairies were surveyed using a protocol developed with CDFG and USFWS. Prior to these surveys, only two Golden Eagle nests were known in Humboldt County. We located an additional 12 historic, active, or occupied nests. Additionally, these surveys documented large areas with no Golden Eagle detections, suggesting that large portions of the forestlands may be unsuitable habitat for nesting Golden Eagles. To better understand Golden Eagle habitat use, we examined the habitat characteristics of this species at the nest site and landscape scale, in comparison to the characteristics of random plots. We found that Golden Eagle nest trees had larger diameters and were taller than those at randomly selected plots. We also found a strong and consistent pattern in the abundance of foraging habitat located within a 3-km-radius core area around known Golden Eagle nests. These findings have helped us to focus our Golden Eagle surveys and provide protection to nest sites. Since 2002, we have continued to monitor Golden Eagle nesting territories when forest and road management activities occur near known nests.

STATEWIDE DISTRIBUTION OF GOLDEN EAGLE NESTS IN NEVADA

BOONE, JOHN D. (boone@gbbo.org), Great Basin Bird Observatory, Reno, NV, and CRIS TOMLINSON, Nevada Department of Wildlife, Las Vegas, NV

In 2011, the Great Basin Bird Observatory and Nevada Department of Wildlife conducted a statewide inventory with the goal of mapping and characterizing as many of Nevada's Golden Eagle nest sites as possible. More specifically, we were tasked with providing Nevada's BLM state office with information about Golden Eagle nest-site distribution to assist them in evaluating the potential impact of proposed energy development projects. For this reason, we concentrated our efforts within Nevada's 19 million ha of BLM-managed land, which represents nearly 67% of the state's land area and contains most of the suitable Golden Eagle nesting habitat. We first identified the BLM lands with proximate cliffs using GIS data, and prioritized our survey effort within approximately 8.1 million ha based on this criterion. Ultimately, from March – October 2011 we searched more than 5.7 million ha for Golden Eagle nests, 0.9 million ha by helicopter and 4.8 million ha from the ground. We searched approximately 332,000 ha using both methods, allowing some comparison of their relative efficacy. We recorded just over 1,000 confirmed, probable, or possible Golden Eagle nest sites during the 2011 inventory, and collected multiple nest-site attributes for each. We combined data from the 2011 inventory with data collected previously by the Nevada Department of Wildlife and other project contributors. We are currently comparing the 2011 nest-site locations to those present in the older records, but from a preliminary analysis, it is clear that the 2011 inventory greatly increased our knowledge of Golden Eagle nesting locations in the southern half of Nevada, as well as in portions of northern Nevada, most notably Humboldt and Pershing counties. Upcoming analyses to be presented will include a comparison of aerial and ground survey results, along with basic habitat and spatial modeling of nest-site locations.

OREGON'S STATEWIDE GOLDEN EAGLE INVENTORY AND MONITORING EFFORT: A MODEL FOR BROAD-SCALE MONITORING OF NESTING EAGLES

EVERETT, JEFF G. (jeff_everett@fws.gov), U. S. Fish and Wildlife Service, Portland, OR; FRANK B. ISAACS, Oregon Eagle Foundation, Philomath, OR, and BILL PRICE, Oregon Eagle Foundation, Beaverton, OR

We compiled historical (pre-2011) Golden Eagle nest locations in Oregon (*n* = 1,520) from many sources. We grouped the nest locations into 653 potential breeding areas, which we then used to guide new Golden Eagle nest inventory, survey, and monitoring efforts. In 2011, 576 nest locations at 324 historical and 135 previously undocumented breeding areas were observed, resulting in a minimum of 788 potential breeding areas for the state. Statewide minimum population size and productivity estimates, based on 788 breeding areas and the observed occupation rate (61%) and productivity (0.95), were 481 occupied breeding areas and 457 young produced in Oregon in 2011. We recorded similar results in 2012. We will discuss analysis of historical data, survey design, statewide field-season survey efforts and coordination, and results from the 2011 and 2012 (preliminary) field seasons. We will also discuss the application of results for wind-energy project development, Golden Eagle programmatic take permitting through the USFWS, and additional study efforts that this project has fostered.

MONITORING ABUNDANCE OF GOLDEN EAGLES IN THE WESTERN UNITED STATES

ERICKSON, WALLACE (werickson@west-inc.com), and RYAN M. NIELSON, Western EcoSystems Technology, Inc., Cheyenne, WY (presenter **JOEL THOMPSON**, WEST, Inc.)

