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THE ARMY AND THE ENDANGERED SPECIES ACT:

WHO'S ENDANGERING WHOM?

A Thesis

Presented to

The Judge Advocate General's School, United States Army

The opinions and conclusions expressed herein are those of the author and do not necessarily represent the views of either the Judge Advocate General's School, The United States Army, or any other governmental agency.

David N. Diner

Major, U.S. Army

41ST JUDGE ADVOCATE OFFICER GRADUATE COURSE

APRIL 1993

THE ARMY AND THE ENDANGERED SPECIES ACT:

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ABSTRACT: Mankind is causing a mass extinction of plant and animal species. The Army, as steward of twenty-five million acres of public lands, is being asked to play an increasingly decisive role in recovering endangered species. At the same time, the increased range, mobility, and lethality of modern weapons requires larger training areas, and pressures the dwindling habitats of many such species. This study examines the conflict between the Army and its endangered species, and proposes a methodology to allow both to coexist.

THE ARMY AND THE ENDANGERED SPECIES ACT:

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DAVID N. DINER

MAJOR, U.S. ARMY

I. INTRODUCTION

The last word in ignorance is the man who says of an animal or plant: "What good is it?"[1]

Aldo Leapold

We are living during the greatest mass extinction of plant and animal species in the past 250 million years.[2] Certainly, animal extinction is nothing new. Approximately ninety percent of all species that have inhabited the earth are no longer alive.[3] What is new is the cause and rate of extinctions. Extinctions have accelerated from a natural "background" level of perhaps a few species per million years, to a current level of approximately one species per day.[4] By the end of this century, the rate could increase to thousands or tens of thousands of species extinguished each year.[5] What is also unique, is that one species is the primary cause of these extinctions: Homo sapiens.

In 1973, the United States Congress acted to stem the tide of animal extinctions and passed the Endangered Species Act (ESA).[6] Finding that extinction had been caused by, "[E]conomic growth and development untempered by adequate concern and conservation,"[7] Congress designed the Act to conserve endangered species and their threatened ecosystems.[8] The ESA contains a comprehensive program to identify endangered and threatened species, and prohibit their being "taken"[9] by any person. The Act also strictly limits federal agency action that may affect listed species, and imposes an affirmative duty on these agencies to conserve such species.

The United States Army owns or administers approximately 25 million acres of land within the U.S.,[10] making it the fifth largest steward of federal lands. As the range and lethality of modern weapons have increased, so has the Army's need for training space. Army leaders insist on tough, realistic training, allowing soldiers to utilize their weapons and vehicles much as they would in actual combat. At the same time, efforts to save money have caused scores of Army installations to close or be proposed for closure, further reducing available training land.

While the pressure on Army training areas rise, so does the number of endangered species.[11] Destruction of old-growth and other valuable habitat on private lands has increased the

necessity of recovering listed species on federal lands. In many cases, species have disappeared from private lands, and exist only in national parks, forests, and military installations. The Army is seemingly on a collision course with endangered species and the law that protects them. Can it be that Congress intended an "[U]ndistinguished woodpecker,"[12] fish, slug, wolf, or tortoise to threaten the training and combat effectiveness of the forces guarding the nation? Can the Army exist in peace with animals while training for war with humans?

My answer to the latter question is yes. To achieve this end, I propose a proactive and scientific approach to managing endangered species on Army lands. My plan adopts an interdisciplinary focus, involving cooperative efforts among Army biologists, lawyers, trainers, and commanders. If adequate resources are committed to this strategy, the Army can accomplish its mission and conserve endangered species.

The Endangered Species Act is equal parts science and law, and understanding the Act requires a working knowledge of biology and the process of extinction. I will explore this science by examining the biology of three animals: the red-cockaded woodpecker, the Mexican gray wolf, and the desert tortoise. These species exemplify the Army's ESA experience.

Critical to understanding my thesis, is an appreciation of the desperate problem posed by plant and animal extinctions. We are hemorrhaging life, and compromising the stability of the global ecosystem; an ecosystem we depend upon for existence. To understand why, we must turn to the origins of life on this planet and examine the phenomenon of extinction.

II. THE SCIENCE OF EXTINCTION

A. IN THE BEGINNING

The earth was formed from a cloud of celestial gasses about 4.6 billion years ago.[13] Life on earth began approximately 3.5 billion years ago.[14] The first animals appeared 750 million years ago, the first reptiles-320 million years ago, the first mammals-220 million years ago, the first birds-145 million years ago, and the first humans-300 thousand years ago.[15]

During this 750 million year period extinctions have been a fact of life.[16] A "background" or normal level of extinction has occurred at a fairly constant rate of perhaps three or four species per million years. These extinctions were local in character and resulted from normal evolution and competition between species for food, resources, and ecologic niches.[17]

B. MASS EXTINCTIONS

Separate from the background extinctions discussed above were eras of vastly accelerated species loss called mass extinctions. These eras were characterized by rapid (geologically speaking) loss of life forms on a regional or global scale. Entire biological classifications of life were wiped out.[18] The cause of these mass extinctions is not clear, but most theories involve global and catastrophic climate changes that radically altered the environment.[19]

During the past 750 million years, there have been nine such periods of mass extinction.[20] One particularly cataclysmic episode occurred at the end of the permian[21] period. During this time, seventy to ninety percent of the world's species became extinct.[22] Land species and sea species were impacted worldwide, although sea species were affected most. Possible causes include radical changes in sea level and salinity, cosmic radiation, and trace element poisoning.[23] The length of this mass extinction was several million years. The extinction rate during this period was approximately 190 taxonomic[24] families per million years.[25] Through the process of respeciation, the earth was eventually able to rebuild the inventory of species, *but it took approximately 110 million years*. It was not until the late jurassic[26] period that the number of taxonomic families equalled pre-permian mass extinction levels.[27]

The most famous episode of mass extinction occurred in the late cretaceous period, ending approximately sixty-five million years ago. This was the mysterious period when dinosaurs became extinct. For more than 100 million years, dinosaurs and other great reptiles were the dominant form of life on earth. Great herds of dinosaurs roamed what is now the western United States, rivaling in numbers and diversity the herds of mammals that populated the grasslands of Africa early in this century.[28] Mammals existed, but were small, inconspicuous, and poorly developed by modern standards, probably living in terror of the preying herds of carnivorous dinosaurs.

Yet, for all their dominance, the dinosaurs disappeared in the geological blink of an eye. Mammals, however, were virtually unscathed.[29] The total extinction of the dinosaurs allowed the small, rodent-like mammals to rise to ascendancy in a process called radiated speciation, and colonize the world. Without the extinction of the dinosaurs, man would not have evolved.[30]

There are many theories to explain the demise of the dinosaurs and other creatures that disappeared during the late cretaceous mass extinction. They range from terminal constipation,[31] to increased volcanic activity, to acid rain, to catastrophic impacts with celestial bodies.[32] Even during this period of mass devastation, when whole taxonomic orders of life

were being obliterated with headspinning rapidity, probably no more than one species became extinct each thousand years.[33]

This was the "great dying" that has so captivated the imagination of a generation of paleontologists and school children. This was the last great "natural" extinction;[34] the last extinction to predate the arrival of man.

C. THE NEW MASS EXTINCTION

1. How Many Species are There?

Man evolved into a recognizable species about 300,000 years ago.[35] By 40,000 years ago truly modern man had evolved, indistinguishable from humans today.[36] At first, humans had minimal impact on animal populations. They lacked the speed, strength, and natural weapons of more successful predators. But, as the human population grew, and technological innovations in weapons and tactics evolved, man proved capable of hunting animals to extinction.[37] By 1600 A.D., man had overtaken natural processes as the greatest cause of animal extinctions.[38] Between 1600 A.D. and 1900 A.D. man extirpated about seventy-five species. Another seventy-five species were driven out of existence by 1960.[39] Since 1960, the rate has grown dramatically, with as many as 1000 species per year becoming extinct as a direct consequence of human activity types.

Nobody knows how many species of plants and animals there are in the world. Estimates vary between three and ten million.[40] Approximately 1.5 million species have been identified, of which forty percent are concentrated in the tropical rainforests that comprise about seven percent of the earth's land mass.[41] There may be one million species or more in the Amazon basin alone. The distribution of the world's identified species is summarized below:

SPECIES TYPE	NUMBER OF SPECIES
Mammals	4,100
Birds	8,600
Reptiles	6,500
Amphibians	2,600
Fish	20,000
Higher Plants	250,000
Insects	1,200,000
TOTAL:	**1,491,800**[42]

As many as twenty-five percent of these (and the unidentified species) may be lost in the next quarter century. Assuming there are five million species in the world, then one million species or more may become extinct.[43] This would amount to a loss rate of 40,000 species per year, or about forty million times the rate of extinction of the dinosaurs.[44]

2. Why are They Dying?

Humans can cause animal extinctions directly by over hunting. Even species with abundant populations can be eradicated with astonishing swiftness once man (the greatest predator species to ever live) decides to hunt in earnest.[45] Man kills for meat, fur, hides, horns, ivory, and sport. Man also kills to prevent competition from predator species such as wolves and coyotes.[46] Humans also cause extinctions indirectly through habitat destruction. Although not as spectacular or obvious as the direct taking of species through hunting, habitat destruction poses the far greater threat. It also presents the more difficult issues of land use, deforestation, and economic development.[47]

There are over 200 nations in the world and almost five billion people.[48] Since prehistoric times, ever growing human populations, coupled with advancing technology and aspirations, have pressured the habitat of animals and plants. Disruptions can be physical, chemical, or biological.[49] Physical disruptions include clearing land, planting crops, building homes and businesses, building dams, filling wetlands, and the like. Chemical disruptions involve spreading pesticides and insecticides, and industrial and agricultural pollution. Biological disruptions involve importing non-native species that compete and interact with native species in often unintended ways.[50]

These processes are well advanced in many parts of the world, and just beginning in others. Western Europe has been eighty percent deforested since 900 A.D. for cropland,[51] and only a small fraction of old-growth forest remains in the U.S. Many of the animals associated with these habitats are extinct or displaced[52]. In terms of potential species loss, the most critical habitat is the tropical rainforests.[53]

The Amazon basin is the world's largest tropical rainforest. It contains 1.235 billion acres of land, and drains into the sea one-fifth of the world's fresh water.[54] It contains an awesome collection of plant and animal species, of which only fifteen percent have been identified by science.[55] It has been said that man knows more about the moon than the interior of the great tropical rainforest.[56]

The rainforests are being relentlessly destroyed. Unlike some temperate forests, they lack the capacity to regenerate themselves. Once a tropical rainforest is destroyed, it and its animal inhabitants are gone for good. Because of the rainforest's poor soil quality. Most of the nutrients relied upon by the trees are contained in rotting leaves and vegetation on the forest floor. Once the forest is cleared, the soil is capable of sustaining crops or grazing cattle for only a few years. After that, wind and erosion turn the once lush forest

into a wasteland.[57] Pressure from expanding and desperately poor populations continue the cycle.[58]

These factors have combined to create an unprecedented extinction spasm. Comparing the current mass extinction with those of the past, demonstrates how serious it is:

EXTINCTION PERIOD	EXTINCTION RATE[59]
Background	3-4 Per Million Years[60]
Late Permian	190 Genera Per[61] Million Years
Late Cretaceous	1 Per Thousand Years[62]
1600-1900 A.D.	1 Per Four Years[63]
1901-1980 A.D.	1 Per Year[64]
1981-1999 A.D.	1 Per Day[65]
2000-2025 A.D.	109 Per Day[66]

D. THE VALUE OF BIOLOGICAL DIVERSITY

1. Why Do We Care?

No species has ever dominated its fellow species like man. In most cases, we have assumed the God-like power of life and death, extinction or survival, over the plants and animals of the world. For most of history, mankind pursued this domination with a single-minded determination to master the world, tame the wilderness, and exploit nature for the maximum benefit of the

human race.[67] We know that in past mass extinction episodes, as many as ninety percent of the existing species perished, and yet the world moved forward, and new species replaced the old. So why should we be concerned now?

The prime reason is our own survival. Like all animal life, we live off other species. At some point the number of species could decline to the point where the ecosystem fails, and then we too would become extinct. Nobody knows how many species are needed to support human life, and it is not sound policy to find out. In addition to food, species offer many direct and indirect benefits to mankind.[68]

2. ECOLOGICAL VALUE

Ecological value is defined as the value that species have in maintaining the functioning of the environment. Pest,[69] erosion, and flood control are prime benefits certain species provide to man. Pollution control,[70] oxygen production, sewage treatment, and biodegradation are other ecological services provided by plants and animals.[71]

3. SCIENTIFIC AND UTILITARIAN VALUE

Scientific value is defined as the use of species for research into understanding the natural world.[72] Without plants and animals, a large portion of basic scientific research would be impossible. Utilitarian value is the direct benefit humans

derive from exploiting plants and animals.[73] Only a fraction of the earth's species have been examined, and mankind may someday desperately need the species that are being wiped out today.

It may be difficult to accept that the snail darter, harelip sucker, or Dismal Swamp southeastern shrew,[74] could save mankind. Many, if not most, species are useless to man in a direct utilitarian sense. Nonetheless, they may be critical in an indirect role, because their extirpation could negatively affect a directly useful species. In a closely interconnected ecosystem, the loss of each species affects other species dependent upon it.[75] Moreover, as the number of species decline, the affect of each new extinction on the remaining species increases dramatically[76]

4. BIOLOGICAL DIVERSITY

The main premise of species preservation is that diversity is better than simplicity.[77] As the current mass extinction progresses, there has been a general decrease in the world's biological diversity. This trend occurs within ecosystems by reducing the number of species, and within species by reducing the number of individuals. Both trends carry serious future implications.[78]

Biologically diverse ecosystems are characterized by a large number of specialist species, filling narrow ecological niches.

These ecosystems are inherently more stable than less diverse systems: "The more complex the ecosystem, the more successfully it can resist a stress...[l]ike a net, in which each knot is connected to others by several strands, such a fabric can resist collapse better than a simple, unbranched circle of threads- which if cut anywhere breaks down as a whole."[79]

By causing widespread extinctions humans have artificially simplified many ecosystems. As biologic simplicity rises, so does the risk of ecosystem failure. The spreading Sahara desert in Africa, and the dustbowl conditions of the 1930s in the U.S. are relatively mild examples of what might be expected if this trend continues. Theoretically, each new animal or plant extinction, with all its dimly perceived and intertwined affects, could cause total ecosystem collapse, and human extinction. Certainly, each new extinction increases the risk of disaster. Like a mechanic removing, one by one, the rivets from an aircraft's wings,[80] mankind may be edging closer to the abyss.

III. THE ENDANGERED SPECIES ACT

A. INTRODUCTION

"It is further declared to be the policy of Congress that all Federal departments and agencies shall seek to conserve

endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this act."[81] In 1973, with these words, the United States Congress launched federal agencies deeply into the arena of wildlife conservation. The Endangered Species Act was the method Congress selected to deal with the problem of diminishing biological diversity. Its goal was nothing short of reversing the greatest mass extinction of the past 250 million years.

Sometimes called the "pit bull" of U.S. environmental statutes,[82] the Act is comprehensive and broad reaching. The Supreme Court, in reviewing the Act stated: "[t]he plain intent of Congress in enacting [the ESA] was to halt and reverse the trend toward species extinction, whatever the cost."[83] Although it has been able to modestly change the behavior of deeply entrenched economic and political interests, it has, in many respects, failed to live up to its promise.[84]

Largely neglecting ecosystem preservation, the Act instead focuses on a species-by-species protection scheme. The ESA does nothing to protect species in even severe decline until the species is "in danger of extinction over all or a significant portion of its range,"[85] or likely to become so.[86] At this point, recovery of the species may be excessively difficult and costly, if possible at all. Still, by its clear expression of U.S. national policy, and recognition of the value of species, the ESA

galvanized public opinion and debate on the issue of disappearing plant and animal species.

The ESA was not the first federal foray into wildlife conservation. As early as 1894, hunting was prohibited in Yellowstone National park,[87] and in 1900 the Lacey Act was enacted,[88] providing for limited conservation of wild birds. This was the first true acknowledgement that species protection and restoration was in the national interest.[89] A system of wildlife refuges was well established by the 1930s.

In the 1960s the impetus for the modern species conservation movement began to grow.[90] Several high profile extinctions and near extinctions served to advance the issue in the national consciousness.[91] In 1964, the Interior Department formed a Committee on Rare and Endangered Species, and issued the first official list of endangered species.[92] The plight of endangered species became a powerful rallying point for the burgeoning U.S. environmental movement of the late 1960s.

In 1966 and 1969, Congress passed limited endangered species statutes.[93] These statutes provided protection for endangered native species of fish or wildlife, but only if they faced actual extinction. Plant species were not protected at all. Most importantly, federal agencies were only required to conserve endangered species to the maximum extent consistent with their

mission.[94] In a case of conflict between an agency mission and an endangered species, the species were not afforded the necessary protection.[95]

In 1973, priorities changed. Following the passage of the ESA, Federal agencies could no longer place mission requirements over the survival of endangered species.

The Act also extended protection to plant species and created a lessor category of protection for species not yet on the brink of extinction, but likely to become endangered within the foreseeable future.[96] Finally, unlike the previous statutes, the ESA contained a broad prohibition (including criminal penalties) against taking an endangered species.

Riding a groundswell of public support, the ESA was enacted virtually unopposed. Few lawmakers apparently envisioned the bitter competition between owls, darters, power plants and loggers that the Act would engender.[97]

The ESA has three key provisions: Section Four, dealing with listing endangered and threatened species; Section Seven dealing with the affirmative obligations of federal agencies; and Section Nine prohibiting the taking of listed species.[98]

B. LISTING OF SPECIES

1. THREATENED OR ENDANGERED SPECIES

The Secretary of the Interior and the Secretary of Commerce share responsibility for administering the listing provisions of the ESA. The Secretary of the Interior has authority for listing land animals, and has delegated this authority to the U.S. Fish and Wildlife Service (FWS).[99] Because of the species by species approach to preserving biological diversity taken by the ESA, great significance is placed on whether a species is a "listed" species. Essentially, a species receives no protection unless it is listed.[100]

A species, subspecies, or group of species may be listed when the Secretary determines that they are either threatened or endangered.[101] Once a species is listed, it may only be removed from the list if the Secretary of Interior finds that the species has become extinct, has recovered so it is no longer threatened or endangered, or the original listing decision was in error.[102]

Significantly, the Secretary of Interior must base his or her decision to list a species *solely* on the best available scientific and commercial information. The Secretary may not consider the possible economic impacts of the decision.[103]

2. DESIGNATION OF CRITICAL HABITAT

The Secretary is also required to make a determination of a listed species' critical habitat,[104] "to the maximum extent prudent and determinable" at the time the species is proposed for listing.[105] In designating critical habitat, the Secretary considers not only the best scientific and commercial data available, but also the economic and other impacts of the decision. The Act balances these competing factors by permitting the Secretary to exclude an area from designation as critical habitat if the, "benefits of such exclusion outweigh the benefits of specifying such area as part of critical habitat, unless he determines...the failure to designate such area...will result in the extinction of the species concerned."[106]

Interestingly, the implementing regulations speak solely to the meaning of "prudent and determinable", in designating critical habitat. They make no mention of the balancing of benefits required of the Secretary under §1533(b)(2) of the Act[107]. Under the regulations, critical habitat must be designated at the time of listing, unless the species would be harmed by the designation,[108] or there is insufficient information available to make the determination.

