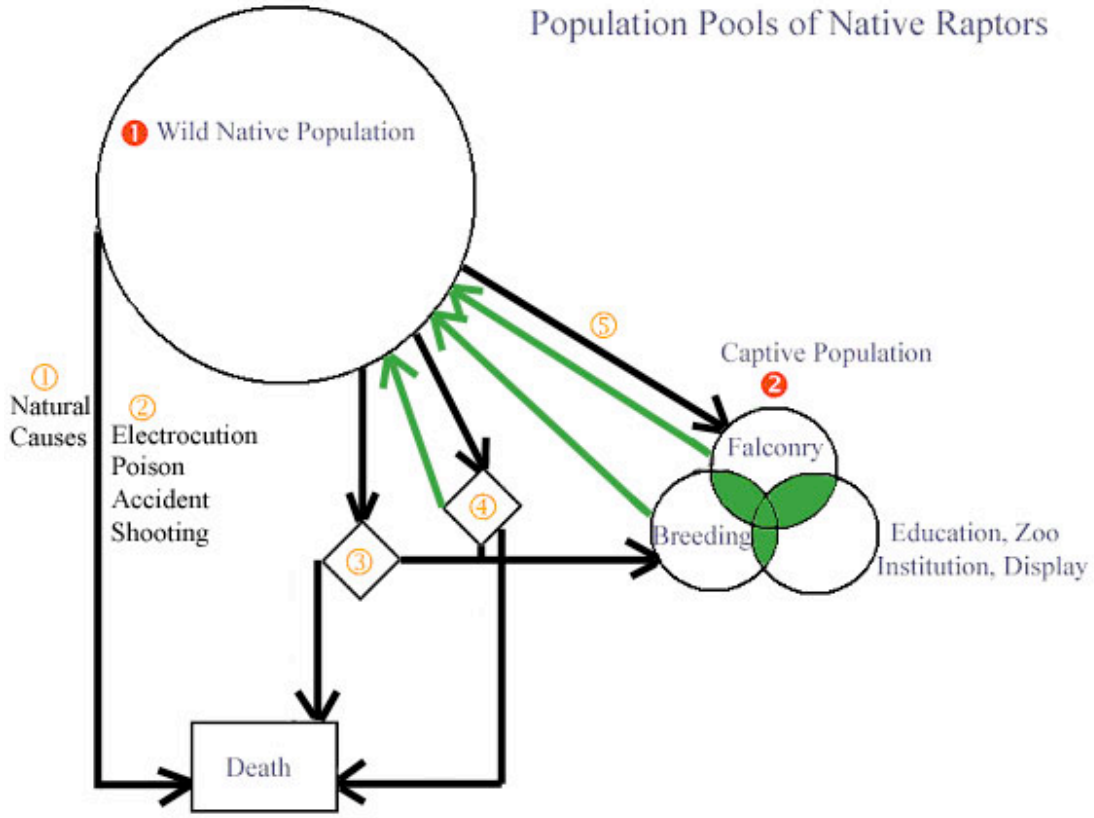
Population Pools of Native Raptors

This paper was initially published in 2004. In 2011 a few updates were made recognizing the regulation changes.

The raptors native to North America are controlled and monitored by many groups, primarily state and federal governments in accordance with international agreements. Much has been written on the health of these populations and purposes of them. However, it is not the purpose that necessarily matters, but rather the health and the potential mechanisms to improve the health of the wild populations. There are individuals who are removed from the wild population by means of death. There are other individuals who are removed from the wild population by means accepted by the governing bodies - these means would include education, research, breeding, and falconry. There are individuals who are removed by means that are not legal and are not considered an accepted use of these resources - a pet or shooting target would be two examples. The governing bodies are in a position to not only decide which activities are acceptable, but also which individual citizens are allowed to participate. There have been many discussions in the past and present over whether the wild populations must have fewer allowed pathways that individuals may be removed, or whether there are any valuable purposes that they can serve outside their biological functions in the wild. The intent of this paper is to gather the current research on populations and growth trends and to examine the appropriate roles of wildlife management and the role of wildlife in captive populations.

There are, essentially, two major pools of raptor populations - the wild population and the captive population. The wild population is that population which most concerns the federal departments and the state Fish and Wildlife departments. As such, these entities are also interested in any individuals exiting this population pool for any reason. They have also coordinated on bringing new individuals into this population pool for conservation. The captive population falls into many categories, but essentially they are all defined as not being a part of the wild population. These may be birds that were born in the wild population and were removed either for definite purposes or through injury or death. These may also be birds that are of a native species, but were hatched in captivity.



Exit points of the wild population are of the most concern; entry points and other status changes are of interest, but only incidental.

