



PROPOSALS FOR A NEW INSECT STUDY, COMMERCE, AND CONSERVATION LAW THAT DEREGULATES DEAD INSECTS, AND PROPOSALS FOR FIXING THE ENDANGERED SPECIES ACT AS APPLIED TO INSECTS

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Why Do We Need New Insect Laws?

The current laws regulating insects (and plants) in the U.S. are very bad. They were made for deer, and are only incidentally being applied to insects, because no legislators ever thought to make laws specifically targeted at insects that are not agricultural pests. These laws are not serving the conservation of insects well, and the laws are retarding the taxonomic study of insects, and are making criminals out of harmless hobbyist insect collectors. Basically, large animals like deer and Bighorn Sheep can be managed by controlling the numbers hunted using bag limits and exclusion areas etc., and roping and corralling them and transporting them to new sites. Large animals tend to have low population numbers, so might need to be protected from hunting (after all, at the end of the shooting spree in the late 1800s, the U.S. reached a low of population numbers for Bison and deer and nearly every other large animal, and their numbers have gradually recovered since). But insects are tiny by comparison, and their population sizes are huge by comparison. The average insect may be a thousand or a million times more numerous than your average deer. Insect population sizes cannot be "managed" like deer, because population sizes vary hugely mostly depending on the weather and other uncontrollable factors, and their survival depends on the continued survival of their habitat, rather than useless government intervention. Yet our legislators do not understand this. Basically, our insect populations, and our entomologists, are being regulated by goat ropers. It may be insensitive to say that, but it's unfortunately true, and it must change. Our insect laws must have some logical scientific foundation; they must not be inappropriate incidental afterthoughts that are dredged up by lawyer prosecutors simply because that's all they can find that remotely applies.

The Crisis in Entomology and the Need for New Laws

Federal laws apply very poorly to insects, because these laws were basically all written for deer. These laws essentially assume that bugs should be managed by setting hunting limits. Actually, hunting limits have no effect on bugs, and only habitat protection works to save rare bugs. These bad laws have caused a lot of problems to entomologists, especially in western U.S., where much of the undeveloped land is federal land. As a quick example, a tourist that collects a dozen butterflies in Yellowstone National Park can be prosecuted and jailed for years, while in a single day the cars going through Yellowstone splatter something like 30,000 insects on their windshields and grills, and the lights at night roast 10,000 more.

Differences Between Deer and Insects. The basic problem is that all existing conservation laws are written using deer as a model. Deer numbers are successfully managed by controlling the location and level of hunting. But legislators unfortunately do not realize that insects cannot be so managed; insects lay 100-1000 eggs/female so can explode 500-fold in numbers in one generation; their numbers can also crash in one generation due to bad weather etc. Thus numbers of insects cannot be "managed", and endangered insects are stay-at-homes that do not travel as far as deer, so habitat loss is the overwhelming cause of insect (and plant) extinction. Idiotic Deer laws blame collectors for all insect extinctions; sensible laws would prevent habitat loss.

Deer and elk multiply if they are not hunted (because the natural predators like wolves and grizzly bears have been exterminated), and they decline or disappear if heavily hunted. For example, the heavy hunting in the late 1800's reduced elk to very low numbers in Colorado, and only in the 1990's have elk returned to their former abundance.

But collecting does not harm insects. The main reason is that insects are vastly more numerous than mammals and birds. Each insect species is about 1000 to 10000 times more numerous on average than each mammal or bird species, so collecting of insects is comparatively harmless with rare exceptions. In general, the bigger an animal is, the rarer it is. Thus a rhinoceros may have a population of only a few hundred or thousand, while the equivalent Rhinoceros Beetle population numbers in the thousands or millions, and a bacteria population numbers in the trillions. A single ant colony can have 10,000 ants, or even 100,000. You can find 100 beetles feeding on pollen and nectar in one cactus flower. (And, yck, 50,000 cockroaches have been found in one apartment.)

And insect populations have incredible recuperative powers. A single female insect can lay up to a thousand eggs (rarely a million for one female termite), with an average of about 100 eggs in nature for big insects like butterflies, so an insect population can recuperate from disaster such as a hailstorm in a single generation, or can easily explode 50 times in abundance if weather and other conditions are good. For eons insects have been eaten by birds and mice and spiders etc., so it is the nature of insects to reproduce abundantly to survive predators. Collection by humans is no big deal to insect populations, because they are used to being eaten.

Another big reason collecting does not hurt insects is that insects are very small compared to big birds and mammals, so are much harder to see and find to collect. Most insects are too small to even see their details without a good microscope. Some butterflies around Denver for instance are so hard to find that only a few have been seen, yet we know that the population is native and does not migrate here (for example *Chlosyne leanira fulvia* is known from only three adults and one larva over the last 25 years, and *Papilio machaon bairdii* is known from only about 20 adults, yet these butterflies continue to exist).

Still another reason that collecting does not hurt natural populations is that most adults seen in nature (typically 90% or more) are males, because males are conspicuous as they actively seek females to mate with (males have to conspicuously approach other passing insects in order to determine whether they are receptive females), whereas females are scattered about the habitat inconspicuously laying eggs, so females are seldom seen or collected. Since only females lay eggs and there is always a surplus of males for mating because males can mate with many females, collecting removes few females so the number of eggs laid decreases very little and the population is not harmed.