These would appear to be relatively rare exceptions. In practice, however, critical habitat has been designated for only about twenty percent of listed species, and that percentage has

been relentlessly declining.[109] In 1986, concurrent critical habitat designation was made in only four out of forty-five cases.[110] From 1980 through 1988, the FWS declined to list critical habitat concurrently with listing an endangered or threatened species in 320 cases. In 317 of these cases, it found critical habitat designation would not be prudent.[111]

The reasons are evident. There is often intense pressure on the FWS by political, commercial, and economic interests to avoid designation. These groups fear that a designation of critical habitat will negatively impact on land use in a particular area.[112] Conversely, environmental preservationists put pressure on the FWS to designate critical habitat, in many cases, not so much to protect the endangered species, but to protect the habitat itself. Because there is no general land use statute in the U.S., the ESA has been forced to do what it was not intended to do: arbitrate land use and development questions between developers and preservationists. Its species-by-species approach leaves it ill suited to the task. Some commentators have called for such a general land use law as a solution.[113]

3. RECOVERY PLANS

Recovery plans form the heart of the ESA's approach to the preservation of biological diversity. The ESA requires the Secretary to develop plans for each listed species unless he finds that, for a particular species, a plan would not promote

the conservation of a species.[114] The recovery plans are complex scientific documents listing the details of how a species will be saved. Each must contains:[115]

1. a description of such site-specific management actions as may be necessary to achieve the plan's goal for the conservation and survival of the species;

2. objective, measurable criteria which, when met, would result in a determination, in accordance with the provisions of this section, that the species be removed from the list; and

3. estimates of the time required and the cost to carry out those measure needed to achieve the plan's goal and to achieve intermediate steps toward that goal.

The type of conservation embodied in recovery plans goes far beyond merely providing passive protection to a species. The plans outline affirmative management steps required from a host of agencies and organizations. They utilize a team approach and require extensive coordination and administrative skill to successfully implement.[116] They are also a very costly approach to species conservation, largely because of the individual approach taken. As of 1991, the FWS had 276 approved recovery plans, covering 363 domestic species.[117]

There have been some notable recovery success stories, such as the American bald eagle, American alligator, and peregrine falcon.[118] But overall, the record has been spotty.[119] Many of the plans are outdated, and less than half are being actively implemented.

C. INTERAGENCY COOPERATION

1. THE CONSULTATION REQUIREMENT

Section 7(a)(2) is the single most critical provision of the ESA. It requires federal agencies to "consult" with the Secretary to insure that agency action is not, "likely to jeopardize the continued existence of an endangered species or a threatened species..."[120] The federal agency (called the action agency) must also consult to ensure that their actions will not result in the, "destruction or adverse modification of [critical] habitat of such species..."[121]

The implementing regulations broadly define the term "action" as, "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal Agencies in the United States or upon the high seas."[122] This includes actions where a federal agency is the approval or permitting authority for a project.[123] For terrestrial species, FWS is the delegee of the Secretary of the Interior for engaging in consultations with federal agencies, and is generally called the

consulting agency. For marine species, the consulting agency is the National Marine Fisheries Service.

Concern over the welfare of candidate species (those proposed for listing) prompted Congress to insert Section 7(a)(2). This section requires federal agencies to "confer" with the Secretary on actions likely to jeopardize the continued existence of those species, or in the destruction or adverse modification of proposed critical habitat.[124] The conferences are "informal discussions" that result in non-binding recommendations by the FWS to minimize or avoid the adverse impacts.[125]

The Section Seven consultation requirements apply only to discretionary agency actions.[126] If an action agency is required to take a particular action by law, there is no point in requiring a meaningless consultation.

Section 7(a)(2) spawned a host of litigation.[127] The most famous case is *Tennessee Valley Authority v. Hill*,[128] where a three inch fish (snail darter)[129] stopped the $100 million Tellico dam project. *Hill* was a defining moment for the U.S. environmental movement in general, and for the ESA in particular. In *Hill*, the Supreme Court was faced with the certain eradication of the snail darter on one hand, or the cancellation of the almost complete Tellico dam on the other.[130] The court ruled that Congress had made a conscious choice, in enacting the ESA, to

give endangered species priority over the primary missions of federal agencies, holding::

> It may seem curious to some that the survival of a relatively small number of three-inch fish among all the countless millions of species extant would require the permanent halting of a virtually completed dam for which Congress has expended more than $100 million...[w]e conclude, however, that the explicit provisions of the Endangered Species Act require precisely that result. One would be hard pressed to find a statutory provision whose terms were any plainer than those of section seven of the Endangered Species Act...[t]his language admits of no exception.[131]

This decision provoked a firestorm of protest from the Tennessee Valley Authority and other development organizations, and stunned surprise from many lawmakers who seemed not to have realized the implications of the act they had voted for with such enthusiasm.[132] Eventually, Congress amended the ESA extensively and voted to let the Tellico dam open.[133]

2. BIOLOGICAL ASSESSMENT

Agencies are required to review their actions and determine if any, "may affect listed species or critical habitat."[134] If so, the consultation requirements of Section 7(a)(2) are

triggered. If consultation is required, the agencies must first determine the "action area", or the area to be affected directly or indirectly by the proposed action.[135]

A biological assessment is then required if the proposed action is a major construction activity.[136] Conducting a biological assessment is optional otherwise. The biological assessment is designed to thoroughly and scientifically evaluate the effects of the proposed action on listed species and critical habitat in the action area.[137] The biological assessment gives the action agency their shot at the "science" of a project, and allows them to favorably influence the consulting agency if the assessment is properly performed. For this reason, it is often advisable to prepare a biological assessment even for actions not strictly requiring one.

3. INFORMAL AND FORMAL CONSULTATIONS

The next stage is initiating consultations. These consultations may be either formal or informal. Informal consultations are initiated at the action agency's option, and consist of informal discussions and other contacts between the action and consulting agencies.[138] They are supposed to assist the action agency in determining whether formal consultations are necessary. Their major attraction is that, if the agencies can agree that the proposed action is not likely to adversely affect a listed species or critical habitat, further consultation is not

required.[139] Any opinion by the FWS that a proposed action is likely to jeopardize the continued existence of a listed species or critical habitat, requires formal consultation.

Formal consultations are initiated by written request from the action agency.[140] During formal consultations, the action agency must provide the best available scientific and commercial data to evaluate the effects of the proposed action on listed species and critical habitat.[141] Normally, formal consultations must conclude within ninety days of their initiation.[142]

In *Lane County Adubon Society v. Jamison*,[143] the Bureau of Land Management(BLM) was challenged for its failure to consult with the FWS over its strategy for managing approximately 1,149,954 acres of old growth, northern spotted owl habitat. The BLM claimed that the strategy was not an agency action requiring consultation, but merely a voluntarily created "policy statement." The BLM further argued that each individual decision to allow logging in the old growth forest would be submitted for consultation. The Court disagreed, upholding the District Court's injunction, pending the proper consultations. The Court ruled that the management strategy set forth the criteria to be used in selection of land to be logged, and thus it was, independent of the actual timber sales, an agency action.[144] This continued the trend towards a very expansive definition of "agency action."

After the consultations are over, the action agency has a continuing obligation to comply with Section Seven. In *Sierra Club v. Yeutter*,[145] the U.S. Forest Service (USFS) adopted management practices for the red-cockaded woodpecker, and consulted with the FWS about them. The practices were approved with monitoring requirements by the FWS. Ultimately, the Sierra Club sued the USFS, alleging that the management practices violated, *inter alia*, Section Seven of the ESA, because they threatened the continued existence of the woodpecker. The Court, upholding the District Court judgment, ruled that the USFS, even after consultations, had the burden of determining whether its silvicultural practices violated Section Seven.[146]

4. BIOLOGICAL OPINION

At the conclusion of formal consultations, the consulting agency issues its biological opinion. This opinion provides the consulting agency's views on whether the proposed action is likely to jeopardize the continued existence of any listed species or critical habitat.[147] There are two general types of opinions the consulting agency can issue: the "no jeopardy biological opinion,"[148] and the "jeopardy biological opinion."[149] If the consulting agency issues a jeopardy opinion, it is required to identify "reasonable and prudent alternatives"[150], if any, that will, if implemented, allow the action agency to go forward with the action. The reasonable and prudent alternatives cannot change the basic design and scope of the

project. They are simply other methods of accomplishing essentially the same object, without the negative impacts.

In the recent case of *Greenpeace v. Franklin*,[151] the Ninth Circuit Court of Appeals articulated the measure biological opinions must meet to survive review on an "arbitrary and capricious" standard. Greanpeace alleged that the NMFS had violated Section Seven by issuing a no jeopardy biological opinion allowing excessive pollack fishing. The pollack are the main food source of the endangered stellar sea lion. The Court ruled that the biological opinion was adequate even though it relied on some data that was uncertain, and could not accurately predict the impact on the sea lion. As long as the NMFS analyzed all of the available data, and premised its opinion on a reasonable evaluation of that data, the opinion was acceptable.[152]

5. INCIDENTAL TAKE

If the consulting agency issues a no jeopardy biological opinion, or a jeopardy opinion with reasonable and prudent alternatives, they also include an incidental take statement.[153] This statement sets forth how many individual members of a species can be permissively taken in conjunction with the action agency's proposed action. This recognizes the impossibility of not taking some members of a species when implementing an action. As long as the requirements of the incidental take statement are met, the taking is lawful.[154] The incidental take statement also

contains measures the action agency must take,[155] in order to minimize the impact of the taking, as well as monitoring and reporting requirements.

6. IMPLEMENTATION RECORD OF SECTION SEVEN

How well has Section Seven worked? Although Section Seven raised fears among developers of widespread cancellation and delay of projects, the numbers do not bear this out. Of the consultations conducted between 1979 and 1986, less than one percent resulted in jeopardy opinions.[156] Between 1982 and 1984, the FWS conducted 18,670 consultations.[157] Of these, only 922 were formal consultations, and of these, only 86 received jeopardy opinions. Of these 86, only 14 projects were cancelled.[158] In the vast majority of cases, it has been possible to design mitigating measures into the projects that avoid conflicts with endangered species.[159]

Delay has not been a serious problem either. The 922 formal consultations that took place between 1982 and 1984 averaged only fifty days to finish. Even those resulting in jeopardy opinions required only an average of ninety days.[160]

The use of formal consultation has decreased dramatically. Formal consultations made up approximately thirty-eight percent of all consultations in 1979, but only four percent in 1989.[161] Part of this decrease was due to the additional time and cost of

a formal consultation. Although the number of consultations conducted annually have increased fourfold, the FWS consultation budget remained roughly constant. Another part of the decrease was due to the increasing knowledge and experience of the action agencies in planning and assessing projects. Overall, Section Seven has succeeded in injecting endangered species consideration into the planning and implementing of federal actions.

7. DUTY TO CONSERVE SPECIES

Section 7(a)(1) of the ESA[162] requires all federal agencies to, "carry out programs for the conservation[163] of endangered species and threatened species listed pursuant to section 4 of this act."[164] In the early years of the ESA, Section 7(a)(2) received most of the attention as litigants sought to define agencies' duties to avoid jeopardizing listed species.[165] Recently, Section 7(a)(1) began to attract attention from courts, agencies, and litigants, as the importance of agencies' duties to conserve species became more appreciated. Still, there are relatively few cases in this area.

While the duty to conserve listed species under Section 7(a)(1) is mandatory, the agencies have substantial discretion in selecting and implementing their programs. They certainly have more discretion than they have in meeting their Section 7(a)(2) obligations.[166] Unlike the mandatory findings of section 7(a)(2), the consulting agency may provide "conservation recommendations"

with the biological opinion.[167] These recommendations are "advisory and not intended to carry legal force."[168] Unlike the detailed regulations promulgated to implement Section 7(a)(2), the consulting agencies have not issued regulations implementing Section 7(a)(1).

Like Section 7(a)(2), Section 7(a)(1) contains a provision requiring consultation with the Secretary in, "utilizing [the agencies'] authorities in furtherance of the provisions of this act..."[169] The action agencies, however, view their consultation requirements under Section 7(a)(1), differently from those in Section 7(a)(2). The lack of mandatory regulations covering these consultations tends to support the action agencies' views. The courts have recognized that agencies have considerable discretion in carrying out their conservation duties under section 7(a)(1).

The first court to address Section 7(a)(1) was the Supreme Court in *Tennessee Valley Authority v. Hill*.[170] In *Hill*, the Court firmly rejected the notion that an agency's primary mission took priority over its duty to conserve listed species, noting that Congress had carefully omitted any such language from the final version of the act.[171]

In *Carson-Truckee Water Conservancy District v. Watt*,[172] the Ninth Circuit Court of Appeals recognized that an agency had

"some discretion" in selecting conservation measures, but declined to define the scope of the discretion or the section 7(a)(1) conservation obligation.[173]

The leading case in this area is *Pyramid Lake Paiute Tribe of Indians v. Navy*.[174] *Pyramid Lake* involved a challenge to the Navy's agricultural outlease program at Fallon Naval Air Station, Nevada. Under this program, the Navy leased land, and associated irrigation water rights, to farmers to grow vegetated buffer strips adjacent to air strips at the installation. The buffer strips were necessary to maintain safe flight conditions on the air strips. Irrigating the buffer strips required diversion of water from the Truckee River, which reduced the water flowing into Pyramid Lake. Pyramid Lake is located on the Pyramid Lake Indian Reservation, and is the sole habitat of the endangered cui-ui fish. Increased flow of water into Pyramid Lake was stipulated by the parties to be necessary in order to conserve and recover the cui-ui.

The plaintiffs were an indian tribe living along the lake. They sought to enjoin the Navy outlease program, claiming it violated the Navy's duty not to jeopardize, and to conserve the cui-ui under Sections 7(a)(2) and 7(a)(1) of the ESA. The district court ruled in favor of the Navy on both provisions, holding that non-interior agencies are entitled to "some

discretion" in carrying out their duty to conserve listed species under Section 7(a)(1).[175]

The Ninth Circuit affirmed, holding first on the Section 7(a)(2) claim, that the Navy's reliance on FWS "no jeopardy" opinions was not arbitrary and capricious.[176] Next, the Court addressed the Section 7(a)(1) claim, holding that federal agencies have some discretion in carrying out conservation activities, but rejecting the Navy's position that the degree of conservation exercised only needed to be "consistent with the agencies primary goals."[177] The Court then rejected the Tribe's contention that the Navy be forced to implement the Tribes's conservation plan, finding that the Tribe's plan would have only an insignificant impact on the water levels in the lake. The court reasoned:

> An insignificant conservation measure in the context of the ESA is oxymoronic; if the proposed measure will be insignificant in its impact, how can it serve the ends of conservation, and thus be a 'conservation measure'?" To require an agency to implement such a measure would be ill advised. This position...coincides with the wording of the Act, which... defines conserve to mean 'the use of all methods and procedures which are

necessary to render a species no longer subject to the label endangered.'[178] (citation omitted).

The Court specifically distinguished this case from *Hill*, noting that in *Hill*, the Court was faced with the almost certain eradication of a species. The Court also placed weight on a series of mitigation measures the Navy offered to implement to help the cui-ui.

Pyramid Lake is an instructive case, but still leaves a great deal of uncertainty as to the scope of Section 7(a)(1). The Court was not faced with a case where a listed species was likely to be extirpated, or an alternative conservation measure which was clearly superior to the one advanced by the agency. The most that can be gleaned from the holding is that a federal agency, in carrying out it conservation duty under Section 7(a)(1), will be granted "some discretion" in selecting a conservation program. Future cases will have to flesh out the remaining scope of Section 7(a)(1).

D. PROHIBITION ON TAKING LISTED SPECIES

Section Nine of the ESA[179] prohibits a wide range of conduct applied to endangered species. The most significant is the prescription against "taking [any endangered species] within the United States or the territorial sea of the United States."[180]

Like other key terms in the ESA, taking is defined very broadly as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[181]

Unlike Section Seven, which applies only to federal agencies, the prohibition against taking endangered species under Section Nine, applies to "any person subject to the jurisdiction of the United States."[182] This includes individuals, corporations, and local, state, and federal governments and agencies.[183] Thus, private as well as public conduct is regulated by Section Nine. As with all provisions of the ESA, violators are subject to criminal and civil liability.[184] The general taking provisions are reasonably clear and merit little discussion. What is not well settled, however, is whether Section Nine can be used to stop adverse habitat modification by private parties.