Population Pools

The pools themselves are separate and distinct. The wild pool breeds, produces, and dies largely separate from the activities of the captive pool. The captive pool has many purposes, and raptors may hold more than one purpose. A raptor held for the primary purpose of falconry and hunting may also serve as a breeding participant. A bird with the primary purpose of education may also be used for falconry or free-flight training. *Because of this, a bird's uses should not be limited, nor should there be a limit on how permittees purpose or cross-purpose raptors as it only brings more value and contribution out of any individual within the captive pool.* Among other things, the captive pool can be seen as an emergency reserve. The people involved in maintaining this pool must be seen as building their individual knowledge as well as raising the knowledge level of the community as a whole on matters of husbandry, reproduction, training techniques, and natural history. As has been proven in the case of Peregrine Falcons, the captive breeding projects, cooperation of zoos, private interests, government, and falconers was one of the key factors to the recovery of the species. As has also been proven with the Peregrine Falcons, reintroduction is more than hatching new individuals and placing them in the wild *(See also the Harris' Hawk reintroduction).*[4] Many

techniques of breeding, training, and natural history of the animals need to be developed and understood well for any effort to be successful. The introduction of privatization around this species has allowed funding beyond expectation resulting in a stable wild population where previously there were no wild individuals existing west of the Mississippi. Fifty years ago the knowledge of the husbandry, reproduction, and reintroduction would not have allowed for this success. It is due to the casual naturalists, the non-professionals, who have independently dedicated finances and time to the causes. Through their cooperation with each other and governments, the wild population of Peregrine Falcons is not only stable, but rapidly rising.

These two pools need to allow for genetic movement between them. There will be movement between these pools as individuals are introduced to bolster wild populations and genetic depths, and as individuals are injured or removed for other reasons and contribute to the future genetic stock of captive pools. This is only good management to allow flow between these pools in order to maintain diversity and robustness.

Raising the size of the wild pool for each species is not the goal, for these birds are balanced against one another and against prey, predators, and their competition. To raise or lower the population dramatically beyond what is healthy is not a valid management goal. To have the ability to recover a population is a luxury that human stewards have only recently enjoyed. The goal of wildlife organizations should be to achieve balanced, healthy populations that are stable. This then allows a larger exit flow as it tolerates more individuals exiting the wild population and a greater participation of people with wildlife. So long as the population is stable, it should not overly concern governing bodies if this exodus is from natural predation or human intervention. It does concern the governing bodies to track the flow and the population pool health.

Wild Population Pools

Genus: Accipiter

Cooper's Hawk

Population: 19,400 [28] (US and Canada)

Trend: Declined, perhaps recovering

"No evidence of a decline exists in migratory populations of Cooper's hawks in the western U.S. (HawkWatch International unpublished data, Golden Gate Raptor Observatory data in McDermott 1996, Battalio 1996). Based on 1986 Christmas Bird Count data, an estimated 19,400 birds reside in the United States and Canada. The California breeding population of Cooper's hawks has declined to an unknown degree, resulting in its listing as a Species of Special Concern (Remsen 1978). However, this list is currently in the process of being revised, and Cooper's hawk is not included in the current Draft List (CDFG and PRBO 2001). Most declines since the 1940's have been attributed to DDT accumulation and, more importantly, habitat destruction (Remsen 1978)." [28]

Goshawk

Population: No recent research published

Trend: Stable

"The U.S. Fish and Wildlife Service announced today that the northern goshawk in the western United States does not qualify for addition to the Federal endangered species list at this time. The Service found no evidence of a declining population trend for goshawks. In general, the available data indicate that goshawks remain widely distributed throughout the western United States." [25]

Sharp-shinned Hawk
Population: 30,100 [30] (US and Canada)
Trend: Stable
"No evidence of a decline exists in migratory populations of sharp-shinned hawks in the western U.S. (HawkWatch International unpublished data, Golden Gate Raptor Observatory data in McDermott 1996, Battalio 1996). Only a few population estimates are available due to the difficulty in making observations during the breeding season. A population decline occurred in the 1940s to 1970s due to the widespread use of DDT. Another apparent population decline in the 1980s and 1990s has since been attributed to migratory short-stopping in northern regions and not an actual decline in the population overall (Bildstein and Meyer 2000). Based on the 1986 Christmas Bird Count, an estimated 30,100 birds wintered in Canada and the United States (USDA 1994)." [30]

Swainson's Hawk
Population: No recent research published
Trend: Declining/stable
"The Swainson's hawk has suffered population declines since the first half of the century and was Blue-Listed in the United States from 1972 to 1982. It has since been placed on the National Audubon's List of Special Concern in 1986. It is now listed by the United States Fish and Wildlife Service as a Category 3C candidate. It should be noted that the Swainson's hawk was removed from the active Federal list because it was found to be more abundant than previously thought. A major cause of Swainson's hawk population decline was pesticide use in its wintering grounds of Argentina. Farmers there were using pesticides to control grasshopper infestations and the Swainson's hawks were ingesting these pesticides in several different ways." [39]
"Migratory flocks sometimes number from five to ten thousand. Migration from North to South America passes over land and one can imagine the great numbers seen in Central America as the hawks are funneled by the narrowing land mass. Veracruz, Mexico has seen up to 845,000 Swainson's Hawks in one fall. Pesticide use on alfalfa and sunflower fields in Argentina resulted in the death of some six thousand birds in 1995 and 1996.)
"Few historical records exist for mountainous and forested terrain in the North Sierra Nevada-Cascade Range, North Coast-Klamath Mountains, or Southern Sierra Nevada-White Mountains. However, small populations were recorded in non-forested habitats in Owens Valley, Shasta Valley, and Sonoma County. During historical times (circa 1900), an excess of 17,000 pairs of Swainson's hawks may have bred in California (CDFG 2000)." [47]

Genus: Aegolius

Saw-whet Owl

Population: 100,000 - 300,000 [35] (Canada)

Trend: Declining

"Mortality rates are thought to be approximately 60% for first-year Northern Saw-whet Owls, and roughly 50% for older individuals. The oldest known individual in the wild lived to just over 10 years, but an average lifespan is probably closer to just 3 - 4 years.

