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THE CALIFORNIA CONDOR IN NORTHWESTERN NORTH AMERICA

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ABSTRACT: Native Americans, European and American explorers, fur trappers, and settlers observed the California Condor (*Gymnogyps californianus*) in the Columbia River basin, the Cascade Range, along the Snake River in Idaho, as far north as latitude 52° in British Columbia, and east of the Rocky Mountains in Alberta and Montana. Before European contact, indigenous people were familiar with and culturally connected to the California Condor in northwestern North America. The condor occurred year round and possibly persisted until the mid-20th century. Oral history of condor chicks kept in Indian villages attests to the condor's nesting in the Pacific Northwest. Historical accounts of the condor's food and foraging suggest that poisoning was the primary cause of the species' extirpation from this region.

Most of what is known about the critically endangered California Condor is from detailed studies in California (Harris 1941, Koford 1953, Wilbur 1978, Snyder and Snyder 2000). In the American Southwest, the condor is known from at least 18 fossils 9600–22,000 years old (Emslie 1987), but there are only six 19th century records (Snyder and Rea 1998). In Baja California (Norte) a small population persisted until the 1930s (Grinnell 1928, Hill and Wiggins 1948, Wilbur and Kiff 1980).

In the Pacific Northwest, explorers, fur trappers, pioneers, ranchers, and naturalists encountered California Condors in the 18th, 19th and early 20th centuries; these reports have been summarized by Hall (1933, 1934), Harris (1941), Jewett et al. (1953), Gabrielson and Jewett (1940), and Wilbur (1973). Schaeffer (1951) presented oral accounts of condors from native American sources east of the Rocky Mountains. In the Pacific Northwest, condor bones have been found at three native American archaeological sites; those at Five Mile Rapids near The Dalles have been carbon-dated at 8000–9000 years before present (A. H. Miller 1942, L. H. Miller 1957, Hansel-Kuehn 2003). Wilbur (1973) stated that "Pacific Northwest condors were permanent residents with a long history," and "records from the Pacific Northwest indicate condors may have been as plentiful in winter as at any time of year," but

he did not present in detail, map, or graph the supporting data. Kiff et al. (1996:2) stated, inaccurately, that "by the time of the arrival of European man in western North America, California Condors occurred only in a narrow Pacific coastal strip…until the mid-1800s in the northern portion of the Pacific Coast region," though they were known then to be more widespread and to have occurred more recently. Condors were presumed extinct in the Northwest after 1904, but little effort was made to verify the presumption.

An up-to-date, detailed consideration of the geographic and seasonal distribution of the California Condor in northwestern North America is needed. In this paper I summarize and analyze published and new data, including data from native American sources. The condor's foraging ecology has been studied in California (Collins et al. 2000, Snyder and Snyder 2000:152), but data on its food and foraging in the Pacific Northwest are lacking. Here I also summarize and evaluate historical observations of condors foraging in the Pacific Northwest.

METHODS

I searched for and compiled records of the California Condor in the Pacific Northwest (Oregon, Washington, Idaho, and western Montana in the United States; British Columbia and southwestern Alberta in Canada) from journals, letters, and reports of explorers, fur traders, missionaries, pioneers, and early naturalists. For 4 years I also unearthed and compiled new data through interviews and conversations with native Americans, cultural anthropologists, biologists, condor researchers, and authors. Data obtained from interviews, conversations, and correspondence with informants are archived with the Wilson Ornithological Society at the University of Michigan.

I used the following criteria to evaluate the validity of condor observations: how well the birds were seen ("at close range, cannot be mistaken for any other species," Snyder and Schmitt 2002:3); size (fur traders and native American observers referred to small and large vultures; A. Henry per Coues 1897, Ross 1956, Tolmie 1963); shape (extended unfeathered neck, ruff, wing angle); coloration (dark body, color of head and neck, white in wings); physical evidence (specimens, body parts, feathers, photograph); observer competence and familiarity with local fauna and species with which the condor could be confused, particularly the Bald Eagle (*Haliaeetus leucocephalus*), Golden Eagle (*Aquila chrysaetos*), and Turkey Vulture (*Cathartes aura*) (see below); whether the observation was corroborated by other observer(s); whether the observed bird was named as "vulture" (in the 1800s this usually referred to the California Condor, Wilbur 1978:19), "California vulture" (pers. obs., Snyder and Snyder 2000), or equivalent name in a native American language (see below); behavior; and other descriptive details.

In the Pacific Northwest the California Condor and Turkey Vulture are distinguishable on the basis of noncongruent geographical ranges and seasonal distributions (Kirk and Mossman 1998, Snyder and Schmitt 2002) and by differences in foraging behavior. There are records of "vultures" (condors) in the Northwest in winter, whereas the Turkey Vulture is migratory and absent in winter (Kirk and Mossman 1998, Gilligan et al. 1994, Marshall et al.

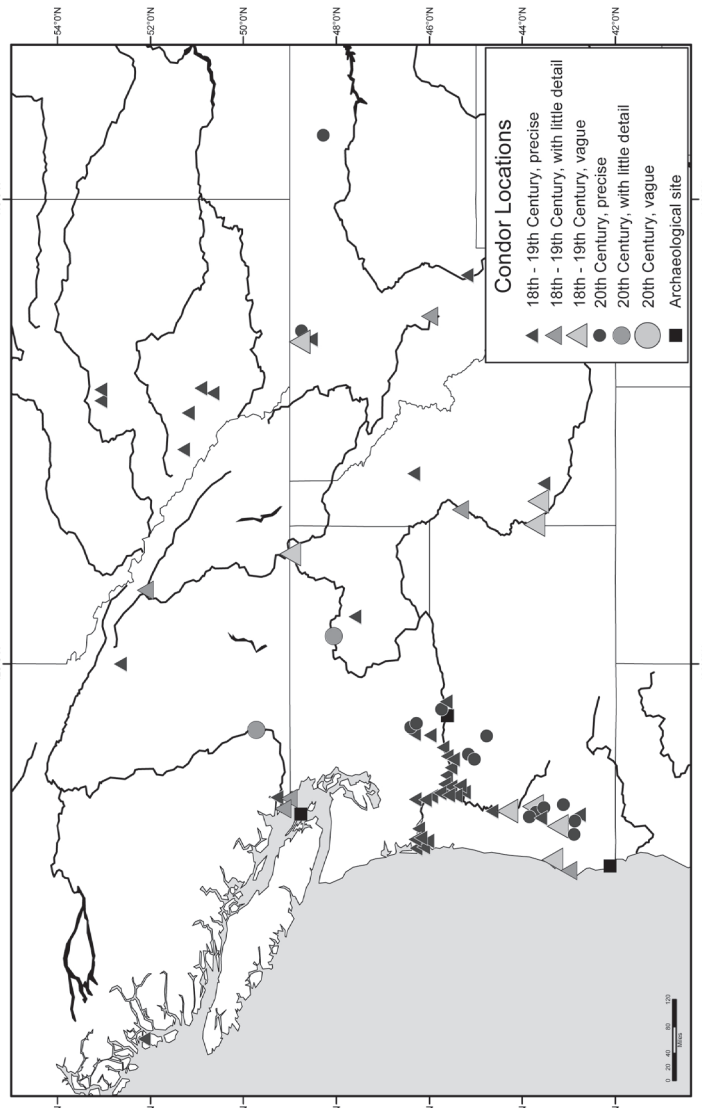

Figure 1. Locations of California Condors observed in northwestern North America. *U*sing Google Earth (www.google.earth.com) and United States Geological Survey quadrangles, I mapped records with precise geographical locations to the nearest minute of latitude and longitude. I plotted *records with imprecise locations to the nearest degree, identifying them by a different symbol on the map*. Twentieth century condor records are identified with *a unique symbol* on the map, as are *records with minimal details*.

2003, pers. obs. 1974–2008). There are reports of "vultures" from northerly latitudes in British Columbia beyond the range of the Turkey Vulture, which is found only in the southern part of the province (Munro and McTaggart-Cowan 1947, Campbell et al. 1990); the Turkey Vulture has expanded northward in the last decade (pers. obs., H. Nehls pers. comm.), but the reports I discuss pertaining to vultures were all from the 19th century. Lewis and Clark stated, "saw some turkey buzzards this morning [9 April 1806] of the species common to the United states which are the first we have seen on this side the rocky mountains" (1990, vol. 7:97–98); they arrived at the Columbia River in October 1805, and all their observations of vultures during the winter of 1805–06 thus pertained to condors (they also left descriptions and took five specimens). From 1853 to 1860 the Turkey Vulture arrived in the Pacific Northwest in the middle of May (Cooper and Suckley 1860). Therefore, reports from mid-October to March, conservatively, represent the condor. As regards foraging behavior, condors appropriated, dismembered, and moved fresh deer and elk shot for human consumption (E. Saluskin, Lewis and Clark 1990, Harris 1941:32), whereas there are no records of Turkey Vultures doing so (Kirk and Mossman 1998). My minimum standard for whether a given record pertains to the condor is "preponderance of the evidence." Some records provide few details, sometimes only size, location, season, or the competence and credibility of the observer; even though meager, these can be sufficient and convincing. Records with minimal details are mapped separately in Figure 1.

I obtained anthropological and cultural evidence on condors in the Northwest directly from indigenous sources, from interviews and correspondence with anthropologists, and from the literature. The cultural evidence includes linguistics, place names, basketry, petroglyphs, pictographs, sculpture, feathers, oral history, and specific sightings. The existence of names for the condor in indigenous languages implies that it was known well enough to native Americans to require a means of reference. Tribal names refer to the "thunderbird"/condor as both a biological, living bird and as a mythical entity with spiritual power (E. S. Hunn, University of Washington, Department of Anthropology, pers. comm.). It might have been possible to create a map of the condor's distribution in the Northwest by mapping the distribution of tribes with a name for the species, but the latter would have required more precise information than is available, so in this study I used tribal names as corroboration or context for the records based on sightings and specimens. As with tribal names, I refer to place names in the text but not on the map. Native oral histories are an independent source of information; when an oral history is relevant to the identification, distribution, status, or ecology of the condor, I refer to it in the text.

I graphed records with dates by month and by season. "Winter," "spring," "summer," and "fall" are defined as Dec–Feb, Mar–May, Jun–Aug, and Sep–Nov, respectively, and used chi-squared tests to assess whether monthly or seasonal observations were more or less than expected (Steel and Torrie 1960). I disregarded reports without dates or mappable locations, except those with ecologically intrinsic value, which are described at the end of Appendix A.

Data recorded on food and foraging included circumstances, kind of food, behavior, location, habitat, season or date, and association with human beings.

RESULTS

I located over 90 records of the condor in the Pacific Northwest, 74 with geographical locations (Figure 1) and 60 with data on month or season of occurrence (Figures 2 and 3; see Appendix A for details). They included 13 specimens, a historical photograph, and bones from three native middens. The remainder were sight records, all but one of which were of birds seen at close range; the exception is that of Peck (Appendix A). Distance as a source of misidentification is thus negligible for these records. A wealth of data from native American sources—linguistics, oral history, place names, and basketry (see Anthropological Evidence below)—reflect most tribes' familiarity with the condor throughout the Pacific Northwest. These data provide context for the date- and location-specific records. Of the records, 25 have information on food or foraging (Table 1). Details are provided in Appendix B.

Geographical Distribution

Competent observers encountered condors on the Columbia River from its estuary to its headwaters in the Rocky Mountains of British Columbia, in eastern Washington, along the Snake River in Idaho, in both coastal and interior British Columbia north to latitude 52–53° N, and east of the Rocky Mountains in Alberta and Montana (Figure 1). More than half of the 74 observations of condors I compiled were along the middle and lower Columbia, the Willamette River, and in the Umpqua region of Oregon. The Lewis and Clark party observed condors along the lower Columbia River on nine occasions from October 1805 to April 1806 and once in the Rocky Mountains; they collected five specimens. Douglas (1829) encountered condors as far north as the Canadian border, as far south as the Umpqua River, and collected five specimens, including two while on an Indian-escorted excursion to Larch Mountain in September 1825 (Douglas 1829), related to me in astonishing detail in a native oral history passed down for 180 years (Ken Kachia Smith, Wasco elder, Corbett, Oregon, pers. comm. 2006).

