

# Language Use and Misapplied, Selective «Science»; Their Roles in Swaying Public Opinion and Policy as Shown with Two North American Raptors

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## ABSTRACT

Habitat modification, overexploitation, invasion by exotic plants and animals, and chemical pollution are the principle reasons that global biodiversity is being lost at an unprecedented rate. In its extreme manifestation, the loss of biodiversity results in endangerment of certain species, and this has been especially true of raptors. The Endangered Species Act was passed by the United States Congress in 1973 to protect and recover species in extreme peril. Listed species enjoy funding and protection priorities, and public policies and perceptions toward species are altered by the designation of endangered status. Much of the discussion of this paper revolves around the ever-broadening use of the word «endangered.» We feel that scientific integrity is increasingly being compromised by the inappropriate use of this term to secure secondary agendas, including philosophically attractive ones, unrelated to the original legal definition of endangered. For example, there is pressure to apply the endangered label to the Northern Goshawk *Accipiter gentilis* populations in the western United States, seemingly for reasons unrelated to the actual status of the species. Furthermore, the Peregrine Falcon *Falco peregrinus* is currently classified as endangered in the western U.S., although its present numbers greatly exceed the designated goals required for downlisting to threatened status or even complete removal from the endangered list. Yet the species is maintained on the endangered species list,

in part because certain unrealistic criteria have been suggested as necessary for downlisting action, including some that are difficult to determine or measure and that are unrelated to the reason the falcon became endangered, or to the reasons its numbers are now increasing. Ultimately, although some species are truly endangered, the misapplied use of language describing a non-periled species as endangered may compromise science and in the end will reduce the credibility of conservation biologists generally and the validity of the endangered species concept specifically. It is imperative that we maintain the integrity of any legislative mandates that benefit biodiversity, including the Endangered Species Act, especially in the face of current attacks to weaken them. Alternative ways to pursue legitimate, worthwhile, and often necessary efforts to preserve ecological diversity without forcing the inappropriate use of endangered species labels are needed.

## INTRODUCTION

Currently, a major concern facing conservation biologists is the reduction of species diversity, density or distribution due to alteration and losses of habitats, caused primarily by anthropogenic activities (Raven 1990). Many species, although not presently reduced to the point of actual endangerment, are rapidly declining to that status (Myers 1993). Once a species is actually endangered, it is frequently difficult, if not impossible, to improve its status and effect complete recovery. Reflecting such concerns, some individuals contend that it is useful to forestall this irremediable condition by designating as endangered those species that seem to be heading for trouble *prior* to a time they truly are threatened or endangered. This viewpoint exists, in part, because the process of endangerment frequently takes place in an imperceptible manner, piece by piece, bit by bit, location by location, until a species is suddenly in trouble throughout large portions of its range before its plight is recognized. Once formally listed as endangered, at least in the U.S., such species receive protection from a very powerful piece of legislation, the Endangered Species Act (ESA), that is intended to reduce the potential for continued injury to the species and to promote its recovery.

Recently, the power of the ESA has facilitated its own abuse by attracting efforts to list species that do not actually fall within the limits of the ESA's definition. The original wording of the ESA required that a species should be demonstrably «...in danger of extinction within the foreseeable future throughout all or a significant portion of its range» to qualify as endangered (U.S. Department of Interior 1988). Species in less peril can be classified as «threatened,» and under that category the species is considered «...likely to become endangered within the foreseeable future throughout all or a

significant portion of its range» (U.S. Department of Interior 1988). In the jargon of conservation managers, species in the threatened and endangered categories are often referred to as «T & E species.»

Because of human emotional attractions to certain animals, the endangered species concept has sometimes become compromised by attempts to have species listed for reasons other than sound biological criteria. For example, the Gyrfalcon *Falco rusticolus*, was listed as a CITES Appendix I species, not because it was rare, or even under threat from such usual factors as habitat reduction, pollution, predation, or take by humans (Parrish and White 1987). Rather, a minority of countries (e.g., Greenland, which was administered by Denmark at the time) where Gyrfalcons occur wanted to reduce or eliminate illegal take and trade of the species, partly because of enforcement difficulties. Consequently, these countries lobbied to have the falcon listed, even though the purported take could not be shown to be harmful to the species, nor even verified. The ensuing inaccurate semantics of calling this widespread and even locally common species «rare,» despite published estimates that there were 15,000 to 17,000 breeding pairs throughout the Holarctic (Cade 1982), had a profound effect on the public's perception, and even that of some scientists, about the status of the Gyrfalcon.