"Data on the status of the Northern Saw-whet Owl's population is limited. Though it is a fairly numerous bird, with an estimated Canadian population of 50,000 to 150,000 pairs (Kirk and Hyslop 1998), some have suggested that the population may be slowly declining." [35]

Genus: Aquila

Golden Eagle

Population: 100,000 [43] (in US)

Trend: Stable

"Polite and Pratt (1990) postulated that golden eagles might be more common in southern California than in north California. No recent population estimates of the golden eagles in California are available. Braun et al. (1975) estimated the total North American population of Golden Eagles at up to 100,000 individuals. Huegly (1975) estimated the population in the western U. S. in excess of 40,000 birds. Olendorff et al. (1981) estimated a winter population of 63,000 Golden Eagles in the western United States, with 5,000 of these in California. Thelander (1974) estimated that only 500 nesting pairs resided in California. The golden eagle population is believed to be stable or increasing, although the Breeding Bird Survey trends indicate a decline in the central part of the United States between 1968 to 1989, while populations in the west have fluctuated, with the most recent years (1980-1989) showing a decline. California populations increased from 1968 to 1980, but have decreased nonsignificantly from 1980 to 1989 (USDA 1994). Although population numbers of golden eagle have been reduced near urban development, in general, the Department of Fish and game considers the populations to be relatively stable." [43]

"We don't know how many eagles nest within the entire six million-acre [Denali Nat'l] Park and Preserve but it is probably well over 100 pairs. Starvation, disease, and death caused by predators (including other eagles) are probably the most common natural causes of death. Preliminary results of our telemetry studies suggest that starvation is very common in first year eagles after they leave their nesting areas. Unfortunately we also have recorded mortalities of Denali's eagles due to illegal shooting and electrocution." [44]

Genus: Bubo

Great Horned Owl

Population: No recent research published

Trend: Stable/rising (potentially at the expense of other species)

"Great Horned Owls are supreme generalists. They are found in more varied habitats than any other owl in North America. Great Horned Owls are widespread and common. They adapt well to change and are doing well in most areas. The Breeding Bird Survey recorded a significant increase in Washington since 1966. As more of Washington's forests are fragmented by logging, more area becomes available for Great Horned Owls, sometimes at the expense of endangered Spotted Owls, which not only require old-growth forest but also are preyed upon by Great Horned Owls. The Spotted Owl is not the only Washington owl that has been affected by expanding Great Horned Owl populations. In eastern Washington, Great Horned Owls displace Barn Owls in old buildings and barns." [21]

Snowy Owl
Population: No recent research published
Trend: Rising
"Recent policies prohibiting the shooting and trapping of Snowy Owls have proved effective. Harvesting of owls by native peoples is minimal enough that it has little population-level effects. Not well understood. Information and surveys insufficient for establishing population stability, but local monitoring appears to show that populations are stable." [37]

Genus: Buteo

Ferruginous
Population: 6,000 - 14,000 [42] (in US)
Trend: Rising
"Across the Canadian prairies, the range was diminishing up until 1980, and at that time, birds were felt to be occupying 48 percent of its original range. Numbers were generally felt to be diminishing and a total Canadian population was estimated at 500 to 1000 pairs. By 1987, population increases were being noted, and the Alberta population alone was estimated at 1,800 pairs. The upswing was likely due to a greater availability of food on the wintering grounds, making the birds more likely to breed when they returned to Canada. In the United States, there has been a history of concern for this species in many states with declines noted, but in 1988, one study suggested that the population in California and locally elsewhere may have increased significantly. The wintering population north of Mexico was estimated at 5,500 birds in 1986. In 1984, the population estimate for North America was between 3,000 and 4,000 pairs, and in 1987, it was 14,000 individuals." [39]
In Canada, "Ferruginous Hawks have benefited from a 5.2% annual increase in population size from 1966-1998, a non-significant increase of 8% from 1985-1998 and a non-significant increase of 2% from 1983-1991 (Schmutz, 1999)." [41]

Red-Tail Hawk
Population: 350,000 [39]
Trend: Rising
"A 70 percent population increase may have occurred between the 1940s and the 1970s. The wintering population in North America has increased by about 33

percent since the early 1980s, with at least 350,000 birds present. The average mortality rate in the first year is about 54 percent and the mean annual mortality rate is about 20 percent after that. Only about 10 percent of hatchlings may be alive at age six and about 2 percent by age 13 years. Having reached age two, birds may be expected to live four to five more years." [39]