Table 1 Observations of Food and Foraging of the California Condor in Northwestern North America[a]

Species	Number of observations	Habitat
Bison	3	Plains
Salmon	6	Shoreline
Other fish species	1	Shoreline
Marine mammals	2	Shoreline
Winter-killed elk	1	Forested upland
Hunter-killed deer and elk	4	Forested upland, riparian
Domestic animals	3	Forested upland, grassland
Domestic animals, carcasses poisoned	2	Forested or cleared upland
Wild "cranberries" (*Arctostaphylos uva-ursi*?)	1	Forested upland
Human bodies	2	Shoreline, riparian

[a]See Appendix B for source data.

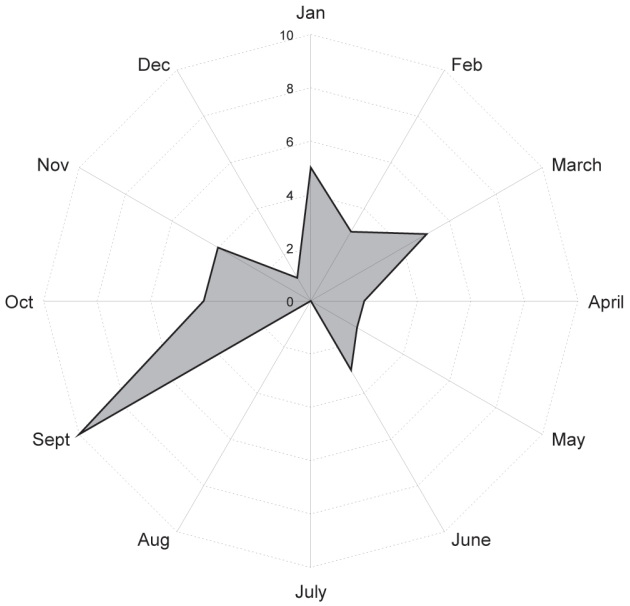

Figure 2. Number of California Condor sightings in the Pacific Northwest by month.

British Columbia. Nine records of the condor in British Columbia include five at the coast and four in the interior. The coastal locations are Bella Bella at latitude 52° N in 1827 (Tolmie 1963) and the mouth of the Fraser River in the 1860s, 1880, and late 1880s (Lord 1866, Fannin 1891, Rhoads 1893). Lord (1866) simply stated without elaboration that condors occurred in interior British Columbia. Specific reports in the interior (Appendix A) include that of Alexander Ross (1956), who shot "a bird of the vulture tribe" on 17 September 1817 northwest of the Canoe River in central eastern British Columbia at latitude 52° 40′ N, and De Smet (1978), a Catholic missionary, who on 4 September 1845 observed "vultures," wolves, and grizzly bears at "the source of the Columbia," latitude 52° N. A Sto:lo Salish native American saw a condor-sized bird in 1935 on the Fraser River near Spuzzum (S. McHalsie, Sto:lo tribal biologist, pers. comm.).

Brooks and Swarth (1925) stated that British Columbia records lacked "conclusive evidence." Campbell and others (1990) listed the condor as "hypothetical," but Bringhurst (2001) objected that the authors did not avail themselves of indigenous sources of information. A condor tarsometatarsus excavated at the site of a native village on Pender Island in 2006 provides physical evidence of the condor in the province (R. Wigen pers. comm. 2006).

Idaho. The condor record in Idaho includes four sightings from Euro-American sources in the 1800s: that of Lewis and Clark (1990, vol. 8:22–23) of vultures appropriating freshly killed game, two sightings, including one in winter, along the Snake River by the fur trader McKenzie (Ross 1956), and,

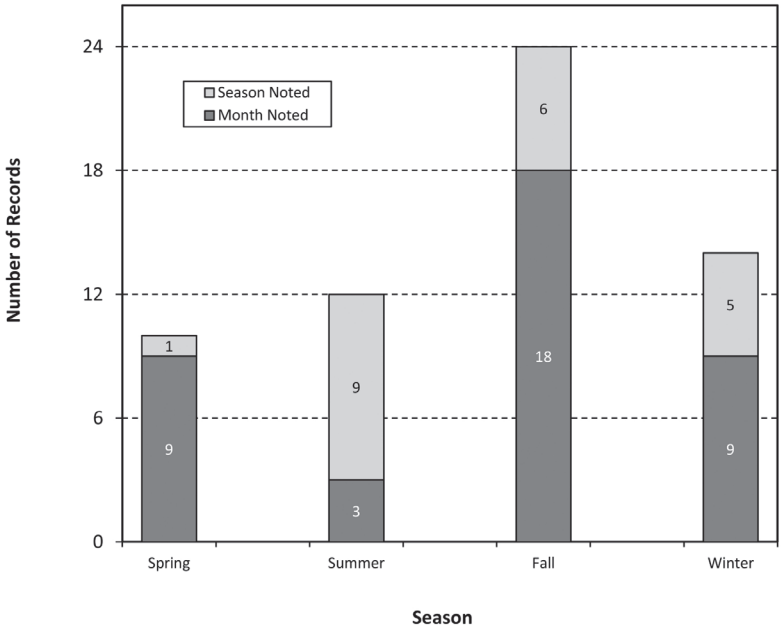

Figure 3. Number of California Condor sightings in the Pacific Northwest by season.

in a colorful description, Wilcox (1918). In addition, less specifically, Douglas (1959) stated that condors were seen on the Snake River 400 miles inland. A Nez Perce oral history placed condors in the Hells Canyon–Seven Devils area (Josiah Pinkham, Nez Perce tribal member, pers. comm.), and there is pre-contact Nez Perce and Shoshone–Bannock linguistic evidence from the Snake River (D. Walker, anthropologist, pers. comm.). Euro-American and native sources point to the lower Snake River as the condor's center of abundance in Idaho. I failed to find accounts of petroglyphs of condors in the Snake River watershed (M. Pavesic, archaeologist, Boise State University, pers. comm.; J. Braga, petroglyph hunter, pers. comm.).

Records east of the continental divide. On 10 September 1896, Fannin (1897), curator of the British Columbia Museum, observed two "fine" condors in the Bow River valley between Calgary and the Rocky Mountains, stating, "I was not aware that this bird was found east of the Rocky Mountains, or so far north." From interviews with members of the Blackfeet and Cree tribes east of the Rockies, in western Alberta and western and central Montana, Schaeffer (1951) obtained 19 observations of the condor, of which 11 were detailed and reliable enough to be mapped.

Seasonal Distribution

The 60 records with dates show that condors occurred in the Pacific Northwest year round, with more than the expected number of records in

September ($\chi^2 = 25.308$, $P < 0.01$, df = 11) (Figure 2). By season, observations were more frequent in fall (24) than in winter (14), spring (10), or summer (12) ($\chi^2 = 7.197$, df = 3, $P < 0.10$) (Figure 3).

Anthropological Evidence of Condors in the Pacific Northwest

In this region, most tribes have names for the condor, either as a biological entity and/or as a creature with mythical power (the thunderbird). The list of these tribal names, not complete (some tribes and their languages are extinct, for example, the Rogue, Willamette, Cowlitz, and Clatsop), includes the Snoqualmie (Puget Sound Salish, Washington) *hed-e-libsh* or "broke down the weirs," distinguished from *c'ika'wd* ("red" or "bay") for the Turkey Vulture (Turner 1976); the Pyallup–Nisqually *hedelabc,* "a real bird," "much stronger than eagle," "devouring," and "the biggest bird there was," distinguished from the thunderbird as mythological/spiritual power (Smith 1940:69, 70); coastal Salish Sto:lo (Fraser River, inland British Columbia) *sxwe-xwo:s* or "opening his eyes" (Sonny McHalsie pers. comm.); Chinook–Wasco (lower Columbia) *ha'-ness* (Gill 1909, K. K. Smith pers. comm. 2004), also *iakessitl'nos,* "sharp beak" (Demers et al. 1856, Long 1909, Thomas 1935, Shaw 1909, K. K. Smith pers. comm.), distinguished from *hem-letet* ("stinkhead") for the Turkey Vulture (T. Johnson, Grande Ronde Tribe Cultural Affairs Program, pers. comm.); Sahaptan Wasco, Toppenish, and nearby tribes (Columbia River east of the Cascades) *pach'anahúy* (E. S. Hunn pers. comm.); Wasco (central Columbia River, Warm Springs) *k'unwakshun,* distinguished from *q'shpa-li*' for the Turkey Vulture (K. K. Smith pers. comm.; Wasco language program, Warm Springs Reservation, Oregon, pers. comm.); Colville–Okanagan Salish (upper Columbia River, eastern Washington) *s-ʔítwn* (Hunn pers. comm.); Yakama (central Washington) *patsami hu'u* or "rough or crooked beak" (Lavina Wilkins, Yakama Cultural Center, pers. comm., Nisbet 2003); Nez Perce (eastern Washington and Snake River, Idaho) *qu'nes*, differentiated from *q'ispa'laya,* the Turkey Vulture, by "the bent shape of the [latter's] wings" (J. Pinkham, Nez Perce Tribe, pers. comm., D. Walker pers. comm. 2006); Shoshone–Paiute–Bannock (Snake River, Idaho) *quana* (D. Walker pers. comm. 2006); and Blackfoot (western Montana, southwestern Alberta) *omaxsapi'tau* or "big golden eagle" (Schaeffer 1951).

In British Columbia, at the condor's northern geographical limit, as delineated by historical sightings and specimens, a vague mythology replaces specific observations. The Porteur Indians (Fort Alexander, upper Fraser River) described "thunderbirds" in mythical terms (Demers et al. 1856:164). The condor as biological entity was "unknown" to the Haida (Swanton 1898), who named only a creature with supernatural power (Tolmie 1963, Bringhurst 2001). The terror of a native guide who accompanied Ross into interior British Columbia in 1817 was noteworthy (Ross 1956).

Several native place names in the Northwest refer to thunderbirds. In the vicinity of Orting, near Tacoma, Washington, a rocky face with alcoves, called "tsiyaqwadi altu" or "thunderbird's house," was perhaps a nest site (D. Buerge, historian, pers. comm.). Near Lake City in the Seattle area of Puget Sound is a ridge called "Xwi-yah-qwa-di-A'lt," "thunderbird's house," said to be where thunderbirds nested in trees (Waterman 1922). Along the Fraser River, near Hope, British Columbia, a cave near the head of Pitt Lake

Figure 4. Condor motif on Wasco basket, Columbia River, late 19th century. Outstretched wings are characteristic of condors; the long neck eliminates the Turkey Vulture. Photo courtesy of Portland Art Museum.

was called by the Sto:lo "xwexwo'sawtxw," "home of the thunderbird" (Carlson 2001). Various locations in eastern Washington refer to condors (E. S. Hunn pers. comm.). In coastal Oregon, in the area of the Umpqua, a variety of place names referring to "buzzards" and "vultures" on U.S. Geological Survey quadrangles invite further investigation of any local oral history. Such place names may signify collectively remembered nest sites, roosts, or sightings.

On Wasco baskets from the Columbia River, a motif common in the 1800s and early 1900s was the depiction of condors with characteristically outstretched wings and long unfeathered necks (Schlick 1994, Oregon Art Museum, Portland, Oregon, pers. obs. 2005, Maryhill Museum, Goldendale, Washington, pers. obs. 2006; Figure 4). Petroglyphs depicting condors are said to exist along the river at sites not disclosed to prevent desecration (K. K. Smith pers. comm. 2006), but there are no photographs or drawings of petroglyphs with condor motifs in Keyser's (1992) *Indian Rock Art of the*

Columbian Plateau. Depictions of condors in petroglyphs and basketry suggest that condors occurred in the area, though Wasco baskets were perhaps traded up and down the Columbia River.