The final reason that collecting does not hurt natural populations is that collectors only want perfect specimens, and most butterflies found in nature are worn (with many scales missing) or have damaged wings (chunks torn from wing margins by encounters with bushes or just the wear and tear of days of flying). So the damaged ones are generally let go and only the perfect ones are kept.

There is still no well-documented example of collecting exterminating a butterfly population in the U.S., and there is evidence that collecting does not hurt endangered butterflies. For instance, the California butterflies *Apodemia mormo langei*, *Plebejus icarioides missionensis*, *Callophrys mossi bayensis*, and *Plebejus idas lotis* are now listed as endangered. But before they were listed as endangered 10 years ago, they were previously collected for 20-30 years by entomologists with no noticeable harm. The habitat of *Apodemia mormo langei* was reduced by sand-mining to an acre or two of sand dunes around an electric power tower by the 1950s, yet people collected it there until 1976 without harm. The habitat of *Plebejus icarioides missionensis* was reduced to just two hills by the growth of San Francisco, and just one mountain for *Callophrys mossii bayensis*, yet both were then collected for 30 years without harm before being declared endangered. *Plebejus anna lotis* occurred in a tiny little colony just an acre in size near Mendocino California which was then collected for 40 years or more without harm, until it was declared an endangered species, and then five years later it became extinct there, for unknown reasons other than collecting.

Many \$billion dollars\$ have been spent around the world to try to exterminate populations of insects, but pest control operators have generally found that exterminating insects is impossible. There has been almost no success at exterminating insect populations with heavy spraying of pesticides and every other weapon at their command, except that they have managed to kill a few insects on tiny little islands. With a billion dollars and thousands of people and a giant factory producing irradiated maggots, the U.S. managed to exterminate the Screwworm Fly southward to the Isthmus of Tehuantepec, but if the U.S. stops paying for the program for just a couple years they will swarm back into Texas.

Entomologists realize that habitat loss, not collecting, causes the extinction of insects. Dr. Robert Pyle, the foremost expert on insect conservation and the founder of the Xerces Society (the official society for conservation of invertebrates), wrote in a recent *Journal of the Lepidopterists' Society* (1996, volume 49, pp. 397-411, near bottom of p. 406): "No instance of extinction by overcollecting has ever been shown unequivocally". Dr. Paul Opler, a butterfly expert in the U.S. Fish & Wildlife Service and former head of the Endangered Species Office, wrote the same thing in an article with Dr. Pyle and Michael Bentzen on *Insect Conservation in the Annual Review of Entomology* (volume 26, page 241).

The only butterfly extinctions in the U.S. were caused by development, not by collectors: the entire subspecies *Cercyonis sthenele sthenele* was wiped out by the growth of San Francisco by about 1880; the entire subspecies *Glaucopsyche lygdamus xerces* was exterminated by the growth of San Francisco in 1943; and the only population of *Speyeria nokomis coerulescens* in the U.S. was exterminated by U.S. Air Force construction of a radar facility (never finished) on top of Mt. Lemmon near Tucson, Arizona.

Experiments have even been done on butterflies in which scientists (including famous Paul Ehrlich, reported in Science magazine 188:221-228, 1975) deliberately tried to exterminate a population by collecting (in order to study "density dependence"), but the population could not be exterminated because many of the adults could not be found, and the butterflies that avoided being collected multiplied faster because of better conditions with fewer competitors.

Accusations that collectors have exterminated butterflies have not been proven. For example, the USFWS accused collectors of hurting the butterfly *Boloria improba acrocnema* by collecting it. But this was very dubious because the Forest Service/BLM put guards on the colonies starting in 1984-1986 onward to exclude collectors, and yet the colonies still declined through 1990-1991, when USFWS erroneously declared one colony "extinct", then the colonies exploded in 1992-1993, evidently because a long drought had ended (it had nothing to do with collectors). One person even accused me of exterminating a colony of a butterfly *Lethe eurydice fumosus* near Fort Collins Colorado when I transplanted a dozen females from there to a sedge marsh in the Denver area to establish a new colony (which has persisted in Denver through 2003 at least, the last time I visited it), but later another entomologist Stephen Spomer found them still present at that same site near Fort Collins. The USFWS claimed that collectors were creating an emergency situation for the butterfly *Neonympha mitchellii* "franciscus" on the Fort Bragg military base in North Carolina in order to get it quickly declared an endangered species, but the truth is that Steven Hall of the North Carolina Natural Heritage Program found the butterfly still lives on the base (in 1994) and is partial to the gunnery ranges; in fact, no one is allowed on Fort Bragg to collect it (of course access to the gunnery ranges with their unexploded bombs is very restricted), so the butterfly has probably not been collected at all since the early 1980s when a military man discovered it there. Actually "franciscus" is a weak subspecies at best and I treat it as identical to subspecies *mitchellii*, so it should have already been covered by the endangered species designation for the rest of the species *Neonympha mitchellii*, but the Endangered Species Act is fatally flawed by treating weak subspecies the same as distinct species. And the species has recently been found in Virginia, Alabama, and Mississippi, and is common in Michigan, so it may not be endangered after all. A book by Jeffrey Glassberg "Butterflies through Binoculars" claimed that a "group of greedy immoral individuals returned day after day, year after year" [and] "illegally collected and killed these animals for their own 'amusement' and in some cases profit.", and thus collected the butterfly *Neonympha mitchellii* to extinction in New Jersey. However, Mr. Glassberg evidently exaggerated in this statement to support his binoculars-using anti-collector bias, because my letters to people there including Mr. Glassberg provided no concrete facts or actual names that support such a nefarious plot; I hear the butterfly is extinct in N.J., but the last President of the Lepidopterists' Society, Dr. Ray E. Stanford, told me the real reason *mitchellii* died out in New Jersey: it occurred below an electric power line, which was periodically mowed by the power company, maintaining the habitat of sedges/grasses that *mitchellii* required, but a few years ago the power line company stopped mowing, and vegetation (bushes, trees etc.) built up and choked out the habitat! There is also the rumor that someone built a fence across the habitat, preventing the butterflies from going from one side to the other and harming the colony. Here is still another example, that butterflies cannot live without habitat! Several dozen colonies of this butterfly in Michigan were collected for many decades and none have gone extinct, although the Michigan highway department is now planning the first extinction by running a freeway right through the middle of a big colony. The U.S. Fish & Wildlife Service recently claimed that *Papilio indra martini* was threatened with extinction in the Providence Mts. California, and as a result Bonanza King Canyon has been closed to butterfly collecting; but an entomologist Bruce Griffin later proved that the butterfly is widespread in those mountains, and is not threatened by collectors or anything else. Quoting Griffin: "the great percentage of the breeding area is seldom collected", and "the rugged, poorly accessible habitats admirably favor long term survival."