One of our goals here is to suggest that the ESA is too important to be compromised. Actions that misrepresent the true status of an organism jeopardize the ESA itself. We feel that the scientific community should be guardians of the integrity of the ESA and that the use of imprecise language which conveys misinformation creates a certain dilemma for conservationists. Our position is that the scientific community has a primary responsibility to rigorously examine data regarding the health of species and to put other agendas aside. Good intentions on the part of the scientist may be thwarted, however, because the loss of biodiversity is not only a biological issue, but is also a political and public domain issue (Tobin 1990). As more and more species are listed, some will be lost simply because of the compromises that will be made to balance saving biodiversity, maintaining an effective ESA, and meeting other legitimate needs of the human population (see Mann and Plummer 1995).

## THE PROBLEM

As biologists, we are often caught between what we would like to see happen concerning a given issue and what the data tell us about that issue. At times our personal agendas and philosophies may be in conflict with the facts and reality of an issue. Some of this conflict is portrayed by examples involving the ESA, use of the term endangered, or use of data to portray a certain

perspective. Below are some scenarios suggesting how such conflicts may play out in different arenas.

First, there are the critics of the endangered species concept, including private groups and some governmental and elected officials wanting to pacify outspoken constituents who find the ESA too restrictive. Unquestionably, some property owners have not been able to develop land because of the occurrence of critical habitat or listed species on their property. As a result of these ESA restrictions, a large portion of the general public may be affected. On top of this, when information, sometimes popularized and dramatized by the media, shows that the species in question may in fact not be endangered after all, the reaction or backlash from the public may be particularly severe. The lawsuit resulting from the Tellico Dam/snail darter *Percina tanasi*, a fish that had been declared endangered, was one such example (see Mann and Plummer 1995). When the lawsuit to stop the dam was filed in early 1976 some \$ 78 million dollars had already been committed to the dam. By 1980, within a year after the flood gates at the dam closed and after an enormous amount of monetary and human resources had been used, the darter was found in four of 20 streams sampled below the dam. These streams had been previously thought to be too polluted and turbid to contain darters. One wonders why the surrounding regions were not extensively examined prior to the darter's endangered designation and the lengthy and expensive litigation process. Regardless, by 1984 the darter had been found to be in such good shape that it was proposed for downlisting with the possibility of delisting altogether, and in the final analysis this case gave critics of the ESA fuel for their objections. Just such types of reactions and responses have led to a movement to alter the ESA through legislation. One of the most fundamental modifications proposed for the ESA is to require that human economic hardship be considered prior to designating a species endangered. Ironically, it is usually some direct action by individuals, driven by economics, that has caused a species to become endangered in the first place.

Second, resource management organizations have not always properly managed the natural resources under their control. Mismanagement of a resource (or lack of any management) as a means of placating or aiding the private sector may place certain species in jeopardy. For example, the Sage Grouse *Centrocercus urophasianus* has experienced more than a 50% decline and reduction of its range over extensive regions (Braun 1995) and has become extinct in one Canadian province and one U.S. state during this century (DeSante and George 1994). The species is presently in jeopardy in several regions. This decline has been caused by several factors, mostly land conversion to agricultural use. In addition, management agencies are reluctant to restrict hunting in some areas where it can no longer be justified biologically



because of the potential economic losses to the states and resistance by large hunting lobbies. Such inaction, in turn, stimulates a backlash from the environmental community, which, in frustration, is prompted to invoke the ESA as a last line of defense, having concluded that there is no better way to contest what is viewed as dishonesty than with a «fight fire with fire» strategy. In this scenario, it would obviously be better for such species to receive proper protection with traditional wildlife regulations and management techniques from the beginning.