The wealth of anthropological data implies that the California Condor was important in the culture of northwestern native American tribes. Culturally the Pacific Northwest was thus comparable with California (Simon 1983). However, cultural evidence of the condor in the American Southwest is meager, and such southwestern tribes as the Pima, Pueblo, Paiute, Navajo, and Apache do not have oral histories, basketry, petroglyphs, or names for the condor (A. Ferg, Arizona State Museum, Tucson; D. Zimmerman, Arizona State University, Flagstaff; G. Rice, Arizona State University, Tempe; K. Hays-Gilpin, C. Downum, and R. Riner, Northern Arizona University, Flagstaff; R. Johnson, Navajo cultural specialist; J. Mead, palaeontologist, Grand Canyon National Park, pers. comm. 2004). Only the Hopi have a name for the condor, *kwaatoko*, or "big eagle" (the Turkey Vulture is *wisoko*), but oral history is lacking (M. Yeatts, Hopi Cultural Office, pers. comm.). When the first condors were released in the Grand Canyon of Arizona in the 1990s, assembled Navajo elders created a name for them, *jisho tsoh*, simply "big buzzard" (R. Johnson pers. comm.).

Archaeology of Condors in the Pacific Northwest

Condor bones have been found at three native archaeological sites. The large midden at Five Mile Rapids, Oregon, contained bones from 63 individual condors (L. H. Miller 1957), which dated from 8770 ± 230 to 8470 ± 190 years before present. The distal ends of some wing bones bore cuts from implements, indicating ceremonial use of the feathers (Hansel-Kuehn 2003). A radius of a condor from a midden north of Brookings, coastal Oregon, predated native contact with Caucasians (A. H. Miller 1942). A condor metatarsus unearthed in 2006 at the site of a native village on Pender Island, British Columbia, was radiocarbon-dated at 2900 years (R. Wigen pers. comm.). No condor remains were found in nine middens around Puget Sound (L. H. Miller 1960) or in middens elsewhere on the Oregon coast (M. Moss, University of Oregon Department of Anthropology, pers. comm.).

Specimens

Nineteen records of condors from the Northwest, all but one from the 19th century, include 13 birds collected, 1 poisoned (not "shot" as per Wilbur 1978:72), and skins and feathers reported by native Americans, including one photograph by Edward S. Curtis (Schaeffer 1951, Hines 1991, www.memory.loc.gov/award/iencurt/ct07/ct07010v.jpg). Of five condors collected by Lewis and Clark, only one preserved head was taken back to Washington, D.C. None of the four specimens David Douglas sent to London are extant (he discarded a head-shot fifth specimen), and only one specimen from the Pacific Northwest, collected on the Willamette River near Oregon City in April 1835 (Townsend 1848), still exists. This Townsend gave or sold to J. J. Audubon, who presented it to Spencer Baird, secretary of the Smithsonian Institution; it is now in the National Museum of Natural History (catalog number 78005), its location mislabeled "the Columbia" (C. Angle, Smithsonian Institution, pers. comm.) and misreported as "mouth of

the Columbia" (Baird et al. 1858). The disposition of the "vulture" (condor) Ross shot in interior British Columbia in 1817 (Ross 1956) is unknown (he ate the Bald Eagle he shot at the time), as is that of the condor poisoned in the Umpqua area (Putnam 1928); both birds were probably discarded. The whereabouts of several condor skins and feathers valued as symbols of power by native Americans (Schaeffer 1951) are also unknown.

Abundance

Lewis and Clark observed "some fiew" condors at the mouth of the Wind River in October 1805 (Lewis and Clark 1990, vol. 5:356). Douglas traveled extensively in the Northwest and saw condors on many occasions; he stated, "During the summer [condors] are seen *in great numbers*…from the ocean to the mountains four hundred miles in the interior. In winter they are less abundant" (Douglas 1959:241); "nowhere as abundantly as in the Columbian valley between the Grand Rapids and the sea" (Douglas 1829); "great numbers on the Umpqua river" (Douglas 1959:216); and in the Willamette Valley on 3 October 1826, "nine in one flock" (Douglas 1959:241). Townsend saw condors "in abundance" on the Columbia River in spring and summer in 1835, and "constantly found the Vultures at all points where the Salmon was cast upon the shores" (Townsend 1848). In the 1800s Henry, Tolmie, and Peck referred to vultures plural or in flocks. Scouler, Cooper, and Merriam observed single birds (Appendix A).

Wilbur (1973) hypothesized that "heavy" scientific collecting was the cause of the disappearance of condors from the Columbia River. Yet I could find record of only 13 condors collected there, 1805–1835, and Tolmie's (1963) observation of flocks of condors in 1833 at two deserted Indian villages along the Columbia suggests that the species survived the early collecting.

Food and Feeding

The 25 reports of condors feeding are summarized in Table 1 and detailed in Appendix B. The condor's diet included winter-killed elk, which are uncontaminated and benign, and hunter-killed deer and elk, contaminated with lead. Similarly, it included domestic animals, sheep and cattle, which are benign, and domestic animals laced with poison, which are not. The report of a condor eating "wild cranberries" is from a meadow at high elevation in the Cascades (Appendix A). Snyder and Schmitt (2002) did not mention vegetation as part of the condor's diet, but Koford (1953:59) observed condors eating leaves and examined condor pellets consisting entirely of vegetation. The Turkey and Black (*Coragyps atratus*) are known to eat fruits (Kirk and Mossman 1998, Buckley 1999).

Condors fed on remains of bison killed by native peoples in Montana and Alberta before European contact (Schaeffer 1951). The condor's occurrence east of the Rockies was apparently driven by food and seems not to have extended beyond the last bison drives by the Blackfoot tribe in 1872 and the bison's extermination in 1882 (Ewers 1949). There are no reports of condors feeding on bison on their own, but such observations might not be as likely.

Because human settlements were located on shorelines and rivers were used for food gathering, travel, and trade, aquatic habitats may be over-

represented in the historical record. In Oregon west of the Cascades, condors were seen in areas burned by Indians (Douglas 1959, Peale 1848).

Condors fed on human carcasses: on dead slaves thrown out by their owners to be disposed of by scavengers and on unburied inhabitants of native villages dying *en masse* in an epidemic (Appendix B). In November 1830, fur trapper P. S. Ogden observed "foul birds" at a native American village on the Columbia River near Fort Vancouver (Ogden 1933), where 90% of the inhabitants were dead or dying from an epidemic of malaria. In 1833, when the epidemic was still virulent, Tolmie (1963) observed flocks of "large vultures" (condors) at two nearby abandoned villages. Turkey Vultures have migrated out of the Pacific Northwest by November, and a Wasco oral history of thunderbirds feasting on the corpses (Aguilar 2005) independently confirms that the unnamed "foul birds" were California Condors. Human carcasses have not been mentioned as a component of the condor's diet in California (Koford 1953, Collins et al. 2000, Snyder and Schmitt 2002).

Association with Humans

The condor's and human diet overlapped broadly. The condor–human association could be characterized as commensal. In 15 of 25 observations of foraging, condors were associating with humans for food at villages, settlements, camps, and ranches. Condors were attracted to fish offal around native villages on the Columbia River (Audubon 1839), and condors appropriated big game killed by hunters. In April and May, 1806, on their return trip east, the Lewis and Clark company shot and cached deer that condors located and ate (Lewis and Clark 1990, vol. 7:25, vol. 8:22–23). In the early 1800s condors frequented fur traders' camps on the Columbia River for this reason, and Alexander Henry called condors "very troublesome" (Coues 1897:808, 817). Those data suggest that condors recognized and benefited from opportunities to forage in association with humans.

Sense of Smell

Several observations from the Pacific Northwest imply that condors may be able to smell (Douglas 1829, Coues 1897:817, Fleming 1924, Demers et al. 1856:180). Demers et al., relying on Chinook or Cowlitz informants along the lower Columbia River in 1843, reported that "the Vulture, said to be from California, a bulky black bird, very voracious, [was] noted for the keenness of its sense of smell. Alluding to this quality, the natives call it *iakessitl'nos*, who has a sharp nose. The odor of carrion attracts it from a great distance. It gorges itself so well…that it is then impossible to start flying, and then a club suffices for killing it. The feathers… are much sought after by the aborigines." "Unable to fly" when gorged suggests the condor, already near the mass limit for flapping flight (Douglas 1829, Snyder and Schmitt 2002:5). However, the Chinook word *iakessitl'h* means "sharp" in the sense of "cutting," rather than pertaining to smell or taste (Gibbs 1863, Thomas 1935, T. Johnson, K. K. Smith pers. comm.), and condors are noted for their strength and ability to demolish fresh carcasses. *Nos* is nose, beak, or prow of a boat (Shaw 1909, T. Johnson pers.comm.), rather than nose for smelling, which is *e'-meets* in Chinook (Long 1909). It is also possible that Demers misunderstood his informants and conflated characteristics of the condor and Turkey Vulture into one.

Twentieth Century Records, in Oregon and Washington

Most of the reports are from wilderness areas of the Cascade Mountains. In the 1920s and 1940s Yakama Indians reported condors near Mount Adams (M. Schlick pers. comm.; C. Mack, Gifford Pinchot National Forest archaeologist, pers. comm.; E. S. Hunn pers. comm.). From 1930 to 1935 Bill Brown, a fire lookout, observed single condors several times over 5 or 6 successive years at three lookout towers in the western foothills of the Oregon Cascades, in southern Douglas County within 32 km of Canyonville and Myrtle Creek. He and several other fire lookouts communicated the sightings to each other by radio at the time (J. Nisbet pers. comm.). In the 1950s K. K. Smith (pers. comm.) saw condors at close range on the upper Clackamas River and on the east slope of Mt. Jefferson on the Warm Springs Indian Reservation, feeding on winter-killed elk. John Krussow and a Forest Service road-survey crew observed three condors at close range on dozens of occasions at a roost on the Collawash River, December 1964–April 1965; the presence of "California Condors" in the area at the time was also known to local loggers (J. Krussow, road surveyor, Mt. Hood National Forest, Hood River, Oregon, pers. comm. 2006). Rebuilding the logging road washed out in 1964 entailed dynamiting rock below the roost, which put an end to the condors' roosting at that location.

Elsewhere, condors continued to be observed at Celilo Falls in the early 1900s (K. K. Smith pers. comm.), and Jacqueline Cook (pers. comm.) stated that her father, a rancher, saw a condor on the Colville Reservation in eastern Washington in the 1930s, when the Grand Coulee dam was under construction.

The latest generally accepted records for condors in the Pacific Northwest are for 1903 and 1904 (Peck 1904, Finley 1908, Wilbur 1973, pers. comm.), but several unpublished reports suggest that condors survived later (Figure 1, Appendix A). Clearly, historical records from indigenous and lay sources do not meet current standards for reports of rare birds, but most were observations at close range. Even if a few are erroneous, collectively they suggest a few condors persisted in the Pacific Northwest into the mid-20th century.

DISCUSSION

Patterns of Occurrence

Fannin's (1897) 1896 observation of "two fine condors" near Calgary was rejected by Macoun and Macoun (1909) for want of a specimen, was thought "startling" by Harris (1941), and was disputed by Wilbur (1978, pers. comm.). In his time, however, Fannin was perhaps the most highly respected ornithologist in British Columbia, and his observation gains credibility from multiple Blackfoot and Cree observations of *omaxsapi'tau (*"big eagle" or condor) in Alberta and western Montana in the 19th and early 20th century and the 1897 observation of a condor near Browning, Montana, in particular (Schaeffer 1951) (Appendix A).

Brown's sightings of condors at fire lookouts in the Umpqua foothills in the 1930s were made near the area where Douglas and McCleod saw

"great numbers...on the Umpqua river, and south of it" in 1826 (Douglas 1959:241), where Titian Peale, ornithologist with the Wilkes expedition, saw two condors in the mountains between Umpqua and Rogue rivers in 1841 (Peale 1957), where a condor was poisoned at Yoncalla in the upper Umpqua River watershed in the winter of 1852 ("the largest wild bird... is the vulture…only an overgrown buzzard. I saw one measured [with a wingspan of] 10 to 11 feet"; Putnam 1928), and where G. and H. Peck saw condors on three occasions in 1903 and 1904 near Drain, 11 km from Yoncalla (Peck 1904, Finley 1908). A history of condor occurrences in the Umpqua area over a period of 110 years lends credibility to the 20th century observations of Brown.