1. ADVERSE HABITAT MODIFICATION

As mentioned earlier, Section Seven of the ESA prohibits federal agencies from engaging in any action that would "result in the destruction or adverse modification" of an endangered species' critical habitat.[185] In contrast, Section Nine does not expressly forbid adverse habitat modification. It does, however, forbid "harm" to an endangered species. If the definition of harm extends to adverse habitat modification, Section Nine can be

used to regulate private, i.e. non-federal, land development practices. If so, Section Nine will likely exert an enormous influence on land use development law in the years to come. Thus, Section Nine has been termed "perhaps the strongest and most far-reaching provision of the Endangered Species Act."[186]

"Harm" is not defined by the ESA. The Secretaries of Interior and Commerce in their implementing regulations, however, define harm as "an act which actually kills or injures wildlife."[187] They include in this definition "significant habitat modification or degradation where it actually kills or injures wildlife..."[188]

This issue was addressed by the Ninth Circuit in *Palila v. Hawaii*.[189] The endangered Palila is a six inch long finch-billed bird whose sole habitat is the slopes of Mauna Kea on the Island of Hawaii.[190] The Palila's critical habitat is totally owned by the State of Hawaii. The bird is entirely dependent on the mamane-naio woodlands for food and shelter, eating the pods, flowers, buds, berries, and leaves of the mamane and naio trees. The Hawaii Department of Land and Natural Resources (Hawaii), introduced species of feral goats and sheep and later the mouflon sheep[191] to the mamane-naio woodlands for the enjoyment of sport hunters. These goats and sheep fed upon the mamane trees and allegedly posed a mortal threat to the Palila. The plaintiffs claimed that by introducing the goats and sheep, Hawaii had

harmed the Palila and thus committed a taking under section nine of the ESA.[192]

The District Court ruled in favor of the Palila, finding that the introduction of the mouflon sheep constituted "harm" under the Secretary's definition,[193] by "causing habitat degradation that could result in extinction." [194] On appeal, Hawaii claimed that the Secretary's interpretation of harm was too broad because it included not only direct killing or injuring, but also indirect harm by "impairment of essential behavior patterns via habitat modification."[195]

The Ninth Circuit rejected Hawaii's argument, finding that Congress intended to define "take" in the broadest possible way to include every conceivable way a person could take an endangered species.[196] The Court held that the Secretary's interpretation followed the plain language of the ESA in protecting ecosystems upon which endangered species depend.[197]

Although the Court left open the issue of whether habitat modification that only retards species recovery constitutes a taking, it firmly established (in the Ninth Circuit) the validity of regulating land use under Section Nine of the ESA.

Likewise, in *Sierra Club v. Yeutter*,[198] the Fifth Circuit found a taking by the U.S. Forest Service (USFS) of the red

cockaded woodpecker. The USFS permitted clear cut forest management practices within two hundred feet of woodpecker cavity trees. The Court found that these habitat modifications impaired the woodpecker's "essential behavioral patterns" and thus constituted harm, and a violation of Section Nine.[199]

These cases are especially significant in light of the FWS decreasing willingness to designate critical habitat when listing a species under Section Four. The Section Nine taking provisions, which apply even without formal designations of critical habitat, may be the best weapons preservationists have to prevent habitat modification or destruction on public and private land.

2. LAWFUL TAKING

There are several instances where taking of endangered and threatened species are authorized under the ESA. Takings authorized by an incidental take statement under Section Seven, or for legitimate self defense are two examples mentioned earlier. Another instance of lawful taking is in the "extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved."[200] Takings under this last circumstance are considered conservation measures that aid the species survival.[201]

E. EXEMPTIONS

In the wake of the Tellico Dam decision,[202] Congress extensively amended the ESA in 1978. Surprised by the plain language in their own law, many lawmakers professed not to realize that the ESA would protect the lowly snail darter, along with more majestic species, like the bear and eagle.[203] In response, they created a complicated exemption process under Section Seven of the ESA.

1. THE ENDANGERED SPECIES COMMITTEE

The Endangered Species Committee was the mechanism Congress selected to review applications for exemptions.[204] Known variously as the "God Committee" or the "God Squad" for their supposedly divine power over endangered species, the committee is chaired by the Secretary of the Interior and is made up of six cabinet level officials and one member, appointed by the President, from each state affected by the decision.[205] The Committee has broad authority to receive evidence and grant exemptions, but its decisions are subject to judicial review.[206]

2. PROCEDURES

A federal agency, state Governor, or permit or license applicant may apply for an exemption, as long as they have completed consultation with the consulting agency under Section 7(a)(2), and received a jeopardy biological opinion.[207] Upon receipt of the application, the Secretary of the Interior is

required to make certain threshold determinations. If the applicant satisfies these prerequisites, the application qualifies for consideration by the Endangered Species Committee.[208]

The Secretary of the Interior next prepares a report on the application for consideration by the Committee. To assist in developing a record for the report, the Secretary may appoint an administrative law judge to conduct a hearing. The report will generally discuss the merits of the application, including the benefits of the proposed project, the availability of reasonable and prudent alternatives, and any appropriate and reasonable mitigation and enhancement measures.[209]

The Secretary of the Interior submits the completed report to the full committee for action. A minimum of five members concurring are needed to approve an exemption. The exemption is granted if the Committee determines:[210]

1. there are no reasonable and prudent alternatives to the proposed action;

2. the benefits of such action clearly outweigh the benefits of alternative courses of action consistent with conserving the species or its critical habitat and such action is in the public interest;

3. the action is of regional or national significance; and

4. neither the federal agency concerned nor the exemption applicant made any irreversible or irretrievable commitment of resources.

3. **EXEMPTION RECORD**

In 1978, Congress ordered the Endangered Species Committee to consider exemptions for the Tellico Dam and the Gray Rocks Dam on the Laramie River in Wyoming.[211] In the Gray Rocks Dam case, the Committee granted the exemption, in the Tellico Dam case, it did not.[212]

The Gray Rocks Dam case involved the endangered whooping crane. The Committee voted unanimously to grant the exemption, with mitigation and enhancement measures designed to reduce the threat to the birds.[213] The mitigation and enhancement measures required the establishment of a conservation trust fund to maintain the critical habitat, and the careful monitoring of water withdrawals from the dam.[214]

In the Tellico Dam case, the Committee carefully considered the benefits of the dam, and the costs associated with obliterating the Little Tennessee River. These costs included

the eradication of the snail darter and also the loss of the cultural, recreational, and archeological value of the riverside way of life. The Committee voted unanimously to deny the exemption.[215]

After this decision, legislation was introduced in the Senate to abolish the Endangered Species Committee, but was defeated. Ultimately, Congress voted in 1980 to exempt the Tellico Dam from the ESA.[216]

These were the only two decisions the Endangered Species Committee made until 1992, when the Bureau of Land Management (BLM) sought exemption for forty-four timber sales in Oregon. The proposed timber sales threatened the critical habitat of the northern spotted owl, a threatened species. In a somewhat bizarre procedural setting, the BLM (a division of the Department of Interior), was pitted against the FWS (also a division of the Department of Interior), finally appealing to the Endangered Species Committee, chaired by the Secretary of Interior.[217] The hearing consisted largely of a battle of science and biology between proponents and opponents of the spotted owl and the old growth ecosystem of the pacific northwest.

The Committee ultimately voted in favor of the BLM timber sales. Litigation concerning this decision has been initiated, and the final chapter on the spotted owl story is unwritten.[218]

Other proposed sales of timber from old growth BLM forests in Oregon are also tied up in litigation, casting doubt on the significance of the Endangered Species Committee decision.[219]

In many ways the Endangered Species Committee has not lived up to its billing. It has issued only three decisions in the almost fifteen years since it was established.[220] It certainly has not proven an easy way around the strict requirements of the ESA, as opponents feared in 1978. On the other hand, it has served to deflect criticism from the ESA, and its priority of species preservation above all. Organizations that might have gone to Congress for relief from unfavorable FWS opinions can be asked to prove their case to the Endangered Species Committee first, where their economic concerns can be aired.

4. NATIONAL DEFENSE EXEMPTION

The ESA contains a broad exemption for national security reasons: "Notwithstanding any other provision of this Act, the Committee shall grant an exemption for any agency action if the Secretary of Defense finds that such exemption is necessary for reasons of national security.[221] This exemption is not subject to the discretion of the Endangered Species Committee, but is dependent only on certification by the Secretary of Defense. Within the Army it is viewed as an extraordinary remedy, to be invoked as a measure of last resort in wartime.[222] It has never been used.[223]

With an understanding of the problems of extinction, and the mechanics of the ESA, I now turn to the central theme of this study--the Army. I'll look at the Army's environmental program, its experiences with endangered species, and the prospects for success in its future conservation efforts.

IV. THE ARMY AND ENDANGERED SPECIES

A. THE ARMY ENVIRONMENTAL PROGRAM

The modern environmental movement began in the late 1960s. Although not widely appreciated today, the Army, in several important respects, was at the forefront of this movement.[224]

Like other large public or private organizations of the time, the Army did not fully appreciate the magnitude of the environmental challenges it confronted. Although there were some notable successes, the Army's compliance record was inconsistent, and there was no overall strategy for incorporating environmental objectives into the Army's mission.

By the late 1980s, this situation improved, with the formation of the Army Environmental Law Division within the Office of the Judge Advocate General,[225] and the Army Environmental Office, within the Office of the Chief of Engineers. Overall coordination of Army environmental policy was

vested in the Assistant Secretary of the Army for Installations, Logistics, and the Environment, and the Deputy Assistant Secretary of the Army for Environment, Safety, and Occupational Health.[226]

By 1992, the Army had developed and largely implemented an ambitious environmental program. More than $2 billion was allocated in support of the program that year.[227] Also in 1992, the Army articulated a comprehensive environmental strategy designed to carry it into the twenty-first century. The linchpin of the strategy is a concept of environmental stewardship; the idea that the nation's land and vital resources are given to the Army in trust, and must be wisely managed for the benefit of current and future generations.[228]

The strategy is built around plans to achieve success in four major environmental functional areas:[229] compliance with environmental laws, restoration of previously contaminated sites, prevention of future harm, and conservation and preservation of natural resources.[230] Preserving biological diversity and managing endangered species issues is part of the conservation pillar.

B. THE ARMY AND CONSERVATION

Expecting the Army to act as a steward of environmental resources is not a new concept. The military has supervised or

managed public lands since 1823.[231] Before the National Park Service and the U.S. Forest Service were established, the Armed Forces managed the national parks and forests. Army engineers built roads in some national parks well into the 1920s.[232] During World War II, the Army acquired millions of acres of new lands for training and housing the eight million soldiers that would enter the ranks during the war. Army engineers conducted major conservation activities on portions of these lands, including erosion and dust control projects, and forestry activities.[233] Following World War II, the services were given responsibility for managing wildlife resources on their installations.[234] Today, the Armed Forces administer over 25 million acres of public lands.[235]

C. ENDANGERED SPECIES MANAGEMENT

Endangered or threatened species listed under Section Four of the ESA have been found at sixty-three Army installations.[236] These include fifty-seven endangered species, forty-three threatened species, and several hundred candidate species.[237] The presence of these species present special challenges for commanders and natural resource managers. Although official policy requires the Army to be a leader in conserving listed species,[238] the Army's record has been less than perfect. Brigadier General Gerald Brown, Commander of the Army Environmental Center, recently stated in a memorandum to all Army elements:

> [t]he Army continues to experience serious problems in meeting its responsibilities under the Endangered Species Act of 1973 (ESA). ESA requirements have had a significant impact on training operations at Fort Bragg and have the potential to significantly restrict Army training operations at other installations. Therefore, *it is crucial that the Army adopt policies and procedures that will provide for more effective endangered species management and reduce the conflict with mission requirements.*[239] (Emphasis added).

On January 26 1993, in conjunction with the memorandum cited above, the Army issued comprehensive guidance on its management of endangered and threatened species.[240] This document provides a blueprint for the future of endangered species management within the Army.

The guidance revolves around a simple but critical directive: "[m]ission requirements cannot justify actions violating the ESA."[241] Given the nature of the Army mission, namely deterring and fighting wars, this statement ranks as a defining event in Army environmental history. It appears to give a higher priority to protecting endangered species, than it does

to the Army's warfighting mission. This depth of commitment is especially evident when contrasted with the private sector, where the attempt to protect even a modest remnant of old-growth habitat has evoked storms of protest from the affected economic interests and politicians.[242]

The central tenet of the ESA is a species-by-species approach to protecting endangered plants and animals, which provides no protection until a species is well advanced on the path to doom. This strategy has been severely criticized as costly and inefficient.[243] In contrast, the Army guidance adopts an ecosystem approach to preserving species, and specifically recognizes the value of biological diversity, and protecting species before they are in danger of extinction.[244]

This commitment goes beyond the requirements of the ESA and vaults the Army to the forefront of preservation science. How did this occur? The answer is best divined by examining case studies of three endangered species whose fate has become intertwined with the Army's. The species are the red-cockaded woodpecker, the Mexican gray wolf, and the desert tortoise.

V. ENDANGERED SPECIES CASE STUDIES

A. THE RED-COCKADED WOODPECKER

> *[t]he voluminous evidence...introduced in the trial of this case leaves the court with the firm persuasion that we are presiding over the last rights of this cohabitant of the blue planet.*[245]

Picoides borealis, commonly called the red-cockaded woodpecker (RCW), is an eight inch, zebra stripped, black and white woodpecker found only in the pinewoods of the southeastern U.S.[246] The bird takes its name from a small red patch, or cockade, on the side of the male's head which is displayed during courtship and other times of high excitement. There are anywhere from 3000-9000 RCWs left in the world, all of which are in the United States. The largest concentrations of RCWs are located in the coastal plain forests of the Carolinas, Florida, Georgia, Alabama, Mississippi, Louisiana, and eastern Texas. The RCW is found on eight Army installation in the southeast, including relatively large populations on Fort Benning, Georgia, and Fort Bragg, North Carolina. The battle to save the RCW is largely lost on private lands; eighty-four percent of the birds live on federal property, either on military reservations, wildlife refuges, or national forests.[247] This is true even though seventy-five percent of the nation's pine forests are privately owned. Simply put, there are very few privately owned pine trees

over eighty years old.[248] What do exist, are rapidly giving way to hardwood species, as man dutifully prevents forest fires.[249]

The RCW was best described by the court in *Sierra Club v. Lyng*,[250] as being a rather "undistinguished woodpecker" not well adapted to the realities of twentieth century America: "[t]his woodpecker makes no great or even necessary contribution to ecological balance, his song is unremarkable, and his plumage causes no heads to turn...[t]he red-cockaded woodpecker's chief claim to fame is the fact that it has succeeded in having its name inscribed on the endangered species list."[251]

1. BIOLOGY

There are approximately 200 species of woodpeckers in the world. Of these, twenty-one live in North America.[252] Woodpeckers evolved as specialists in using their bills to construct shelter and forage for food in wood. Woodpeckers developed specialized legs and toes, for grasping vertical tree trunks, strong, wide tail feathers for bracing against the tree while pecking, and powerful neck and shoulder muscles to provide force, and to absorb the incessant pounding inherent in their work.[253] The tongue has evolved into a remarkable tool for food gathering. It may protrude several inches beyond the tip of the bill, and has a horny, spined tip used to skewer grubs, beatles, and other insects it discovers within the bark or sapwood of a tree.

The RCWs are specialists among specialists, in that they are the only woodpeckers known to construct shelters (called cavities), in living trees. All other woodpeckers construct cavities in dead trees where the decaying wood is easily worked. While other woodpeckers can construct a cavity within a week, a RCW cavity generally takes over a year.[254] This is an extraordinary investment of time and energy. What's more, the RCW prefers live pine trees that have been infected with a fungal infection called red heart. The red heart fungus weakens the inner wood of a pine tree (the heartwood) and allows easier excavation.[255] It is apparently impossible for the RCW to tell which trees are infected without excavating through the bark and the hard outer sapwood into the heartwood. Thus, the bird may have to make several abortive attempts at cavity building before it locates a tree infected with red heart.[256]

Once a suitable cavity is excavated, RCWs may use it for many years. They do not migrate, but roost and nest in the trees year round. The cavity provides a warm, dry, defensible shelter that enable RCWs to successfully raise a larger percentage of their young to adulthood than ordinary, branch-nesting birds.[257]

RCWs forage for food in the pine trees as well. Their diet consists mainly of ants and beatles discovered within the bark and sapwood of pine trees. Older trees provide better foraging habitat than younger trees because the cracks and crevices of the

older trees are more likely to shelter the insects preferred by the RCW. Each colony of RCWs requires about 125 acres of high quality, old-growth habitat.[258]

RCWs live in groups called clans. A clan consists of a mating pair with young, and sometimes older offspring who remain with the natal clan. A colony consists of several cavity trees occupied by a clan.[259] Usually, all the cavity trees will be within a circle 1500 feet wide, and there may be several cavity trees under construction at a time.[260] The clan has only one mating male, and he vigorously defends his territory against rivals.

RCWs are cooperative breeders, meaning non-mating members of the clan assist the breeding pair in raising young.[261] The "helper" birds assist in feeding the young, defending the territory and maintaining the physical plant of the colony. Interestingly, the helper birds are all male offspring of the mated pair, who apparently elect to spend an extra season at home before striking out on their own. Female offspring leave the colony as soon as they reach adulthood.[262]

The affinity for red heart infected pine trees is a major reason for the decline of the RCW. Red heart does not generally affect young, strong trees. Pine trees are not susceptible to the fungus until they are sixty to eighty years old. The best

trees for RCW cavities are usually 100 years old or more. This schedule is not compatible with the modern timber industry, which prefers to "harvest" younger trees which grow at a faster, more economically productive rate.[263]

The timber industry's preferred method of harvest is "even age management" better known as clear cutting. Under this method, all trees in a certain area are removed at the same time, and replanted with seedlings or allowed to regenerate naturally by leaving a few seed trees to repopulate the area.[264] Clear cutting destroys the foraging habitat and prevents trees from reaching the suitable cavity tree age.

Another serious threat to the RCW is encroachment from hardwood undergrowth or mid-story.[265] This mid-story dangerously impedes RCW access to cavities and pine forage, while enabling predators to approach more easily. Strangely enough, frequent forest fires naturally clear the mid-story, while sparing the pine trees, and are essential for the RCW's survival. Nevertheless, for generations man has devoted substantial assets to aggressively stamping out the supposed scourge of forest fires, thereby further endangering, the RCW.

2. THE ARMY AND THE RED-COCKADED WOODPECKER

a. Fort Benning

The red-cockaded woodpecker is the most substantial ESA challenge facing the Army.[266] In 1989, the Army received notice from the Sierra Club and the FWS that alleged improper timber management practices at Fort Benning, Georgia were harming the RCW. The improper practices cited were similar to those of the Forest Service condemned by the court in *Sierra Club v. Lyng*, and included clear cutting of RCW foraging habitat, burning cavity trees, and failing to control hardwood mid-story.[267] With minor exception, the violations did not involve Army training activities. The Army was also notified that the FWS was conducting a criminal investigation into possible violations of Section Nine of the ESA at Fort Benning for the unlawful taking of the RCW. The Sierra Club and the FWS alleged that the practices at Fort Benning were in violation of RCW management guidelines the Army had earlier accepted.[268]

John Beasley in his excellent thesis on this topic,[269] visited Fort Benning, interviewed Fort Benning and FWS personnel, and reviewed correspondence between Fort Benning and the FWS. He reached the following disturbing conclusions:

1. the Commander and senior leadership at Fort Benning were not aware that problems existed with RCW compliance;

2. despite the Army having agreed to implement a comprehensive set of RCW protective guidelines, the Commander and senior leadership at Fort Benning were generally unaware of their ESA responsibilities;

3. RCW protection at Fort Benning was placed in relatively equal competition with commercial timber harvesting;

4. RCW decisions were controlled by forestry personnel rather than by the wildlife staff;

5. there was no established mechanism whereby the Commander could measure ESA compliance;

6. Fort Benning made no attempt to go beyond the scope of the guidelines by voluntarily adopting measures from the recovery plan;

7. no internal review procedures were established for RCW protection;

8. inadequate resources were made available for RCW protection;

9. the Fort Benning relationship with the FWS was spotty at best.