Third, individuals from the scientific and environmental communities may often have unstated agendas that drive their actions, or the agendas may, in fact, be evident, but the recommended actions are nonetheless inappropriate and misplaced to achieve a seemingly justifiable end. For example, CMW was told by several state resource management agency employees that their agency did not want to see the downlisting of a certain species because the agency would then lose powerful control over the regulation of oil and mining development in some regions where the species occurred. Yet the species in question, the Peregrine Falcon *Falco peregrinus*, had not become endangered because of land use issues, nor was it classified as such to help with land use problems. In such cases, inappropriate actions are justified in order to achieve the stated end result of control over a resource.

In its original form and application, the ESA was well received by the general public, who enthusiastically supported this legislation as an overdue, non-controversial approach to protecting and assisting in the recovery of certain vertebrate species, e.g., the California Condor *Gymnogyps californianus* and Whooping Crane *Grus americana*, whose populations had been indisputably reduced to only a few individuals. Over time, some environmentalists recognized that the ESA was one of the few tools available to them that could be applied to saving particular *habitats*, an urgent need in many regions that is still not adequately addressed by appropriate legislation. Accordingly, numerous species, including obscure invertebrates and plants, were pressed into action to serve as ecological metaphors to protect specific ecosystems. This has led to an ever-broader definition of the term «endangered,» since some of these species are far more abundant and less threatened than the cohort of species on the original endangered species list. They are obviously listed as endangered, or proposed for such status, because of perceived threats to their habitat, not because they are truly endangered as species.

The following example encapsulates and illustrates some of the points of our thesis. In a thoroughly delightful, highly recommended, and historically important book entitled «The Firecracker Boys» the author, Dan O'Neill (1994),

sought to document his theme that during the attempts to promote nuclear power in a peaceful manner, science was abused, misrepresented, and manipulated to achieve social and economic agendas. Also fundamental to O'Neill's theme, was that the mere use of nuclear devices in the environment may be unjustified. Despite the book's overall excellence, the author used an unfortunate choice of wording in reporting on nuclear testing on Amchitka Island (1967-73) in the Aleutians (p. 273), mentioning that «twenty pairs of the *endangered* peregrine falcon» (emphasis ours) were placed at risk. His choice of the loaded word *endangered* provided a sort of implied validation to his theme of the negative aspects of the nuclear process. However, if ever there was a population of Peregrine Falcons not endangered, it was the one in the Aleutians. Indeed, it was perhaps the most secure peregrine population throughout the species' entire cosmopolitan range during the period of its global decline, and this was previously well documented in the literature (White *et al.* 1971, White *et al.* 1973, Fyfe *et al.* 1976, Cade *et al.* 1988). In fact, the 20 pairs reported represents a very high density for such a small (194 km of shoreline) island. The choice of wording may simply have been a lapse, but it helped reinforce the author's starting premise, while nevertheless misrepresenting the facts. The popular literature contains abundant examples of the similar use -- or misuse -- of the term *endangered* as an advocacy device.

We recognize that the sorts of topics we are exploring can cause hefty controversy. We also acknowledge that there are several points of view and that ours is but one of them. Scientists are never purely dispassionate observers of «reality» but frequently bring their own biases to their experiments and conclusions, and so perhaps the most favorable position on such thorny issues is to align with the instinct of the public and take the path of least resistance (cf. Kingdon 1984). Furthermore, we recognize that one's view of reality or «truth» may be driven by agendas and that agendas are usually clouded by some economic link. Our admitted agenda is to call attention to a trend in science that we think may ultimately have an effect opposite to the desired one. Herein we examine some of the issues alluded to above that surround the cases of two high profile raptor species in North America.

## CASE STUDIES

### Case One:

On 25 July 1992 the U.S. Department of Interior (1992) responded to a petition received on 19 July 1991 to emergency list the Northern Goshawk *Accipiter gentilis*, primarily the southwestern U.S. populations, as endangered. The petition (Silver 1991) was co-signed by ten environmental organizations.