Krussow's three condors at a roost overlooking the Collawash River, from December 1964 to April 1965, were well described (necks long, unfeathered, and orange-pink), were contemporaneously known to loggers in the area, and are complemeted by K. K. Smith's independent observations of condors along the upper Clackamas River, to which Collawash is tributary, in the 1950s when he fished for salmon as a young man. The upper Clackamas was traditionally used for berry-picking by the Wasco, who were aware of condors in the area (K. K. Smith pers. comm.). According to Krussow, the condors left the roost and flew southeast in the direction of Mt. Jefferson, where Smith observed three condors at close range among Common Ravens (*Corvus corax*), Golden and Bald eagles at a winter-killed elk in a melting snow bank in early summer in the 1950s or 1960s. The distance between the Collawash roost and the Mt. Jefferson area is ~35 km, within the range of foraging condors in California (Koford 1953). Krussow and Smith neither met nor knew each other.

David B. Marshall, respected naturalist and co-author of *Birds of Oregon*, asked, "How could such a huge, charismatic species have been missed in the 20th century?" The explanation is quite simple: Euro-Americans did not explore parts of the Cascade Mountains until the mid-1900s. Gabrielson and Jewett wrote in 1940 of "the comparative isolation of…Mount Jefferson, even up to the last few years." The eastern slope of Mt. Jefferson is within the Warm Springs Indian Reservation and is not accessible except to the reservation's residents. The upper Clackamas drainage was rarely visited by non-Indians before roads penetrated the Cascades in the 1950s (Taylor 1999, K. K. Smith pers. comm.) and before logging in national forests increased from the 1960s to a peak in the 1980s (Robbins 2004). Finally, wildlife agencies did not pay much attention to endangered species until the passage of Endangered Species Acts in 1966, 1969, and 1973, and nongame species were almost completely ignored until the 1970s and 1980s (pers. obs.). That federal and state wildlife biologists "missed" condors in roadless wilderness until the mid-1900s is not surprising. The condors were not really "missed" but were known to native Americans and early forest workers like Krussow, a road surveyor, and the first loggers.

Significance of Year-round Occurrence

Records with dates (n = 60; Figures 1 and 2) show that condors occurred in northwestern North America in almost every month and at all seasons of the year. Koford suggested (1953:9) that "condors moved northward in

summer to feed on the salmon" of the Columbia River, but they were not most numerous in summer, and the year-round record is inconsistent with "occurrence and disappearance" and a "southward withdrawal." If "summer is the season of lowest [food] supply" and if condor movements into the Northwest were driven by food scarcity, condors would be more likely to move north in summer (Wilbur 1973). However, the data show not a summer influx in the Pacific Northwest but a higher than expected number of reports in the fall, in September. Peale (1848), A. H. Miller et al. (1965) and Wilbur (1978) also considered food adequate in California.

The condor's occurrence year round could be the result of random northward movements from California regardless of season. But the distance exceeds the condor's regular movements between roosts and foraging areas in California (Koford 1953), and Wilbur (1978:27) considered such movements unlikely. Semi-permanent residence of condors in the Northwest is conceivable, with a return to California to breed, but that implies nest sites are lacking in the region or that condors could not maintain themselves on the food supply available in the Northwest. However, suitable nest sites seem abundant (pers. obs., D Moen pers. comm.), and in the Columbia and other streams salmon ran year round, though in some of the major summer runs they delay spawning until fall, with the result that salmon carcasses are more available and abundant in the fall (B. Bakke, Native Fish Society, pers. comm., Aguilar 2005, Taylor 1999). The simplest and most compelling explanation of the seasonal pattern is that the northwestern population of the condor was permanently resident.

Year-round occurrence does not exclude a northward dispersal in late summer or fall of nonbreeders, young condors, and/or post-breeding adults from California, which may have augmented the Northwest's resident population. Northward post-breeding dispersal in late summer and autumn is known for many species of birds. Phillips' (1968:135) criticism of Koford's hypothesis of northerly movement as a "disservice to the general understanding of *Gymnogyps*" thus might not be deserved. Though Wilbur (1973) stated that condors made "a fairly definite movement to the Columbia in fall [to breed] and away in spring," he did not tabulate any supporting data. The numbers of records I have compiled "at" and "away from" the river (8 and 5 in winter, 7 and 2 in spring, 3 and 10 in summer, 9 and 15 in fall, in total 27 and 32, respectively) suggest that if anything the species was more frequent at the river in winter and spring. During the presumptive breeding season condors thus occurred both near the river and in the mountains. Movement to the river probably should not be equated with movement to a nesting area in any case, because northwestern condors may have nested both along rivers and in uplands.

Probability of Condor Nesting in the Pacific Northwest

Evidence suggesting that California Condors nested in the Northwest includes (1) the species' occurrence year round, as concluded by Wilbur (1973). (2) Archaeological and anthropological evidence, including linguistics, demonstrating that before Caucasian contact native Americans were familiar with the condor, implying it was more than an intermittent or accidental visitor. In addition, according to Wasco oral history, young

condors were captured and kept in villages for protection against thunder and lightning, and if native villagers had local access to young condors, the species must have nested locally (Nelson Wallulatum, chief of the Warm Springs Confederated Tribes, per M. Schlick pers. comm.) (Appendix A). (3) Oral histories of Columbia River tribes refer to condors breeding at Saddle Mountain (overlooking the Columbia River estuary), in the Columbia River Gorge, and near Celilo Falls on the Columbia. For example, a Clatsop creation myth describes eggs from a condor nest at Saddle Mountain breaking open and generating the Clatsop people (Gill 1928, Hines 1991, Boas 2002, T. McAllister, *The Oregonian*, pers. comm., K. K. Smith pers. comm.). (4) Regular observations by Lewis and Clark of condors at the mouth of the Columbia (Figure 1, Appendix A), within sight of Saddle Mountain, which are consistent with native oral history of breeding at that location. Native American oral accounts have been found accurate for geological events in the Northwest such as tsunamis and volcanic eruptions. (5) Townsend's statement (1848:267), that condors were "reputed to breed in the Umpqua country" at higher elevations, according to American Indians, which is consistent with repeated sightings of condors by Euro-Americans in the Umpqua area over 110 years. (6) Indians told Townsend that condors nested on the ground along the Columbia River (Audubon 1839, Finley 1908). Caves, cliffs, and jumbles of rocks along the Columbia River and in the Cascade Mountains provide an abundance of nest sites (pers. obs.). (7) Condor bones in Indian middens document the species' presence in the Pacific Northwest for several thousand years, and ceremonial use of feathers by native Americans suggests more intimate cultural interaction with the condor than possible if it occurred only intermittently.

Altogether, the circumstantial evidence is strong and consistent with condor nesting in the Pacific Northwest; only physical confirmation is lacking. The remains of eggshells or nestling condors in caves would confirm nesting (Snyder and Snyder 2000), as would photographs of nestling or juvenile condors in native villages. Few potential nesting sites in Oregon have been explored, even in areas where clusters of condor records have been documented (Figure 1) (D. Moen pers. comm.).

The Columbia River as Organizing Principle

In the 19th century numerous condor records were concentrated along the Columbia River (Figure 1), which to some extent may reflect the river as a corridor of human travel. However, the Columbia and other rivers of the Northwest produced an abundance of salmonids (salmon and steelhead) year round, which condors used as a food supply, the river supported a dense population of human settlements with which foraging condors associated, and prevailing winds in the Columbia River Gorge gave mobility to foraging condors. According to native oral history, the Columbia also provided the condor with nesting sites.

Observations of condors in the Columbia River's watershed extended inland to its headwaters in British Columbia, the Snake River in Idaho, and other tributaries such as the Willamette and Cowlitz (Figure 1, Appendix A). Transmontane sightings in Alberta and Montana can perhaps be best understood as an extension via passes across the continental divide (by a

route also used by the fur traders): the 90 km from the Columbia's headwaters to the Bow River near Calgary (the site of Fannin's observation) would present no obstacle to a foraging condor (Koford 1953).

Concurrent Declines of the Condor in California and in the Northwest

In the 19th century, the California Condor disappeared from county after county in California (Cooper 1871, Leach 1929, Willett 1931, Koford 1953:18,39–46, Wilbur 1978:57–69). Despite the establishment of protected areas, its numbers continued to decline through the 20th century because of lead and other poisons in the environment (Snyder and Snyder 2000, Mee and Hall 2007), and from 1985 to 1987, the remaining 27 individuals were taken into captivity for their protection (Snyder and Snyder 2000). In the Pacific Northwest, condors seem to have diminished in the late 19th century, a few persisted into the 20th century, perhaps in wilderness refugia, and the species declined to extirpation by the second half of the 1900s; the last sightings were in 1965. It thus appears that the condor's decrease in the Northwest paralleled that in California.

A concurrent decline implies either that the condors in the Northwest and in California consituted one population, in which case a significant decline in California would also result in a decline in the Pacific Northwest, or, if the northwestern population was resident and independent, as appears to be the case, that the factors responsible for the decline were common to both regions.

Implications of the Condor–Human Association

The association between foraging condors and humans in the Pacific Northwest parallels that in California, where condors were "not averse" to foraging near humans or buildings (Koford 1953). "Flying condors show little fear of man and will often approach closely" (Wilbur 1978:35). "Despite their reputation as exceedingly wary birds, California Condors are often tame and inquisitive" (Snyder and Rea 1998:35). California Condors did not or do not avoid even nesting close to roads and trails in California (Snyder et al. 1986). Condors were evidently rewarded with food as a result of their association with humans, in the form of salmon offal at Indian villages, fresh carcasses of big game, and later, after white settlement, domestic animals. Condor bones from a native American midden at The Dalles have been carbon-dated at 4000–8000 years before present (L. H. Miller 1957, Hansel-Kuehn 2003), indicating that the relationship between the condor and people was of long standing, and the condor's foraging behavior may have been genetically selected. The condor–human association is probably properly understood as an extension of the evolutionary relationship between the condor and the megafauna that was the major part of its food supply in the Pleistocene (Emslie 1987). But even if merely learned, the association was clearly an advantageous and adaptive component of the condor's foraging niche. It was only after Euro-Americans introduced lead ammunition and poisons to kill predators and rodents that the condors' association with humans became maladaptive, and some of their foraging strategies became dangerously dysfunctional.

Association with Salmon

The condor's year-round presence in the Pacific Northwest reflects the year-round abundance of salmon, "in all 13 moons" (K. K. Smith pers. comm.), even winter (e.g., Aguilar 2005, B. Bakke, Oregon Native Fish Society, pers. comm.). "In the fall of the year after spawning time the old salmon would die and millions of them would float down the river." (Aguilar 2005:120). The significantly higher than expected number of condor observations in the fall would be expected if salmon were more abundant in the fall. Live salmon were not more abundant in the fall, but because some spring and summer runs do not spawn until fall, salmon were more available then (Aguilar 2005, M. Newsom, Bureau of Reclamation, pers. comm.). Condors fed on both dead and live salmon, and the abundance of dead salmon, or of live and dead salmon combined, is consistent with the greater number of observations in the fall and with the statement that "the California vulture visits the Columbia River in fall, when its shores are lined with great numbers of dead salmon" (Cooper and Suckley 1860, Peale 1848).

It seems unlikely that a shortage of salmon caused the disappearance of the condor from the Northwest, which occurred largely before salmon populations began to reach their lows in the mid 1900s. However, given the apparent importance of salmon in the condor's diet in this region, condors and their reintroduction into the Pacific Northwest would benefit from restoring salmonids in the Columbia River basin. Unfortunately, the Columbia River has been so extensively re-engineered for hydroelectricity, irrigation, and transportation (Harden 1996) that "nearly every population of naturally producing anadromous salmonids in the Columbia River Basin is now listed (or is a candidate for listing) under the [Endangered Species Act]" (U.S. Fish and Wildlife Service 2005). Some runs are extinct; for example, fall coho (*Oncorhynchus kisutch*), and dog salmon (*O. keta*) on the Wind River (Aguilar 2005), where Lewis and Clark first encountered the condor in October 1805. Despite federal agencies having been enjoined by the courts to restore endangered salmon populations, management of salmon in the Columbia River remains an unresolved issue.