Under the Bald and Golden Eagle Protection Act, the United States Fish and Wildlife Service can authorize take of Golden Eagles, including nest removal, disturbance, and lethal take, if the take is compatible with preservation of the species. The Service needs baseline information on the current abundance and trends of subpopulations of the Golden Eagle to properly manage take of the species. Annually during late summer from 2006–2010, we used distance-sampling procedures along ~17,500 km of aerial line transects to estimate Golden Eagle abundance in four Bird Conservation Regions (BCR), which collectively cover about 80% of the species' range in the coterminous western United States. In 2011, we abandoned transects in one of the BCRs (17; Badlands and Prairies) in order to investigate the value of increasing effort in another BCR (16; Southern Rockies and Colorado Plateau) where density estimates have historically had lower precision. We estimated study area populations of 23,601 (90% confidence interval [CI]: 20,000 – 31,575) in 2006 and 23,530 (90% CI: 19,434 – 30,468) in 2010, including all breeding and non-breeding individuals. We used a Bayesian hierarchical model to estimate trends in individual BCRs and the entire study area based on numbers of eagles counted. The analysis indicated no statistical evidence of a non-stable population for three of the BCRs during 2006–2011 (90% credible intervals [CRIs] encompassed 0.0), and during 2006–2010 for BCR 17 (not surveyed in 2011). However, we detected declines (90% CRIs < 0.0) in numbers of Golden Eagles classified as juveniles in BCR 16 during 2006–2011 and in BCR 17 during 2006–2010. Continuation of this monitoring effort will provide consistent baseline information on Golden Eagle abundance and trends across the western United States, and allow the Service to evaluate the potential effects of authorizing take requests. Extending this work to BCRs not sampled should be considered as well.

GOLDEN EAGLE MIGRATION MONITORING AT THE GOSHUTE MOUNTAINS, NEVADA AND BEYOND

SLATER, STEVE J. (sslater@hawkwatch.org), HawkWatch International, Salt Lake City, UT, and JEFF P. SMITH, H. T. Harvey & Associates, Los Gatos, CA

HawkWatch International (HWI) has counted 130–344 migrating Golden Eagles each fall since 1983 at the Goshute Mountains in northeastern Nevada. Trend analysis through the Raptor Population Index (RPI) suggests a near-significant (P = 0.055) long-term decline of -1.3% per year from 1983–2009, with a steeper decline of -5.7% per year since 2000 (P = 0.059). In addition, polynomial regression (adjusted R^2 = 54.8%) suggests a cyclical pattern in the counts, with lows during 1984–1990 and 2003–2009 and highs in the intervening and subsequent years, but with generally lower peaks and troughs observed over time. The cyclic high/low patterns track long-term moisture/drought conditions north of the site. Count data from Bonney Butte, OR, and the Bridger Mountains, MT, suggest a similar pattern. Data from these additional sites, as well as Chelan, WA, also suggest long-term declines in Golden Eagle migration counts. Long-term peak passage at the Goshutes occurred between 15–19 October. Regression analysis of annual median passage dates (standardized observation window and adjusted by effort) did not suggest a significant change over time (P = 0.12). Instead, passage date also appears related to climatic variation, with later passage observed in drier years. There is increasing evidence of long-term declines in Golden Eagle migration counts at western sites beyond annual count variation, likely driven by climatic factors, and we suggest that additional investigation into migration ecology and population dynamics is warranted. HWI has also conducted single-year exploratory counts in Baja California (2 sites), southern California (15 sites), northeastern California (16 sites), and eastern Nevada (15 sites) with variable results. The modeling of factors associated with migration volume at western ridgetops will allow us to identify potential migration hotspots and provide additional context to long-term count data collected in the region.

DISTRIBUTION, TRENDS, AND SUSTAINABLE TAKE OF GOLDEN EAGLES IN CALIFORNIA AND NEVADA

BART, JONATHAN (jon_bart@usgs.gov) and MARK FULLER, US Geological Survey, Boise, ID, STEVEN SLATER, HawkWatch International, Salt Lake City, UT, COREY RIDING, Boise State University, Boise, ID, and LEAH DUNN, Great Basin Bird Observatory, Reno, NV

We investigated Golden Eagle distribution using eBird and trends in population size using the Breeding Bird Survey (BBS), Christmas Bird Counts (CBC), and migration counts. eBird data show that both Golden and Bald Eagles may occur nearly anywhere in North America south of the boreal zone. Preliminary analysis of Golden Eagle populations indicates a rangewide increase during 1950–2000. Since 1995, BBS counts have been stable rangewide, whereas the CBC counts have declined at about 2% per year. Preliminary analysis shows that counts at migration monitoring sites from the western US declined and then increased during the past 4–6 years, except at Mt. Lorette where counts show no long-term trend. BBS counts suggest stable or increasing populations in the north and declines in the south and around the edge of the breeding range. We used population growth rates during past times in combination with density estimates from 19 intensive studies in the western US to estimate the effect of increased mortality on population size. If mortality rates increase, population size will shrink but will stabilize again unless the take exceeds the maximum sustainable level. We present estimates of how much population size will decline given different levels of increased mortality. All the data used in this analysis are available through the USGS Coordinated Bird Monitoring Program.

