Marine mammals and contaminants in the diet of coastal feeding California Condors

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A recent article in Vulture News (Anon. 2006) highlighted the potential for marine mammals as a "natural food source" for reintroduced populations of California Condors Gymnogyps californianus on the west coast of USA. This article cites a recent study (Chamberlain et al. 2005) that uses stable isotope techniques to determine the extent of the marine and terrestrial components in the historical and recent condor diet. This work and a more recent study (Church et al. 2006) using stable isotope ratios to identify ammunition as the source of lead fragments ingested by California Condors demonstrate the exciting potential of such techniques in answering some fundamental questions on species ecology and biology. Thus, for example, the case against lead from ammunition (bullet fragments and lead shot) as the source of lead poisoning in condors, and the primary limiting factor restricting the establishment of viable condor populations, is now beyond doubt thanks to this (Church et al. 2006) and other studies (Janssen et al. 1986, Wiemeyer et al. 1988, Fry & Maurer 2003, Hunt et al. 2006, Parish et al. 2007, Hall et al. 2007). However, we take issue with the conservation recommendations drawn by Chamberlain et al. (2005). In their conclusion, the authors stated that "efforts to establish a self-sustaining condor population may be enhanced, however, by the widespread availability of marine mammals as an additional food source".

Chamberlain et al. (2005) suggested that marine mammal carcasses represent an alternative food supply that could provide protection from lead contamination to released condors, but this conclusion must be questioned because of long-term data indicating shooting as a frequent cause of death in California's marine mammals (Goldstein et al. 1999). Further, marine mammals constitute a highly questionable food supply because of their continuing high organochlorine contaminant loads, especially PCBs (see Le Boeuf & Bonnell 1971, Le Boeuf et al. 2002, Ylitalo et al. 2005), the butyltins in marine food chains (Kannan et al. 1998), and domoic acid contamination resulting from diatom blooms (Scholin et al. 2000). Recent reproductive failures of reintroduced Bald Eagles Haliaeetus leucocephalus on Santa Catalina Island, California, have evidently been due primarily to contamination with organochlorines originating in marine foods (Garcelon 1997, Sharpe & Dooley 2001), and

concerns have been raised regarding the viability of various marine mammal populations at the top of food chains because of contamination with a variety of environmental pollutants (Ross et al. 1996, Kannan et al. 1998, Ylitalo et al. 2005). Thus, encouraging the California Condor to become an additional link in severely contaminated marine food chains carries major risks.

Only one condor population, birds released in the Ventana Wilderness area of central California, feeds on sea mammals to any extent, including in spring 2006 on a beached Gray Whale Eschrichtius robustus, the first documented feeding by condors on a whale since Lewis and Clark observed condors feeding on a whale near the mouth on the Columbia River, Oregon, in 1806 (see www.ventanaws.org/condors.htm). Although birds in that population have been mature enough to breed for the past 3-4 years (the oldest cohort was nine years of age in 2006), breeding was not documented until 2006. In contrast, the age of first breeding of condors in the southern California population has been from 5-8 years for both males (mean = 7.0 +- 1.2 years) and females (mean = 6.3 +- 0.9 years), although one nine-year old female is still to breed. Although no egg was found at the central California site in 2006, a pair of condors was thought to have attempted to breed (see e.g. www.bigsurcalifornia.org/condors.html) but possibly failed early in incubation at a nest cavity in a coastal redwood tree. Eggshell fragments recovered from this cavity were subsequently identified as being those of a California Condor but appeared to be thin-shelled (mean = 0.541 mm ± SD 0.048; mean adjusted to include 0.1 mm membrane derived from measures of whole or partial eggs in the historical population; see Kiff et al. 1979, Snyder & Meretsky 2003) following thickness measurements of 10 fragments at the Western Foundation of Vertebrate Zoology (RC, LSH, & AM. unpubl. data). Condor eggshell thickness historically ranged from 0.65-0.95 mm, mean = 0.79 mm, in the pre-DDT era (pre-1947), 0.47-0.64 mm, mean = 0.57 mm, in the DDT era (1960s), and 0.45-0.91 mm, mean = 0.71 mm, in the post DDT (1980s) ban era (Kiff et al. 1979, Snyder & Meretsky 2003). Further analysis should determine if the shell structure shows abnormalities consistent with the effects of contaminants such as DDE.

We may already be seeing effects of contaminants in this population. Marine mammals, especially pinnipeds and cetaceans, are among the most contaminated food sources in the environment (see for example Le Boeuf & Bonnell 1971, Ross et al. 2000, Le Boeuf et al. 2002). Contrary to Chamberlain et al. (2005), rather than being an alternative food source, we believe that scavenging on marine mammals, unfortunately, places coastal condor populations at

greater risk of contamination and should not be promoted as an alternative management option for establishing self-sustaining populations. Rather continued efforts to remove lead from the condor range by replacement with ballistically comparable or superior non-lead ammunition should be endorsed and supported as an urgent priority. Ultimately, this will almost certainly require legislation banning the use of lead ammunition in the condor range if viable, self-sustaining condor populations are to be established. We support and endorse such legislation.

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POSTSCRIPT: In October 2007, Governor Arnold Schwarzenegger signed into law a bill banning the use of lead ammunition for hunting big game in the range of the California Condor. Assembly Bill 821, the Ridley-Tree Condor Preservation Act, written by Assemblyman Pedro Nava, D-Santa Barbara, requires the use of non-lead center fire rifle and pistol ammunition when shooting big game or coyotes within specific areas of the state identified as the condor's range.