The March 1995 National Geographic perpetuated some misconceptions blaming collecting for harming endangered butterflies, which are worth correcting here. The two butterflies it lists as declining due to "exploitation" (collecting), *Boloria improba acrocnema* and *Neonympha mitchellii*, were actually not harmed by collecting as far as we know, and the latest data on the former shows that it has become as common as it ever was. Another butterfly *Lycaeides atrapraetextus* (*melissa*) *samuelis* has become rare in NE U.S. not because of collectors, but because its open sandy forest has become scarce because of development and fire suppression. Most of the "endangered" species of butterflies in the U.S. are not great candidates for listing, and probably would not make the list if they were proposed for listing today: *Plebejus icarioides missionensis* is a rather-weak subspecies of a butterfly that is common and widespread throughout western U.S. and Canada. *Euphilotes bernardino allyni* was reduced to just a few spots near the L.A. airport due to development, but the species is widespread in California and Nevada. *Heracles aristodemus ponceanus* is a widespread Caribbean butterfly that is now thought to be just a temporary resident of extreme S Florida, which immigrates and dies out repeatedly there as weather changes. *Callophrys mossii bayensis* is a very weak California subspecies of a widespread western butterfly that is common as far east as Colorado. *Speyeria zerene hippolyta* is limited to just a few coastal sites in Oregon, but other populations all along the coast to Alaska are very similar, including the very similar California ssp. *myrtleae*, and the species is widespread and common in western U.S. and Canada including Colorado. *Euphilotes enoptes smithi* is a rather weak subspecies of a species widespread from California to Washington. *Plebejus anna lotis* is a weak subspecies of a widespread western butterfly; subspecies *lotis* allegedly occurred only in Mendocino County California and is now extinct there due to unknown reasons, but the Warner Mts. California populations are similar to it. *Apodemia mormo langei* was

reduced to just one colony by development, but a couple other colonies have similar adults, and the species is widespread in all western U.S. states. Study of endangered butterflies tells us that destruction of their habitat harms them, but collecting does not. Unfortunately the Endangered Species Act provides no money to purchase habitat for insects, so provides little help to improve their status.

Collecting is absolutely necessary to study insects. People in government do not realize the difficulties entomologists have in studying and identifying insects. Most insects are very small, only about 1-2 millimeters in size (1/16th inch) for the average insect, and human eyes are not sharp enough to see the identifying features of creatures that small. One cannot identify insects by looking at them with binoculars like birds or mammals, except for a very few large conspicuous species. We have to collect insects and bring them into the lab to be identified with microscopes (high quality microscopes that cost \$700.-\$4000.). Without identifying an insect, one cannot study the species and report one's findings, so without collecting, progress on the study of insects would cease. To study eggs and larvae and pupae of insects, we have to collect females and get them to lay eggs in the lab, or we have to collect eggs or larvae in nature and raise them to adults in the lab to make sure of the species identification. To determine the plant species that insects eat in nature, we have to collect the plant plus the eggs or larvae found on that plant and then rear some adults, then send adults and plant to experts to identify.

And there are thousands of species of insects. North America alone probably has 100,000 species of insects, and there are anywhere from THREE TO TEN MILLION species of insects in the world. Nobody knows exactly how many species there are because most insects are poorly studied. There are so many species that no one can identify more than a small portion of them, so to study the others they must be collected and sent to specialist experts to be identified, usually in another state or country, and sometimes it takes years to get a proper identification because there are few experts working on too many insects, and with the retirement and non-replacement of many current entomologist taxonomists, some insects cannot now be identified at all. There are thousands of insects even in major museums that have not been identified; these backlogged specimens are still waiting to be sorted and identified, and named if they represent new species. Some specimens that were collected 100 years ago and deposited in museums are only now being studied and given names! The unknown species of insects are often small and usually look very similar to known species, so these insects must be collected and carefully compared to known species with microscopes to properly study them. "Butterfly watching" with binoculars has become popular especially among members of the Audubon Society etc., and they have formed their own association the North American Butterfly Association dedicated to binocular watching. Unfortunately for entomologists, these butterfly watchers--along with various radical environmentalists--actively discourage butterfly collecting with almost a religious zeal, while real entomologists--amateurs and professionals--have to collect insects to study them. Unfortunately for science, butterfly watchers contribute nothing to scientific progress, and they are harming science by blocking entomologists' ability to collect insects.