Rough-Legged Hawk
Population: 100,000 [39] (US)
Trend: Stable
"In 1986, it was estimated that nearly 50,000 individuals were wintering in the United States alone. Pesticides do not appear to be as problematic as they have been for other raptors as the rough-legged hawk's major food sources are not migratory and accumulate very small amounts of chemicals. It may be the most common raptor breeding in the arctic regions. The populations obviously fluctuate but are not cyclic in nature. To suggest that the populations fluctuate directly with fluctuations in lemming and small mammal populations on the breeding grounds is appealing but is not supported by studies. This buteo has the ability to switch to other prey items when mammals are low so this may allow it to survive the periodicity or random fluctuations in mammal populations." [39]

Genus: Cathartes

Turkey Vulture
Population: No recent research published
Trend: Rising
"The breeding bird survey of the U.S. Fish and Wildlife Service [2001] shows vulture populations have increased by 10 percent in the last few years.
The hard numbers don't reflect precise counts, but the relative rise of the count year after year indicates a large increase, says Carl Betsill, section manager for research and regulations for the North Carolina Division of Wildlife Management. "That's a significant upward trend," Betsill said. Speeding traffic on back roads provides the vultures with much of their prey. The more cars, the more road kill, and that could be one of the reasons for the rise in the vulture population, scientists say. "They're doing pretty well because there's a lot of dead things on the road," Betsill said." [38]

Genus: Falco

Gyrfalcon
Population: 50,000? (Canada) [27]
Trend: Rising
"Because the Service has no evidence that this particular population has ever been threatened due to habitat loss, nest robbing or trade, the U.S. is proposing to transfer the North American gyrfalcon from Appendix I to Appendix II with a special restriction. Although the U.S. has determined that trade in the North American bird does not appear to pose a significant threat to the survival of the species, it is asking for a provision which will continue the ban on trade in all wild gyrfalcons." [26]

Kestrel
Population: 2.4 million [45] (N. America)
Trend: Rising
"The American kestrel 's North American population has been estimated at 1.2 million pairs, with the Central and South American populations being as large. It is possible that the clearing of parts of North America for agriculture in the last two hundred years has caused the American kestrel population to increase." [45]

Merlin
Population: No recent research published
Trend: Stable
"The merlin is a winter visitor to California. Suspected population declines (Fox 1964; 1971) prompted concern by various agencies 25 years ago (Remsen 1978), but most biologists now feel that merlin populations are doing well (see Palmer 1988; Johnsgard 1990). Merlins are regularly seen during the winter darting across flooded rice fields hunting songbirds and shorebirds." [29]

Peregrine Falcon
Population: No recent research yet available published
Trend: Rising
"The crash of the Peregrine Falcon population in the middle of the last century has been well documented. Though never an abundant species, up until the mid-1900s, the Peregrine Falcon had healthy populations throughout much of North America. But by the late 1950s, almost all were in trouble, with reproduction having ceased almost entirely. By 1964, no wild Peregrine Falcons were known to exist anywhere east of the Mississippi River (arctic population excepted).
"The bigger challenge lay in attempting to restore the Peregrine Falcon population. Major captive breeding facilities were established in both Canada and the USA, with smaller additional sites added over time. By the late 1970s, these captive populations had grown to the point where the first releases were possible, and over a period of roughly 25 years, more than 6,000 Peregrine Falcons have been released back to the wild through these efforts." [31]
"Recovery efforts over the past 20 years have brought the breeding population in California from less than 10 active sites in 1975 to over 130 in 1994 (B. Walton pers. comm. 1994)." [32]
"The proposed action, if approved, would allow the capture, or "take" of up to 5 percent of the annual production of nestling American peregrine falcons in the 11 states west of the 100th Meridian, where populations are high. With more than 1,650 breeding pairs of peregrines nationwide, productivity goals for the peregrine's recovery from the Endangered Species list have all been met or exceeded. Maximum take of nestlings under the proposed alternative in initial years would be about 82 young. Allowing this level of take would still allow for healthy population growth of about 3 percent per year under existing conditions, according to Service projections. The management plan allows take to be reduced or suspended if populations decline or fail to meet growth projections.

The proposed alternative assumes a level of 20 percent annual mortality for peregrine falcons surviving their first year, a mortality level that is most likely higher than is actually occurring in the wild. Given that mortality rate, allowing a 5 percent level of take would still enable the American peregrine population in the West to reach approximately 6,438 birds in 15 years." [33]

"At a minimum, we believe the population to have been 10% greater in 2001 than it was in 1998. We also determined that recent productivity in the western United States has averaged about 1.51 young per nesting attempt. We published a Final Environmental Assessment in April 2001. The draft Revised Environmental Assessment was done to correct an error in the modeling on which the earlier Environmental Assessment was based. In the models the breeding age for American peregrines was inadvertently set at two years of age, rather than three. Though some peregrines breed as early as age two, to be conservative we intended to model breeding first at age three. To determine an appropriate value to use for adult mortality in the assessment, we used post-delisting data from Arizona, California, Colorado, Idaho, Montana, New Mexico, Oregon, Washington, and Wyoming. Population data from those States, combined with modeling of population change, indicated that adult mortality since delisting has been 10.1% per year." [34]

Prairie Falcon

Population: 10,000 [46] (N. America)