EBERLY, CHRIS (ceberly@dodpif.org), DoD Partners in Flight, Warrenton, VA, and **ROBERT TURNER** (robert.turner@nellis.af.mil), Nellis AFB, NV

Department of Defense (DoD) training lands and ranges occupy up to 3 million ha of potential Golden Eagle habitat in California and Nevada. Including Utah, Idaho, Arizona, and New Mexico, the area is 6.4 million ha. Eagle populations are thought to have been stable on these lands for many years, but no consistent survey or monitoring protocols have been implemented across all DoD lands. The first part of this talk will summarize what information is known about Golden Eagles on DoD lands, and outline the concept for a working group to help DoD and USFWS better identify the need for and scope of guidelines for addressing the potential take of Bald and Golden Eagles on military installations and assist the DoD in satisfying the requirements of programmatic eagle take permits as defined in the regulations at 50 CFR 22.26 and 22.27. The second part of the presentation will feature information from the Nellis Test and Training Range (NTTR), which has the best data for any DoD property in California and Nevada. Much of NTTR's 1.2 million ha is inaccessible during some or all of the year, making consistent, comprehensive surveys a challenge. In addition, there is a need for data collected on NTTR to be consistent with other large training areas, including large ranges in Idaho, Utah, Arizona, and New Mexico. Because some DoD lands are Withdrawn BLM lands, consistency across agencies and landowners also is imperative.

A NEW NATIONAL WILDLIFE REFUGE SYSTEM INVENTORY AND MONITORING INITIATIVE AND GOLDEN EAGLES IN CALIFORNIA AND NEVADA: MINING EXISTING DATA

LAING, KAREN (karen_laing@fws.gov), U.S. Fish and Wildlife Service, Sacramento, CA

The National Wildlife Refuge system has collected large amounts of data on Refuge lands over time, but little effort has been spent on cataloging, standardizing, or making the data accessible to Service staff, partners, and the public. The U.S. Fish and Wildlife Service (FWS) Inventory and Monitoring initiative will collect, synthesize, and manage information on natural resources, including Golden Eagles, on National Wildlife Refuges. In the Pacific Southwest Region (comprising California and Nevada) of the FWS, we are engaged in several related foundational tasks to make information from refuges easily accessible. These tasks include finding historical documents and making them available on a new, national online Service Catalog (ServCat); collecting information on species occurrence; and creating a centralized species information system to catalog species taxonomic and occurrence data. We are also working to ensure that data in the species information system meet Darwin Core standards, and that data are usable by partners such as the Avian Knowledge Network. As these tasks are completed in the next several years, historical and current data on Golden Eagles from National Wildlife Refuges will become accessible.

CURRENT U.S. GEOLOGICAL SURVEY RESEARCH SUPPORTING GOLDEN EAGLE MANAGEMENT

PHILLIPS, SUSAN L. (sue_phillips@usgs.gov), U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis, OR, and MARK R. FULLER, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise, ID

The U.S. Geological Survey (USGS) and its partners are conducting several research projects that directly support management of Golden Eagles in the context of energy development. For instance, observations of Golden Eagles made during Midwinter Bald Eagle Surveys from 1986–2010 (3,790 sightings from more than 500 sites in 39 states including CA and NV) are being assembled into an interactive map that provides summary statistics about the occurrence of Golden Eagles by state and Bird Conservation Region. USGS scientists and U. S. Fish and Wildlife Service collaborators are developing a comprehensive survey and monitoring plan to establish the distribution and status of Golden Eagles at project, regional, and continental scales. Further, they are modeling the occurrence of Golden Eagles throughout the western United States to identify important geographic areas and habitats during breeding and non-breeding seasons. The results can be used to locate areas of high eagle occurrence suited to focused management, and areas of low eagle occurrence potentially suited to development. The USGS is evaluating historical and current data from the Altamont Pass Wind Resource Area to estimate survival, reproduction, and range sizes to assess population-level effects of fatality from wind turbines. Analyses will show whether Golden Eagle populations have the resiliency to absorb fatality from wind turbines over time, and will provide an estimate of the number of successful nests required to replace the birds killed by a project and to maintain stable populations. Finally, to understand Golden Eagle populations in the California Desert Renewable Energy Conservation Plan zone, the USGS will compile and analyze existing data for Golden Eagles from both within that zone and across the species' full migratory range. When combined with landscape characteristics such as landform, water availability, land use, and prey base, a platform for analyzing monitoring protocols, population trends, and environmental effects on eagle populations will be built.