Here is what happens when an entomologist sees a typical insect. He sees it doing something interesting that is worth recording. But he doesn't know what species it is, because there are 10 million species and many of them look very similar to the one you see. Therefore, he has to collect the insect, preserve it properly with special microtools and liquids, expensive storage cabinets etc., and then try to identify it. You can't just check out a book and identify the insect, because the literature on identifying insects consists of millions of separate papers in obscure libraries, and the best biology libraries (such as the best library in Colorado, at Colorado State University) have only a small percentage of these papers. So you have to send the insect to an expert. You must determine who is an expert on that kind of insect, contact him and ask if he is willing, and mail your insect to him. He probably has a big backlog of thousands of specimens to identify, because there are so many species of insects, and as a rough estimate there are at least one billion billion individual insects in the world (at least 2000 per square yard, most of them in the soil). To identify it, he has to examine it under the microscope, and compare it to named species described in scientific papers, or compare it to other individuals of that species, if he has any in his collection. If he doesn't have your species in his collection, then he may have to take your specimen to large museums in New York or Washington D.C. or Frankfurt or London or Paris etc. to identify it, a process that can take years. But very often, he cannot identify the insect, because of the 10 million estimated insect species in the world, only about one million of them have been named, leaving 90% without a name, so your insect will rest in some museum for years or decades before being named. Thus, after this long and tortuous process of collecting insects and transporting them back and forth that may take six months or years, your insect still may not be identified.

The conclusion is that collecting does not eliminate insects. So it is a huge mistake for our laws to do nothing but set hunting limits, without providing any habitat protection. These government laws also hurt the study of entomology, by arresting entomologists for collecting, and destroying entomologists' ability to study insects.

There's another practical matter to consider here. Most entomologists, even those who now work on ants and beetles and mosquitoes, got their start by collecting butterflies when they were teenagers. If collecting were made illegal, future teenagers would find some other hobby such as collecting baseball cards, and the supply of entomologists would greatly decline, and research on agricultural pest insects and insects that transmit disease to man (such as mosquitoes transmitting malaria) would suffer greatly.

Harmful Government Interference with Entomologists. In this country, totally needless U.S. government restrictions on entomologists--from the misguided application of deer laws--have put a halt to normal scientific study of insects. Here are some of the harmful things the federal government has done that have crippled entomology:

1) An explosion of permits required by governments is choking off insect research. Permits are required to collect insects in bald eagle reserves, in national monuments dedicated to preserving petrified wood or volcanic craters, in national parks where fishing is permitted, in wildlife refuges set up for duck hunting, in state parks, etc. etc. In most western states, where most of the land is federal, entomologists can't do any field research on insects without wasting weeks trying to get permits many months ahead of time. Spur-of-the-moment cutting edge research on insects is no longer possible because of half-year delays in getting permits. And most research on popular insects like butterflies is done by amateurs, yet governments seldom will give permits to amateur entomologists, resulting in the crippling of most research. Most range extensions for insects are found by amateurs randomly sampling the countryside, and that work is no longer possible on government land.

For the state of Alaska, an entomologist Kenelm Philip published an article (in 1994 News of the Lepidopterists' Society, # 3-4, pp. 57-64) detailing all the laws and agencies involved and their requirements for entomologists to collect insects legally. His compilation of agencies requiring permits includes 12 National Parks, 16 National Wildlife Refuges, eight National Forest offices, three BLM regional offices, 116 state parks and six area offices, 12 Native Regional Corporations, and 12 villages by Native Regional Corporations (many of which are not part of a Native Regional Corporation). He states that a permit for aquatic insect collecting must be obtained from the Alaska Department of Fish and Game. He lists all the permits that must be obtained from all these agencies, and states that the US Fish & Wildlife Service even requires an onerous form to bring insects into the Alaska (a part of the U.S.) even if they were collected in the rest of the U.S. (the lower continental 48 states). He states that USFWS regulations require that all wildlife must enter and leave the U.S. through a limited number of Ports of Entry, yet there are no Ports of Entry in Alaska! He details how one should fill out form 3-177 even for soil samples such as nematodes and mites if the animals can be enumerated. He states how one should apply for permits at least three months beforehand, but not before January of the calendar year in which you want to collect, because of peculiarities of various arctic government bureaucracies. All these regulations are the problem!, and are ethically and scientifically useless because in all of Alaska and northern Canada there are NO endangered or threatened insects (arctic insects in general are very widespread and are common where found).

2) With 100,000 species of U.S. insects and 10,000 of lepidoptera (butterflies and moths), exchanges between workers are absolutely necessary for proper identification and study because noone can be an expert on more than a small portion of these species, but now the U.S. government has demanded that everyone obtain a "special use permit" for approximately \$100 for collecting specimens for "commercial purposes" on each parcel of federal land, and they define even non-monetary specimen exchanges as a "commercial purpose." This amounts to petty extortion, and has put a stop to all exchanges of specimens for scientific study, because there are hundreds of federal agencies and national forests and BLM properties etc. and applying for permits is time-consuming and expensive and the amateurs who do nearly all study of insects like butterflies cannot afford either. Every time an entomologist wants an expert to identify an insect, the federal government forces him to obtain this permit to send the specimen for identification.