The petition stated that goshawks had suffered a significant decline, particularly in the southwestern U.S., because of logging practices of the U.S. Forest Service (USFS), and it claimed that the goshawk was under threat of extinction. The arguments in the petition rested in large part on data from a paper by Crocker-Bedford (1990), and the basis of the case went something like this: Between 1985-1987 a study (Crocker-Bedford 1990) was conducted in the North Kaibab National Forest of northern Arizona, and 31 territories were reported in the study plot in 1987. Most of the nests were previously found between 1973-1984 during timber sale preparations. By 1990 only 27 territories were believed to remain in the same area (Silver 1981). From this sample of nests and their densities, a series of projections about pre-settlement landscapes and uniform goshawk densities were generated, and it was suggested that: (1) At pre-settlement perhaps 260 pairs bred there, but (2) by 1972 only 130 pairs remained, and (3) in 1988 only about 60 pairs remained on the forest. From these assumptions and projections the petition then suggested that there had been an 89% decrease in nesting pairs from the presumed pre-settlement numbers to 1990 and a 96% decrease in reproduction, all caused by forest management practices. An independent study in the same region in 1991-92 could not document any of the above projections (Reynolds *et al.* 1994). An adjacent forest in Utah, the Dixie National Forest, was said by some observers, although anecdotal (pers. comm. to CMW), to have fewer than five pairs of goshawks remaining, a decline also attributed to the overharvest of trees and clearcutting. Part of the overall problem was thought to be that management practices reduced canopy closure beyond the point at which goshawks would attempt nesting. The petition also indicated that only 83 goshawk territories remained throughout the Southwest (Silver 1991). Reductions in the Kaibab National Forest were said to be most critical because the goshawks in that forest formed an isolated population, yet, at the same time, it was purported to form the core or reservoir for other populations in northern Arizona, if not for those in adjacent states. Assumptions in the petition were also that the goshawk was at or below a minimum viable population level although there were no data to indicate how a so-called viable population statistic was arrived at.

The manner of presentation of these data made them difficult to analyze and confirm. It was clear, however, from the reading of the petition, that its major intent was to stop heavy timber cutting practices in forests. We, too, regard clearcutting as a generally destructive silvicultural practice, but it may be justified in some cases, especially as a conservation tool as suggested by Hagan (1995). Nevertheless, we feel that the practice of clearcutting and the reported biologically endangered status of goshawks are two completely different issues. The issue that demanded attention was that of silvicultural

practices, particularly clearcutting, not the status of the goshawk.

What do the data show relative to the claim that goshawks are endangered? First, the projection of pre-settlement goshawk density, distribution, and biological viability were taken as real data points in the petition. Second, conclusions were then based on these assumed historical estimates. Third, seemingly only USFS lands, an extremely small portion of the goshawk's extensive continent-wide range, were taken into account in determining the «health» of the species. There was no evidence in the documents presented, for example, that quaking aspen *Populus tremuloides* forest components, which contain large numbers of breeding goshawks (Younk and Bechard 1994), were considered in the extrapolations of forest area within the USFS land value used; apparently, only coniferous forests were included in the calculations. Fourth, if, in fact, the Kaibab Forest had contained the projected pre-settlement number of 260 pairs used as a baseline for judgement, the forest would have had an extremely high (and not particularly believable) density for a large highest trophic level predatory bird with what is presumably their available food base. The 95 territories documented for that forest in 1992 (Reynolds *et al.* 1994) represent a more realistic density. Even the latter figure of currently known densities shows that the Kaibab population contains one of the highest documented densities throughout the goshawk's North American range (Reynolds *et al.* 1994). Fifth, in 1992 over 720 goshawk nests were found on USFS lands alone in the lower 48 states, and by 1994 about 970 nests were known on USFS lands, including parts of southeast Alaska (D.A. Boyce, USFS Goshawk Coordinator, pers. comm. 1994). This increase in numbers resulted primarily from increased searching and reporting effort. On the Dixie National Forest, where it had been reported that there were only five pairs in 1989 (R. Rodriguez, pers. comm.), over 30 known active territories were documented in 1993 (Johansson *et al.* 1994). Probably more goshawks nest in Canada than throughout the entire U.S. and Mexico combined. Sixth, while the reproductive output for the years of the 1980s study might have been low, goshawks vary considerably in reproductive success year to year because of several factors, including weather conditions (e.g., deep spring snow) which produce fluctuations in prey availability. For example, in the Wasatch/Cache National Forest in Utah there was 76% nest success in 1992 (n=16), but after the severe winter of 1993 there was zero success (R. Rodriguez, USFS, pers. comm.).