Lead and Poisoning as Causes of Decline

Snyder and Synder (2000) discussed the significance of lead contamination of the condor's food as a factor in its mortality. Church et al. (2006) confirmed that ingestion of lead from ammunition in carcasses of animals killed by hunters is the cause of most of the elevated levels of lead now found in the condor's blood, and Cade (2007) stated, "lead exposure, indicated by blood samples, is [now] virtually ubiquitous among free-flying condors…an unmanaged, self-sustaining population probably cannot exist." In the Pacific Northwest, condors fed on deer and elk killed by hunters, implying they were regularly exposed to lead in this region as well. The data from the Northwest are thus consistent with Snyder and Snyder's inference (2000:252) that condors were exposed to lead poisoning for two centuries, with lethal consequences for both the California and Pacific Northwest populations.

As a wilderness, the Grand Canyon of Arizona was chosen as the "perfect" site for establishment of a second condor population as insurance against the adverse effects of human development in southern California (Rea

1981, Nielsen 2006:192). But foraging habitat in the surrounding area was contaminated, and condors released in the canyon experienced an annual mortality rate of 47%, primarily from lead poisoning (www.arizonaes.fws.gov, Nielsen 2006). A decision based on the characterization of the condor as a wilderness species unwittingly led to its introduction into a contaminated environment.

Poisons (strychnine, cyanide, and sodium fluoracetate or 1080) intended for large predators killed many condors (Snyder and Snyder 2000, *contra* Wilbur 1978). The foreman of the Tejon Ranch, a major area for the condor's foraging in California, stated that "before this poisoning was done [in the 1870s], both wolves and condors were plentiful in the Tejon country" (Snyder and Snyder 2000), a statement almost identical with that of Wilcox (1918) in Idaho (Appendix B). The problem of poisoning persists: for example, in June 2006, up to 10 of 13 captive-reared and released condors were poisoned by an effort to control ground squirrels near Salinas, California (*Monterey County Herald*, 20 June 2006). In India and Pakistan, 98% of the vulture population has disappeared because of diclofenac poisoning (Green et al. 2004, Gilbert et al. 2006). In South Africa in 1984, "a single strychnine-poisoned cow carcass killed 42 Cape Vultures (*Gyps coprotheres*)…ten percent of the total population" and "a single dead cow in Botswana was found with 79 poisoned vultures dead nearby" (Mundy 1983). "In 1979 one poisoned elephant carcass in Caprivi [Namibia] killed six lions and 150 Cape Vultures…vultures collect in large numbers at a single feeding site, and come…from a considerable distance, [so] an isolated poisoning event can have a devastating influence on vulture populations over a whole country" (Houston 2001:62). At the Patuxent Wildlife Research Center tests of sodium fluoracetate fed to captive Turkey Vultures revealed a range of lethal and sublethal effects (Eisler 1995) including lethargy and incapacity. In the field, 1080 was the "preferred method of control" when ranchers killed thousands of Black and Turkey Vultures in Texas during 1950s (Parmalee 1954). Lethal and sublethal effects of 1080, lead, and other toxins, alone and in combination, may account for some of the "quantitatively conspicuous" rate of predation of reintroduced condors (Mee and Hall 2007:252).

Estimates of the deer population (550,000), harvest (50,000) (P. Test, Oregon Dept. Fish and Wildlife, pers. comm.), and losses to crippling suggest at least 1% of the carcasses available to condors in the Pacific Northwest are contaminated. This figure is similar to estimates of the rate of diclofenac contamination of ungulate carcasses available to the White-backed Vulture (*Gyps bengalensis*) in Asia, 1–3% (Gilbert et al. 2006) or 0.13 to 0.77% (Green et al. 2004), which were sufficient to cause a loss of 98% of that population. An early impression of loss to crippling can be gained from Lewis and Clark in 1806: "About noon 7 of our hunters returned with 8 deer; they had wounded several others and a bear but they did not get them" (Lewis and Clark 1990, vol. 8:22–23). From 1 December 1805 to 20 March 1806, the Lewis and Clark party consumed 131 elk and 20 deer, presumably crippling many more (Gass 1904:169, Lewis and Clark 1990, vol. 7:25, Ordway 1916:366). Since Lewis and Clark, continuous exposure to lead contamination seems sufficient to have caused the relentless decline and eventual extinction of the condor in the Pacific Northwest.

To my knowledge, there are no studies under laboratory or field conditions that have examined the combined effect on the condor of lead and other poisons.

Mortality from Collecting

Wilbur (1973, 1978) suggested that the northwestern condor population was small enough to have been exterminated by collectors, but the number of documented specimens taken in the Northwest was only 13, too few to explain the disappearance of even a small population. Furthermore, Tolmie's observations in 1833 of groups of condors at deserted Indian villages (Tolmie 1963:185) are inconsistent with the hypothesis that the collecting in the first three decades of the 19th century (10 specimens) exterminated the condor along the Columbia River. In California the number collected was actually small, seven by 1860 (Wilbur 1973, 1978), yet the species was already extirpated from several counties; that is, the decline of the condor in California was well underway *before* scientific collecting peaked at the end of the 19th century. Furthermore, the decline continued throughout the 1900s *after* collecting of condors ended. Population declines in California, however, *did* coincide with the pervasive use of lead ammunition and poisoning for predator and rodent control. That condors were disappearing from the Pacific Northwest and California simultaneously suggests a common factor, but that factor doesn't appear to have been collecting.

Reintroduction

Condors have been reintroduced into southern California, Arizona, and Baja California. High mortality has plagued reintroductions (www.arizonaes.fws.gov, Nielsen 2006), and productivity has also been low. Lack of uncontaminated food has been problematic (J. Grantham, D. Clendenen, G. McMillan, N. F. R. Snyder, pers. comm.). Factors responsible for mortalities were eliminated neither before nor since reintroductions began in 1992, even though Snyder and Snyder (2000) insisted that it was "axiomatic" that poisons in the condor's food be eliminated before captive-reared condors are released into contaminated landscapes. Only by regular recapture and chelation of lead (Meretsky et al. 1999, Snyder and Snyder 2000) and by surgical removal of microtrash from the stomachs of chicks (Walters et al. 2008), can reintroduced condors be protected to some extent from life-threatening contamination.

The condor has an extensive record in northwestern North America, and a strong and competitive case can be made for reintroduction here. The paleontological record is proof of condors' long-term presence in the region, cultural connections between the condor and northwestern native American tribes were rich and diverse, and there seems to be no shortage of nesting sites or food. But would the Pacific Northwest provide a functional, life-sustaining habitat for the condor's foraging, or an environment that is life-threatening? It is as "axiomatic" here as elsewhere that the factors that caused the decline and extirpation of this population need to be addressed and corrected before an attempt to re-establish the condor in the Northwest.

The association between condors and humans was beneficial and adaptive, the condor's diets and ours overlap, and lead and other environmental

contaminants that are lethal to condors are also a public health problem (Davis 2002, 2007). Eliminating such limiting factors as lead in the environment would benefit humanity as well as the condor. With public support, it is within the power and jurisdiction of the Environmental Protection Agency to effect such change. Past strategies for condor management such as establishing sanctuaries and food subsidy have failed. It seems to me that a more effective way, perhaps the only way, to protect the California Condor is for managing agencies and the public to recognize that protecting the public health and the recovery of the condor are related and to address both at the same time.

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Appendix A. Source data for Figures 1–3.

A. **Fossils and prehistoric material**

Indian midden, Five Mile Rapids, near The Dalles, OR: minimum of 63 individual condors (L. H. Miller 1957); radiocarbon dates from 8470 ±190 and 8770 ± 230 years before present (Hansel-Kuehn 2003).

Indian midden, southern Oregon Coast, 10 km north of Brookings, OR: one condor radius (A. H. Miller 1942).

Native village site, Pender Island, BC, tarsometatarsus, radiocarbon date 2900 BP (Rebecca Wigen, University of Victoria, pers. comm. Feb 2006).

B. **Native American oral history**

Ellen Saluskin. Early 1800s, probably autumn, Sahalie-Tyee Lake, Indian Heaven Wilderness, Gifford Pinchot National Forest: "Ellen Saluskin's great grandfather saw a 'huge black bird' that landed and began to devour a half-dressed deer. 'It had eyes like fire. It appeared enormous. Its beak was long and yellow and it was constantly opening and shutting its beak.' He carried a condor tail-feather as talisman the rest of his life." (Transcript of interview by Cheryl Mack, U.S. Forest Service archaeologist, Mt, Adams Ranger District, Trout Lake, WA, pers. comm. 22 May 2006; Mary Schlick pers. comm. 17 Mar 2006). Appropriation of freshly killed big game was characteristic condor behavior.

Nez Perce oral history. "Qu'unes [condor] said to be in the area of Seven Devils Mountains [wilderness] and Hells Canyon," ID (Josiah Pinkham, Nez Perce cultural office, pers. comm. 2006).

Wyam shaman. 1910, vicinity of Celilo Falls, junction of Deschutes and Columbia Rivers, east of The Dalles: photo of shaman with condor wing feather(s) (Hines 1991: plate 5), Curtis photo North American Indians, vol. 7, folio plate 20 (www.memory.loc.gov/award/iencurt/ct07/ct07010v.jpg). Corroborates Wasco oral history of condors at Celilo Falls (K. K. Smith pers. comm. 2004, Aguilar 2005, D. Moen pers. comm.). Condor feathers were a symbol of earned power; they could not be obtained as an article of trade, and could be given only within a kinship group (K. K. Smith pers. comm.).

Lila Walawitsa, of Toppenish, WA, recalled on 14 February 1977 that her father spoke of *pach'anahúy* (condor) at Potato Hill, north of Mt. Adams, probably 1890s (E. S. Hunn pers. comm. Jan 2006). Note record from Smartlowit in same area in 20th century.

Nelson Wallulatum, chief of the Wasco: "I did find my original notes from the meeting with the Wasco elders. Nelson Wallulatum's exact comment was: 'We kept big [condor] babies in camps to keep thunder and lightning spirit from striking.' 11/11/89. Warm Springs. That is taken directly from my handwritten notes, however in my transcription typed when I came home, I write: 'Said they kept a chick tied in camp to keep away thunder and lightning spirits.' I suspect that I would not have written that it was tied if he had not said that" (Mary Schlick pers. comm. 2006).

C. **Specimens and sightings with locations or dates**

Lewis and Clark Company

30 Oct 1805, confluence Columbia and Wind rivers, WA: "Scattered about in the river, this day we Saw Some fiew of the large Buzzard. Capt. Lewis shot at one, those Buzzards are much larger than any other of ther spece or the largest Eagle white under part of their wings" (Lewis and Clark 1990, vol. 5:356), "some turkey buzzards which had white under their wings" (Ordway 1916:306).

18 Nov 1805, mouth of Chinook River, Baker Bay, WA: "Reuben Fields killed a Vulter"; "Rubin Fields Killed a Buzzard of the large kind near the whale we Saw… measured from the tips of the wings across 9½ feet… wing feather 2-½ feet," weight 25 lbs (Lewis and Clark 1990, vol. 6:66). Annotation inserted in 1810: "head in Peale's Museum"

(not extant, see text). Gass journal entry 20 Nov: Clark had killed a "remarkably large buzzard, of a species different from any I had seen. It was 9 feet across the wings, and 3 feet 10 inches from the bill to the tail." (Gass 1904:153). "One of the party killed a verry large turkey buzzard which had white under its wings, and was nine feet from the points of its wings, and 3 feet 10 inches in length." (Ordway 1916:311–312).

29–30 Nov 1805, Columbia River estuary (editor's annotation "Youngs Bay"): "I observe…The large Buzzard with white under their wings Grey & Bald eagle." (Lewis and Clark 1990, vol. 6:94).

3 Jan 1806, mouth Columbia River: "the beautifull Buzzard of the columbia still continue with us" (Lewis and Clark 1990, vol. 6:164).

16 Feb 1806, near mouth Columbia River: "Shannon an[d] Labiesh brought in to us today a Buzzard or Vulture of the Columbia which they had wounded and taken alive. I believe this to be the largest Bird of North America…." A lengthy account describes the bird in detail with a drawing of the head; the wingspread measured "9 feet 2 Inches," weight 25 lbs but "not in good order," maybe 10 lbs heavier when healthy (Lewis and Clark 1990, vol. 6:319–323); "killed…a new kind of Turkey buzzard" (journal entry for 17 Feb) (Ordway 1916:325).