Trend: Stable

"Since the decrease in the use of organochlorine pesticides in North America, the number of Prairie Falcons has been at least stable or increasing continent-wide. The fact that they do not migrate to countries where hazardous pesticides are still used is a bonus for this species. There are likely more than 5,000 pairs in North America and some ideal areas may have saturated breeding densities. Threats locally include expanding urbanization that destroys nesting or foraging areas, illegal killing, excessive human disturbance around nests, and removal of prey species as part of agricultural pest control operations. Environmental contaminants always remain as a potential threat to birds at the top of the food chain and a constant vigil is required in this and other raptor species." [46]

Genus: Haliaeetus

Bald Eagle

Population: 80,000 - 110,000 [20]

Trend: Rising

"More than 100,000 bald eagles were killed in Alaska from 1917 to 1953. Alaskan salmon fisherman feared they were a threat to the salmon population." [19] A bounty on eagles in Alaska was maintained as late as 1953, in the mistaken belief that they were having an adverse effect on salmon fisheries. Bald eagles were officially declared an endangered species in 1967 in all areas of the United States south of the 40th parallel, under a law that preceded the Endangered Species Act of 1973. By 1981, the nesting population in the lower 48 had doubled, and a 1993

census counted more than 4,500 nesting pairs, with a healthy sized next generation of 5,000 to 6,000 juveniles. [20]

Genus: Pandion

Osprey

Population: ~30,000 [36]

Trend: Rising

"Today, by some estimates, more than 15,000 breeding pairs of the birds range throughout the nation. Mark "Bird" Westall is a founder of The International Osprey Foundation, based on Sanibel, which funds raptor research." [36]

Genus: Tyto

Barn Owl

Population: No recent research published

Trend: Declining

"Although the common barn owl is not listed on the U.S. endangered species list, many states - including Illinois, Indiana, Iowa, Michigan, Missouri, Ohio, and Wisconsin [(Kirk, 2000)] - have classified the owl as threatened or endangered. In Britain, the Hawk and Owl Trust credits the installation of nesting boxes with helping to reduce a steep decline in the country's barn owl population. According to the group, the number fell from about 12,000 pairs in the 1930s to 3,000 or so by the 1960s." [22] "The Common Barn Owl is, on the average, a short lived creature. Studies indicate that about 60% of all barn owls die before completing their first year. The causes of death include accidental pesticide poisoning, starvation, human predation, accidents with moving vehicles, fences and power lines, and, the most common cause, attacks by the Great Horned Owl." The average lifespan for Barn Owls is 1 - 2 years, closer to 18 months. [23,24] One percent of barn owls live to the age of ten. [23]

It is of interest to note that almost all species which are actively used for activities such as falconry are also actively used for education and breeding. It cannot be mere chance that each of these species has stabilized or recovered population due to this involvement.

Exit Pathways

The primary exit path for most individuals will be before that individual has reached 12 months of age. Studies place the survival rate here at between 10% and 30%. The primary cause for this high rate is the first, and largest, exit path - the natural causes of predation, accidents (falling out of the nest), fratricide, infection, injury, starvation, and many others. For that 10% - 30% which do survive, most will eventually exit the population through injury, predation, malnutrition, and other natural causes. Very few will die due to advanced age.

A secondary exit path is also death, but through unnatural causes. At times during the past century, this has been extremely high, and the rate of this path will vary based on locale. Some causes here are electrocution, poison, accidents, shootings, and other un-natural

causes. Most individuals who exit through these two paths are never seen, known of, or counted.

After these causes, the pathways for flow out of the population are very small.

Rehabilitation is an attempt to reverse an exit pathway, ideally leading back into the wild population. Although the reasons may be identical to the previous two, human intervention to reverse the effects now plays a role. Complete reversal of the cause of exit from the pool usually means that the individual previously destined for removal can now be re-introduced to the wild pool. Anything less than complete reversal can still leave these individuals alive, but impaired. These individuals then typically join the captive population in one or more capacity. It is frequent, however, that there is no reversal at all and these individuals exit the population completely.

Depredation, through approved permits, is another exit pathway. Depredation typically is approved for nuisance, dangerous, or economically impacting individuals. Raptors that attack domestic animals or livestock are considered for this. Raptors who threaten humans (as in the New Mexico Sharp-Shinned Hawk nest slated for removal) are also considered for some form of intervention. This path typically means death for an individual, but possibly relocation or transfer to the captive pool. The USDA is one such participant. In 2009 alone, the USDA killed 336 American Kestrels, 66 Marsh Hawks, 593 Red-Tail Hawks, 199 Barn Owls, among many other wildlife[49].

The last, and smallest, exit path is a direct take from the wild population into the captive population. These individuals are technically defined as having permanently exited the wild population pool as there is no guarantee that a particular individual will return. However, in reality a 50% and greater return rate is seen just from the falconry sector of this pool[13]. From the breeding sector, although the individuals who entered the captive pool are not necessarily the ones who exit to return to the wild population, their offspring are frequently re-introduced to the wild populations. This can be through concerted conservation efforts to bolster a wild population or through accidental release, especially from the falconry sector.

Who exits the population?