We do not doubt that the northern goshawk may have lost some local populations here and there due to habitat loss or perhaps other reasons. We are personally familiar with many examples of such local loss. Two examples are the local loss of breeding Ferruginous Hawks *Buteo regalis* over the past two decades from a valley in west central Utah (Woffinden and Murphy 1989)

because of some still undetermined reasons, and the permanent reduction of Prairie Falcons *Falco mexicanus* from a canyon in northern Utah (White 1969) where housing developments encroached.

In summary, despite the tremendous focus of attention on this species in the West during the past five years, there are no convincing data that it fits the endangered category. Attempting to force such a label on it risks the credibility of both the scientists that do so and that of the ESA process.

### **Case Two:**

Based on available historical accounts, the 17 most western states of the U.S. (those westward from the plains) contained roughly 366 known historical (pre-1960) eyries of the Peregrine Falcon (Enderson *et al.* 1995). Given the uneven nature of the historical data base, this is an admittedly minimal estimate, but it provides a practical index of the peregrine's relative abundance and distribution in the region. By the early 1970s only about 35 eyries were known for the same region. Between 1947 to the early 1970s peregrines became extinct in the temperate eastern U.S. and Canada and were reduced to about 25-35% of their former numbers over vast portions of Alaska and northern Canada (Fyfe *et al.* 1976). California provides a typical example. Prior to 1946 about 100 successful breeding sites were known. By 1970 only about 3% of the known sites were occupied (Herman 1971).

These reductions, unlike the goshawk example that used many extrapolations, were based on actual counts of well known populations. The species was legitimately determined by the U.S. Fish and Wildlife Service (USFWS) to be endangered throughout much of North America and at least threatened in large portions of Alaska. This severe, well-documented reduction in numbers resulted almost entirely from the effects of synthetic organochlorine chemicals (see Cade *et al.* 1988). The principal culprit, the pesticide DDT, was restricted for domestic use in Canada in 1970 and in the U.S. in 1972 (EPA 1972). For the 17 western states, two separate recovery plans (see Porter and Marshall 1977) were approved in the 1980s. The Pacific Coast plan (California, Nevada, Washington, and Oregon) required recovery to a level of 122 pairs before downlisting from endangered to threatened could proceed (USFWS 1982). In addition, at the point when 185 pairs could be documented (at which time California itself should have reached 120 pairs) with a fledging rate of 1.5 young per eyrie, the species should be recommended for complete removal (delisting) from the T & E list. The plan covering the remaining 13 states, basically the Rocky Mountain/Southwestern states, called for a recovery target of 183 pairs (based on 228 known historical eyries), at which point the falcon's status should be reassessed for possible reclassification (USFWS 1984).

In summary, the two plans called for a goal of 305 eyries throughout those states with reproduction at some stated minimum level. Each plan also recommended that the eggshells should be at some lower level of thinning (e.g., within 10% of the pre-thinning values) and that eggs should contain reduced levels of chlorinated hydrocarbons (see USFWS 1994). Curiously, neither plan contained goals that coincided closely with the number of known historical eyries; for example, Utah had 42 documented pre-1960 eyries, but the plan called for a recovery to only 21 eyries.

By 1994 there were about 750 known pairs of peregrines in the western U.S., even though some states (e.g. New Mexico) submitted data based on incomplete surveys (Enderson *et al.* 1995). Using the specific examples cited above, California had 150 known pairs, and Utah had 140 known pairs (nearly three times the known historical level for this state) by 1994. Yet the Peregrine Falcon remains listed as endangered, and there is considerable resistance for even downlisting it to threatened status in some areas of the West. We argue that the intent of the ESA is compromised by continued inaction by both state and federal regulatory agencies in the face of compelling biological evidence that recovery of this species has been achieved in the West.