MONITORING SEASONAL MOVEMENTS AND RANGING BEHAVIOR OF GOLDEN EAGLES IN THE CONTEXT OF ENERGY DEVELOPMENT

TODD KATZNER (todd.katzner@mail.wvu.edu), ADAM DUERR, and TRICIA MILLER, Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV, MICHAEL LANZONE, Cellular Tracking Technologies, Somerset, PA, DAVID BRANDES, Department of Civil and Environmental Engineering, Lafayette College, Easton, PA, and PHILIP TURK, Department of Statistics, West Virginia University, Morgantown, WV

Monitoring eagles requires an understanding of year-round patterns of movement and behavior. Nevertheless, it is rare that biologists are able to follow movements of individuals of any population throughout the annual cycle. We telemetered and followed seven adult breeding Golden Eagles in the Mojave Desert of east-central California. Birds were captured in January and May 2012 and outfitted with GPS-GSM telemetry systems that collected GPS data at 15-minute intervals and sent those data over the mobile phone network. We evaluated season-specific home-range size of these eagles. When eagles had eggs or chicks in the nest, they maintained, defended, and rarely strayed from tightly defined home ranges that were similar in size for both males and females. Once breeding was completed (characterized by either reproductive failure or fledging of chicks), eagle behavior changed dramatically. We observed two behaviors that are reported anecdotally in literature, but are rarely described empirically. First, one adult female eagle, whose reproductive effort failed, engaged in prospecting behavior, passing through the territories of two adjacent pairs of eagles, possibly investigating quality of habitat and nest sites. Second, four other eagles engaged in repeated altitudinal movements from their nest site into mountains on the edge of the Mojave Desert and back. Altitudinal movement behavior occurred repeatedly between 01 June and 26 August 2012. Eagles made 0–15 altitudinal movements >10 km, with most lasting >1 day. Developing a sampling scheme that effectively monitors eagles in the desert requires a solid understanding of eagle behavior to account for seasonal movements and behavior patterns. Our data show that movements of desert eagles span a greater area than previously recognized, suggesting that monitoring for this population needs to account for the different patterns of space use throughout the annual cycle.

GUIDELINES FOR PRE-PROJECT SURVEYS OF GOLDEN EAGLES

PAGEL, JOEL E. (joel_pagel@fws.gov), U. S. Fish and Wildlife Service, Carlsbad, CA

Determining the abundance and distribution of breeding and non-breeding Golden Eagles has become an important step to ascertain impacts involved in construction of ground-disturbing projects where there is an inherent potential for “take.” USFWS guidelines suggest that at least two years of systematic breeding and non-breeding season surveys within 16 km of a project footprint are important for a robust risk characterization. These field activities may include timely aerial and/or ground reconnaissance to locate nests within suitable habitat, and ground observations to monitor reproductive attempts. Systematic breeding and non-breeding season monitoring includes the use of long-sit point counts and migration season monitoring to provide data necessary to calculate risk of “take” for Golden Eagles.

QUALITY OF DATA FROM RENEWABLE ENERGY GOLDEN EAGLE NEST SURVEYS

DRISCOLL, DANIEL (eaglestudies@gmail.com), American Eagle Research Institute, Apache Junction, AZ

Renewable energy development in the United States has increased dramatically as a result of the Production Tax Credit (PTC), and is strongly endorsed by the Secretary of the Interior (Secretarial Order 3285). The total U. S. utility-scale wind power capacity through June 2012 was 49,802 MW, with an additional 10,312 MW under construction, across 38 states (American Wind Energy Association [AWEA] 2012). Similarly, utility-scale solar projects have been approved on 115,335 ha of public lands in the southwestern U. S., and an additional 7.7 million ha have been identified for projects, with a total development of 23,700 MW when constructed (Department of the Interior 2012). If the PTC is extended in December 2012, it is estimated that 90,000 MW of wind power will be constructed by 2016 (AWEA 2011).

A number of environmental consulting firms are conducting Golden Eagle nest surveys for renewable-energy development projects in the western United States. Although protocols have been developed to assist biologists in conducting aerial and ground surveys (Pagel et al. 2010, Driscoll 2010), experience levels vary and can impact survey results. State and Federal agencies and renewable-energy companies are negotiating permit processes, as well as making decisions on the cost effectiveness and environmental impact of projects, based on survey data that should be reasonably accurate, especially in the immediate vicinity of project footprints.