The Fort Benning findings were especially disturbing in light of the minimal importance to the Army mission of commercial timber sales. They were indicative of a generally poor understanding of ESA issues at the installation level, and the low priority attached to them by commanders and installation staffs. Even though the Army had agreed to RCW protective guidelines, they were not implemented in the field. On January 28, 1992 three Army civilian employees of the Fort Benning Forestry office were indicted in the United States District Court for the Middle District of Georgia for conspiring to take the RCW in violation of section nine of the ESA and making false statements to FWS criminal investigators during the investigation.[270]

b. Fort Bragg

Unlike Fort Benning, Fort Bragg squarely presents the issue of Army training versus the RCW. Fort Bragg is the most active military installation in the United States, comprising approximately 150,000 acres. Fort Bragg contains one of the largest remaining parcels of old-growth pine forests in the

United States, and approximately seventy percent of all RCW colonies in the state. In 1991, There were around 279 active RCW colonies widely scattered over 100,000 acres.[271]

In the mid 1970s Fort Bragg rejected a proposed RCW management plan because it conflicted with their timber management goals. Although Fort Polk, Louisiana and Marine Corps Camp LeJune, North Carolina sought consultation with the FWS over military training impacts on the RCW in 1980 and 1979, Fort Bragg did not.[272] Although the same 1984 Army-wide RCW forestry guidelines applied to both Fort Bragg and Fort Benning, they were not widely implemented. In May 1988, Fort Bragg was notified by the FWS of concerns over the impact of military training on the RCW.[273] The FWS also expressed concern over Fort Bragg's failure to remove hardwood mid-story encroachment in RCW colony areas, and requested that Fort Bragg enter into consultation over the training issues. After prompting from higher headquarters, Fort Bragg agreed to prepare a biological assessment and enter into consultations with the FWS.[274]

In July 1989, a team of Army forestry and wildlife personnel from the Pentagon visited Fort Bragg and found numerous violations of the 1984 Army RCW guidelines caused by military training. The team found heavy troop activity in RCW colonies including gun positions directly beneath cavity trees, heavy digging and direct damage to cavity trees, and extensive damage

from tracked vehicles circling cavity trees.[275] In some cases, the team found axe damage and cable and parachute lines wrapped around marked cavity trees.[276] These observations were reported to the Army leadership in Washington, D.C.

In March 1989, Fort Bragg released their biological assessment. It was a defiant, combative document that demanded total flexibility to train "without environmental consideration."[277] While officials of the FWS were stewing over this, Fort Bragg added fuel to the flames by conducting a massive training exercise involving as many as seventeen artillery battalions. Heavy damage to RCW habitat resulted.[278] Bad luck played a role as well, when Hurricane Hugo roared through South Carolina, wiping out the largest RCW population in the country, increasing the importance of the Fort Bragg colonies.[279]

On February 2, 1990, the FWS issued its biological opinion. The consultations leading up to the biological opinion had not gone well for Fort Bragg, with training personnel showing little interest in participating, and engineering personnel having insufficient authority to negotiate for the Army in good faith.[280] The biological opinion that resulted was, not surprisingly, a hard line, "jeopardy with reasonable and prudent alternatives" opinion. The reasonable and prudent alternatives consisted of a series of very restrictive conditions on training.[281]

At the same time the biological opinion was released, the Army received notice from the Environmental Defense Fund, a prominent national environmental group, of its intent to sue the Army for violations of Sections Seven and Nine of the ESA, under the ESA's citizen suit provisions.[282] Clearly, Fort Bragg had maneuvered itself into the worst of all positions: severe training restrictions, high profile litigation with adverse publicity, potential criminal liability, and abysmal relations with the FWS.[283] This debacle was to be the low point in the Army's stormy history with the RCW and the ESA.[284] It would provide the impetus for the new Army policy on protecting biological diversity.

B. THE MEXICAN GRAY WOLF

> *And when he got to the well and stooped over and was just about to drink, the heavy stones made him fall in and was drowned miserably. When the seven kids saw that, they came running to the spot. "The wolf is dead! The wolf is dead!" they cried, and danced for joy round about the well with their mother.*[285]
>
> *The Brothers Grimm*

Few creatures on earth are as reviled by humans as wolves. Unlike the RCW, which suffers largely from indirect and unintended deprivations, the wolf has been systematically, even joyfully, hunted, trapped, clubbed, and poisoned to the brink, or beyond, of extirpation.[286] Likewise, few creatures illustrate the fickle relationship between man and animal as well as the wolf.

Ironically, the wolf now depends for survival, on the same government agency that devotedly pursued it to extinction.[287]

1. BIOLOGY

The wolf's downfall is that it competes directly with man for food. In early times, it competed with man for game, and later, it raided man's domesticated herds of livestock. At times, the wolf seemed almost to revel in the competition, often killing three or four of a rancher's yearling calves, but feeding only on one.[288] One storied wolf nicknamed "Old Aguila" by ranchers, was said to have killed sixty-five sheep in one night, and forty another.[289]

The Mexican gray wolf (Canis lupus baileyi), an endangered species since 1976, has been completely exterminated in the U.S. since about 1970, although a handful still exist in Mexico.[290] In 1990, there were forty-six Mexican wolves in a captive breeding program in the U.S., intended to form the nucleus of a reintroduced population.[291]

The Mexican wolf is one of the physically smallest North American wolf species.[292] Adults average about five feet long including a fifteen inch tail. Height at the shoulders is about thirty inches.[293] They weigh an average of eighty-nine pounds for males and seventy-seven pounds for females. They have large feet, short, thick muzzles, and thick necks.[294] Their jaws are

remarkably strong, and have been known to bite through steel traps, galvanized buckets and enamel pots and pans.[295] Their teeth are sharp enough to slice through tough steer hide, and spill a victim's entrails at full run. Their most famous attribute is their long howl, thought to announce presence and facilitate assembly after separation.[296]

Relatively little is known of their detailed behavior because no comprehensive studies were performed prior to their eradication in the wild. The best information available is anecdotal accounts evidence from wolf hunters.[297] Mexican wolves are nocturnal hunters, and can range huge distances in search of prey. They use their keen sense of smell to locate their prey in the dark, and obtain the advantage of surprise. Their natural prey was deer, but they came to prefer the fatter, easier pickings of cattle, sheep, and horses.[298] They generally preferred to run their prey down from the rear and bite through the flanks and hindquarters.

Wolves are social animals and live and hunt in packs. The pack occupies and defends a discrete territory which is scent marked with urine and dung. Mexican wolves lived in smaller packs than northern wolves, perhaps two to eight animals, and might hunt in pairs or singly.[299] They bare young once per year, usually in litters of four to five pups. The members of the pack assist the mother in caring for the young. Food is brought to

the den partially digested in the adults' stomachs, and disgorged for the pups. Carcasses and body parts may also be dragged to the den.[300]

2. MEXICAN WOLF CONTROL PROGRAMS

From the time European settlers set foot in the new world, they began a battle to control wolves. The sheep that arrived with the original settlers at Jamestown were devoured by wolves.[301] Later, George Washington despaired of ever building a viable sheep industry in the United States due to wolves.[302] In 1896, the annual losses to wolf depredation in Wyoming was $1 million per year-four times the entire state budget.[303] Some of the earliest public laws in colonial America related to wolf control and cash bounties for killing wolves.[304]

In the American west, wolf control became serious business after 1880, when the vast plains filled with grazing herds of domesticated livestock for the first time. These initial efforts were private. Ranchers and cattle associations offered bounties to freelance wolf hunters. Later, many larger ranches hired full time wolf hunters. The prime methods employed were shooting, trapping, poisoning, and denning, in which a den of wolf pups would be located and destroyed.[305]

In 1915, the U.S. government entered the wolf killing business in earnest. Congress appropriated $125 thousand and

placed responsibility for the program on the Fish and Wildlife Service. The goal was total extermination. The methods were similar to those in use already, but with a greatly expanded use of poison, particularly arsenic, strychnine, and cyanide.[306] Poisoned grain was spread in likely wolf areas, poison was encapsulated in suet, and sodium cyanide was loaded into a spring gun device called a "coyote getter".[307]

By 1925, the campaign was largely successful, although efforts would continue into the 1970s.[308] The wolf was pursued to destruction with an almost religious zeal, even after its numbers were reduced to manageable levels. There was a single-minded intent to cause extinction that is probably unprecedented in natural history.[309] The wolf was extirpated from New Mexico by 1942.[310] The last known Mexican wolf was killed in the wild in the U.S. in 1970,[311] although a sparse population remain in Mexico.

After the ESA was enacted in 1973, the indiscriminate killing of predator species was largely curtailed.[312] In 1976, the Mexican wolf was officially listed as endangered.[313] In an ironic reversal of roles, the FWS was given responsibility for recovering the species.[314] Between 1977 and 1979, four Mexican wolves were captured in Mexico and brought to the U.S. to form the basis of a captive breeding program.[315] In 1982, the FWS issued a recovery plan for the Mexican wolf under section four of

the ESA. The recovery team concluded that reintroduction was feasible if a suitable area within the historic range of the Mexican wolf could be located. They estimated that 5000 square miles would be needed to support a self-sustaining population of 100 wolves.[316]

3. THE ARMY AND THE MEXICAN GRAY WOLF

Finding a reintroduction site proved a daunting task. In 1986, the FWS contacted the three states in the Mexican wolf's historic range, Arizona, New Mexico, and Texas, and asked for nominations for suitable sites. The Texas legislature responded by making it illegal to reintroduce wolves in Texas.[317] Arizona initially identified fifteen locations, but later requested reintroduction be postponed for several years pending a public education program.[318] New Mexico nominated the U.S. Army White Sands Missile Range.[319]

White Sands Missile Range is a large installation, measuring 100 miles long and 37 miles wide. It's located in the Tularosa Basin of south-central New Mexico, approximately 45 miles north of El Paso Texas.[320] Its mission is to support missile and weapons development for the armed forces, NASA, and other government agencies.[321] The climate is typical of the dry Chihuahuan desert region.[322]

The unsolicited[323] nomination of White Sands Missile Range put the Army in a unique position. For the first time, the Army was involved in a major environmental controversy unrelated to its mission. Moreover, the issue involved protecting an animal not present on Army lands. Complicating matters further was White Sand's neighbors; working cattle and sheep ranches whose owners were decidedly cool to the idea of conserving the wolf.

The FWS coordinated the proposed action directly with the Commander of White Sands Missile Range, who initially allowed the FWS to commission a biological evaluation of WSMR's suitability for wolves.[324] On September 27, 1987, approximately nine months into the study, the Commander changed his mind and rescinded his agreement to the reintroduction, although he allowed the study to continue.[325] The Commander apparently made this decision without approval from higher headquarters.[326] The refusal was affirmed by a new Commander on March 1, 1988. Stymied, the FWS put the project on hold.[327]

On February 14, 1990 a group of environmental organizations, including the Sierra Club and the National Audubon Society,[328] served the Secretary of the Interior and the Secretary of Defense with a sixty day notice of intent to sue.[329] The group alleged that the FWS improperly terminated the reintroduction plans, and that the Army violated its duty to conserve the Mexican wolf under section 7(a)(1) of the ESA.[330] On April 20, 1990,

Headquarters, Department of the Army reversed the White Sands Missile Range Commander. In a letter to the FWS, the Army agreed to "cooperate fully" with the FWS in further studies of White Sands Missile Range as a potential reintroduction site.[331] The Army further stated that it had no objection to the FWS proceeding with "appropriate planing" for the reintroduction.[332]

Not satisfied, the plaintiffs filed suit on April 23, 1990, alleging that the Army failed to cooperate with the FWS for the better part of eight years,[333] and demanding a "mandatory injunction compelling the Secretary of Defense to cooperate with the United States Fish and Wildlife Service in the implementation of the Mexican Wolf Recovery Plan."[334]

Currently, the case remains in litigation, although a settlement appears imminent.[335] Meanwhile, the Mexican wolf still waits for a home.

C. THE DESERT TORTOISE

The Desert tortoise (Gopherus agassizii) is a shy and peaceful plant eating species that has survived, in some form, for 175 million years.[336] Dating from the age of the dinosaurs, the tortoise survived the ancient mass extinctions, but may not live through the current one. The desert tortoise provides a fascinating glimpse of pre-history, but like the other animals I have featured, is ill suited to modern life.

1. BIOLOGY

The desert tortoise is found in portions of California, Arizona, Nevada, and Utah. It also lives in Sonora and Sinaloa, Mexico.[337] It is an herbivorous reptile that reaches one foot in diameter and lives seventy years or more.[338] The desert tortoise spends large portions of the year in burrows as deep as thirty feet, dug in the desert floor. The burrows shield the tortoise from the extreme hot and cold temperatures present in the harsh desert environment, and provide protection from predators.[339] The desert tortoise is most active in spring when they emerge from their burrows to feed on the fresh perennial plants in spring bloom.

They have a long life cycle and are slow reproducers. They do not reach sexual maturity until about fifteen or twenty years of age. Few young desert tortoises survive to adulthood. Their shells do not fully harden for nearly five years, during which time they are especially vulnerable to predators. Desert tortoises do not care for their young. Once the eggs are laid, their parental duties are complete.[340]

There are believed to be between 308,465 and 530,688 desert tortoises in existence.[341] They are a threatened species in California under the ESA. Although their numbers are much larger than the other species I have discussed, they have been in rapid decline for the past ten years. The prime reasons for the

decline are increased predation, and loss of habitat. The increased predation is due to large increases in ravens, a natural tortoise predator.[342] In a curious chain reaction, the ravens, which feed on garbage at city landfills, have increased due to urbanization of many desert areas.[343]

The loss of habitat is due to damage by off-road recreational vehicles, overgrazing by cattle and sheep, and increased human construction and development of the desert.[344] In addition, many desert tortoises have been collected directly by humans for pets.[345]

The Desert Tortoise has been increasingly afflicted with a somewhat mysterious ailment called Upper Respiratory Tract Disease (URTD).[346] This disease is highly contagious and appears to be 100 percent fatal. The cause of URTD is unknown, but is believed to be related to ecological stress on this sensitive animal, and its habitat.[347] The severe California drought of the past five years likely plays a role in the disease as well.

2. THE ARMY AND THE DESERT TORTOISE

The Army has run afoul of the desert tortoise over the proposed expansion of the Army's National Training Center (NTC) at Fort Irwin, California. The NTC is the Army's premier training facility, and is located in the heart of California's Mojave desert. It may seem strange that, in an era of defense

reductions and base closures, the Army wants to drastically expand this facility, but the NTC is not the average installation. Unlike other Army installations, the NTC does not have assigned combat units.[348] Instead, combat battalions from throughout the Army periodically "rotate" through the NTC to receive training.[349]

By any measure, Fort Irwin is already a large military installation, occupying approximately 1000 square miles, although only about fifty-five percent of the area is actually available for training.[350] This size is insufficient, however, for brigade sized exercises. Moreover, the vastly increased range, lethality, and mobility of modern weapons, coupled with the Army's warfighting doctrine of AirLand Battle,[351] requires large training spaces. In 1988, the U.S. Commission on Base Realignment and Closure recognized the need for expanded training areas at certain critical locations, including the NTC at Fort Irwin.[352]

In 1985, an Army land use study (validated by the GAO in 1990), determined that an additional 238,000 acres of training land was required at Fort Irwin.[353] In 1988, the Army and the Bureau of Land Management agreed to cooperatively analyze the environmental impact of the proposed expansion, with the Bureau as lead agency for preparing an environmental impact statement under NEPA. In 1991, the Army prepared and submitted a

biological assessment to the FWS as part of the consultation process under Section 7(a)(2) of the ESA.[354] The biological assessment envisioned a 328,660 acre expansion to the south of the NTC.[355]

In September 1991, the FWS responded to the Army proposal with a draft biological opinion. They found that the terrain to the south of the NTC contained high density desert tortoise populations and habitat, and the Army plan would likely jeopardize the continued existence of the species. They identified three reasonable and prudent alternatives that did not involve expansion of the NTC to the south.[356]

The Army had several choices in responding to the unfavorable FWS biological opinion. It could have adopted an adversarial posture, a la Tennessee Valley Authority and the timber industry, and sought an exemption from the Endangered Species Committee. It could have requested the Secretary of Defense declare the action "necessary for reasons of national security" under 16 U.S.C. §1536(j), as Fort Bragg considered in 1989. It could have sought legislative relief in Congress. Finally, they could carefully study the FWS concerns, and undertake additional scientific work with a view towards achieving the Army's objectives while accommodating the survival of the desert tortoise. That the Army chose the latter alternative was the first tangible evidence of a dramatic change

in Army thinking towards endangered species; changed thinking that would soon spawn the far reaching guidance for management of endangered/threatened species referred to above.[357]

The Army decided to scrap the proposed expansion south of the NTC and study a possible expansion to the east. The NTC commissioned four separate tortoise density studies during late 1991 and 1992, to better define the desert tortoise population.[358] The data gathered convinced the Army that an expansion to the east, coupled with aggressive mitigation measures, could give the Army the high quality training land it needed, without jeopardizing the continued existence of the desert tortoise.