What are some of the factors and forces working to impede the species' downlisting or complete removal from the T & E list? Many of the objections to reclassification are generated by statements in the two former recovery plans. Unfortunately, some of the assumptions of those plans were best guess estimates, based on sketchy data, and can now be seen as inaccurate, or irrelevant. For example, there is really no «magical» rate of young that needs to be fledged to maintain a stable population. The number of young peregrines needed for recruitment depends on immigration and emigration rates, numbers of effective breeding pairs in the «population,» and mortality rates of immatures and adults. In the case of western peregrines it is not even known whether all these variables might be either density dependent or density independent. Without such knowledge any discussion of these variables lacks relevance to actual population status. Meanwhile, the USFWS has been, in a sense, held hostage by earlier documents that can now be seen as flawed, given the present state of our knowledge.

Other objections to downlisting (extracted from letters and documents submitted in 1993 to USFWS lead office for peregrine recovery implementation, Reno, NV) included: (1) combined elevated levels of chlorinated hydrocarbons and some continued eggshell thinning; (2) high turnover rates in some local populations; (3) certain local populations that may be too small to be self-sustaining; (4) an overall population too small to be genetically viable; (5) insufficient knowledge of population dynamics; (6) the present population, while superficially robust, merely reflects the impact of peregrine release programs, and the population might collapse if such programs are discontinued, and (7) fear that removal from intensive

management will facilitate another decline. Most of these objections were generated by local situations, and such questions as the reported high turnover rates, which might be related to movement of individual falcons rather than to mortality, cannot be answered with the existing data, given their largely provincial nature. In any case, despite assertions that the species is not self-sustaining, the number of breeding peregrine pairs has continued to climb at a rate of 5-10% per year in the West as a whole (Enderson *et al.* 1995), and this continues to occur years after the discontinuance of release programs (e.g., in California), or in presumably disjunct areas (e.g. southern Utah, Arizona, coastal Washington), where the release of captive-produced young never occurred.

## CONCLUSIONS

At the time of this writing, the Endangered Species Act is intact and robust, but it is in danger of being weakened through continued attempts within the U.S. Congress to amend, or even eliminate it. Opposition to the ESA is coming from strong politicians supported by powerful constituencies, including developers, agricultural interests, the military establishment, and other large-scale land users. Unfortunately, these lobbies are able to cite an increasing number of instances of the apparent misuse of the ESA by certain scientists and environmental groups in situations like the ones just described. Increasingly, petitions to list new taxa as endangered or threatened seem to have less to do with the precarious status of the particular species, but more to do with a perceived threat to the creature's habitat. Whereas there is general agreement among biologists and conservationists that the preservation of *habitat* diversity is among our most important conservation goals, the effect of using the ESA to accomplish this objective, however laudable it may be, is subjecting this valuable tool to extreme political risk. We suggest that this is not a sound strategy in a political sense and that it leads to overly zealous behavior by some that undermines our collective scientific credibility and public support.

As scientists, we should expose and challenge political agendas that would destroy the intent of the ESA, or sound conservation in general (cf. Hagan 1995). There is a continuing need for scientifically sound evidence that the general public (politicians included) can evaluate to show that the ESA works to restore rare species. Now, more than ever, there needs to be a greater realization by the general public that the loss of species, i.e., biodiversity, is an irreversible loss to all mankind. Strict integrity within the scientific community is required if we are to maintain the public trust. We must be the keepers of the philosophy and goals of the ESA and related legislation.

Several authors have described the pitfalls of how we use our language

and the importance of being reliable in the use of data with undetached agendas. For example, Marks (1993) presented an eloquent discussion of scientific accuracy. He quoted a study by the National Academy entitled «Responsible Science; Ensuring the Integrity of the Research Process» in which the author suggested that one of the most critical issues before us is «misrepresenting speculation as fact...especially in the public media, without providing sufficient data to allow peers to judge the validity...(p. 382).» Similarly, Brussard *et al.* (1994) articulated the dangers of scientists falling into the trap of promoting mixed or partisan agendas, rather than issues of scientific objectivity, and the resulting negative impact on the scientific community and our societies.