We compared data from surveys conducted by five different consulting firms to data we collected while capturing Golden Eagles for telemetry studies and conducting nest surveys for renewable-energy projects in Arizona, California, and Nevada during 2011 and 2012. We restricted comparisons to the number of nest clusters, number of total nests, number of occupied sites, and location of an occupied site within or adjacent to project footprints, within the same five survey areas. The number of nest clusters showed the smallest variation among the five surveys (n = 29 vs. n = 38) with a known error of 24%, or an error magnitude of 1.3 (i.e., our surveys revealed 1.3 times more nest clusters than the other surveys). The numbers of total nests (n = 103 vs n = 308) and occupied sites (n = 14 vs. n = 41) showed a larger known error (67% and 66%), or error magnitudes of 3.0 and 2.9, respectively. Of particular concern was three occupied breeding areas within or adjacent to project footprints that other surveyors missed completely, all of which had young, including two that fledged.

Although it is unlikely that the minimum of two aerial surveys suggested for renewable energy projects will detect all Golden Eagle nests or pairs within an area, the level of error detected at the five study areas was high. Note, however, that adjusting the number of occupied breeding areas by a magnitude of three may result in an overestimation of pairs for surveys conducted by experienced personnel.

POSTER PRESENTATION ABSTRACTS

RECORDS OF GOLDEN EAGLES OBSERVED IN THE DESERT RENEWABLE ENERGY CONSERVATION PLAN AREA

DUNN, LEAH (ldunn@usgs.gov), Great Basin Bird Observatory and U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise, ID, MARK FULLER and JON BART, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise, ID, and SUE PHILLIPS, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis, OR

This poster displays a preliminary map of the reported locations at which Golden Eagles have been recorded in the Desert Renewable Energy Conservation Plan (DRECP) area of southern California. We have been gathering records of detections of Golden Eagles and their nests to describe the occurrence of the species at local and regional geographic scales. The locations depicted on this map are from these principal sources: Breeding Bird Surveys, Christmas Bird Counts, eBird checklists, and records that have been contributed by organizations, agencies, bureaus, and individuals. These records are archived in the secure Coordinated Bird Monitoring Database (CBMD) at the USGS Forest and Rangeland Ecosystem Science Center (FRESC). Some records will be made available and others must be requested from the original contributors. FRESC and the USGS Western Ecological Research Center are comparing records gathered by each organization to compile a more complete dataset of historical Golden Eagle distribution in the DRECP and the California-Nevada region. We encourage you to contribute records to the CBMD; contact Leah Dunn if interested.

GOLDEN EAGLE RISK AND FATALITY PREDICTION

ERICKSON, WALLACE (werickson@west-inc.com), Western EcoSystems Technology, Inc., Cheyenne, WY

The U. S. Fish and Wildlife Service (USFWS) has developed statistical methods for predicting Golden Eagle fatality rates at wind-energy facilities for use in risk assessments, eagle conservation plans, and applications for Incidental Take Permits. The USFWS approach uses a collision risk model that attempts to estimate the number of annual Golden Eagle fatalities that might be expected at a proposed wind-energy facility from flight activity recorded during on site avian use surveys. Assuming that eagle mortality is proportional to pre-construction eagle activity, a Bayesian correction factor has been established by the USFWS based on pre- and post-construction surveys conducted at eight wind-energy facilities. Bayesian analyses incorporate a prior belief (or best guess) about model parameters as supporting evidence in determining a posterior distribution of eagle exposure and mortality. This presentation includes an evaluation of methods and metrics used by the USFWS, as well as our approaches to assess risk to eagles and predictions of mortality. Accurate assessments of eagle risk and mortality based on pre-construction avian use surveys would aid in siting projects and turbines to have the least impact on eagles. Quantitative and qualitative methods for assessing eagle risk at wind energy facilities are presented, including collision risk, regression analysis, spatial modeling, and evaluation of historical data. Limitations are considered along with the effectiveness of these methods in relating pre-construction eagle use to recorded mortality.