In October 1992, the Army issued a new biological assessment.[359] This assessment called for acquiring approximately 327,150 acres of land to the east of the NTC, and securing agreement from the Navy for joint use of 148,870 acres of the central portion of the U.S. Naval Weapons Center Mojave B Test Range Complex to the west of the NTC.[360] This proposal was roughly similar to one of the reasonable and prudent alternatives posed by the FWS in its draft biological opinion. The Army estimated that if this proposal was implemented, without mitigation measures, approximately 1266 desert tortoises would be lost due to incidental take and habitat loss.[361]

The Army proposed an extensive set of mitigation measures as part of desert tortoise conservation plan. The plan consisted of tortoise proof fencing at strategic locations, relocation of tortoises to safe areas, soldier education, and extensive tortoise research. The plan also called for the acquisition of important desert tortoise habitat to the south of the NTC as a refuge. The cost of these conservation measures are $5.7 million the first year, and $17.1 million over the following twenty-eight years for a total cost of $22.8 million[362] After implementation of the conservation plan, the estimated loss of desert tortoises is 670 (from a total population of between 308,465 and 530,688).[363] The Army is currently awaiting a biological opinion from the FWS regarding this proposal.

Next, I'll look for lessons to be drawn from the Army's experiences with the three animals examined. I'll discuss the likely future course of the ESA, and the Army's prospects for long-term compliance or exemption.

VI. ANALYSIS

A. THE CASE STUDIES

The case studies demonstrate the evolution of Army ESA issues by subject matter and time. It's obvious that until the late 1980s, the Army did not place a high priority on the ESA, the science of extinctions, protecting ecosystems, or the earth's

diminishing biodiversity. The Army was struggling to define its environmental program, and priority was placed on achieving compliance with rule based statutes, and addressing the thousands of contaminated sites discovered on its installations. The ESA, by contrast, is a planning type statute, requiring negotiation, consultation, and close cooperation with other agencies, rather than reliance on black letter rules. Traditionally, the Army has been more comfortable dealing with rule based laws.[364]

Consequently, installations were largely left to themselves on ESA issues, and generally assigned these missions to their engineer or forestry office. Commanders and trainers showed little interest. At Fort Bragg and Fort Benning, timber sales (of trivial importance to the Army mission), were given higher priority than protecting the RCW. The notion that a soldier or Army civilian employee could be criminally prosecuted for a violation of the ESA would have been considered absurd.

This era came to an abrupt close with the debacle at Fort Bragg in 1989, where the Army was caught in blatant violation of the ESA. This event proved to be another defining moment in the environmental program, for it shocked the Army leadership into a change of priority, a change that would ultimately grow into the visionary Army policy on protecting biodiversity.[365]

Similar insights can be gleaned from examining the long-running comic opera at White Sands Missile Range and the Mexican wolf.[366] Acting independently, the Commander alternately approved, then abruptly withdrew Army cooperation for reintroduction of the wolf on his installation. Prompted by litigation, the Army disavowed his actions, and instituted a policy generally favorable to reintroduction of endangered predator species to their former ranges.[367]

Finally, the shy desert tortoise provides a glimpse of the future. A future where the Army achieves its vital objectives with coordinated, proactive, and scientifically defensible programs, in compliance with the law of the land.

B. THE FUTURE OF THE ENDANGERED SPECIES ACT

Like the Army environmental program, the ESA has substantially evolved over the past twenty years. Its central tenet, a species-by-species approach to preventing extinctions, has been largely discredited as inefficient and expensive.[368] There is a growing realization that herculean efforts to save a few high profile species does little to stem the tidal wave of extinctions sweeping the planet.

This old approach has given way to a system-wide emphasis, protecting whole ecosystems rather than individual species.[369] In this way, species can flourish or die naturally, meanwhile giving

the planet (and humans) the full value of their ecological services.[370] The importance of preserving diversity within species as well as among species is emphasized, as is recognition of the necessity of having sufficient numbers of individual members of a species to perform ecologically significant tasks.[371] No effort is made to select which species should live and which should die. It's likely that, after reauthorization this year or next, the ESA will move significantly in this direction.

C. THE FUTURE OF THE ARMY AND THE ESA

1. CAN THE ARMY COMPLY WITH THE ESA?

The short answer is yes, although much work remains. Certainly, in formulating the new endangered species guidance, the Army acted quickly and decisively to embrace the future of the ESA, with its emphasis on protecting biodiversity and ecosystems. The Army Environmental Strategy for the Twenty-First Century also evidences a strong leadership commitment towards conservation and endangered species issues. The challenge now facing the Army is to implement these policies in the field.

The Army must adopt a cooperative and scientific approach to conserving biodiversity. Money spent to hire biologists will pay dividends in increased credibility and flexibility. The Army must have the tools to convincingly make its case. If adequate

attention is paid to the science, and if lawyers, trainers, and commanders are integrated into the team, the Army can accomplish its mission and comply with the ESA. The example from White Sands Missile Range shows that this approach is viable.

The obstacles are considerable. Even in a drastically downsized Army, the pressures on remaining training lands seems likely to multiply. The increased sophistication and range of weapons, coupled with the larger scale and level of dispersion needed for survival on the modern battlefield, demands ever larger training grounds. At the same time, the Fish and Wildlife Service, confronting a swollen endangered species list, and shrinking old-growth habitats on private land and in national forests, will increasingly look to military installations as recovery havens for endangered species.[372] The impacts of reduced military budgets add a substantial element of uncertainty to the equation.[373]

2. SHOULD THE ARMY SEEK EXEMPTION FROM THE ESA?

The difficulty in complying with the ESA has prompted some within the Army to advocate relief from the requirements, by resort to the Endangered Species Committee, the national security exemption of the ESA, or outright legislative exemption from the Act. In an unforeseen or extreme emergency, such a possibility cannot be ruled out, but presently, such a request is premature.

Most of the Army's ESA violations have been due to arrogance and ignorance, not good faith inability to comply. Axe damage to clearly marked RCW cavity trees, and emplacement of tracked vehicles and generators directly beneath such trees at Fort Bragg are examples.[374] The Army would be hard pressed to articulate how this type of behavior is critical for national defense. Until these obvious violations are eliminated the Army is in no position to request special consideration.

The key to improvement is educating commanders and soldiers about ESA compliance and integrating these concerns into routine mission planning. Already, substantial progress has been made at Fort Bragg in this regard. Although regrettable, the ongoing prosecutions at Fort Benning over illegal taking of the RCW may also assist this process.

Finally, I'll describe how the Army can achieve compliance with the ESA while maintaining its training excellence.

VII. CONCLUSIONS AND RECOMMENDATIONS

The greatest failings in the Army endangered species program have been caused or substantially aggravated by inadequate or nonexistent communication between the Army staff and the installations. Fort Bragg and White Sands Missile Range effectively made Army policy, apparently without the knowledge of

the Army Secretariat or Staff.[375] Moreover, this poor coordination prevents the Army from adopting a proactive posture in planning its ESA compliance strategy. The Army has displayed an unfortunate tendency to allow environmental activist groups to define its priorities through strategically timed litigation. The endangered species issues at Fort Benning, Fort Bragg, and White Sands Missile Range were not meaningfully advanced towards resolution until such groups sued or threatened suit under the citizen suit provisions of the ESA. Obviously, such instances force the Army into a less desirable defensive or reactive posture.

The reasons are clear. Under the current system, cases in litigation are intensively managed by the DA Environmental Law Division and the Department of Justice. Other cases receive scant attention because of caseload restraints and limited resources. This is a poor approach because environmental litigation is enormously time consuming on one hand, and inefficient on the other. A proactive, coordinated strategy that resolves endangered species issues prior to litigation would conserve resources and provide better legal service to the Army.

I propose the formation of regional endangered species teams. These teams would possess sufficient legal, scientific, and operational expertise, to intensively manage endangered species issues at the installation level. Their mission would be

to conserve biodiversity on Army lands with minimal impact on military training. I envision a reasoned, scientific approach, and close working relationships with the Fish and Wildlife Service and the installations. This cooperation should help prevent the surprises, litigation, and derailed strategies that have occurred in the past. The endangered species teams would relieve the installations of the necessity of extensive dealings with the FWS. This should prevent many of the problems evident in the case studies.

The endangered species teams could be located with or part of the proposed regional branch offices of the Environmental Law Division. Alternatively, they could be located near FWS regional headquarters, or Army Corps of Engineers regional offices.

The Army has come a long way since the Endangered Species Act was passed in 1973. Despite notable ups and downs, I am convinced that the new guidance on endangered/threatened species is a farsighted and scientifically valid approach that can place the Army in a leadership role for the nation in protecting biodiversity. Since the outcome of this issue may well determine the long term health and viability of our country, it is fitting that the Army should play this role. Properly implementing the guidance, however, presents a significant challenge. The interdisciplinary, coordinated, and proactive approach detailed above offers a substantial probability of success.

ENDNOTES

1. ALDO LEOPOLD, A SAND COUNTY ALMANAC 190 (1966) (originally published in 1949).

2. NORMAN MEYERS, THE SINKING ARK 4 (1979).

3. *Id.*

4. *Id.* at 5.

5. ID. Meyers estimates that as many as 40,000 species may become extinct per year by the year 2000.

6. 16 U.S.C. §§ 1531-1541 (1988 & Supp. 1992)

7. 16 U.S.C. § 1531 (1988)

8. "[T]he purposes of this Act are to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be preserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the

purposes of the treaties and conventions set forth in subsection (a) of this section. *Id.*

9. Taking is defined broadly as "[t]o harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." 16 U.S.C. § 1532 (1988); *See* Palila v. Hawaii Dep't of Land & Natural Resources, 649 F. Supp. 1070 (D. Haw. 1986), *aff'd*, 852 F.2d 1106 (9th Cir. 1988).

10. GEORGE H. SIEHL, NATURAL RESOURCE ISSUES IN NATIONAL DEFENSE PROGRAMS 1 (Congressional Research Service Report for Congress, 1991).

11. Virginia Albrecht & Kathleen Rogers, *After the Snail Darter: The Endangered Species Act and Private Land Use*, 750 A.L.I.A.B.A. 750, 754 (1992). As of July 6, 1992, 727 U.S. species were on the endangered species list. Of these, 558 were endangered and 169 were threatened. 16 species have been removed from the list: four recovered, seven became extinct, and five had been erroneously listed. The status of 55 of the listed species was improving, and 212 was declining.

12. "Picoides borealis, commonly known as the red-cockaded woodpecker, is a small undistinguished woodpecker indigenous to the southern United States." Sierra Club v. Lyng, 694 F. Supp. 1260, 1265 (E.D. Tex. 1988), *aff'd* Sierra Club v. Yeutter, 926 F.2d 429, (5th Cir. 1991).

13. STEVEN M. STANLEY, EXTINCTION 62 (1987).

14. Meyers, *supra*, note 2, at 4. This life consisted of simple, single cell organisms. Algae did not develop until approximately 1.4 billion years ago. STANLEY, *supra* note 12 at 62 (1987).

15. STANLEY, *supra* note 13, at 9.

16. Extinction is defined as the contraction of a species' geographic range and population to zero. *Id.* at 10. Because extinction implies an imperfect creator, the concept was denied on religious grounds until the mid-nineteenth century, when the evidence became compelling. *Id.* at 1.

17. *Id.* at 13. *See* David Jablonski, *Mass Extinctions: New Answers, New Questions in* THE LAST EXTINCTION 43, 44 (Les Kaufman & Kenneth Mallory eds. 1986).

18. Life is classified into seven taxonomic groups: kingdom, phylum, class, order, family, genus, and species. For example, man is classified as: kingdom-animal, phylum-chordates (vertebrates), class-mammals, order-primates, family-hominids, genus-homo, and species-homo sapiens. STANLEY, *supra* note 13 at 12. Mass extinctions have swept away life up to the order level.

There were two orders of dinosaurs extirpated during the late cretaceous period of mass extinction.

19. Examples are an increase or decrease in sea level, an increase or decrease in the salinity of sea water, an increase or decrease in global temperature, and catastrophic collisions with celestial bodies. *See* Antoni Hoffman, *Changing Palaeontological Views on Mass Extinction Phenomena in* MASS EXTINCTIONS: PROCESSES AND EVIDENCE 1, 1-12 (Stephen K. Donovan ed. 1989).

20. W.D. Maxwell, *The End Permian Mass Extinction in* MASS EXTINCTIONS: PROCESSES AND EVIDENCE 152, 158-159 (Stephen K. Donavon ed. 1989).

21. Geologic time is divided into eons, eras, and periods. Periods last approximately 30 to 100 million years. The permian period occurred from 286 million years ago to 248 million years ago, a total of 38 million years. Jablonski, *supra* note 16 at 9.

22. STANLEY, *supra* note 13 at 96.

23. *Id.*

24. *See supra* note 18.

25. *Id. See* Jablonski, *supra* note 17 at 45. *See* Maxwell, *supra*

note 20 at 158.

26. The jurassic period occurred from 213 million years ago to 144 million years ago, a period of 69 million years. Jablonski, *supra* note 17 at 9.

27. Jablonski, *supra* note 17 at 45.

28. STANLEY, *supra* note 13 at 129-131.

29. Jablonsky, *supra* note 17 at 47.

30. STANLEY, *supra* note 13 at 132.

31. PAUL & ANNE EHRLICH, EXTINCTION 28 (1981). This theory postulates that the evolution of flowering plants caused herbivorous dinosaurs to die of constipation, leading to lack of prey and subsequent starvation for carnivorous dinosaurs as well. As appealing as it is, the theory does not explain the simultaneous demise of sea creatures which also occurred during the late cretaceous mass extinction episode.

32. The celestial impact theory involves the collision with the earth of a large meteor, probably 7-14 miles in diameter. The impact, equivalent in energy to hundreds of hydrogen bombs, threw massive amounts of dust into the atmosphere. The dust blocked

out the sun's energy and caused a significant decrease in the earth's temperature, with catastrophic consequences for the dinosaurs. This theory is bolstered by the presence of iridium, an extremely rare mineral, in the earth's geological record at the end of the cretaceous period. Iridium is known to exist in abundance in meteors. *See* STANLEY, *supra* note 13; EHRLICH & EHRLICH, *supra* note 31; Garland R. Upchurch Jr., *Terrestrial Environmental Changes and Extinction Patterns at the Cretaceous-Tertiary Boundary, North America in* MASS EXTINCTIONS: PROCESSES AND EVIDENCE 195 (Stephen K. Donnovan ed. 1989); Jablonsky, *supra* note 17.

33. MEYERS, *supra* note 2.

34. Several "minor" extinction episodes have occurred since the end of the cretaceous period, but they are of limited significance. *See* STANLEY, *supra* note 13 at 1.

35. Bryan G. Norton, *Introduction to* THE PRESERVATION OF SPECIES: THE VALUE OF BIOLOGICAL DIVERSITY 3 (Bryan G. Norton ed. 1986).

36. Steven M. Stanley, *Extinction as Part of the Natural Evolutionary Process: A Paleobiological Perspective in* ANIMAL EXTINCTIONS: WHAT EVERYONE SHOULD KNOW 31, 39 (R.J. Hoage ed. 1985)

37. Large deposits of wooly mammoth bones have been discovered in central Europe, mixed with flint spear heads and other stone-age implements dating back approximately 20,000 years. EHRLICH & EHRLICH, *supra* note 31 at 111.

38. MEYERS, *supra* note 2 at 29.

39. *Id.* at 4.

40. Thomas E. Lovejoy, *Species Leave the Ark One by One in* THE PRESERVATION OF SPECIES: THE VALUE OF BIOLOGICAL DIVERSITY 13, 14 (Bryan G. Norton ed. 1986).

41. EHRLICH & EHRLICH, *supra* note 31 at 17.

42. *Id.*

43. Norton, *supra* note 35 at 10.

44. Les Kaufman, *Why the Ark is Sinking in* THE LAST EXTINCTION 1, 12 (Les Kaufman & Kenneth Mallory eds. 1986). *See* MEYERS *supra* note 2 at 5.

45. The classic example of a direct hunting extinction is the passenger pigeon of the United States. *See* A.W. SCHORGER, THE PASSENGER PIGEON: ITS NATURAL HISTORY AND EXTINCTION (University of

Oklahoma Press 1973). A bird of immense population in the eighteenth and nineteenth centuries, individual flocks were known to number more than two billion individuals. At the time of the discovery of America, the passenger pigeon may have accounted for twenty-five to forty percent of all birds in North America. A roosting flock could stretch for forty miles, and their droppings could swamp vegetation and kill trees by sheer volume. Humans liked them because they were good to eat and easy to catch. As flocks flew over early American cities, literally blotting out the sun, residents would blaze away with shotguns or strike at low flying birds with sticks, hoes, brooms or nets. Even greater hauls could be made by hunting the birds in their roosts. One innovative hunting method involved feeding the birds grain that had been soaked in alcohol. The intoxicated birds would fall from the trees in droves allowing the hunters to collect them on the ground. There were instances where hunters killed over one million birds at a time by this and other methods. By the 1870s the passenger pigeon was in rapid decline. The last one died in the Cincinnati zoo in 1914. EHRLICH & EHRLICH, *supra* note 31 at 114-115. James D. Williams & Ronald M. Nowak, *Vanishing Species in Our Own Backyard: Extinct Fish and Wildlife of the United States and Canada in* THE LAST EXTINCTION 107, 110 (Les Kaufman & Kenneth Mallory eds. 1986).

Other examples include the american bison and Stellar's sea cow. The bison was reduced during a brief time-span, from around thirty million individuals down to 500. They were pulled back

from the brink of extinction and have now recovered to about 25,000, but none exist in the wild. Stellar's sea cow was discovered by naturalist Stellar in the eighteenth century. This twenty foot marine mammal was hunted to extinction within about ten years, primarily by Russian sailors for its tasty flesh. E. RAY LANKESTER, EXTINCT ANIMALS 21 (1905). Many species of whales such as the blue and the fin were also hunted to near extinction by the early twentieth century for their oil. *Id.* at 103-106.

46. In Australia over one million kangaroos have been killed because they compete with sheep for grass. *Id.*

47. The difficulty of preventing directly caused extinctions should not be minimized. Even protected species in national parks and wildlife refuges are still in serious danger of extinction from poaching. The hippopotamus, rhino, and elephant, hunted for meat, horns and ivory tusks are examples. There are an estimated 50,000 to 150,000 elephants killed each year for the ivory trade. *Id.*

48. Kaufman, *supra* note 44 at 1.

49. *Id.*

50. *Id.*

51. *Id.*

52. Probably the first fish to become extinct in North America in recent times is the harelip sucker. Once abundant in streams throughout the midwest and south, the harelip sucker became extinct around 1900. The extinction was caused by increased silt and mud in it's streams. The silt was runoff from forest land cleared for agriculture in the nineteenth century. The cloudy streams smothered the mollusks the sucker lived on and reduced its ability to see it's food. *Id.* at 120.