In summary, one of our prime obligations as scientists is to maintain professionalism. We should foster a stewardship of the ESA so that it will continue to be functional and serve its stated goals. As rightly pointed out by Gould (1990), we are continually searching for proper themes and language to express our environmental concerns. However, although it is often hard to find innovative ways to reverse landscape impacts that reduce biodiversity and may cause endangerment of species, we cannot allow the misapplication of the ESA to reduce its value. To paraphrase the words of a former politician we may ask, «...is not a million years...of evolving landscape and fragile beauty worthy of our most attentive stewardship...The ultimate test of man's conscience may be his willingness to sacrifice something today for future generations whose words of thanks will not be heard» (cited in Tobin 1990:270). We do not live in a generational vacuum.

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## ADDENDUM

This manuscript was originally written in autumn 1994. The minimum known number of breeding pairs of peregrines in the west has risen to 829 by 1995. On 30 June 1995 the U.S. Fish and Wildlife Service issued a notice of proposal to remove the peregrine falcon from the T&E list (Federal Register, vol. 60, no. 126:34406-34409). As of 1 May 1997 action on the falcon was still caught up in the political and legal system.



On 6 June 1996 the U.S. Fish and Wildlife Service Issued their findings on the petition, to list the Northern Goshawk, in the Federal Register vol.61.no.110: 28834-28835. They declined to list the hawk because of environmental groups had obtained a court ruling against the USFWS because of their findings, and the matter is tied up in the court system.

## REFERENCES

- BRAUN, C.E. 1995.** Distribution and status of sage grouse in Colorado. *Prairie Naturalist* 27: (in press).
- BRUSSARD, P.F., D.D. MURPHY, & C.R. TRACY. 1994.** Cattle and conservation biology--another view. *Conser. Biol.* 8:919-921.
- CADE, T.J. 1982.** *The Falcons of the World.* Comstock, Cornell Univ. Press, Ithaca, New York.
- CADE, T.J., J.H. ENDERSON, C.G. THELANDER, & C.M. WHITE. 1988.** Peregrine Falcon Populations: Their Management and Recovery. *The Peregrine Fund*, Boise, Idaho.
- CROCKER-BEDFORD, D.C. 1990.** Goshawk reproduction and forest management. *Wild. Soc. Bull.* 18:262-269.
- DESANTE, D.F., & T.L. GEORGE. 1994.** Population trends in the landbirds of western North America. *Studies in Avian Biol.* No. 15:173-190.
- ENDERSON, J.H., W. HEINRICH, L. KIFF, & C.M. WHITE. 1995.** Population changes in North American peregrines. *Trans. 60th North Amer. Wildl. Nat. Resour. Conf.* pp. 142-161.
- ENVIRONMENTAL PROTECTION AGENCY. 1992.** Consolidated DDT Hearings, Opinion and Order of the Administration. *Federal Register*, vol 37, no. 131:13369-13376, July 7, 1992.
- FYFE, R. W., S.A. TEMPLE, & T.J. CADE (EDS.). 1976.** The 1975 North American Peregrine Falcon survey. *Canadian Field-Nat.* 90:228-273.
- GOULD, S.J. 1990.** The golden rule--a proper scale for our environmental crisis. *Nat. Hist.* 9:24-29.
- HAGAN, J.M. 1995.** Environmentalism and the science of conservation biology. *Conser. Biol.* 9:975-977.
- HERMAN, S.G. 1971.** The peregrine falcon decline in California. II. Breeding status in 1970. *Amer. Birds* 25:818-820.
- JOHANSSON, C., P.J. HARDIN, & C.M. WHITE. 1994.** Large-area goshawk habitat modeling in Dixie National Forest using vegetation and elevation data. pp. 50-57. in: W.M. Block, M.L. Morrison, and M.H. Riser (eds.). *The Northern Goshawk: Ecology and Management.* *Studies in Avian Biol.* No. 16.
- KINGDON, J.W. 1984.** *Agendas, Alternatives, and Public Policy.* Little, Brown Co., Boston, Massachusetts.
- MANN, C.C. & M.L. PLUMMER. 1995.** *Noah's Choice; The Future of Endangered Species.* Alfred A. Knopf, New York.
- MARKS, J. 1993.** Scientific misconduct; where «just say no» fails. *Amer. Sci.* 81:380-382.
- MYERS, N. 1993.** The question of linkages in environment and development. *BioScience* 43:302-306.
- O'NEILL, D. 1994.** *The Firecracker Boys.* St. Martin's Press, New York.
- PARRISH, J.R., & C.M. WHITE. 1987.** C.I.T.E.S. Classification of the Gyrfalcon. *J. Raptor Res.* 21:40.
- PORTER, R.D., & D.M. MARSHALL. 1977.** The recovery team approach to restoration of