A QUARTER-CENTURY OF GOLDEN EAGLE FALL MIGRATION COUNTS IN CENTRAL COASTAL CALIFORNIA

FISH, ALLEN M. (afish@parksconservancy.org), CHRIS W. BRIGGS, and BUZZ C. HULL, Golden Gate Raptor Observatory, Sausalito, CA

From 1986 through 2011, the Golden Gate Raptor Observatory monitored fall raptor movements through the Marin Headlands in Marin County, California. Trained volunteer teams used a rigorous and repeatable quadrant system to conduct counts. Daily raptor-sightings were totaled for each season and adjusted to activity per hour for interannual comparisons. On average, we recorded 18 Golden Eagles sightings per season (SD = 8.1, range 8–39). Our data indicated no evidence of trends in Golden Eagle activity over the course of the study period, and we found no evidence of significant temporal autocorrelation (i.e., periodicity) in the data. In addition, the mean annual peak of Golden Eagle activity did not change significantly over the 26-year history of the project. The mean peak activity date for Golden Eagles across all years occurred on 17 October (range 5 October – 1 November). Although the GGRO sees relatively few Golden Eagles, we provide one of the few long-term assessments of Golden Eagle numbers in California.

THE BAYESIAN EAGLE-RISK MODEL: INPUT IMPLICATIONS, STUDY DESIGN, AND FATALITY ESTIMATES

FARMER**,** CHRIS, Tetra Tech, Inc., Langhorne, PA, and LAURA NAGY (laura.nagy@tetratech.com), Tetra Tech, Inc., Portland, OR

The U. S. Fish and Wildlife Service (USFWS) now allows for incidental eagle take under the Bald and Golden Eagle Protection Act. One of the critical parts of the permit application is the estimate of eagle take, which drives the risk category the USFWS assigns and provides the basis for compensatory mitigation. In the 2012 Eagle Conservation Plan Guidance (Module 1: Land-Based Wind Energy, Technical Appendices), the USFWS described a model based on Bayesian statistical analysis. The objective of this poster is to provide guidance for pre-construction study design to minimize the loss of precision in fatality estimates that arises from scaling. We use model simulations to illustrate the effect of decisions regarding the input values. The survey input for the Bayesian model is eagle minutes over the project. Eagle flight data are collected using point counts and the USFWS recommends that these counts last 1–2 hours; however, returns on sampling effort are asymptotic and developers should think carefully about sampling design before beginning eagle surveys. One of the most significant input effects is associated with rotor radius, because it is squared in the calculation of hazardous area, placing a premium on using the correct rotor radius and resulting in different fatality estimates among different turbine types. In contrast, the number of turbines in the wind farm scales linearly, and this difference creates a design tradeoff between the number of turbines and the size of the turbines. The Bayesian fatality model forces developers to carefully balance up-front survey cost with potential mitigation and opportunity costs when designing pre-construction eagle surveys. Thought should be given to the data inputs necessary for the fatality model when designing pre-construction eagle surveys to avoid costly duplication of effort later in the process.

RESULTS OF GOLDEN EAGLE NEST SURVEYS IN ARIZONA'S PORTION OF BIRD CONSERVATION REGION 33

JACOBSON, KENNETH V. (kjacobson@azgfd.gov), Arizona Game and Fish Department, Phoenix, AZ

In Arizona, little is known about Golden Eagle distribution or status. Surveys were conducted in the 1970's, but fell far short of being comprehensive or statewide. As of 2010, the Arizona Game and Fish Department's (AGFD) Heritage Database Management System included 136 documented Golden Eagle breeding areas statewide, of which 17 were located within Bird Conservation Region (BCR) 33. In light of growing national concerns for the species, a changing regulatory environment, and an ever increasing demand for current Golden Eagle information, the AGFD formed the 16 member Southwestern Golden Eagle Management Committee consisting of state, federal, private, and tribal entities to collaboratively address statewide Golden Eagle conservation and management issues. Through this collaborative approach, the AGFD was able to partner with the Bureau of Land Management to fund a 2-year nearly statewide Golden Eagle nest survey. The AGFD now has 204 Golden Eagle breeding areas documented within the state, of which 40 are located within BCR 33. In addition, the 2-year Golden Eagle nest survey documented 330 potential Golden Eagle breeding areas with one to several Golden Eagle sized nests in varying condition, of which 131 are located within BCR 33. Of the 131 potential breeding areas within BCR 33, 73 had at least one nest in good condition with a presumably high likelihood of recent use. Future surveys will determine the current occupancy status of these potential Golden Eagle breeding areas.