53. Ehrlich & Ehrlich state:

> The fate of the tropical forests will be the major factor that determines the biological wealth of the Earth in the future. These extraordinarily vulnerable ecosystems are the greatest single reservoir of biotic diversity on the planet...something on the order of two-fifths to one-half of *all* species on Earth occur in the rainforests, which occupy only 6 percent of the Earth's land surface. EHRLICH & EHRLICH, *supra* note 31 at 159.

54. Ghillean T. Prance, *The Amazon: Paradise Lost? in* THE LAST EXTINCTION 63 (Kaufman & Mallory eds. 1986). If accounted for as

a separate country the Amazon basin would be the world's ninth largest nation. The author describes the rainforest: "[t]he depths of the tropical rainforest are awesome to enter. A sense of quiet dignity pervades the quiet interior, where one is surrounded by massive trunks rising pillar like to the vaulted arches of branches and the green ceiling of layered leaves...[t]he damp, decaying leaves muffle the sound of footsteps, and only the snapping of a twig or whine of an insect breaks into the solemn serenity." *Id.* at 64.

55. *Id.*

56. EHRLICH & EHRLICH, *supra* note 29 at 159.

57. *Id.* *See* MEYERS, *supra* note 2 at 119.

58. Scientists speculate that destroying the rainforests would have catastrophic consequences for the temperate regions of the world as well. Climatic changes including reduced rainfall in the U.S. plains region, and increased global warming are some of the possible results. Effects of this scenario on U.S. food production could be severe. MEYERS, *supra* note 2 at 128.

59. All figures are for species, except for the late permian period which is given by genus. Estimating extinction rates is not possible with precision. Although science knows with fair

accuracy how many taxonomic families disappeared from the fossil record, it is unclear how long the extinctions took. The late permian extinction probably exterminated upwards of ninety percent of all living species, but took five or ten million years. The late cretaceous extinction wiped out far fewer families and species but did so over a shorter period. *See generally*, Jablonski, *supra* note 17 at 44-47.

60. MEYERS, *supra* note 2 at 3-5.

61. W. Desmond Maxwell, *The End Permian Mass Extinction in* MASS EXTINCTIONS: PROCESSES AND EVIDENCE 158 (Stephen K. Donovan ed. 1989).

62. MEYERS, *supra* note 2 at 4.

63. Kaufman, *supra* note 44 at 1.

64. *Id.*

65. *Id.*

66. Norton, *supra* note 35 at 10. Based on an average estimate of four to five million species in the world today, and a twenty to twenty-five percent loss rate over the next quarter century.

67. Prior to the late nineteenth century man did not generally believe that animals *could* become extinct. Such a notion conflicted with the religious tenet of a perfect creator and creation.

68. Stephen R. Kellert, *Social and Perceptual Factors in the Preservation of Animal Species in* THE PRESERVATION OF SPECIES: THE VALUE OF BIOLOGICAL DIVERSITY 50, 52-53 (Bryan G. Norton ed. 1986).

69. Paul R. Ehrlich, *Extinctions and Ecosystem Functions: Implications for Humankind in* ANIMAL EXTINCTIONS: WHAT EVERYONE SHOULD KNOW 159, 161 (R.J. Hoage ed. 1985). Over ninety-seven percent of crop pests and carriers of human disease are controlled naturally by ecological systems.

70. MEYERS, *supra* note 2 at 78. One third hectare of water hyacinth can purify 2000 tons of sewage per day, and can also filter out many heavy metals

71. *Id.* These services are essential to human life: "Few people in our society, and certainly few of our decision makers, understand that the ecological systems of the planet provide Homo sapiens with a whole series of little recognized but absolutely essential services, without which civilization cannot exist-indeed, without which Homo sapiens cannot exist." Ehrlich, *supra* note 69 at 160.

Plants are the most critical group of species for the functioning of the world's ecosystem. Although all species depend on the sun as their source of food and energy, only plants can directly manufacture food from the sun's rays. All other species either eat plants, or plant eaters. As widespread deforestation occurs, the earth's capacity to utilize the sun's energy declines and the world's food supply decreases. Because of the dependency on plants, each plant species extinction may cause as many as ten animal extinctions. Plants also have a major affect on climate by reflecting the sun's energy and by processing water. *See generally* Meyers, *supra* note 2 at 128.

72. *Id.*

73. *Id.* Norman Meyers summarized the utilitarian value of species:

> Protection of species is not merely an objective for idealist preservationists. It serves strictly utilitarian purposes of immediate value to society. Present uses of genetic resources run into the many thousands of forms, the main categories being modern agriculture, medicine, and pharmaceuticals, and industrial processes. In view of the

> benefits derived from the small segment of species investigated thus far, the planetary spectrum of species can be considered among society's most valuable raw materials. Conversely, the erosion of genetic resources is not only a loss to future generations, but an impoverishment for present society.
> MEYERS, *supra* note 2 at 57.

The Penicillium mold appeared to be an ordinary and useless mold. Subsequently, man discovered it had a natural ability to ward off competing fungi. This discovery lead to the development of modern antibiotics. Lovejoy, *supra* note 40 at 16.

74. There are many colorfully named species. The court in Sierra Club v. Lyng dryly noted: "The red-cockaded woodpecker has joined the ranks of other interestingly named flora and fauna, including the Santa Cruz long-toed salamander, the Dismal Swamp southeastern shrew, the purple-spined hedgehog cactus, and the Appalachian monkeyface pearly mussel. Of course, the listing of an animal or plant on the endangered species list is a distinction without cause for celebration. The list also includes the national symbol of our country, found on the seal of this Court-Haliaeetus leucocephalus, commonly known as the American bald eagle." 694 F.2d at 1265.

75. *See* Bryan G. Norton, *On the Inherent Danger of Undervaluing Species in* THE PRESERVATION OF SPECIES: THE VALUE OF BIOLOGICAL DIVERSITY 110, 118 (Bryan G. Norton ed. 1986)

76. *Id.* at 119. Norton uses this theory to argue that all species have utilitarian value to man, which man has been significantly undervaluing. When the relationships between species are taken into account, it's probable that almost any extinction will affect a species that has utilitarian value to man: "Scientific understanding of ecosystems is too limited even to begin to list interdependencies among species, so it is impossible to predict which species will be included in the cascading wave of extinctions resulting from the initial extinction. When an extinction creates more extinctions, a downward spiral in diversity, which will be extremely difficult to reverse, is begun." BRYAN G. NORTON, WHY PRESERVE NATURAL VARIETY? 62 (1987). There is also a high utilitarian value in having a diverse species "bank" to draw on, both for presently undiscovered uses, and for maintaining the health and vigor of the bank itself.

77. *Id.* at 61.

78. Although there are believed to be around 80,000 potential food plants on earth, twenty of them provide about ninety percent of the world's crops. MEYERS, *supra* note 2 at 57 Any disease or

blight that strikes one of these varieties could cause famine. To keep these crops productive, it is necessary to periodically renew their genetic makeup. After a few years, plants become vulnerable to newly evolved forms of diseases, and geneticists breed the plant with wild strains from the "gene reservoir" to produce new strains resistant to disease. *Id.* at 60. For example, in introducing two new strains of sorghum, scientists studied 9000 wild forms of the plant.

The so called "green revolution" that drastically increased the productivity of certain food crops was produced by taking genes from thousands of wild plant species and producing the characteristics of the plant most useful to man. This would have been impossible without sufficient genetic diversity. Genetic diversity is also important within species, as the well known problems with "inbreeding" of species has shown. As many populations of species shrink to fewer and fewer individuals, the strength of the species declines, and so does its ability to respond to stress, disease, and disruption. In a genetically diverse species, some individuals will usually have a "natural" resistance to a disease or toxin. These surviving individuals then pass this trait to succeeding generations. Examples are the rapid resistance insects develop to certain forms of pesticides, and the devastation suffered by native populations in North and South America after contact with European diseases. Over many

generations, the Europeans developed genetic resistance to common diseases like measles which the native populations lacked.

79. BARRY COMMONER, THE CLOSING CIRCLE 38 (1972).

80. EHRLICH & EHRLICH *supra* note 31 at xi. The Ehrlichs pose an example of a "rivet popper" methodically removing rivets from an aircraft's wing because the airline can sell each rivet for two dollars and fuel additional growth. The rivet popper sees no harm in this because the manufacturer constructed the aircraft stronger than it needs to be, and because he has been popping rivets for a long time with no apparent ill effect on the plane.

81. 16 U.S.C. § 1531(c)(1) (1988).

82. Robert D. Thorton, *The Endangered Species Act: Searching for Consensus and Predictability: Habitat Conservation Planning Under the Endangered Species Act of 1973*, 21 ENVTL. L. 605 (1991).

83. Tennessee Valley Authority v. Hill, 437 U.S. 153 at 184.

84. *See* John D. Dingell, *The Endangered Species Act: Legislative Perspectives on a Living Law in* BALANCING ON THE BRINK OF EXTINCTION 25 (Kathryn A. Kohm ed. 1991).

85. 16 U.S.C. § 1532(6) (1988).

86. 16 U.S.C. 1532(20) (1988)

87. Kathryn A. Kohm, *The Act's History and Framework in* BALANCING ON THE BRINK OF EXTINCTION 10 (Kathryn A. Kohm ed. 1991).

88. 16 U.S.C. §§701, 3371-3378 and 18 U.S.C. §42 (1976 and Supp. V 1981).

89. Kohm, *supra* note 87 at 11.

90. *Id.*

91. Examples are the extinction of the American bison in the wild, and the serious plight of the American bald eagle.

92. *Id.* The list, containing 63 vertebrate species, was compiled from informal expert opinion.

93. The Endangered Species Preservation Act of 1966, Pub. L. No. 89-669, 80 Stat. 926 (1966), and The Endangered Species Conservation Act of 1969, Pub. L. No. 91-135, 83 Stat. 275 (1969)

94. *Id.*

95. Kohm, *supra* note 87 at 13.

96. 16 U.S.C. § 1532(20) (1988).

97. Lynn A. Greenwalt, *The Power and Potential of the Act in* BALANCING ON THE BRINK OF EXTINCTION 31, 32 (Kathyrn A. Kohm ed. 1991).

98. *See generally* James C. Kilbourne, *The Endangered Species Act Under the Microscope: A Closeup View From a Litigator's Perspective.* 21 Envtl. L. 499 (1991).

99. *See* 50 C.F.R. §17.2 (1991). The Secretary of Commerce has authority for listing marine animals, and has delegated this authority to the National Marine Fisheries Service (NMFS). Under the Act, the term "Secretary" is used interchangeably to refer to the secretary with the appropriate authority for a particular species. 16 U.S.C. §1532(15) (1988); 50 C.F.R. §424.02 (1992).

100. If a species is a candidate species, that is a species proposed for listing, the Secretary must monitor its status periodically to ensure that it does not become extinct while the listing decision is pending. Because of a large backlog, a species can languish as a candidate for years. In 1975, after only two years of the ESA, the Secretary had made 114 listing decisions out of 23,962 petitions received. William Reffalt, *The*

Endangered Species Lists: Chronicles of Extinction? in BALANCING ON THE BRINK OF EXTINCTION 77, 81 (Kathryn A. Kohm ed. 1991).

101. 16 U.S.C. §1533(a)(1) (1988); 50 C.F.R. §424.11 (1992).The species must possess at least one of the following five criteria:

1. present or threatened destruction, modification, or curtailment of its habit or range;

2. overutilization for commercial, recreational, scientific, or educational purposes;

3. disease or predation;

4. inadequacy of existing regulatory mechanisms;

5. other natural or manmade factors affecting its continued existence.

There is also an emergency listing procedure, where protection for a species begins as soon as notice is published in the Federal Register, pending completion of the normal rulemaking procedure. 16 U.S.C. §1533(b)(7) (1988). *See* City of Las Vegas v. Lujan, 891 F.2d 927 (D.C. Cir. 1989).

102. 50 C.F.R. §424.11 (1992).

103. 50 C.F.R. 424.11 (1992).

104. Critical Habitat Means:

1. the specific areas within the geographic area currently occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features essential to the conservation of the species and that may require special management considerations or protection, and

2. specific areas outside the geographical area occupied by a species at the time it is listed upon a determination by the Secretary that such areas are essential for the conservation of the species. 50 C.F.R. §424.02 (1992).

105. 16 U.S.C. §1533(a)(C)(3)(A) (1988); 50 C.F.R. §424.12 (1992).

106. 16 U.S.C. §1533(b)(2) (1988).

107. 50 C.F.R. §424.12 (1992).

108. Such a situation could occur if the species is threatened by hunters or trappers, and designating a critical habitat would

notify the potential "takers" where they might expect to find the species.

109. James Salzman, *Evolution and Application of Critical Habitat Under The Endangered Species Act*, 14 HARV. ENVTL L. REV. 311, 332 (1990).

110. D.ROLF, THE ENDANGERED SPECIES ACT: A GUIDE TO ITS PROTECTIONS AND IMPLEMENTATION 51 (1989).

111. *Id.*

112. *See* Northern Spotted Owl v. Hodel, 716 F. Supp. 479 (W.D. Wash. 1988) (holding that the FWS had abused its discretion in failing to designate critical habitat concurrently with listing the northern spotted owl as threatened).

113. *See generally* Christopher A. Cole, *Species Conservation in the United States: The Ultimate Failure of the Endangered Species Act and Other Land Use Laws*. 72 B.U.L. REV. 343, 373-379.

114. 16 U.S.C. §1533(f)(1) (1988).

115. 16 U.S.C. §1533(f)(1)(B) (1988).

116. *See generally*, Tim Clark & Ann Harvey, *Implementing Recovery Policy: Learning As We Go? in* BALANCING ON THE BRINK OF EXTINCTION 147 (Kathryn A. Kohm ed. 1991).

117. Kilbourne, *supra* note 98 at 525.

118. Clark & Harvey, *supra* note 116 at 148.

119. *Id.* Clark & Harvey identify four common problems of recovery teams that have led to difficulties:

> [f]irst, species recovery is a tremendously complex task involving numerous people who must somehow integrate their diverse perspectives into a workable program. Second, these people often have conflicting goals, some of which have more to do with controlling the project than saving the species. Third, rarely is their explicit consideration of organizational structures appropriate to the task of saving species; recovery programs tend to develop into traditional hierarchial bureaucracies. Fourth, intelligence failures and program delays often occur because of preconceptions held by decision makers and the large number

of clearances required in programs with multiple participants.

120. 16 U.S.C. §1536(a)(2) (1988). Jeopardize the continued existence of means "to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species." 50 C.F.R. §402.02 (1991).

121. *Id.*

122. 50 C.F.R. §402.02 (1991). Examples given of agency actions that require consultations are:

1. actions intended to conserve listed species or their habitat;

2. the promulgation of regulations;

3. the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or

4. actions directly or indirectly causing modifications to the land, water, or air.

123. The vast majority of all projects are thus included within the ambit of section seven because of the wide definition of "action".

124. 16 U.S.C. §1536(a)(4) (1988).

125. 50 C.F.R. §402.02 (1991).

126. 50 C.F.R. §402.03 (1991).

127. *See* Kilbourne *supra*, note 98.

128. 437 U.S. 153 (1978).

129. The snail darter is a type of perch, one of about 130 different species of darters. At the time of discovery, there were approximately ten to fifteen thousand snail darters in existence. Its sole habitat was a branch of the Little Tennessee river. New species of darters were being regularly discovered at about the rate of one per year. 437 U.S. at 159.

130. The Tellico dam had been approved, financed, and mostly built, before the ESA and section seven became law. The snail darter had been listed as an endangered species, and the Little Tennessee river designated as its critical habitat.

131. 437 U.S. at 172. The Court went on to hold that section seven's prohibition against agency action that would jeopardize the continued existence of a listed species or its critical habitat, prohibited the opening of the dam.

132. Greenwalt, *supra* note 97 at 32. Many lawmakers later sheepishly admitted they thought they had been voting to protect eagles, bears, condors, and other popular, high profile animals, and had not realized that obscure, apparently valueless species would also be protected. They also did not realize the sort of land use issues that would be raised by the ESA. Certainly, after the decision in *Hill*, lawmakers, conservationists, and developers would not underestimate the power of the Act again.

133. *Id.*

134. 50 C.F.R. §402.14 (1991).

135. 50 C.F.R. §402.02 (1991). Including the area of indirect effects may substantially enlarge the action area from the immediate area. The action agency must also consider cumulative effects of the proposed action. The cumulative effects are those effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation.

The reason for excluding effects of other federal actions, is that these actions would be the subject of section 7(a)(2) consultation requirements in their own right.

136. 50 C.F.R. §402.02 (1991). A major construction activity is a "major federal action significantly affecting the quality of the human environment as referred to in the National Environmental Policy Act (NEPA, 42 U.S.C. §4332(2)(C)). This is an action which would trigger the obligation to prepare an environmental impact statement under NEPA.

137. 50 C.F.R. §402.12 (1991). Although the contents of the biological assessment are up to the action agency, the regulations suggest that the following be considered for inclusion:

1. the results of an on-site inspection of the action area to determine if listed or proposed species are present or occur seasonally;

2. the views of recognized experts on the species at question;

3. A review of the literature;

4. An analysis of the effects of the action on the species and habitat, including consideration of cumulative effects, and the results of any related studies;

5. An analysis of alternative actions considered by the federal agency for the proposed action.

138. 50 C.F.R. §402.13 (1991). The time limits present in the formal consultation process to not apply to informal consultation.

139. *Id.* The consulting agency may suggest modifications to the proposed action that would avoid the likelihood of adverse impacts to listed species or critical habitat.

140. 50 C.F.R. §402.14(c) (1991). The request will be accompanied by:

1. a description of the action to be considered;

2. a description of the specific area that may be affected by the action;

3. a description of any listed species or critical habitat that may be affected by the action;

4. a description of the manner in which the action may affect any listed species or critical habitat and an analysis of any cumulative effects;

5. relevant reports, including any environmental impact statement, environmental assessment, or biological assessment prepared; and

6. any other relevant available information on the action, the affected listed species, or critical habitat.

141. 50 C.F.R. §402.14(d) (1991). Examples in the regulation include studies or surveys conducted by the action agency.

142. 50 C.F.R. §402.14(e) (1991). The action and consulting agencies may mutually agree to extend this period.

143. 958 F.2d 290 (9th Cir. 1992).

144. *Id.* at 293.

145. 926 F. 2d. 429 (5th Cir. 1991), *aff'g* Sierra Club v. Lyng 694 F. Supp. 1260 (E.D. Tex. 1988).