16 Mar 1806, near Fort Clatsop: "Yesterday [15 Mar] while I was absent, getting our meat home, one of the hunters killed two vultures, the largest fowls I had ever seen. I never saw any such as these except on the Columbia River and the seacoast." (Gass 1904:169); cf. "nothing else extraordinary"! (Ordway 1916:328).

28 Mar 1806, Deer Island, OR: "The men who had been Sent after the deer returned with four only, the other 4 having been eaten entirely by the Voulture except the Skin." (Lewis and Clark 1990, vol. 7:25). "The grey Eagles are plenty on this Island. They eat up three deer in a short time which our hunters had killed some of the hunters killed Several of them." "J. Fields even reported to Lewis 'that the Vultures had draged a large buck which he had killed about 30 yards, had skined it and broken the back bone.'" (Ordway 1916:333, editor's footnote).

5 Apr, near Sandy River: "we saw…crows, eagles, Vultures and hawks" (Lewis and Clark 1990). Burroughs (1961:204–208) has listed all Lewis and Clark's many encounters with eagles, additional demonstration of their familiarity with those species.

6 Apr 1806, Columbia River, OR, near Beacon Rock, 14 km above the mouth of the Washougal River: "Jos. Field killed a vulture of that Speces already discribed" (Lewis and Clark 1990, vol. 7:88)."

9 Apr 1806, near Multnomah Falls, Columbia River: "we saw some turkey buzzards this morning of the species common to the United states which are the first we have seen on this side the rocky mountains." (Lewis and Clark 1990, Burroughs 1961:204). Therefore, all "buzzards" and "vultures" seen by the Lewis and Clark party previously in the Northwest were the condor.

13 Jun 1806, near Weippe, ID: "About noon 7 of our hunters returned with 8 deer; they had wounded several others and a bear but they did not get them. In the evening Labuish and Cruzatte returned and reported that the buzzards had eaten up a deer which they had killed butchered and hung up this morning." (Lewis and Clark 1990, vol. 8:22–23). "All the meat except Labuches was brought in & that the ravens and buzzards eat while he was hunting a little more." (Ordway 1916:366). Burroughs' (1961:203–204) assumed that this observation referred to the Turkey Vulture, but more likely this encounter was with the condor.

Alexander Henry, fur trader

19 Jan 1814, Strawberry (now Hamilton) Island, Columbia River: "Some extraordinarily large vultures were hovering over camp" (Coues 1897, vol. 2:808).

25 Jan 1814, Pudding River, tributary to Willamette River, OR: "I sent for the eight deer killed yesterday. The man brought in seven of them, one having been devoured by the vultures. These birds are uncommonly large and very troublesome to my hunters, by destroying the meat, which, though well covered with pine branches, they contrive to uncover and devour." (Coues 1897, vol. 2:817).

Alexander Ross and Donald McKenzie, fur traders

On or about 19 Sep 1817, northwest of Canoe River, BC: "Not far from Eagle Hill, we shot two grizzly bears and a bird of the vulture tribe" (Ross 1956:105); no specimen saved. The location is inexact: landmarks passed before the shooting included Canoe River on 10 Sep, 7 days travel to the southeast; latitude north of Turkey Vulture records; mid-September date is late for the Turkey Vulture in BC even on the coast. "Turkey Vultures do not occur regularly at the Canoe River, although [since the 1990s] there may be one or two sightings from there" (W. Weber pers. comm. Feb 2008).

October 1818, Snake River, ID, location imprecise: For details of McKenzie's itinerary, see Nielsen (1940). On McKenzie's "outward journey [to Idaho]…eagle and vulture of uncommon size fly about the rivers" (Ross 1956:137).

Winter 1819, Snake River, ID, location vague: "On our way back nothing to be seen but dreary and forbidding winter, the leafless forests and snow-clad hills with scarcely an animal to attract attention, except a wolf or fox which now and then crossed our paths, or an eagle or vulture watching their prey about rapids when open water was still to be seen" (Ross 1956:137). McKenzie left the Boise River in Jan 1819, and after 600 miles on snowshoes arrived back at Ft. Nez Perces, Walla Walla River, in Apr 1819 (Ross 1956, Nielsen 1940).

John Scouler, botanist. 22 Sep 1825, near Ft George (Astoria, OR), downstream from Mt. Coffin: "obtained specimens of *Pelecanus onocrotalus* [presumably *P. erythrorhynchos*], *Falco*—and a species of *Vultur*, which I think is nondescript [i.e., undescribed]. My birds were principally obtained from the Indians, who would go through any fatigue for a bit of tobacco" (Scouler 1905). Location of specimen unknown (Wilbur 1978); tentatively proposed by Harris (1941) to be the specimen seen by Bonaparte in London in 1827.

David Douglas, botanist, explorer

Between 2 Jan and Mar 1826, near Fort Vancouver: "A species of Buzzard or Vulture (*Sarcoramphos Californianus* of Vigors) is the largest bird seen here except the Wild Swan. I killed only one of these interesting birds, but the buckshot which went through its head spoiled the specimen" (Douglas 1904). "On the Columbia there is a species of Buzzard, the largest of all birds here, the Swan excepted. I killed only one of this very interesting bird, with buckshot, one of which passed through the head, which rendered it unfit for preserving; I regret it exceedingly, for I am confident it is not yet described….When they find a dead carcase or any putrid animal matter, so gluttonous are they that they will eat until they can hardly walk and have been killed with a stick. They are the same color as the common small buzzard found in Canada [east of the Rockies]. The feathers of the wing are highly prized by the Canadian voyageurs for making tobacco pipe-stems (Douglas 1959:152,154).

South of and inland from Columbia River, 3–4 km southeast of Larch Mountain (30 km east of Portland, OR): "Specimens, male and female, of this truly interesting bird [*Vultur californianus*, described in detail], which I shot in lat. 45.30.15., long. 122. 3. 12. [Larch Mountain] were lately presented by the Council of the Horticultural Society to the Zoological Society, in whose Museum they are now carefully deposited" (Douglas 1829). No date was given, but Douglas had climbed Lookout Mountain north of the Columbia River from 3 to 5 Sep 1825 (Douglas 1959), where he saw "hawks, eagles, and vultures" (in early September probably Turkey Vultures); he then (perhaps 6–7 Sep) ascended a mountain south of the river [Larch Mountain is directly across the Columbia from Lookout Mountain]; his journals report being in that vicinity on no other occasion. K. K. Smith (pers. comm. 12 Feb 2006) related to me a story passed down orally through his family for over 180 years, of four to six Wasco who guided Douglas via the Oneonta trail for 2 days to the back side of Larch Mountain [however, condors were not mentioned].

Willamette Valley, OR, 3 Oct 1826: "The Large Buzzard, so common on the shores of the Columbia, is also plentiful here; saw nine in one flock" (Douglas 1959:216). Wilbur (1978:109) wrote "condors 'plentiful' on Umpqua River, Oregon, 3 Oct

1823—nine seen in one flock," but the date and location are in error: Douglas did not arrive in the Northwest until 1825, and on 3 Oct 1826 (not 3 Oct 1823) he saw the nine condors in the Willamette Valley, not the Umpqua.

10–15 Oct 1826, Umpqua Mountains: "Several species of *Clethra* were gathered—one in particular, *C. grandis*, was very fine—and many birds of *Sarcoramphos californica* and *Ortyx californica*, and two other species of great beauty were collected." (Douglas 1959:67). Douglas wrote two accounts of his journey, one an abbreviated sketch summarized by week or month, and a daily journal. The above quotation is from the sketch; grammatically ambiguous, it is the source of Harris' (1941:20) and Koford's (1953:8) inferences that Douglas collected a condor in the Umpqua. The more detailed daily journal refers pointedly to *Clethra* and a specimen of the quail, which was new to him, but makes no mention of condors in the period 10–15 Oct, presumably because he had previously described his encounters with condors and they were no longer the focus of his attention. In his publication on the condor, Douglas (1829) did not mention a specimen from the Umpqua, though he lost much of his collections from this trip in the Santiam River while returning to Fort Vancouver in Nov 1826.

23 Oct–4 Nov 1826, Umpqua River: Douglas' journal for February 1827, in a periodic summary of what he knew about the occurrence of condors, stated "great numbers seen by myself on the Umpqua river" (Douglas 1959:241), though his actual daily journal for that period did not mention condors. Details included, "Feeds on all putrid animal matter and are so ravenous they will eat until they are unable to fly.... Their flight is swift but steady, to appearance seldom moving the wings; keep floating along with the points of the wings curved upwards. Of a blackish-brown with a little white under the wing; head of deep orange color; beak of a sulphur-yellow; neck, a yellowish-brown varying in tinge...." (Douglas 1959).

23 Oct-4 Nov 1826, Umpqua: "great numbers" of condors seen in the Umpqua area by fur trader McLeod, summarized in February 1827 (Douglas 1959:241), not in the daily journal. McLeod had separated from Douglas and traveled from the mouth of the Umpqua as far south as the Coquille and Elk rivers (Douglas 1959:228-233). (On this journey, Douglas' primary purpose was to find sugar pine, *Pinus lambertiana*, in the Umpqua River area.) There is no first-hand report of McLeod's findings, but Douglas reunited with him two weeks later. McLeod was traveling with Douglas when condors were seen on 3 Oct and 10–15 Oct 1826, and was himself therefore familiar with the species.

Feb 1827, Fort Vancouver, WA: "Killed a very large vulture, sex unknown." (Douglas 1959:241); Barnston, the company clerk, stated "spring"; wingspan of the specimen measured 9′; the winter of 1827 was hard and many condors were seen (Fleming 1924).

"I have met with them as far to the north as 49° N. Lat. in the summer and autumn months" (Douglas 1829:329). No specific inland Columbia River locations were mentioned in his journal. A location "as far to the north as 49°" would not have been west of the Cascades, which Wilbur (unpubl. data) thought likely, because Douglas apparently did not travel north and west of the Cascades until 1833; the location in question was therefore probably the Columbia River east of the Cascades near the Canadian boundary, where in 1827 he was following the fur traders' "express" route to eastern Canada.

Peter S. Ogden, fur trader. Nov 1830, downstream near Fort Vancouver: "Intermittent fever" (malaria) was "the single most important epidemiological event in the recorded history of...Oregon" (Boyd 1999:84); it arrived on the Columbia River in summer 1830 and lasted through November. McLoughlin (1948, letter number 134) wrote that by mid-October it had "carried off three fourths of the Indian population in our vicinity" [Fort Vancouver]. The epidemic recurred every year until at least 1834 (McLoughlin 1948, Boyd 1999). Ogden, sick with malaria in mid-October, after convalescing, probably in late October or November, visited two villages downriver, probably Multnomah and Clannahquah (Boyd 1999:232). He wrote of "utter destruction [by malaria] of every human inhabitant...why linger those foul birds around

the spot, gorged, and scarcely noticing my presence?... Let these unburied [human] carcasses resolve the question" (Ogden 1933:69). Wasco oral history identifies the "foul birds" as condors: "During the worst years [of the plague of the 1830s], some people could no longer bury or take care of their dead. The victims of these diseases fattened the huge Thunderbirds" (Aguilar 2005:12).

William F. Tolmie, physician, fur trader, scholar

19 May 1833, on Columbia River downstream from Sauvie Island, Tolmie had "coasted along right bank, on which several small vultures seen, tearing their prey" (Tolmie 1963:182).

21 May 1833, the malaria epidemic still virulent, 2 miles up Jolifie ("Pretty-girl") River, presumably the Kalama River (Cowlitz Co., WA; Meany 1923:126), tributary to the Columbia, at the site of Callamaks, a deserted village formerly with 200 inhabitants (Boyd 1999:240), Tolmie's party "scared some large vultures and crows from their feast" (Tolmie 1963:185).