- endangered species. Proc. World Conf. on Birds of Prey, Vienna, ICBP, pp.314-319.
- RAVEN, P.H. 1990.** The politics of preserving biodiversity. *BioScience* 40:769-774.
- REYNOLDS, R.T., S.M. JOY, & D.G. LESLIE. 1994.** Nest productivity, fidelity, and spacing of northern goshawks in Arizona. *Studies in Avian Biol.* No. 16:106-113.
- SILVER, R.D. 1991.** Formal petition to list the isolated regional population of Northern Goshawk (*Accipiter gentilis*) in the southwestern United States. Correspondence to Mr. Secretary, Manuel Lujan, Department of Interior, Washington, D.C.
- TOBIN, R.J. 1990.** The Expendable Future: U.S. Politics and the Protection of Biological Diversity. Duke Univ. Press, Durham, North Carolina.
- U.S. DEPARTMENT OF INTERIOR. 1988.** Endangered Species Act of 1972, as amended through the 100th congress. U.S. Fish and Wildlife Service, Washington, D.C.
- U.S. DEPARTMENT OF INTERIOR. 1992.** Endangered and threatened wildlife and plants; notice of 90-day finding on petition to list the northern goshawk as threatened or endangered in the western United States. *Federal Register*. vol. 57. No. 123:28274-28276.
- U.S. FISH AND WILDLIFE SERVICE. 1982.** Pacific Coast American Peregrine Falcon Recovery Plan. Prepared in cooperation with the Pacific Coast American Peregrine Falcon Recovery Team. USFWS, Denver, Colorado.
- U.S. FISH AND WILDLIFE SERVICE. 1984.** American Peregrine Falcon Recovery Plan (Rocky Mountain/Southwest Population). Prepared in cooperation with the American Peregrine Falcon Recovery Team. USFWS, Denver, Colorado.
- U.S. FISH AND WILDLIFE SERVICE. 1994.** Addendum to the Pacific Coast and Rocky Mountain/Southwest American peregrine falcon (*Falco peregrinus*) recovery plans. Unpubl. ms. USFWS, Portland, Oregon.
- WHITE, C.M. 1969.** Population trends in Utah raptors, pp. 359-363. in: J.J. Hickey (ed.), *Peregrine Falcon Populations: Their Biology and Decline*. Univ. Wisconsin Press, Madison, Wisconsin.
- WHITE, C.M., W.B. EMISON, & F.S.L. WILLIAMSON. 1971.** Dynamics of raptors populations on Amchitka Island, Alaska. *Bio Science* 21: 623-627.
- WHITE, C.M., W.B. EMISON, & F.S.L. WILLIAMSON. 1973.** DDE in a resident Aleutian Island peregrine population. *Condor* 75:306-311.
- WOFFINDEN, N.D. & J.R. MURPHY. 1989.** Decline of a ferruginous hawk population: a 20-year summary. *J. Wildl. Manage.* 53:1127-1132.
- YOUNK, J.V., & M.J. BECHARD. 1994.** Breeding ecology of the northern goshawk in high-elevation aspen forests of northern Nevada. *Studies in Avian Biol.* 16:119-121.

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