Under the old system, there were conservation laws, but everyone assumed they only applied to vertebrates like deer, because that was the legislators' original intent (for example no entomologist has ever been hired for a "wildlife biology" job, which are strictly given only to vertebrate biologists), so lepidopterists went about their business of studying insects in comparative isolation (shunning was more often the correct word) and happily gave their findings to governments if asked--and governments almost never asked. Now, in addition to the normal discrimination that lepidopterists endure--being called crazy or weird or gay or laughed at by the ignorant public who think butterflies are a frivolous joke (causing most lepidopterists to conduct their studies rather furtively with a minimum of public display)--governments are suddenly claiming that their deer laws apply to butterflies and are obstructing the work of entomologists at every turn. Entomologists are frustrated, some amateur entomologists are quitting the study of entomology altogether, and many entomologists are fighting back in ways that are harmful to both government and the study of insects. Entomologists are burning specimens collected on federal land; perhaps a million or more insects have already been burned by entomologists who never knew that they had to have permits to collect and exchange insects on national forests and BLM land, etc., and are now worried that they might be thrown in jail by the government. Many entomologists are now refusing to permit anyone connected with a government to study their specimens without payment.

Government people have to have the cooperation of entomologists if they want to find out which insects live on their lands, because federal employees have nearly zero competence to study their own government faunas. Entomologists go through long hard years of study to develop the expertise to identify and study those insects. You can only imagine how difficult it is to identify the 100,000 species of insects found in North America; it requires hundreds of experienced entomologists. Making entomologists mad will only increase the cost to government of paying entomologists to cooperate and provide data to government, and will guarantee inferior data because of lack of cooperation. Most entomologists are now so mad at government policies and interference that they are no longer willing to contribute any information to governments.

Governments do not realize that the "commercial purpose" market for insects is quite small. There are few buyers for insects, and only the largest and gaudiest insects such as Swallowtail Butterflies and *Morpho* Butterflies can be sold in any numbers, and only for very small prices compared to vertebrates. Nearly all U.S. citizens will only pay to exterminate insects (and employers will rarely pay to study insects, they will only pay to exterminate insects).

3) The U.S. Forest Service has considered a rule banning the collecting of such things as insects from all National Forests. There aren't many National Forests in eastern U.S., but in the western U.S., the rule would cripple the study of insects, because nearly all the western mountain ranges are U.S. Forest Service property, and these mountains hold at least half the fauna of the west. This regulation is totally meritless.

4) Already, it is illegal to collect insects in National Parks and Monuments, even though there is no defensible ethical reason for this rule. Hypocritically, these parks deliberately kill millions of insects by spraying for flies and mosquitoes, they permit fishing (in Yellowstone etc.), they allow grasshoppers and worms to be collected and skewered on fishhooks as fishing bait, and allow vast millions of insects (and some birds etc.) to be killed in the parks by splattering on car radiators and windshields. Unless these laws are overturned, the President of the United States should not be surprised if someday a group of angry entomologists steps in front of his car as it is exiting some National Park, and the entomologists examine the car's grill and windshield and carefully scrape off the flattened fauna and place it into glassine envelopes as evidence, and then calmly issue the President a warrant for Citizen's Arrest for violating federal laws for the willful destruction of wildlife and willful transport of said wildlife out of a National Park.

5) The U.S. Fish & Wildlife Service's recent implementation of the Lacey Act (Federal Register vol. 59 no. 177, pp. 5-13, rules 50 CFR parts 13 & 14) requires everyone who sends or receives even dead insects from abroad to fill out an onerous form 3-177, which must list every individual present in the shipment and requires every one to be identified by species (which is impossible for most insects because of the difficulty of identification). Form 3-177 also requires payment of a \$50 license fee, and requires sending the package only via a few border crossing points, where each shipment would be assessed a \$55 customs inspection fee. The USFWS even proposes another amendment that would prohibit people from using the U.S. mail at all to send or receive foreign insects, so would require them to use some other very costly means of shipment. These horrible regulations would completely kill all international cooperation in the study of insects. Outraged entomologists deluged USFWS with complaints about these onerous regulations, which would essentially put an end to the study of foreign insects.

Entomologists are not rich. Entomology is a Jekyll and Hyde profession: you like bugs and nature so you go to college and study entomology and become Dr. Jekyll the learned scholar, but then you graduate and find that the only jobs are for Mr. Hyde The Exterminator (spraying roaches & mosquitoes, killing corn earworms, studying pheromones of tree-eating bark beetles, etc.). The number of jobs in taxonomy--the study of how many species there are and their identification and habits--is actually DECLINING in the U.S., as retiring insect taxonomists are replaced by gene technicians. Entomologists can't pay these government fees, especially the amateur entomologists who do nearly all of the scientific research on popular insects like butterflies.

6) In the last decade or so the U.S. Fish & Wildlife Service has raided and seized specimens from about 55 entomologists, even from public museums. Even bird people (the Audubon Society) have complained about the tactics of USFWS. They have not raided me, but I have been impacted by this, because various entomologists have stopped sending me insects I needed for my research, because they have been terrorized by USFWS to the extent that they are afraid to send anything now.