146. *Id.* at 439.

147. 50 C.F.R. §402.14(g) (1991).

148. 50 C.F.R. §402.14(h) (1991). This opinion states that the proposed agency action is not likely to jeopardize the continued existence of a listed species or critical habitat.

149. *Id.* The jeopardy biological opinion states that the proposed action is likely to jeopardize the continued existence of a listed species or critical habitat.

150. *Id.* Reasonable and prudent alternatives are alternative actions that can be implemented by the action agency, consistent with the intended purpose of the action, within the authority and jurisdiction of the action agency, are technically and economically feasible, and will avoid the likelihood of jeopardizing the continued existence of the listed species or critical habitat.

151. 1992 U.S. App. LEXIS 33688 (9th Cir. Dec. 29, 1992).

152. *Id* at *38. The action agency cannot blindly rely on the biological opinion. Their reliance must not be arbitrary or capricious. Pyramid Lake Piaute Tribe of Indians v. Navy, 898 F.2d 1410, 1415 (9th Cir. 1990). *But see* Stop H-3 Ass'n v. Dole, 740 F.2d 1442, 1459-60 (9th Cir. 1984). (Even if the FWS biological opinion is based on weak data, the action agency's

reliance will not be overturned unless the movant can show new information contradicting the FWS opinion).

153. 50 C.F.R. §402.14(i) (1991).

154. 50 C.F.R. §402.14(i)(5) (1991).

155. 50 C.F.R. §402.14(i)(2) (1991). These required measures are referred to as "reasonable and prudent measures."

156. Steven L. Yaffee, *Avoiding Endangered Species/Development Conflicts Through Interagency Consultation in* BALANCING ON THE BRINK OF EXTINCTION 86, 89 (Kathryn A. Kohm ed. 1991).

157. *Id.*

158. *Id.*

159. *Id.* Examples of mitigating measures used in some projects include, creating a conservation trust fund, conducting conservation research, acquiring alternate habitat, revegetation of disturbed areas, off-site reintroduction and recovery, public education plans, and changing use regulations for public waterways and boat rental.

160. *Id.* at 90.

161. *Id.* at 91.

162. 16 U.S.C. §1536(a)(1) (1988).

163. The terms "conserve", "conserving", and "conservation" mean to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this act are no longer necessary. Such methods and procedures include, but are not limited to, all activities associated with scientific resources management such as research, census, law enforcement, habitat acquisition and maintenance, propagation, live trapping, and transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, may include regulated taking. 16 U.S.C. §1532(3) (1988).

164. *Id.*

165. Kilbourne, *supra* note 98 at 564.

166. *Id.*

167. 50 C.F.R. §402.14(j) (1991).

168. *Id.* Conservation recommendations are "suggestions of the Service regarding discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding development of information." 50 C.F.R. §402.02 (1991).

169. 16 U.S.C. §1536(a)(1) (1988).

170. 437 U.S. 153 (1978).

171. 437 U.S. at 181.

172. 741 F.2d 257 (9th Cir. 1984), *aff'd in part and vacted in part*, 741 F.2d 257 (9th Cir. 1984), *cert. denied*, 470 U.S. 1083 (1985).

173. 741 F.2d at 260-262.

174. 898 F.2. 1410 (9th Cir. 1990).

175. 898 F.2d at 1413.

176. 898 F.2d at 1415. The Navy had consulted each year with the FWS prior to awarding the leases. Each year the FWS returned a

"no jeopardy" biological opinion, stating that the lease program would not jeopardize the continued existence of the qui-ui. The court ruled that although an agency cannot, "abrogate its responsibility to ensure that its actions will not jeopardize a listed species", a court will only overturn a case where the agencies' reliance on a biological opinion is arbitrary and capricious. *Id.*

177. 898 F.2d 1410 at 1418. The Court relied on *TVA v. Hill*, noting that the Supreme Court had rejected the same argument in that case.

178. 898 F.2d 1410 at 1418.

179. 16 U.S.C. §1538 (1988).

180. 16 U.S.C. §1538(a)(1)(B) (1988).

181. 16 U.S.C. §1532(19) (1988).

182. 16 U.S.C. §1538(a)(1) (1988).

183. 16 U.S.C. §1532(13) (1988).

184. 16 U.S.C. §1540 (1988). It is a defense to prosecution for taking an endangered species, that the defendant committed the

offense based on a good faith belief that he was acting in self defense, or defense of another from attack by the endangered species.

185. 16 U.S.C. §1536(a)(2) (1988).

186. John P. Ernst, *Federalism and the Act in* BALANCING ON THE EDGE OF EXTINCTION 98, 104 (Kathryn A. Kohm ed. 1991).

187. 59 C.F.R. §17.3 (1991).

188. *Id.*

189. 852 F.2d 1106 (9th Cir. 1988).

190. The Palila, a member of the Hawaiian honeycreeper family, had standing to bring the lawsuit in its own name as an endangered species. As a party it was entitled to have its name capitalized. 852 F.2d at 1107.

191. Earlier litigation resolved the issue of the feral goats and sheep. The instant case dealt with the mouflon sheep.

192. *Id.*

193. 50 C.F.R. §17.3 (1991).

194. 649 F. Supp. 1070 (D. Haw. 1986) *aff'd*, 852 F.2d 1106 (9th Cir. 1988).

195. 852 F.2d at 1108.

196. *Id.*

197. 16 U.S.C. §1531(b) (1988).

198. 926 F.2d 429 (5th Cir. 1991), *aff'g* Sierra Club v. Lyng, 694 F. Supp. 1260 (E.D. Tex. 1988).

199. 926 F.2d at 438.

200. 16 U.S.C. §1532(3) (1988).

201. *See* Sierra Club v. Clark, 755 F.2d 608 (8th Cir. 1984), where the FWS issued regulations allowing sport hunting of the eastern timber wolf (a threatened species) in Minnesota. The Eighth Circuit struck down the regulation as being a taking under section nine, because the FWS could not demonstrate any genuine population pressures, or conservation benefit to the wolves from the taking.

202. Tennessee Valley Authority v. Hill, 437 U.S. 153 (1978).

203. *See supra* note 132. Congress received a wave of protest from development interests and taxpayers enraged at the waste of federal dollars expended on the Tellico Dam.

204. 16 U.S.C. §1536(e) (1988).

205. 16 U.S.C. §1536(e)(2) (1988). The cabinet level officials are the Secretaries of the departments of Agriculture, Army, and Interior, plus the Chairman of the Council of Economic Advisors, The Administrator of the EPA, and the Administrator of the National Oceanic and Atmospheric Administration.

206. 16 U.S.C §1536(n) (1988).

207. 16 U.S.C. §1536(g)(1) (1988), 50 C.F.R. §451.02(c) (1992). The application must be accompanied by complete documentation, studies, and justification for the proposed exemption.

208. 16 U.S.C. §1536(g)(3)(A) (1988), 50 C.F.R. §452.03 (1992). The threshold determinations are:

1. whether any required biological assessment was conducted;

2. whether the federal agency and any permit or license applicant carried out consultations in good faith and have made a reasonable and responsible effort to develop and fairly consider alternatives that would not violate section 7(a)(2);

3. whether the federal agency and any permit or license applicant have refrained from making any irreversible or irretrievable commitment of resources.

209. 50 C.F.R. §452.04 (1992). The report will contain:

1. the availability of reasonable and prudent alternatives to the proposed action;

2. the nature and extent of the benefits of the proposed action;

3. the nature and extent of the benefits of alternative courses of action consistent with conserving the species or the critical habitat;

4. a summary of the evidence concerning whether the proposed action is in the public interest;

5. a summary of the evidence concerning whether the proposed action is of regional or national significance;

6. any appropriate and reasonable mitigation and enhancement measures which should be considered by the Committee in granting an exception; and

7. whether the federal agency and permit or license applicant, if any, have refrained from making any irreversible or irretrievable commitment of resources.

210. 50 C.F.R. §453.03 (1992).

211. 16 U.S.C. §1539(i)(1) (Supp. III 1979).

212. *See* Jared des Rosiers, *The Exemption Process Under the Endangered Species Act: How the "God Squad" Works and Why* 66 Notre Dame L. Rev. 825, 845-846 (1991).

213. Mitigation and enhancement measures means measures to minimize the adverse effects of a proposed action, or to improve the conservation status of the species. The measures must be likely to protect the listed species or the critical habitat, and be reasonable in cost. 50 C.F.R. §450.01 (1992). Why the mitigation and enhancement measures adopted for the whooping crane could not have been considered reasonable and prudent

alternatives by the consulting agency during the consultation process under section 7(a)(2) of the ESA is not clear.

214. Rosiers, *supra* note 212.

215. *Id.*

216. *Id.* at 847.

217. Kathleen Trever, *The Endangered Species Committee: The Wizard or the Man Behind the Curtain?* 22 Envtl. L. 1097 (1992). In addition to the BLM and the FWS, there were intervening parties from environmental groups, the timber industry, timber workers, municipalities and the state of Oregon. *Id.*

218. *Id.*

219. *Id.* at 1101. A Federal District Court has issued a preliminary injunction halting timber sales on BLM land in Oregon to protect the spotted owl.

220. This may also be a reflection of the low number of jeopardy opinions issued by the FWS in recent years.

221. 16 U.S.C. §1536(j) (1988).

222. Interview with Major Craig Teller, U.S. Army Environmental Law Division, In Arlington, VA (Feb. 3, 1993).

223. *Id.*

224. In 1977 the Army, on its own initiative, formed an organization that would ultimately become the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA). By 1978 USATHAMA was engaged in nationwide study of Army installations to detect, stabilize, and ultimately remediate contamination problems caused by past waste disposal practices. This program became known as the Installation Restoration Program, and pre-dated the passage of the Comprehensive Environmental Responsibility Compensation and Liability Act, commonly known as Superfund, by almost three years. When enacted, Superfund adopted many of the procedures pioneered by USATHAMA.

By 1991, The Installation Restoration Program included 10,578 Army sites, of which 5,054 had all needed restoration work completed. Interagency Agreements, governing clean-ups at all thirty Army sites listed on the National Priorities List were completed.

225. The Environmental Law Division serves as counsel in environmental litigation, and advises the Army staff and major command elements on a full range of policy and compliance issues.

226. The Secretary of the Army and the Chief of Staff, have ultimate responsibility and control over the Army environmental program.

227. UNITED STATES ARMY, ENVIRONMENTAL STRATEGY INTO THE 21ST CENTURY [HEREINAFTER ARMY STRATEGY] 31 (1992).

228. In order to ensure the future success of the Army and the nation, the Army pledged to be "a national leader in environmental and natural resource stewardship for present and future generations as an integral part of our mission." ARMY STRATEGY, *supra* note 244 at 1.

229. These functional areas are referred to by the Army strategy as pillars.

230. The focus of the conservation pillar is to "assess, conserve, preserve, and restore ecological resources to maintain carrying capacities." ARMY STRATEGY, *supra* note 227 at 18.

231. Siehl, *supra* note 10 at 29.

232. *Id.* at 30. One of the prime reasons for acquiring the national military parks was the military training offered by studying the civil war battlefields. The Army was in charge of

administering these national battlefields until 1933. *Id.* at 32-33. During the depression years of the 1930s, the Army managed the human resources of the Civilian Conservation Corps, as the Corps was performing wide ranging conservation duties in the national parks and forests. *Id.* at 30.

233. *Id.* Forestry activities provided excellent training for engineer units, and timber sales served as a source of revenue.

234. *Id.* at 31. *See* the Sikes Act of 1960, Pub. L. No. 86-797, 74 Stat. 1052 (codified at 16 U.S.C. §670A (1992)). The Sikes Act authorized the Secretary of Defense to carry out comprehensive wildlife conservation and rehabilitation programs on military installations, in cooperation with the Secretary of the Interior and State agencies.

235. *Id.* at 1.

236. ARMY STRATEGY, *supra* note 227 at 34.

237. THE RAND CORPORATION, TWO SHADES OF GREEN: ENVIRONMENTAL PROTECTION AND COMBAT TRAINING [HEREINAFTER TWO SHADES OF GREEN] 13 (1993).

238. UNITED STATES ARMY, GUIDANCE FOR MANAGEMENT OF ENDANGERED/THREATENED SPECIES [HEREINAFTER ARMY GUIDANCE] 1 (1993). This guidance was issued to all Army commands as interim policy guidance on January 26,

1993. It will be officially published as chapter eleven of Army Regulation 420-74, Natural Resources, Land, Forest, and wildlife management, when the revision of this regulation is issued late in 1993.

239. Memorandum from Gerald C. Brown, Director of Environmental Programs, Department of the Army Office of the Chief of Engineers, to all Army elements (Jan. 26 1993) (on file with author).

240. ARMY GUIDANCE *supra* note 238. This guidance was developed after an exhaustive review of Army endangered species issues conducted during 1992 and 1993 by a Departmental level task force commissioned by the Army Chief of Staff.

241. *Id.* at 1.

242. It is not my intent to belittle the nature of the controversy involving the timber industry and the northern spotted owl in the pacific northwest. My point is that the significance of these interests pale compared with the defense of the United States, and therefore, the commitment of the Army leadership to the ESA is truly remarkable.

243. *See* The Future of The Endangered Species Act *infra* pg. 83.

244. ARMY GUIDANCE, *supra* note 238 at 2-3. The guidance provides:

> [b]iological diversity is important in maintaining a quality existence for humans. The Army recognizes that natural ecosystems play a vital role in maintaining a healthy environment. Natural ecosystems can best be maintained by protecting the biological diversity of natural organisms and the ecological processes that they perform...The Army also recognizes the importance of habitat management, the key to effective conservation of biological diversity, in the protection of listed species...Conserving biological diversity minimizes the number of species that must be protected as threatened and endangered.

245. 694 F. Supp. 1260, 1265 (E.D. Tex. 1988), *aff'd* Sierra Club v. Yeutter, 926 F.2d 429, 5th Cir. 1991) . Lyng dealt with the demise of the red-cockaded woodpecker in the national forests of Texas.

246. ROBERT W. MCFARLANE, A STILLNESS IN THE PINES: THE ECOLOGY OF THE RED-COCKADED WOODPECKER 15 (1992).

247. *Id.* at 162.

248. *Id.* at 162. Of sixty-three million acres of privately owned pine forest, only 2.5 percent are over sixty years old, and 0.6 percent are over eighty years old.

249. *Id.* at 21. Hardwood trees are more vulnerable to fire than pine trees. Frequent wildfires tends to clear the hardwoods, and perpetuate the pine forest.

250. 694 F. Supp. at 1265.

251. MCFARLANE, *supra* note 246 at 21. The RCW has been protected as an endangered species since 1968, in the precursor act to the ESA.

252. *Id.* note 267 at 40.

253. *Id.* at 44-48.

254. *Id.* at 76.

255. 694 F. Supp. at 1266.

256. MCFARLANE, *supra* note 246 at 80-81. An advantage of using live trees for cavity building is that they produce sap when

damaged. The RCWs use the sap to ward off one of their most feared predators, the rat snake. This snake has the ability to slither straight up pine trees to the cavity and consume the RCW eggs or nestlings. Pine sap contains a natural substance which is highly irritating to the snake. RCWs will "mine" this sap by pecking the tree around the cavity, thereby inducing the tree to produce sap at the desired location. RCWs will also mine adjoining trees to prevent the snake from gaining access in that manner. Once the tree can no longer produce sap, the RCWs abandon the cavity.

257. *Id.* at 74.

258. *Id.* at 208.

259. UNITED STATES FISH AND WILDLIFE SERVICE, RED-COCKADED WOODPECKER RECOVERY PLAN [HEREINAFTER RCW RECOVERY PLAN] 7 (1985).

260. *Id.*

261. *Id.* at 2-3.

262. MCFARLANE, *supra* note 246 at 137-138. This fascinating behavior may stem from the length of time it take a RCW to construct a cavity. Males cannot establish a territory until they have at least one cavity to call their own. Put another

way, a female will not consider a male as a serious mate until he has his own cavity. Since a cavity may take a year or more of mind numbing labor to complete, some timid males elect to stay at home with their parents for an extra season to build up strength for the venture. A fortunate male may find a territory with one or more abandoned cavity trees and move right in, an ideal circumstance.

263. 694 F. Supp at 1260. The court found, as a matter of fact, that the RCW would be extinct in the Texas national forests by 1995 unless the Forest Service changed its timber management practices from the current emphasis on clear cutting. The court found that the sole reason the Forest Service endorsed clear cutting was a desire to please the timber industry, which provided the greatest market for jobs once Forest Service employees left government service. *Id.* at 1267.

264. 694 F. Supp at 1267. The timber industry prefers to cut trees when they reach around sixty years of age. Once clear cut, the area is useless to the RCW, even for forage, for at least thirty years.

265. Hardwood mid-story are young hardwood trees growing within the stands of pine. The pine tree is a hardy, fast growing, "pioneer" species. It is usually the first tree to colonize an area and form a forest. Within its protection, slower growing

hardwood trees begin to grow. Eventually, the hardwood trees will grow above the pine trees, block out the sun with their broad leaves, and kill the pine trees. In this way, pine forests gradually give way to hardwood forests. Frequent forest fires retard this process because hardwoods are very vulnerable to the flames while pine trees are not, thus clearing out the hardwood mid-story and returning the nutrients to the soil. MCFARLANE, *supra* note 246 at 21.

266. John H. Beasley, The Army and the Red-Cockaded Woodpecker: Managing an Endangered Species 74 (1991) (unpublished M. Laws thesis, George Washington University).

267. *Id.* at 80.

268. *Id.*

269. *See Id.* Lieutenant Colonel (Retired) John H. Beasely is the former Chief of the Environmental Litigation Branch of the Army's Environmental Law Division located in Arlington Virginia.

270. TWO SHADES OF GREEN, *supra* note 237 at 3-4. The trial of these three individuals is expected to take place during 1993.

271. Beasley, *supra* note 266 at 87.

272. TWO SHADES OF GREEN, *supra* note 237 at 34. There was insufficient Department of the Army level direction or coordination with the installations in this era. As previously noted, the Army Environmental Office, and the Environmental Law Division were not formed until the late 1980s. Earlier, each installation had considerable autonomy to negotiate directly with the FWS and other environmental agencies.

273. Beasley, *supra* note 266 at 89. The FWS also attached to the May 1988 letter a copy of a sign found on Fort Bragg depicting a range target superimposed over a picture of an RCW. This caused the FWS to question how seriously Fort Bragg was taking the RCW issue.