MOVEMENTS OF BAJA CALIFORNIA GOLDEN EAGLES INTO CALIFORNIA

NORDSTROM, LISA A. (lnordstrom@sandiegozoo.org), San Diego Zoo Institute for Conservation Research, Escondido, CA

Very little is known about the population of Golden Eagles in Baja California and even less about their movement patterns in this region. We have been studying the Golden Eagle population in northern Baja California since 2009 and have found relatively few active territories in the Sierra Juarez mountain range. However, the few adult eagles that we have been able to track using GPS satellite transmitters have revealed some interesting movement patterns. Although most of their movements are concentrated around core home-range territories, these eagles have also displayed longer distance flights, some exceeding 200 km in length. Some of these flights have taken them across the US-Mexico border into California. The northernmost location recorded was made by an adult female who flew to Telegraph Peak in the Cucamonga Wilderness, Angeles National Forest. Unfortunately, after making this long distance flight, the adult female died on her return trip to her territory in the Sierra Juarez. These longer flights can pose considerable risk to the birds, increasing their chance of mortality. Clearly, what happens to them in one part of their range may affect another. Consequently, impacts to eagles in California can have a significant impact on the population in Baja California.

RECORDS OF GOLDEN EAGLES OBSERVED DURING THE MIDWINTER BALD EAGLE SURVEY

PHILLIPS, SUE (sue_phillips@usgs.gov), U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis, OR, WADE EAKLE, U.S. Army Corps of Engineers, South Pacific Division, San Francisco, CA, PATTI HAGGERTY, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Corvallis, OR, LINDA SCHUECK, MARK FULLER, and TOM ZARRIELLO, U.S. Geological Survey, Forest and Rangeland Ecosystem Science Center, Boise, ID

This poster displays a map of the locations of Midwinter Bald Eagle Survey (MWBES) routes on which Golden Eagles have been recorded in California and Nevada. We extracted the locations, occasions, and counts of Golden Eagles recorded during the annual MWBESs from 1980–2010. We organized those data and are in the process of making them available on the Web in a USGS Data Series report, with the report data linked to an interactive map. Users may view survey routes on the map, select them to display summary statistics, and download a file of the data. Data for multiple routes also can be viewed by state or Bird Conservation Region, or by an area specified with a user-drawn polygon. Preliminary results indicate this database contains 8,511 records of Golden Eagles from 535 survey routes in 38 states. Beginning in 1986, there are 892 records from 25 routes on which Golden Eagles were recorded in California. In Nevada, the first routes were surveyed in 1989, and there are 147 records from 10 routes on which Golden Eagles were recorded. The largest yearly count, nationwide, was 97 Golden Eagles recorded on California's Lower Klamath Basin route.

GOLDEN EAGLE OCCURRENCE DATA IN THE CALIFORNIA NATURAL DIVERSITY DATABASE

ACORD, BRIAN (bacord@dfg.ca.gov) and STEVE SCHOENIG, Biogeographic Data Branch, California Department of Fish and Game, Sacramento, CA

The California Natural Diversity Database (CNDDB) is a "natural heritage program" and is part of a nationwide network of similar programs coordinated by NatureServe. Established in 1979, the goal of the CNDDB is to provide the most current information available on the state's most imperiled elements of natural diversity and tools to analyze these data. The CNDDB is a high data-integrity database where data submitted are reviewed by California Department of Fish and Game (CDFG) biologists, compared to previous observations for a site, and subsequently added or updated with respect to nest location, number of young, condition of nesting habitat, threats, etc. Unlike many observation databases, the recorded occurrences are limited to known nest/territory sites or important winter foraging areas. Due to staff and other resource limitations, the CNDDB must concentrate data entry and analysis on species that are ranked as highly imperiled, in areas with active NCCP/HCPs, or support other Department priorities. Consequently, data in the CNDDB are not wholly representative of all Golden Eagle occurrences statewide. There are currently 141 Element Occurrences in the CNDDB for Golden Eagles across the state. Additionally, the CNDDB has more than 200 unprocessed source documents in hand with potential Golden Eagle occurrence data. CNDDB staff is currently mapping Golden Eagle Element Occurrences in the Desert Renewable Energy Conservation Plan (DRECP) area, with just over 100 occurrences added or updated so far (Nov – Dec 2012); however, it is unknown if state-wide mapping will be a future priority. If the priority status of Golden Eagles rises and if high-quality data are a critical need for the conservation of this species, there is much work to be done in the CNDDB. The CNDDB primarily maps nesting occurrences for Golden Eagles; however, other observations, such as flyovers, perched birds, carcasses, etc., are important information for some resource managers. One option to meet the needs of these resource managers would be to develop an observational database specifically for Golden Eagles. This database could house records other than nesting and winter foraging data, and would require less rigorous analysis than the CNDDB currently requires.