A very obnoxious practice of USFWS--one I hope will be corrected--is the current practice of USFWS of seizing all specimens collected in Mexico. I have not been to Mexico for decades, but entomologists tell me that the Mexican consulates here in the U.S. tell them that it is okay to collect insects in Mexico, and Mexican border officials and U.S. customs officials at the border say it is fine to bring insects from Mexico into the U.S., and they do not seize those specimens.

So why does USFWS go around the U.S. and try to seize all Mexican specimens? Ignorant Mexican government officials passed an obscure law that foreigners have to have a permit to collect in Mexico, while their teeming millions of peasants slash and burn their Mexican fauna to death, destroying billion of insects. But these permits cannot be obtained. When U.S. citizens apply for permits and send the requested exorbitant \$700.-\$800. fee (for each location), their checks are cashed and pocketed in Panama and no permit is sent (at least that is what happened to some people in the early 1990s--in the late 1990s I heard that some people did get permits to collect after paying \$600.). Of course this is graft of the highest order by corrupt Mexican government officials. That is not unusual, as we have learned to expect corruption in Mexico, from top officials down to border agents and policemen. A 90-year-old U.S. law--the primitive Lacey Act--makes the U.S. enforce foreign laws, regardless of how idiotic, so U.S. Fish & Wildlife agents have raided dozens of U.S. collectors and seized all Mexican specimens. Thus the Mexicans have hoodwinked the gullible U.S. government into enforcing Mexican graft. Mexico needs a proper conservation law that would preserve the habitats of insects/plants, rather than blame gringo collectors. U.S. lepidopterists were in the process of detailed mapping of the fauna of the northern half of Mexico, but the U.S. government has now killed that work: probably more than 100,000 Mexican specimens have already been burned, and millions more are now lost to science due to refusal of collectors to allow anyone to study their collections.

What I do not understand, is why the USFWS is in the business of enforcing--being an accessory to--bad Mexican laws that almost amount to graft?? By seizing Mexican specimens, USFWS forces entomologists to be defrauded by these corrupt Mexican officials. Why should the U.S. Government be in the business of enforcing a rule the Mexicans themselves do not enforce? Obviously, the backward Lacey Act, which forces the USFWS to enforce ludicrous foreign laws, must be fixed so that unethical foreign laws can be ignored, and the USFWS must use a little intelligence and ethics instead of the ignorance they currently display.

Foreign countries have every right to pass laws that are as incompetent and ridiculous as they want to make them; but why should our Lacey Act require Americans to enforce ridiculous foreign laws??? That is like requiring our women to be circumcised just because that is the practice in some backward African countries.

By the way, our U.S. Monarch Butterfly overwinters in Mexico, in only a couple dozen small forests of Oyamel (a kind of fir) trees in a small high-mountain area west of Mexico City. Meanwhile, the peasants who live there are busy cutting down those trees for firewood and lumber, while the Mexican wildlife laws too often ignore the logging and prohibit collecting of butterflies by foreigners without a permit. The Monarch Butterfly is NOT harmed by collecting, as a million adults (out of a total population of about 100 million) are eaten by birds and mice in the Mexican overwintering sites every winter. But if their overwintering forests are destroyed, this migratory Monarch Butterfly will become extinct, because the Monarchs require those trees for roosting and for the temperature moderation the trees provide, since overwintering Monarchs are killed by heavy frosts and by excessive warmth. Those Mexican overwintering sites are famous, and were featured in National Geographic Magazine. So, the idiotic Mexican laws, and our badly flawed Lacey Act, are giving the Monarch Butterfly NO HELP AT ALL! The Mexicans must fix their rotten laws, and the U.S. must fix our rotten misguided insect laws. In the 1950s, the town of Pacific Grove California passed a law making disturbance of their roosting Monarch Butterflies a crime, yet they then allowed development to cut down many of the Eucalyptus-tree roosts on which the Monarchs overwinter; finally in November 1990 the townspeople realized the lesson that HABITAT--not collecting--was crucial, and they passed a bond issue to restore the tree roosts. Now it's time for our federal laws to verbalize the same lesson.

Every reader of this essay should put pressure on Mexico to reform their graft-filled system and develop the right kind of law, one that would protect the HABITAT of insects, the only way to truly protect them, rather than blame collectors who do absolutely no harm while development destroys hundreds of square miles of habitat and exterminates trillions of insects. And every reader should write their senators and congressmen and send them a copy of the current new law, and respectfully and sincerely request that they fix our bug laws.

Some readers may ask, why would U.S. entomologists want to study Mexican insects? One reason is that many Mexican species also occur in the U.S. But the main reason is that a large proportion (probably more than a third) of the world's entomologists are in the U.S., and another third are in Europe, whereas 90% of the insects in the world are in foreign tropical countries, so U.S. entomologists have to study foreign tropical species or they will remain unstudied. Scientists are curious by nature: they want to study everything, and most of our current western civilization was created by their unbounded zeal.

7) The federal laws--written for deer--require even a federal employee to fill out an identification/collection form on each moth specimen collected in a survey of moths coming to powerful lights in a national park when thousands can be sampled in one night. Legislators and federal employees alike have little knowledge of insects, so the deer laws that are passed just do not work for insects.