"Birds, like most wildlife, are incredibly mobile and impossible to restrict from areas where pesticides are used. When birds do die from pesticide exposure or other causes, their carcasses are not easily detected. Private and public lands on which pesticides are used are not always easily accessed; monitoring efforts for such incidents are generally lacking. Field studies have shown that even trained field personnel may have difficulty locating dead birds. Up to 62 to 92 percent of bird carcasses are scavenged by predators within 24 hours, and those that remain are often camouflaged or hidden in dense underbrush. As a result, scientists liken the number of known pesticide kills to the tiny tip of an enormous iceberg. In 1999, numerous raptor deaths, including bald eagles and at least one Peregrine falcon, deaths of songbirds, ground-nesting birds and waterfowl in the US, Canada and South America have been reported and attributed to pesticides. Many of these cases are under investigation but many others may have never been detected." [9]

Roadways
EST: 60 to 80 million[10, 48]; 50 - 100 million; [2, 3] 57 million [5]
"In the October, 1927 edition of Auk, a game commissioner from Harrisburg, Pennsylvania reported that since November of 1924, 113 permits to collect screech owl specimens from roadsides had crossed his desk. The requests, he noted, came from every county in PA, and were made during every month of the year. Of the 113 dead owls, 82 of them were determined to have been hit by cars (Sutton, 1927). While these numbers were startling to a wildlife manager in the 1920s, they would hardly catch the attention of a state game commissioner today." [10]

Glass (buildings)
EST: 98 to 980 million [2, 3, 5]

Power Lines
EST: 10,000 - 174 million [2, 3, 48]

Agriculture (Poisoning)
EST: 67 million [2]

Agriculture (cutting hay)
EST: 1 million [2]

Oil and Gas Extraction
EST: 1 to 2 million [2]

Communication Towers
EST: 4 to 50 million [2, 3, 48]

Domestic and Feral Cats
EST: hundreds of millions of birds per year [3]

Wind Turbines
EST: 10,000 - 40,000 (from 1,731 MW) [1, 48]
182 total birds 1989 - 1992 at Altamont; 39 Golden Eagles [4] and 119 birds of prey [4]
1994 Altamont study showed currently about 100 Golden Eagles and more than 200 other raptors killed per year. [48]
Average of 2.19 avian fatalities per turbine, or 0.033 raptor fatalities per turbine. [48]

Logging and Strip Mining
EST: unknown [2]

Commercial Fishing
EST: unknown [2]

Stock Tank Drowning

EST: unknown [2]

Land Development
EST: unknown [2]

Electrocutions
EST: 1,000 hawks, eagles, and falcons [2]
One study showed that 80% of Harris Hawk deaths in the Tucson area are due to electrocution [7]

West Nile Virus
EST: 800 - 1000 [6]
As of October, 7, 2002, the CDC has positively attributed 4,462 bird deaths to the WNV, involving 111 species. These, of course, are just the birds that have been found and tested. How many more have died from the disease in the wild is not known. [15]

Who gets rehabilitated?
There are many rehabilitation groups throughout the US, many accept raptors and some exclusively deal with raptors. The Auburn University veterinary medicine program has a unique program in rehabilitation with a particular focus on raptors. The highest year to date was 554 raptors (1999), and their average rate of return to the wild is 40%. [8]

What negative impact does falconry have?
This paper was originally published in 2004. Since that time new federal regulations have been produced and accepted, and many states have begun adopting versions of them. It is gratifying that the new regulations have considered and addressed nearly all the issues listed below.

Study after study, funded from within interested communities as well as from governmental departments, has shown that falconry has no negative impact on the populations of raptors. The simple fact here is that we are dealing with such a small number of people who genuinely have the best interest of the raptor and their populations in mind. There are individuals who do not have these interests in mind, and they are not falconers, but illegal raptor dealers and there are very few of these individuals. The illegal activities at the expense of raptor populations or individuals must not be confused with the art, sport, and professions that involve raptors.

The total number of falconers in the United States is less than 4,000. The recent joint US-Canada CITES proposal enumerates the falconers and their impact on an internationally regulated species very well.

> "In both the United States and Canada use of the gyrfalcon is primarily for falconry and captive breeding. There is also a limited use for scientific and veterinary research. In the United States, falconry is only permitted under joint Federal and State regulations, with 49 States currently allowing falconry as a legal method of hunting (Peyton et al. 1995). Master falconers

> may have no more than three birds of all species in possession; general falconers, no more than two. In 1991, there were 3,738 licensed falconers, and they possessed an estimated total of 4,988 raptors, of which only 145 were gyrfalcons, including 26 wild-caught birds (Peyton et al. 1995). In Canada, 6 provinces and 1 territory also allow falconry as a legal method of hunting and license captive propagators. For both the United States and Canada, captive bred birds must be closed banded and the numbers provided to appropriate government authorities. Approximately 20 private breeders in Canada and the United States hold an additional 300 gyrfalcons as breeding stock, most of which are from F1 or later captive-produced generations. Of these breeders, seven (6 in Canada and 1 in the U.S.) are registered with the Secretariat as commercial breeding operations. The wild founders of this captive population numbered fewer than 30 birds. Although permits can be obtained to collect birds from the wild in the United States and Canada, the number of birds taken in any given year is very small (less than a dozen), and is not believed to have an impact on the population viability of the wild gyrfalcons. Harvest of wild birds is either by the removal of young birds (eyasses) from nests, or by any one of several methods for trapping first year birds after they leave the nest (called "passage birds" when migrating). Wild adults (haggards) may not be trapped in the United States or throughout most of Canada. Neither Canada nor the United States have experienced significant falcon poaching or smuggling for at least 10 years. A review of the database maintained by the U.S. Fish and Wildlife Service Office of Law Enforcement shows no records of cases of illegal trade in gyrfalcons for several years.
>
> As stated earlier, all gyrfalcons exported from Canada and the United States since 1984 have been captive-bred birds. Transferring the species from Appendix I to Appendix II, with a zero export quota for wild birds, should have no significant impact on the species. The only benefit would be that an Appendix II listing would allow for less restrictive trade of captive-bred birds. With the greater availability of new bloodlines or unrelated birds, there is less of a demand to remove birds from the wild for breeding purposes." [11]