274. TWO SHADES OF GREEN, *supra* note 237 at 36.

275. Beasley, *supra* note 266 at 88. Beasley relates the full extent of the violations:

1. significant hardwood mid-story encroachment within RCW colonies;

2. fire plow damage within RCW colonies;

3. heavy troop activity in and among colony sites;

numerous foxholes and gun positions directly beneath active cavity trees;

4. active troop usage, i.e., staging areas, generator site placements, etc., directly beneath active cavity trees;

5. direct damage to RCW cavity trees: i.e., heavy digging in the area, root damage, total ground cover removal, direct damage to the tree trunks, etc;

6. highly visible heavy tracked/wheeled vehicle activity in the colony site areas;

7. cable and parachute lines wrapped around visibly marked cavity trees, axe damage to trees, and severe limb damage;

8. severe erosion from roads and drop zones depositing sediment in colony areas causing death of trees.

276. *Id.* at 89.

277. *Id.* at 93. This posture was contrary to official Army policy, and was virtually certain to evoke a negative response

from the FWS. Beasley speculates that Fort Bragg may have welcomed a fight with the FWS as a way to gain support for claiming the national security exemption to the ESA under section seven.

278. TWO SHADES OF GREEN, *supra* note 237 at 37.

279. MCFARLANE; *supra* note 246 at 248-249. The Francis Marion National Forest in South Carolina was home to the showcase population of RCWs in the nation, 483 active colonies and 1000 birds. The population of RCWs in this forest was healthy and increasing. The hurricane destroyed fifty percent of the birds instantly and wiped out most of the trees the remainder need to survive.

280. TWO SHADES OF GREEN, *supra* note 237 at 37-38. The Rand study concluded that a lack of coordination between mission and garrison staff contributed to the problems during the formal consultations with the FWS.

281. *Id.* at 39. The restrictions included:

1. marking every cavity tree on Fort Bragg with tape and signs;

2. marking all trees within 200 feet of cavity trees;

3. severely limiting damage to pine trees anywhere on Fort Bragg to maintain foraging habitat;

4. limiting activities in colony sites (approximately 1500 feet surrounding cavity trees) to transient foot traffic, and vehicular traffic on pre-existing roads;

5. requiring colony sites to be clearly marked on installation training maps;

6. instituting a three year burn cycle to clear hardwood mid-story.

282. The citizen suit provisions appear at 16 U.S.C. §1540(g) (1988).

283. Perhaps ironically, the RCW would soon receive a temporary reprieve from Fort Bragg soldiers, as the 82nd Airborne Division, the premier contingency unit in the Army, became the first U.S. forces to deploy to Saudi Arabia in support of Operation Desert Shield/Desert Storm. During the first, crucial days of the operation, these Fort Bragg soldiers were the only friendly forces between the Iraqi army and the oil riches of Saudi Arabia. The tough, realistic training they had received at Fort Bragg would pay handsome dividends in the months to come.

284. The biological opinion authorized an incidental take of eight RCWs. Fort Bragg recently had completed a $15 million multi- purpose range complex (a high technology live fire range) in an area containing three active RCW colonies. The range was closed due to concern over exceeding the incidental take limit. TWO SHADES OF GREEN, *supra* note 237 at 49-50.

285. THE BROTHERS GRIMM, ONE HUNDRED FAIRY TALES, THE WOLF AND THE SEVEN LITTLE KIDS 15 (1882).

286. *See generally*, DAVID E. BROWN, THE WOLF IN THE SOUTHWEST: THE MAKING OF AN ENDANGERED SPECIES (1983). In 1982 the Mexican Wolf Recovery Plan noted: "[p]eople far removed from the scene of action, who will never own a cow, or meet a wolf, are taught to abhor and fear the malefactor, and to applaud its death and even its suffering. UNITED STATES FISH AND WILDLIFE SERVICE, MEXICAN WOLF RECOVERY PLAN [HEREINAFTER RECOVERY PLAN] 5 (1982).

287. Literature, theater, and the movies are replete with unflattering characterizations of wolves. What child is not familiar from infancy, with the "big, bad, wolf", whose favorite occupation is to "huff, and puff, and blow your house in"? (With generally unpleasant consequences for the residents, once this object is achieved). Even the recent box office success "The Beauty and the Beast" featured a pack of snarling, ravening

wolves, appearing at critical junctures to menace the heroine and her kindly, though eccentric father. One must resort to Roman mythology to locate an arguably positive portrayal of a wolf, in the tale of Romulus. In that myth, Romulus, the son of Mars and a vestal virgin, was abandoned at birth and left to die with his twin brother Remus. The twins were rescued and raised by a she-wolf named Etruscan. Romulus later founded Rome and became the its first king in 753 B.C. THE AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE 1128 (1969).

288. BROWN, *supra* note 286 at 137.

289. *Id.* at 157-158.

290. JAMES C. BEDNARZ, AN EVALUATION OF THE ECOLOGICAL POTENTIAL OF WHITE SANDS MISSILE RANGE TO SUPPORT A REINTRODUCED POPULATION OF MEXICAN WOLVES 1 (1989).

291. Affidavit of Michael Spear, Regional Director of Region 2, U.S. Fish and Wildlife Service 1 (June 27 1990) (on file with the author).

292. JAMES C. BEDNARZ, THE MEXICAN WOLF: BIOLOGY, HISTORY, AND PROSPECTS FOR REESTABLISHMENT IN NEW MEXICO 7 (1988).

293. BROWN, *supra* note 286 at 119.

294. *Id.* at 122.

295. *Id.* at 126-127.

296. BEDNARZ, *supra* note 292 at 2.

297. *Id.* at 5.

298. BROWN, *supra* note 286 at 132.

299. BEDNARZ, *supra* note 292 at 2.

300. RECOVERY PLAN, *supra* note 286 at 11.

301. David Todd, *Wolves-Predator Control and Endangered Species Protection: Thoughts on Politics and Law* 33 S. TEX. L. REV. 459, 463 (1992).

302. *Id.*

303. *Id.*

304. *Id.* at 465. In Delaware it was considered a public duty for each citizen to produce two dead wolves per year.

305. BROWN, *supra* note 286 at 32-37.

306. RECOVERY PLAN, *supra* note 286 at 5.

307. BROWN, *supra* note 286 at 107. Brown gives a detailed description of the coyote getter:

> a mechanical device which expels sodium cyanide and consists of a shell holder wrapped with fur, cloth, wool, or steel wool; a firing unit; a 38 cal. shell containing the sodium cyanide; and a 5-7 inch hollow stake. The stake is driven into the ground, the firing unit is cocked and placed in the stake and the shell holder containing the cyanide shell is screwed onto the firing unit. A fetid bait, usually made of fish, brains, or blood, is carefully spread on the shell holder. An animal attracted by the bait will try to pick up the baited shell holder. The cartridge fires when the animal pulls up on the shell holder and the cyanide is blown into the animal's mouth.

308. For example, Todd reports that as late as 1963, the FWS set 39,910 traps, spread 151,942 pounds of poisoned grain, prepared

708,130 poisoned baits, and set 64,921 coyote getters. Todd, *supra* note 301 at 460.

309. The wolf recovery team felt the desire to blot out the last surviving wolves was more emotional than economic and attributed the motive to man's innate "fear and loathing" of the wolf. RECOVERY PLAN, *supra* note 286 at 5.

310. BEDNARZ, *supra* note 292 at 2.

311. UNITED STATES FISH AND WILDLIFE SERVICE, A GENERAL PLAN FOR THE REINTRODUCTION OF THE MEXICAN WOLF (DRAFT) 1 (1990).

312. Kevin Bixby, *Predator Conservation in* BALANCING ON THE EDGE OF EXTINCTION 199, 201 (Kathryn A. Kohm ed. 1991).

313. 41 Fed. Reg. 24062, 24066 (1976).

314. BROWN, *supra* note 286 at 176.

315. As previously noted, these four animals had multiplied to forty-six by 1990. Spear Affidavit, *supra* note 291 at 1.

316. RECOVERY PLAN, *supra* note 286 at 23.

317. Bixby, *supra* note 312 at 203.

318. Spear Affidavit, *supra* note 291 at 2.

319. *Id.*

320. UNITED STATES FISH AND WILDLIFE SERVICE, AN EVALUATION OF THE ECOLOGICAL POTENTIAL OF WHITE SANDS MISSILE RANGE TO SUPPORT A REINTRODUCED POPULATION OF MEXICAN WOLVES [HEREINAFTER MEXICAN WOLF STUDY] 4 (1989).

321. *Id.*

322. *Id.* at 10.

323. New Mexico did not inform White Sands Missile Range of the nomination. Defendants' Opposition to Plaintiffs' Motion to Compel at 5, Wolf Action Group v. Lujan, CIV-90-0390-HB (D. N.M. 1990).

324. Spear Affidavit, *supra* note 291 at 2.

325. *Id.*; Letter from Major General Joe S. Owens, Commander U.S. Army White Sands Missile Range, to Michael J. Spear, Regional Director, U.S. Fish and Wildlife Service (Sep. 29 1987) (on file with author). Major General Owens stated reason for withdrawing authorization for the reintroduction was simply "it is not in the

best interest of the range to support the reintroduction program." He concluded by stating "I wish you good luck on finding another site for the Mexican wolf reintroduction."

326. Defendants' Opposition to Plaintiffs' Motion to Compel, *supra* note 323 at 8. On November 17, 1989 the Army issued Technical Note No. 420-74-2, Endangered Species Management Requirements on Army Installations, requiring approval from the Army Major Command and the Army Engineering and Housing Support Center, before the reintroduction of an endangered species. *Id.* at 2. The technical note also stated "[t]he conservation of endangered species, including introduction and reintroduction, will be supported unless such actions are likely to result in long term significant impacts to the accomplishment of the military mission. *Id.*

327. Defendants' Opposition to Plaintiffs' Motion to Compel *supra* note 323 at 6.

328. The group of organizations consisted of The Wolf Action Group, the Mexican Wolf Coalition, the National Audubon Society, the Environmental Defense Fund, The Sierra Club, and the Wilderness Society.

329. Defendants' Motion to Dismiss, or, in the Alternative, for Summary Judgment at 8, Wolf Action Group v. Lujan, Civ No. 90-

0390 HB (D. N.M. 1990). The sixty day notice is a prerequisite to suit under the ESA. 16 U.S.C. §1540(g)(2) (1988).

330. *Id.*

331. *Id.*

332. *Id.* Later, the Commander of White Sands Missile Range wrote to the FWS and agreed to review draft plans for the reintroduction and to allow access to FWS personnel preparing the draft plan. *Id.* at 9.

333. Memorandum in Support Of Plaintiffs' Motion to Compel at 6, Wolf Action Group v. Lujan, Civ No. 90-0390 HB (Nov. 19, 1990) (D. N.M.). The plaintiffs stated:

> "[i]n this case the Recovery Plan for the Mexican wolf is eight years old, and still no definitive action has been taken to reintroduce the wolf. The Army's indecision and failure to cooperate over the *better part of this period* is evidence not only of a violation of the mandate under the Endangered Species Act that federal agencies shall utilize their authorities in furtherance of the purposes of the Act, but is also evidence

that the Army is likely to revoke its current cooperative position sometime in the future. (Emphasis added).

Actually, the Army was not contacted by the FWS regarding the possible reintroduction of the Mexican Wolf until early 1987. Spear Affidavit *supra* note 315 at 2. It's unclear how the period between 1987 and 1990 constitutes indecision and failure to cooperate for the better part of eight years.

334. *Id.*

335. Interview with A. Reid Allison, Litigation Attorney, U.S. Army Environmental Law Division, in Arlington, VA (Feb. 3, 1993). The FWS has not completed the decision making process required under NEPA. The Army will likely agree to support the FWS decision at the conclusion of this process. *Id.*

336. Video tape entitled *The Desert Tortoise: A Delicate Balance*, [HEREINAFTER DESERT TORTOISE VIDEO] produced by The NASA Dryden Flight Research Facility, Edwards Air Force Base, CA (Aug. 1992) (on file with author).

337. NATIONAL TRAINING CENTER FORT IRWIN, CA, REVISED FINAL DESERT TORTOISE BIOLOGICAL ASSESSMENT AND CONSERVATION PLAN FOR THE NATIONAL TRAINING

CENTER'S LAND ACQUISITION PROJECT [HEREINAFTER BIOLOGICAL ASSESSMENT] 3-14 (1992).

338. DESERT TORTOISE VIDEO, *supra* note 336.

339. BIOLOGICAL ASSESSMENT, *supra* note 337 at 3-14.

340. DESERT TORTOISE VIDEO, *supra* note 336.

341. BIOLOGICAL ASSESSMENT, *supra* note 337 at ii. Because of the extensive time the tortoise spends underground, it is difficult to get an accurate count. As part of an intensive inventory of a particular area during the biological assessment, researchers moved foot by foot through suspected habitat, located every desert tortoise burrow identifiable, and lowered portable video cameras into the burrows to verify the presence of animals. *Id.* at 3-15.

342. Las Vegas v. Lujan, 891 F.2d 927, 930 (D.C. Cir. 1989). The ravens prey mainly on young desert tortoises whose shells have not hardened.

343. This is a good example of the unpredictable impacts of human activities on animals. It also demonstrates that some animals benefit from the changes man makes to habitat. Sewer rats and some squirrels are other examples.

344. 891 F.2d at 930.

345. DESERT TORTOISE VIDEO, *supra* note 336.

346. 891 F.2d at 930.

347. BIOLOGICAL ASSESSMENT, *supra* note 337 at 3-15.

348. The NTC does have a highly proficient force trained to mimic likely enemy tactics and equipment to provide realistic training opportunities to U.S. units. This force is known as the Opposing Forces or OPFOR. Fort Irwin also contains normal support troops.

349. The training consists of a series of highly realistic "battles" against the local "opposing forces" using laser devices and high tech detection equipment to simulate weapons employment and casualties. The units are intensively evaluated on their performance. The result is tough, realistic, and extremely demanding training in modern warfare. NTC training has been credited with the exceptional performance of many Army units in Operation Desert Storm. BIOLOGICAL ASSESSMENT, *supra* note 337 at 2-1. *See* DANIEL B. BOLGER, DRAGONS AT WAR (1986) (giving experiences of one mechanized infantry battalion during its NTC rotation).

Some veterans of the Vietnam conflict characterized the NTC training as more stressful than actual combat. *Id.*

350. BIOLOGICAL ASSESSMENT, *supra* note 337 at 2-3. Mountainous areas unsuitable for training, environmentally sensitive regions, archaeological sites, and joint use areas, restrict training on large portions of Fort Irwin. *Id.*

351. AirLand battle doctrine envisions high mobility combined arms forces, operating in depth over large battle areas. These forces must be capable of simultaneously fighting a close in battle and performing deep strikes against an enemy's follow on troop echelons. AirLand battle doctrine anticipates intensive, continuous, night and day operations (as actually occurred in Iraq and Kuwait). This doctrine depends on highly proficient and trained soldiers. *See* Department of the Army Field Manual 100-5, Operations (1986).

352. SIEHL, *supra* note 10 at 24. Attempting to train for modern combat at many of the Army installations in the Eastern U.S. has been compared to training a professional football team on a tennis court. *ID.*

353. BIOLOGICAL ASSESSMENT, *supra* note 337 at 2-1.

354. 16 U.S.C. §1536(a)(2) (1988).

355. BIOLOGICAL ASSESSMENT, *supra* note 337 at 2-4. This alternative was selected out of fourteen studied by the Army as the most suitable expansion area for training purposes. *Id.*

356. *Id.* at 2-5.

357. *See* ARMY GUIDANCE, *supra* note 238.

358. BIOLOGICAL ASSESSMENT, *supra* note 337 at 1-4.

359. *See id.*

360. *Id.* at 2-5.

361. *Id.* at ii.

362. *Id.* at 5-13.

363. The long term benefit to the species from the research programs may more than compensate for the loss of 670 animals. If the Army projections are correct, the mitigation measures will save 596 desert tortoises at a cost of $22.8 million, or $38,255 per animal saved.

364. *See* TWO SHADES OF GREEN, *supra* note 237.

365. Telephone interview with John H. Beasley, former Chief of the Environmental Litigation Branch, Department of the Army Environmental Law Division. (Mar. 12 1993). Beasley described a meeting of top Army officials in 1991 where the Army Chief of Staff personally directed the formation of a top level, interdisciplinary task force to find a solution to the RCW problem at Fort Bragg. This task Force would eventually evolve into the Army Endangered Species Team, which later drafted the new Army policy on protecting biodiversity.

366. The plight of this despised creature prompts biblical analogy. Like Moses and the children of Israel, many of the Mexican wolves bred in captivity may die of old age before reaching the promised land.

367. ARMY GUIDANCE, *supra* note 238 at 20. Installations are now required to coordinate reintroduction questions with Headquarters, Department of the Army. *Id.*

368. Reed F. Noss, *From Endangered Species to Biodiversity in* BALANCING ON THE BRINK OF EXTINCTION 227 (Kathryn A. Kohm ed. 1991).

369. Hal Salwasser, *In Search of an Ecosystem Approach to*

Endangered Species Conservation in BALANCING ON THE BRINK OF EXTINCTION 247 (Kathryn A. Kohm ed. 1991).

370. Ecological services are the essential services species provide to the system in providing food, oxygen, pest and erosion control, nutrient recycling, and similar items, without which an ecosystem and the creatures in it would collapse.

371. For example, it is insignificant from an ecological services perspective whether there are fifty California condors in existence or zero; either way the numbers are to small to have significant impacts on the system. Yet, the current ESA would commit enormous resources to "save" the condor, while ignoring precipitous declines in other species, not yet on the brink of doom. In the long run, this is precisely the wrong approach to take.

372. After all, military installations do not present the thorny political issues of economic impacts and lost jobs in the timber and construction industries. One senses that if a convenient military installation was present in the pacific northwest on which to recover the spotted owl, it would quickly become the FWS's preferred location.

373. The Army of the future may not be able to spend $38,000 per

animal for conservation programs as is proposed for the desert tortoise at the NTC. *See supra* note 363.

374. *See supra* note 275.

375. The Rand Corporation study found, in the Fort Bragg case, "[t]he absence of an expert Department of the Army (DA) or MACOM team for participating in the planning and negotiating process, *coupled with the tradition of installation autonomy*, also prevented a coordinated response [by the Army]. (emphasis added). TWO SHADES OF GREEN, *supra* note 237 at vii.