Why Do We Need ANY Government Regulations for Insects? There is no good reason for any of these government regulations. The "special use permits" will gather very little money for the government, will not protect insects of federal lands, will only prevent entomologists from studying insects of federal lands, and will prevent the federal government from learning what insects do occur on federal lands, because no entomologist will want to tell any government that he collected insects on federal lands when the government may punish him for saying so (the fact is, nearly 100% of American entomologists have exchanged insects caught on federal lands with other entomologists, without this "commercial use permit" that noone knew was required, and nearly all entomologists have sent and received dead insects to and from other countries, thus nearly all our entomologists could be sent to jail if the government wished).

The permits and expensive fees for transporting insects abroad will only kill research on these insects and make amateur entomologists switch to some worthless hobby like stamp collecting. Most of these regulations were never enforced for insects until 1992, because they were written for deer and birds, and since then entomologists have become very disturbed about suddenly being singled out for prosecution.

Banning the collecting of insects in national forests will only stop the study of those insects, it won't have any positive benefit. And the current ban on collecting in National Parks has absolutely no benefit, because it does not aid the conservation of insects and only hurts their study. The only possible reason for such a law might be to maintain the parks' illusory image as a place where nothing can be collected (despite the parks' hypocritical fishing and mosquito spraying and wholesale bison slaughter and grizzly bear killing, past extermination of wolves using government bounties, etc. etc.).

Lacey Act regulations have zero benefit for insects. The seizure of Mexican specimens has only put a complete halt to the study of the insects of northern Mexico by U.S. entomologists, to the detriment of both Mexican and American science.

The Lacey Act is an outdated 1905 law that must be revised. Nearly everything violates it. Strict enforcement of the Lacey Act would require the imprisonment of everyone who got mud on his shoe and carried it out of a National Park, because soil contains thousands of microscopic mites and insects that would be in the mud, and the person illegally transported the mites out of the park and thus violated the Lacey Act. If a spider lurks in your bunch of bananas from Honduras, you are a felony violator of the Lacey Act. And the Lacey Act requires the jailing of everyone who carries the carcass of a splattered grasshopper or fly out of a Park on his windshield or radiator. Yes, if you've ever been to a National Park you no doubt have carried these insects out of the park so you could be sent to jail for five years and fined \$25,000 for your felony violation of the Lacey Act. Must entomologists start making citizens' arrests of thousands of car-drivers exiting National Parks with bugs on their windshields, in order to force congress to fix the Lacey Act? Let's fix the Act without resorting to that kind of ludicrous confrontation.

The current USFWS implementation of the Lacey Act will only kill all study of foreign insects by U.S. entomologists. Already, it has become harder to identify insects, because museums in Europe no longer will loan "type" specimens or other specimens of insects to U.S. workers to allow U.S. entomologists to compare them, because those museums do not want their specimens to be confiscated by USFWS.

8) U.S. government seizures have harmed entomologists by making it difficult for entomologists to sell their insect collections. Entomology is a poorly-paying profession, and one source of income used to be sales of insects. But now it is almost impossible to sell a large collection, because the endangered/threatened ones (that were collected before being declared endangered) cannot be sold, and now any specimen collected in a National Forest or on Bureau of Land Management land cannot be sold, and it is practically impossible to go through every specimen among tens of thousands in a decent-sized collection to identify all those specimens and separate them from specimens caught on private land. The result is that few buyers want to undertake the liability that comes from buying a large collection, so the price that the entomologist can get for that collection has plummeted. The plummeting value has cost hundreds of U.S. entomologists maybe \$5 or \$10 million dollars in the last 20 years. Entomologists slave away for decades building up their collections, and now can't sell them. It's no wonder that one of the U.S.'s best collections of Giant Skipper butterflies, the Stallings & Turner collection, was almost totally decimated by little dermestid beetles that chewed their way through the butterfly bodies because the collection could not find a suitable home where it would be protected from damage.

We need laws that have a reason. Laws that were based on deer, that serve no purpose whatsoever and only do harm when applied to insects, must be eliminated!! That's why we need a new law governing all aspects of the study and conservation of insects.

The only real need for government regulations on insects is to prevent LIVE insects that might escape and become PESTS from entering the U.S. In other words, bugs like the Formosa Termite that is now chewing its way through the south, cotton bollworms, gypsy moths that are eating up northeastern forests, corn borers, Mexican Bean Beetles, Mediterranean Fruit Flies, etc. which can cause millions of dollars of damage to crops or plants or houses, or bugs like mosquitoes that can transmit diseases like encephalitis and yellow fever to people. We need entomologists and laws to keep out live foreign pests, otherwise our crops and yard plants would be eaten up, mosquitoes would give us malaria and yellow fever, fleas would give us typhus, etc. But there is no reason whatsoever for government regulations on DEAD insects. Obviously we need a complete reform of government laws regarding insects, which must include the deregulation of dead insects.

Government bureaucrats, and people who work for conservation groups like the Sierra Club, need money, because bureaucrats are worried about losing their jobs. To get money from congress or from disturbed private donors, they need an evil enemy to blame for ruining the environment, so they can ask for money to fight the evil enemy. Right now, collectors are the evil enemy, because collectors are easily blamed for exterminating endangered species. After all, didn't collectors kill off the African rhinos and the bison? Obviously collecting (shooting) can exterminate big vertebrates, which are few in number and make big easy targets to shoot. Entomologists are easy to blame because they are few in number, and the entomologists who do taxonomy and are wrongly blamed for collecting insects to death are mostly amateurs who don't have big money for lawyers to fight back. But collecting does not hurt insects (and most other invertebrates), and we have proof that it doesn't. So entomologists need legislative relief! HELP!! Please help pass the new law listed at the end of this letter.