MONITORING GOLDEN EAGLE FATALTIES AND RELATIVE ABUNDANCE IN THE ALTAMONT PASS WIND RESOURCE AREA – IMPLICATIONS FOR POPULATION MODELING

SCHWARTZ, JESSE (schwartz@icfi.com), ICF International, Portland, OR, and DOUGLAS LESLIE, ICF International, Sacramento, CA

The Altamont Pass Wind Resource Area (APWRA) is one of the largest wind farms in the country and has been the focus of considerable attention due to the estimated number of Golden Eagles killed each year in turbine collisions. Under a settlement agreement, operators have implemented management actions to reduce the number of Golden Eagle fatalities. These include a winter shutdown of turbines, the removal of "hazardous" turbines, and repowering smaller, older-generation turbines with fewer, larger modern turbines. We estimated the APWRA-wide annual number of Golden Eagle fatalities from September 2005 through September 2011 by searching approximately 50% of the turbines in the APWRA every 30–35 days during the first 4 years, and approximately 25% of the turbines during the last year of the study. We estimated the relative abundance of Golden Eagles by measuring the number of eagle observations per minute per cubic kilometer at 77 observation points across the APWRA. The average number of Golden Eagle fatalities was lowest during winter, roughly corresponding with the seasonal shutdown of turbines, as well as the period of highest relative eagle abundance. Outside the winter period, the average number of Golden Eagle fatalities appeared to increase through the fall, roughly corresponding to the time of natal dispersal and migration. The APWRA-wide adjusted fatality rate declined over the course of the study, due primarily to a spike in fatalities in 2006–2007, while relative abundance remained high during the last 3 years of the study. We hypothesize that the risk to Golden Eagles decreased due to management actions, without affecting their use of prey and nesting resources in the APWRA.

SATELLITE TRACKING OF GOLDEN EAGLES FROM AUTUMN MIGRATION STUDY SITES IN NEVADA AND NEIGHBORING AREAS

SMITH, JEFF P. (jsmith@harveyecology.com), HawkWatch International, Salt Lake City, UT (current affiliation: H. T. Harvey & Associates, Los Gatos, CA)

Documenting a species' movement ecology and the spatio-temporal dynamics of population mixing are important for identifying conservation priorities. For raptors, such information is also important for interpreting trends in long-term migration counts, which are an important tool for population monitoring. From 1999–2010, I tracked 33 Golden Eagles (79% HY/SY males) outfitted with primarily battery-powered, non-GPS, satellite-received transmitters at five long-term, autumn migration study sites in the western United States. The eagles included 5 females (4 juveniles, 1 subadult, and 1 adult) and 26 males (22 juveniles, 5 subadults, and 1 adult). Tracking periods ranged from 2–53.5 months. Recoveries confirmed 13 mortalities; known/suspected causes included starvation/disease (6), electrocution (3), poisoning (2), and a foraging accident; I was unable to investigate 5 other presumed mortalities. A majority (64%) of eagles outfitted within the Intermountain/Great Basin region (Nevada) were regional residents, whereas most (72–75%) eagles outfitted in the Rocky Mountains (Wyoming, New Mexico) and Pacific Northwest (Oregon, Washington) were long-distance (>1500 km) migrants. For migrants that summered in Alaska and Canada, gradual shifts in use of migration routes and winter ranges suggested that use of a coastal migration route reflects immaturity, with a Rocky Mountain route more typical, and that winter ranges shift northward with advancing age. This study illustrated a vast geographic distribution of summer and winter ranges, but also demonstrated common habitat themes across seasons and regions. The arid prairies and deserts of New Mexico, western Texas, and northern Mexico emerged as a key winter range for northern migrants. By contrast, relatively little migratory movement from the north extended into California or ended in the Great Basin region. Novel results included the longest one-way migration (6500 km) ever recorded for a Golden Eagle. The results have distinct implications for understanding the species' conservation needs and developing effective population monitoring programs.

PROTECTING ACTIVE GOLDEN EAGLE NESTS IN YOSEMITE NATIONAL PARK

STOCK, SARAH L. (sarah_stock@nps.gov) and CRYSTAL BARNES, Yosemite National Park, CA

Yosemite National Park protects Golden Eagles through environmental compliance, collaborations with search and rescue personnel, and implementation of climbing closures. Golden Eagles occur year-round in the park, nest primarily on precipitous, rocky ledges, and breed at elevations ranging from approximately 900 to 3,000 m. Since 2009, we have collected monitoring data at 12 Golden Eagle nesting areas in the park. The park used the nesting data to avoid conducting search and rescue trainings in sensitive locations and to evaluate the necessity of climbing closures. Whereas periodic surveys were useful for targeted management purposes, the absence of a standardized survey effort limited our knowledge of the species distribution and nesting status throughout the park.