22 May 1833, Cowlitz River, about 18 river miles from mouth, near the "forks of the Cowlitz" (junction with Toutle River, Cowlitz Co., WA): "Arrived about 11 at a deserted Indian village and startled some large vultures, who hovering above at length perched on the neighboring trees, awaiting our departure…fired twice at vultures" (Tolmie 1963:186). The Columbia River epidemic included the Cowlitz (Boyd 1999).

Nov 1834, Fort McLoughlin, BC, near present-day Bella Bella: "Monday, November 24: After breakfast went to the lake, coasted it in the canoe throught.... What I supposed a large species of vulture at the north end, along with some white headed eagles attracted probably by dead salmon." (Tolmie 1963:293). Tolmie was a meticulous observer, interested in flora and fauna, medicine, science, agriculture, native culture and languages. He also commented on the local Bella Bella natives' belief that "thunderbirds" were the cause of thunder and lightning (Tolmie 1963:292).

John Kirk Townsend, ornithologist

Apr 1835, Willamette River Falls, near Oregon City, Clackamas Co., OR: condor shot and specimen preserved: "In a journey of exploration which I made to the Willamet, in the month of April, when the river was crowded with Salmon, making their way up against the stream, urged by an abortive instinct to pass the barriers of the thirty feet fall, I observed dozens of Turkey Vultures constantly sailing over the boiling surges, with their bare heads curved downwards as if in search of prey. As I gazed upon them, interested in their graceful and easy motions, I heard a loud rustling sound over my head, which induced me to look upward; and there, to my inexpressible joy, soared the great Californian, seemingly intent upon watching the motions of his puny relatives below. Suddenly, while I watched, I saw him wheel, and down like an arrow he plunged, alighting upon an unfortunate Salmon which had just been cast, exhausted with his attempts to leap the falls, on the shore within a short distance. At that moment I fired, and the poor Vulture fell wounded" (Townsend 1848).

No date, Fort Vancouver, WA: "I once saw 2 near Ft. Vancouver feeding on the carcass of a pig that was dead," in letter to Audubon (Audubon 1839).

Spring and summer, 1835, Columbia River: seen "in abundance" (Townsend 1848). See also Records without Locations or Dates.

Titian Peale, naturalist with the United States Exploring Expedition

Sep 1841, Willamette River, OR: "Cannot be considered a common bird in Oregon; we first saw them on the plains of the Willamette River...much more numerous in California, from the fact that the carcasses of large mammals are more abundant, which they certainly prefer to the dead fish on which they are obliged to feed in Oregon and all the countries north of the Spanish settlements…" (Peale 1848, www.sil.si.edu/digitalcollections/usexex/). "Plains of the Willamette" refers to the grasslands as far south as Eugene, which the Indians burned to set back or retard succession to forest (D. B. Marshall pers. comm. Nov 2005).

24 Sep 1841, north of Rogue River, OR (the next day Peale reached the Rogue River): "We saw today golden wing woodpeckers (red var.), Ravens, Crows, Stellar

and Florida Jays, California Vultures, and a few larks. The country was mostly burned by the Indians" (Peale 1957).

Pierre-Jean De Smet, Catholic priest. Week of 4 Sep 1845, Canoe River, source of the Columbia River, Canadian Rockies, interior British Columbia: "On arriving at the two lakes, I saw them covered with swarms of aquatic birds—coots, ducks, water-fowl, cormorants, bustards [Canada Geese], cranes, and swans; whilst beneath the tranquil water lay shoals of salmon in a state of exhaustion….I saw them pass in great numbers, cut and mutilated, after their long watery pilgrimage among the rapids…In the absence of man, the grey and black bear, the wolf, the eagle, and vulture assemble in crowds, at this season of the year. They fish their prey on the banks of the river, and at the entrance of the lakes" (De Smet 1978:130–131). The probability of the Turkey Vulture occurring in the Canoe River area, or at that latitude, at any time of year, is almost nil (W. Weber pers. comm. Feb 2008).

Roselle Putnam, pioneer settler. Winter 1851–52, upper Umpqua River, near Yoncalla, OR: "the largest wild bird in the country is the vulture which is only an overgrown buzzard…I saw one measured which I think was between ten and eleven feet from the point of one wing to the point of the other" (Putnam 1928, letter of 9 Feb 1852). In a previous letter, she commented on the poisoning of wolves: "there has been a great many of them killed this winter [1852], in this neighborhood with strycknine, Charles [her husband] put out upwards of 30 doses of it, and I suppose every one killed a wolf…have seen two that died near the house." It is likely this condor was poisoned, not shot as stated by Wilbur (1978:72).

James G. Cooper, ornithologist. 1854, lower Columbia River: "In January 1854, I saw, during a very cold period, a bird which I took for this [a condor], from its great size, peculiar flight, and long, bare neck, which it stretched out as it sat on a high dead tree, so as to be scarcely mistakable for any other bird" (Cooper and Suckley 1860:141).

T. E. Wilcox, brigadier general, surgeon, U.S. Army. Fall 1879, Boise City, ID: "In the fall of 1879 I came upon two which were feeding on the carcass of a sheep. They hissed at me and ran along the ground for some distance before they were able to rise in flight. They were much larger than turkey buzzards, with which I was quite familiar, and I was very close to them so that I could not be mistaken in their identity. The cattle-men said that the California vulture or buzzard was not uncommon there before they began to poison carcasses to kill wolves" (Wilcox 1918).

John Fannin, curator, Royal British Columbia Museum

Sep 1880, Burrard Inlet, Vancouver, BC: "In September, 1880 I saw two of these birds at Burrard Inlet [mouth of Fraser River]. It is more than probable that they are accidental visitants here" (Fannin 1891).

Sep 1896, Bow River valley, between Calgary and the Rocky Mountains, Alberta: "two fine condors" seen; "I was not aware that this bird was found east of the Rocky Mountains, or so far north" (Fannin 1897). Because of multiple Blackfeet and Cree records of *omaxsapi'tau* (condor) in Alberta and Montana, including physical evidence (Schaeffer 1951, see below), Fannin's observation can no longer be considered "startling" (Harris 1941) or deserving of being dismissed for lack of specimen (Macoun and Macoun 1909).

C. Hart Merriam, Division of Economic Ornithology and Mammalogy, U.S. Department of Agriculture. 30 Sep 1897, Coulee City, Grant Co., eastern WA: "In the early morning of September 30, 1897, Dr. Merriam saw a condor on the ground in open country a few miles east of Coulee City" (letter to S. G. Jewett, 4 Jan 1921) (Jewett et al. 1953:160). No details provided; observer's competence and authority credible.

George and Henry Peck

Jun 1903, near Drain, Douglas Co., OR: George Peck saw 2 condors on 1 Jun 1903 "at great height and I could not have identified them if I had not often seen them in Los Angeles County, Cal" (Peck 1904). "Several" condors seen during June

(Peck 1904).Two condors flying high on 4 July 1903, related by Henry Peck, son of George, to Finley (1908); this may be a duplicate of the 1 Jun record, and is not mapped or graphed.

March 1904, near Drain, OR: H. Peck, "I saw 4 condors which were very close to me, almost within gun shot. I recognized them first by their size, and second by the white feathers under their wings" (Finley 1908). Finley, familiar with nesting condors in California, wrote that the Pecks were "both reliable ornithologists, and both well-acquainted with the bird in southern California."

Late 1800s or early 1900s, coast of southern Oregon: H. Peck reported to Finley that a condor was "killed on the coast of southern Oregon a number of years ago" (Finley 1908).

John Keast Lord, naturalist. "Mouth of Fraser River" no date: "During his wanderings in British Columbia, Lord (1866) recorded this species at the 'mouth of Fraser River'" (Campbell et al. 1990). Details sparse (Fig. 1).

Samuel N. Rhoads, ornithologist. "Seen on Lulu Island, no date, as late as 'three or four years ago' [late 1880's] by Mr. W. London. 'None seen since, used to be common.'" (Rhoads 1893). No information on London, I am relying on Rhoads. Sparse details (Fig. 1).

Bill Brown, fire lookout. 1930–1935, Umpqua Mountains, OR: As a young man, Brown worked summers (1 Jul–15 Oct) at fire lookouts in the Umpquas, at White Rock (23 km ENE of Myrtle Creek), Dutchman Butte (11 km SW of Canyonville), Silver Butte (31 km W of Canyonville), and "N. Sis" (probably North Sister, out of the Umpquas), saw single condors "multiple times" flying below the level of lookout tower; observed ruffs, white wing markings; lookouts at neighboring towers radiophoned each other to "pass off the sightings from one tower to the next"; he met and talked to Jack Nisbet, author of *Visible Bones*, at meeting of Spokane Audubon Society, 4 May 2005; Nisbet, skeptical and not easily persuaded, found his account "convincing" and Brown well-informed and knowledgeable about the Bald Eagle (J. Nisbet pers. comm. Feb 2006, Feb 2008). I have not identified the site of the "N. Sis" lookout (not identified at www.firelookout.com/or.html but presumably near the peak North Sister), though according to a somewhat vague oral history, condors were known from the Three Sisters area (K. K. Smith pers. comm.). The other three sites are in southern Douglas Co.

Jacqueline Cook. Mid-1930s, Columbia River, Colville Reservation: Jacqueline Cook's father, a rancher, saw a condor on Columbia River, between Coulee and Chief Joseph dams, near the latter, the Coulee Dam under construction (M. Schlick, friend of informant, author and authority on native basketry of Columbia River Indians, pers. comm. May 2006). No descriptive details available. Note Merriam 1897 observation in same area (above), and 20th century observations in eastern Washington by native Americans (below).

Josephine Andrews Smartlowit. 1920s and 1940s, Mt, Adams, WA: born 1914, she saw *pachanahoo* or *canahóo* (condor) as a child (thus 1920s) at Howard Lake, northeast of Mt. Adams; "last time I saw it when G. Mo. living; camping at Howard Lake, Jim Kwiyal and Otis Shiloh saw it"; when she was 28–30 years old (thus 1942–1944); "bald headed, like turkey but smoother; like k'shpali (Turkey Vulture)… much bigger than k'shpali but almost same; black and brown; no white on wing; sitting on horse, he could look you in eye standing." From interview 11 May 1977 with E. S. Hunn, Department of Anthropology, University of Washington, Seattle (pers. comm. Jan 2006).

James Fraser, Sto:lo First Nation. about 1935, north of Spuzzum, Fraser River, BC: saw "a large bird," "bigger than an eagle," (Sonny McHalsie, biologist, Sto:lo Nation, pers. comm. Apr 2006). Details sparse.

Ken Kachia Smith, Wasco tribe, Corbett, Oregon:

Early summer, 1950s, east slope of Mt Jefferson OR, on the Warm Springs Reservation: Smith saw 3 condors at close range, "each perched on a different limb" of a large snag 150 feet away; after seeing them he came upon a winter-killed elk in a

snowbank on a north-facing slope, on which a flock of ravens, 3 Bald and 2 Golden Eagles were feeding, Turkey Vultures also present. Of the condors, he noticed large size, bald head, some of the bare neck; he stated emphatically they differed from Turkey Vultures (pers. comm. 2004).

1950–1965, upper Clackamas River: as a young man, Smith fished for salmon in that area every summer, during the time when new logging roads were beginning to open up the country. He regularly saw up to 4 condors at close range, sitting on boulders in the river, half a mile east of its junction with Collawash; noted white in wings, large size, that "sometimes they'd flush, and had difficulty getting up, flew against the wind coming upriver"; also mentioned seeing Mountain Goats (*Oreamnos americanus*) that used to be in the area (pers. comm. Feb 2008).

1950s, Mt. Hood: 2 or 3 seen on several occasions in higher-elevation meadows. Smith was familiar with birds from raptors to songbirds and with the area's geography and Wasco oral cultural history (pers. comm. 2004).

John Krussow, surveyor (retired), Mt. Hood National Forest, resides Hood River, OR. Dec 1964–Mar 1965, Mt. Hood, upper Clackamas River area: 3 condors seen daily for 4 months, as many as 70-80 sightings, roosting in the morning on a rock outcrop overlooking the Collawash River; necks long, bare; heads red-orange-yellow, neck paler; did not note any birds with brown heads; huge size, "magnificent," larger than the Turkey Vultures he saw on a visit to the site with D. Moen and me in Sep 2006; stated that wings were held outstretched, drooping, little white noted; said they seemed to be testing the air for lift; left roost 9:00–9:30 when the wind "seemed right," jumped off and dropped 75 feet before "catching" the air; flew off to southeast toward Mt Jefferson. Area loggers were aware of the birds and called them by name, "the California Condors" (pers. comm. 6 May, 9 Sep 2006).