Michigan recently evaluated its policy on wild take laws opting to relax them. Over the past five years there had been a total of 63 raptors trapped from the wild with a maximum of 18 during any 12 month period, but the average is 15.[12] This should clearly show that the number of raptors affected is a minimal amount and that, moreover, it is controlled. There is no mechanism to immediately stop all raptor deaths due to electrocution, however all wild takes of a species could be halted in an emergency. Mullinex's further research into the rate of raptor deaths under the hands of apprentices shows that even the untrained falconers are running at a higher success rate than nature. Over a sixteen year period in New Mexico (9 years), California (2 years), and Idaho (five years), a total of 50 raptors died under the watch of apprentices, the least knowledgeable of the falconry community. This totals less than a 5% mortality rate, and a 43% release rate of those same individuals back to the wild population pools. [13] Estimates of first year mortality for

wild American Kestrels are 67% (Henny 1972) and for first year Red-Tail hawks are 64% (Henny and Wright 1972).

What negative impact do the current regulations have on falconry?
Although the intent of many of the regulations is to manage the wild population pool as well as ensure the captive pool is well cared for, the language of the law prevents the best choice for raptor management in some cases. If the regulations are to ensure optimal health of the raptors, then we must not tie the hands of those who maintain them.

Secondary handlers - Most spouses and family members of falconers will end up handling the bird, and in many cases this second person can end up providing optimal care when the falconer is away, even for an hour. Having the ability to have a bird supervised means that the bird can be watched, monitored, and moved so he get more or less sun, or otherwise has a better environment. Falconers who are sick, hospitalized, or need to be away for more than a day should be able to rely on their family who are known and accepted by the bird.

Long term care - Falconers fall ill or encounter hardships like any other groups of individuals. The current regulations stipulate that a bird may be passed to another individual licensed to manage a raptor for a 30 day period. The laws do not stipulate what may be done after this 30 day period. Most falconers who are not able to accommodate their bird after 30 days have simply renewed the letter - a deployment to Iraq or a long term illness would be an example. Some have interpreted the lack of specificity to indicate that no birds may be out of the possessor's hands for more than 30 days and have attempted to cite individuals on this. This interpretation only limits the decisions a responsible falconer can make and prevents the birds from having the best care available.

Freelofting - This is a management technique seen in most zoos today where the bird is given a large enclosure with a variety of perches and conditions and can choose for itself where to sit, stand, sun, or bathe. The strictest definition of the falconry regulations assumes this is not happening and therefore would be illegal.

Feathers - The only allowance for keeping feathers is for imping. In reality, falconers should be allowed to keep the downy feathers, keep more than necessary, keep feathers for education or scientific comparison to other individuals or the same individual later in life.

Flying without anklets and jesses - It is stated in the regulations that anklets are to be used while flying. Although may not be seen as the intent, the wording of the regulation states that anklets are to be used when free flying. Some falconers prefer to fly without anklets in case the bird gets loose or to prevent any accident of the anklets being caught and hanging the bird.

Mews without barred windows (i.e. in your house or garage) - A garage or house is a perfectly suited housing situation for some falconers and some species. By the strict

definitions, all the windows would have to have bars, even if the bird is leashed while in the enclosures.

Climbing for another person or assisting in trapping - In reality certain individuals are more trained and able to climb for an eyass or trap a bird, especially if the falconer is handicapped. According to the strict definitions, the climber must claim the take of the bird from the wild as must the recipient, even if he is at the bottom of the tree or nearby. This penalizes the climber from assisting an individual who is not able to climb.

Hacking - Current regulations do not recognize hacking as a valid management practice.

Weathering your bird (at a meet or picnic) - Without leaving the attendant a 3-186a form, this is technically not allowed.

Bag limits - The hunting season for falconry does not span the entire year, however birds must eat year round. Most falconers prefer to provide wild game to their bird due to the lower fat content and more natural diet. Due to game bag limits, this is not possible in many areas to stock up game that the bird has caught and freeze it for a future use.

Education - In many areas knowledgeable falconers are actively prevented by their permit from speaking publicly with their bird. Boy Scout troops, Rotary Clubs and the like have historically been very anxious to find speakers so knowledgeable on environmental and wildlife issues. Many falconers greatly enjoy sharing their knowledge and their birds. The limitation only limits the benefits that the public may enjoy from the individual bird, and may even be on shaky ground with respect to First Amendment rights. In addition, many states will not allow "healthy" non-permanently disabled raptors on an educational permit, leaving the falconer in a precarious situation every time they show someone a falconry bird.

Entertainment - There are specific attempts at limiting both entertainment and profit from raptors. However, the lack of definition around this term would leave even the sport in certain jeopardy as it most certainly is entertainment at its core. Raptors are used by non-profit groups for literature, for educational articles, for videos and more. Is a raptor being used for profit and commercial purposes when it is posing to sell falconry related equipment? Are magazines such as the Hawk Chalk entertainment? Do any of the purposes even matter if the wild population is not affected in any significant way?

What is the positive impact of falconry?

Falconry has had many positive contributions back to biology and conservation. Much knowledge of behavior, habitat, natural history and ecology is brought to light by this highly dedicated community. The real measurable impact has centered on the Peregrine successes. The founder of The Peregrine Fund is a falconer and very effectively worked with the rest of the community and with the government to repopulate the wild pools in an effective manner. Populations that could benefit from future partnerings are the Northern Goshawk, the Swainson's Hawk, the Harris Hawk, and many owl species. Before the genetic pool is so low that we are brought to the point of considering species

for listing on various watch or endangered species lists, we must carefully select wild individuals to work with in a captive environment. This intentional and conscious effort may serve to prevent species from losing the genetic diversity which is out there now. Pre-empting a species crash can always be done when a healthy captive pool is maintained. Once private individuals are given the ability to act with the best interests of their individuals and the populations in mind, then they are free to make the best decision for the situation. And once financial and other incentives are tied to the success of these efforts, more results can be brought about faster.

What would reconsidering the regulations mean?

Projections of the actual impact are insignificant. Just as most individuals do not have more dogs, cats, or cars than they can legitimately care for and maintain, even though they have a full potential to do so, the same applies for raptors. In the UK where falconry and raptor keeping is largely unregulated, a recent study showed that 33% of raptor keepers had one raptor, and only 27% had three or more raptors with a mean raptor to keeper number of 2.23. [14] This would indicate that our similar culture would see similar trends. Moreover, there was positive economic impact to the economy through employment around cottage industries that supported these keepers and community. [14]

There are current practices and norms which are not part of the regulations which must also be examined. Currently, the state frowns on falconers serving the public as educators. I have heard of instances where falconers were told that speaking in public could jeopardize their license. Without a falconry license, any individual may stand up, speak up, and even be paid for presentations or speeches on the topics of raptors and falconry. Going through the licensing process and becoming licensed should not revoke a person's First Amendment rights to free speech. Having a license does not preclude a person from speaking, educating, or researching. Again, allowing an individual in society to serve multiple purposes only makes that individual more valuable to the society.

The most controversial part of the reconsideration would be around potential profits involving a person's raptors. Today a person may adopt a wild Mustang, sell that Mustang, show him, breed him, lease him, teach lessons on him, or use him in videos or movies. Likewise, a wildlife photographer may go into a national park and photograph raptors then sell those photographs for thousands of dollars in personal profit. An individual may open a private hunting reserve for stocked or wild game and have hunters pay to come take game from their land. And an individual may purchase a trapping permit, permanently remove fur bearing animals from the wild and profit personally off of that public resource.

The falconry community is struggling with several questions, some of which can be made into examples of the crux of the issues facing us.

Can a falconer video tape their bird hunting and sell their video tapes?
Can a falconer allow a videographer to pay to videotape the bird?
Can that videographer sell those video tapes?
Can a falconer allow a person to watch their bird hunt?
Can a falconer allow a person to pay to watch the bird?

Allowing falconers to breed individuals which were taken from the wild, then to sell the offspring to licensed individuals would only allow for more potential to recover from low wild populations. The mechanism for falconers to take individuals from the wild is highly controlled and can be shut off in an instant should there be ecological disasters that occurred where the wild population could not sustain the loss of another individual. The restrictions placed on a raptor breeder could include that the individual taken from the wild must have two captive bred individuals replaced to the wild population in order to balance populations properly. Mechanisms that allowed these private individuals to basically lease the raptors could be devised and made flexible enough to respond to immediate needs and crises in the wild populations, both enlisting individuals to assist a population and allowing larger wild takes.

The most important part of reconsidering the current regulations would be the ability to better define the punitive process. The space around broken regulations, appropriate reactions, and punitive actions is very poorly defined. A system similar to the well-defined driver's license system would allow the government to impose immediate restrictions based on the facts and allow falconers to appropriately challenge in court. Relatively minor infractions based on strict interpretations rather than reading the intent of the law has lead to confiscations and countless tax-dollars spent chasing phantom crimes. The birds have been the biggest losers in this process as rarely is a licensed individual actively harming a bird, and instead they are making the best decisions they can about the welfare and maintenance of the bird. The governmental entities are not allowed to spend their time monitoring the real focus of their work, the wild populations. They are instead spending time focusing on healthy captive birds who are already cared for. Restructuring the regulations would place the focus back on the wild population pool, remove unnecessary overhead and effort from around a very small community and allow that same community to join the governmental bodies in monitoring and maintaining the wild populations which are the public's natural resource.

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