Blackfoot and Cree records of *omaxsapi'tau* ("big eagle") in Montana and Alberta, per interviews in 1940s by Schaeffer (1951): Of 19 observations, 11 mapped, 8 discarded.

Raven (Big Crow): winter 1897, Little Badger Creek, Blackfoot Indian Reservation, near Browning, MT: "immense dark-colored bird with a feathered ruff and bald head"; from a distance, thought at first it was a cow; numerous accounts, this one from Richard Sanderville, age 82 about 1945; the year 1897 "became known as 'that in which Big Crow saw the *omaxsapi'tau*'"; "Big Crow was not familiar with the species or with its native name" at the time (Schaeffer 1951:183).

George Bull Child: about 1908, Blackfoot reservation: 2 or 3 seen, "dark in color and about 4 feet high" (Schaeffer 1951:183).

Lewis Bear Child, a Piegan, stated that "about the period 1907–08 some Gros Ventre Indians of the Fort Belknap Reservation wrote Piegan friends that a great bird had been sighted in their part of north-central Montana"; considered a bad omen—next year an earthquake occurred (Schaeffer 1951:183).

Piegan elders: "Older Piegan, in 1945 or thereabouts, identified the species by its native name and recalled that it had visited the region at an earlier period" (Schaeffer 1951:183). Location vague.

Chewing Black Bones: According to his father Tail Feathers Coming Over a Hill, on a raid against the Crow, west of Crow reservation, southeastern Montana, 1860s, Chewing Black Bones reported seeing "a very large bird flying directly before them. Its wingspread and length of tail exceeded those of the eagle.... Heavy Runner…warned his companions, saying 'I have never seen a bird of this kind....We had better turn back'... Most of the party...returned home. Of the six that continued on, five were killed... Chewing Black Bones believed that the bird's appearance…was prophetic of misfortune." "Since Heavy Runner was killed in the Baker Massacre of 1870, the date of this raid may be set in the 1860s" (Schaeffer 1951:184).

Dog Takes a Gun, then age 85 (1945) born on Blood Reserve in Alberta, "recalls his parents' account of an *omaxsapi'tau* near Calgary shortly before the time

of his birth (1860s)…great size…emphasized. In feeding it was said to lean forward so far that is breast nearly touched the ground. A tail feather described as about 2 feet in length, was dropped by this particular bird in flight and picked up" (Schaeffer 1951:184). "Wing of another 'big eagle' killed in this region equaled, when fully extended, the distance from a man's shoulder across his chest to the fingertips of his opposite outstretched arm (about 4 feet)…in the possession of a Calgary curiosity dealer in Calgary some 10 years ago, about 1935 (Schaeffer 1951:184).

Rides at the Door (age 87), Piegan warrior, "one of the few surviving Piegan with a record in intertribal warfare, is said to have seen 'a big eagle' while raiding for horses (mid-1800s) somewhere to the south" (Schaeffer 1951:184). Location vague.

Harry Under Mouse related that his grandfather White Bear, a Cree who lived with the Blood tribe of the Blackfeet in Alberta, and died 1905 about age 83 (born about 1820), was a conjuror and eagle trapper who used to trap and kill eagles for feathers for ceremonial purposes "in the region south of Edmonton." About 1850, an immense bird circled his pit trap, landed, and warily approached the bait (a stuffed coyote skin), but he was afraid of it, so he took a stick and frightened it away. "Later he described it as the largest bird he had ever seen. It was dark in color with brown-striped tail feathers. Its head and hooked beak were large and its legs coarsely scaled." (Schaeffer 1951:184–185). Note the size relative to the Golden Eagles he was accustomed to trapping and handling. Harry Under Mouse saw the stuffed body, wings and tail of a condor used as regalia in Grass Dance, kept by group of Cree, from the Hobbema Reserve south of Edmonton, Alberta "as late as a decade ago" [or about 1935] (Schaeffer 1951:187).

Big Eagle, Alberta Blood tribe of Blackfoot, fasted on Devil's Head Mt., northwest of Calgary, Alberta, had vision and *omaxsapi'tau* power, which he used against enemies. He carried a condor's tail feather throughout life; after he died in 1925, the feather came into possession of Small Eyes, "a prominent ritualist," as told by Harry Under Mouse (Schaeffer 1951:187). Note the man's assumed, earned name, Big Eagle, that is, "condor." Devil's Head in the Alberta Rockies is near the headwaters of the Columbia, where Ross shot and de Smet observed vultures north of the range of the Turkey Vulture.

2. **Records without locations or dates**:

Charles Lucien Bonaparte: Specimen, early 1800s: "*Cathartes Californianus*. A specimen from the Oregan, the second known in any collection" (Bonaparte 1827:49, Harris 1941:19). "The Oregan" is the Columbia River.

David Douglas: From the Columbia River to the Snake River: "During the summer are seen in great numbers…from the ocean to the mountains [of Snake River] four hundred miles in the interior. In winter they are less abundant" (Douglas 1959:241). Douglas traveled extensively in eastern Oregon and probably to the Snake River, as did Hudson's Bay trappers and traders.

John Kirk Townsend: Wrote to Audubon of his experience with condors, their "strutting over the ground with great dignity; but this dignity is occasionally lost sight of, especially when two are striving to reach a dead fish, which has just been cast on the shore" "On the upper waters of the Columbia the fish intended for winter store are usually deposited in huts made of branches of trees interlaced. I have frequently seen Ravens attempt to effect a lodgement in these deposits, but have never known the Vulture to be engaged in this way, although these birds were numerous in the immediate vicinity" (Audubon 1839).

Peter Simon Pallas (?) per Harris (1941): Prior to 1856, specimen in Paris Museum labeled "'Aquis par échange du Musée St. Petersbourg en 1856'… possibly was taken by Pallas. I infer this by the fact that there are several other birds here which were received in exchange the same year from the same source. They are all by Pallas from 'Nord-Ouest Côte d'Amerique' [northwest coast] ….It is of course entirely possible that…the St. Petersburg specimen referred to above, even though a juvenile, may have been taken on the coast even farther north" (Harris 1941:19).

APPENDIX B. Sources and details of records of foraging summarized in Table 1.

Bison: (1) Blackfeet tribes, pre-contact, Montana, 1700s to mid-1800s: "the abandonment by hunters of bison bones and offals, which in fall supplied tallow and meat for the manufacture of pemmican, afforded a source of diet for the condor and other carnivorous creatures." (2) Sanderville, a tribal informant, stated condors attracted by bison carcasses (Schaeffer 1951). (3) Piegan oral history: *omaxsipitau* ("big eagle") appeared infrequently in summer, attracted by remains of bison slain by the Indians on the plains (Schaeffer 1951).

Hunter-killed deer and elk: (1) Gifford Pinchot National Forest, early 1800s, Ellen Saluskin's grandfather killed a condor attracted by an elk he had killed, carried a condor tail-feather as talisman the rest of his life (Cheryl Mack, Forest Service archaeologist, pers. comm.; Mary Schlick pers. comm.). (2 and 3) Deer Island, 28 Mar 1806, and near Weippe, ID, 13 Jan 1806: see Appendix A, part C, Lewis and Clark company. (4) 25 Jan 1814, Pudding River, tributary to the Willamette River: see Appendix A, part C, Alexander Henry. The Turkey Vulture was (and still is) absent from that area in winter.

Winter-killed elk: Eastern slopes of Mt. Jefferson, condors, Turkey Vultures, and eagles seen at close range feeding on an elk in melting snowbank, early summer, 1950s (Ken Kachia Smith, Wasco tribe, pers. comm.).

Salmon: (1) The Snoqualmie name for condor was *hed-e-lipsh*, "the one who breaks down the weirs" (salmon traps made of willows) (Turner 1976:52). (2) Fort McLoughlin, near present-day Bella Bella, British Columbia, 24 Nov 1834: see Appendix A, part C, William F. Tolmie. (3) Willamette River Falls, Oregon City, Apr 1835: see Appendix A, part C, John Kirk Townsend. Townsend also made two general observations, not included in Table 1 though possibly based on observations other than this account, i.e., "during the spring, I constantly saw the Vulture at all points where the Salmon was cast upon the shores, their extreme shyness uniformly prevented an approach to within gun-shot," and "Their food while on the Columbia is fish almost exclusively, as the food is always found in great abundance near the falls and rapids" (Audubon 1839). (4) Townsend wrote to Audubon of the condor "strutting over the ground with great dignity; but this dignity is occasionally lost sight of, especially when two are striving to reach a dead fish, which has just been cast on the shore" (Audubon 1839). (5) Salmon as offal: The condor "is also met with near the Indian villages, being attracted to the offal of the fish thrown around their habitations." (Townsend per Audubon 1839). (6) Canoe River, British Columbia, on or about 4 Sep 1845: see Appendix A, part C, Pierre-Jean De Smet. Two less specific accounts, not included Table 1: "The California vulture visits the Columbia River in fall, when its shores are lined with great numbers of dead salmon" (Cooper and Suckley 1860), and, Sep 1841, "Cannot be considered a common bird in Oregon; we first saw them on the plains of the Willamette River…much more numerous in California, from the fact that the carcasses of large mammals are more abundant, which they certainly prefer to the dead fish on which they are obliged to feed in Oregon and all the countries north of the Spanish settlements" (Peale 1848).

Human beings: (1) summer–Nov 1830, near Fort Vancouver: see Appendix A, part C, Peter S. Ogden. And in May 1833, Tolmie (1963:185) "scared some large vultures [distinguished from "small vultures," which he had seen earlier] & crows from their feast" not far from Ogden's location. (2) H. Perkins, missionary stationed at The Dalles 1838–1844, recorded that Wasco slaves were "thrown to the dogs! The wolves sometimes…share the carcasse with them. Sometimes, however, it is but just to say, a delicacy of feeling, causes the corpse to be dragged to the river and thrown in, to become food at length for the greedy vultures" (Boyd 1996:279). "Nearly all the Wascos and some Sahaptans had slaves, and it is safe to assume that about 30% (a conservative guess) of the population of the Warm Springs were slaves" (Aguilar

2005:169); slaves received no burial. "Late winter/early spring…was a particularly bad time, mortality-wise" for northwest coast peoples, especially slaves (Boyd 1999:285). If slaves died mostly in winter (the "lean period"), as is probable, the vultures referred to would have been condors, not Turkey Vultures, which are absent from the Columbia River in winter.

Domestic animals: (1) George Barnston observed condors feeding on winter-killed horses at Fort Vancouver in Feb 1827 (Fleming 1924); (2) At Fort Vancouver J. K. Townsend "saw 2 condors feeding on a pig" (Audubon 1839); (3) Boise City, ID, on sheep: see Appendix A, part C, T. E. Wilcox.

Domestic animal carcasses laced with poison: (1) Upper Umpqua Valley, winter 1851–1852: see Appendix A, part C, Roselle Putnam. (2) Near Boise, Idaho, fall 1879: "The cattle-men said that the California vulture or buzzard was not uncommon there before they began to poison carcasses to kill wolves" (Wilcox 1918).

Marine mammals and salt-water fish: (1) The Nuu-cha-nulth, a nation of 13 native tribes on the outer coast of Vancouver Island, viewed the condor as the enemy of killer whales (Matthew Williams, tribal elder and author, pers. comm. 2005), and "orcas and thunderbirds are often portrayed together in native art" (Bill McLennan, curator, Museum of Anthropology, University of British Columbia, pers. comm.). The association was probably food-related. (2) Of a condor wounded and collected Lewis and Clark (1990, vol. 6:66) wrote, "we have seen it feeding on the remains of the whale and other fish which have been thrown up by the waves on the Seacoast."

Berries: High meadows, Mt. Hood, Oregon, mid-1900s: condors feeding on the ground on "wild cranberries" (K. K. Smith pers. comm.).