But What About Poaching? Recently, three amateur entomologists pleaded guilty to illegally collecting butterflies in National Parks; one was given a jail sentence of five months, and two were given two years probation. Another amateur was sentenced to jail for five months for importing common insects from Mexico. The word poaching sounds like some bad deed was done, and collecting in National Parks is currently illegal, but actually collecting insects in National Parks--or anywhere else--does very little if any harm. For example, a major legal complaint against three persons was that they collected the butterfly *Papilio indra kaibabensis* in Grand Canyon National Park, and the prosecution attempted to claim that the collecting hurt a rare butterfly, because it occurs only in the Grand Canyon. But actually this butterfly is common over 2000 square miles of the canyon, which is some of the most rugged and inaccessible terrain on earth. All the butterfly collectors in the world (about 3000) could not make a dent in this butterfly population if they all went to the Grand Canyon to try to exterminate it. It's impossible even to hike down into the canyon except at a few places. These convicted persons

did not harm any butterfly population, they just violated certain laws, laws which were made for deer and were never intended to apply to insects and had mostly not been applied to insects previously. In another case, the charge was that the butterfly *Agriades glandon rustica* was collected in Arapahoe National Forest in Colorado and offered for sale. But that butterfly is common over half of North America, and it has always been legal to collect it in National Forests. Laws that make criminals out of ethical people are just plain wrong. Laws must be based on ethics, not on deer-saving hysteria.

The government response to entomologists' complaints of government interference, is that permits can be granted to entomologists to study and collect insects in National Forests and Parks, and permits can be granted to mail insects abroad, etc. etc. But permits are a nuisance, requiring a lot of time and money, which harms the study of insects. Each entomologist would have to get about a hundred permits and forms a year to do what he normally did each year before this government interference began, and since applying for this number of permits is impossible in practice, entomologists now must curtail their research.

And most research on insects (especially the big showy insects like butterflies and large beetles) is done by amateurs to whom the government would not give permits. Many of these amateurs are quality scientists. The foremost butterfly expert in California is a dermatologist who works on butterflies in his spare time, and tells me that he has quit trying to get permits to study butterflies in Death Valley National Monument because of all the hassles. The foremost butterfly expert in Wyoming is an engineer. The foremost butterfly expert in Utah is a retired army Colonel. The foremost butterfly expert in Arizona is a retired agricultural pest entomologist. The foremost butterfly expert in New Mexico is a hydrologist. The foremost butterfly expert in Colorado is myself, a basically-unemployed Ph.D. entomologist who scrapes by on paltry book royalties and occasional construction work and metals recycling, etc. And so it goes all across the country, as the foremost butterfly expert in the northeast is a Philadelphia medical pathologist, the foremost expert in the Carolinas was a minister, etc. Nearly ALL of the new species and new subspecies and range extensions of insects like butterflies are found by amateur collectors who stumble upon them by accident during their explorations. In contrast, professional entomologists make very few discoveries of new species and range extensions, because there are so few employed professional entomologists, and their research is so highly focused on problems of known common insects that they do not have time for exploration. These professionals are busy teaching or working on pests like cotton bollworms etc. and do not have time to do the field work needed to discover new insects and range extensions and work on the feeding habits etc. of insects in nature (nowadays the latest research fad is the sequencing of genes and to a lesser extent the biochemistry of insect compounds, so professional entomologists have to do lab biochemistry on their bugs rather than field work). There are extremely few jobs for entomologists. No one will hire butterfly experts such as myself for instance, because of the stigma attached to "wasting" money studying such frivolous creatures as butterflies (for instance the late Senator William Proxmire gave several butterfly projects his "Golden Fleece" awards). There are already at least 400 people in the U.S.--at least 100 who work on butterflies and moths--who have gotten Ph.D.s in entomology who do not have a relevant job in entomology. These amateurs will continue to do most of the work on biodiversity of insects, if the government will only stop obstructing them.

Is Government Competent to Regulate Entomology? No!. Unfortunately, federal competence in entomology is extremely poor, except for a few entomologists in the USDA who study pest insects. Federal competence in the study of butterflies is nearly zero (it IS zero, except for a couple persons at the Smithsonian who spend their time studying genitalia mostly of tropical species). They don't hire many entomologists to begin with, and the ones they do hire are less-qualified persons hired for political correctness rather than merit. Then after being hired, insolent micromanagement from Washington D.C. legislators and top bureaucrats prevents these lower bureaucrats from exercising any competence they might possess.

But what about the new U.S. Biological Survey? Unfortunately, that Survey was created on paper only, merely by giving existing government bureaucrats new titles, so is just a reshuffling sham of sorts designed to extract more money out of congress, and very few biology experts have been newly hired to staff this Survey. I don't know of any butterfly experts who have been hired for this survey, and I know most of what goes on in North American butterfly research because I correspond with hundreds of butterfly people.

Federal customs inspectors are absolutely and totally incapable of identifying insects well enough to tell an endangered species from numerous similar species, and frankly there is no hope that they can ever be trained to do so, because even entomologists have a terrible time identifying insects. Therefore, regulations that charge customs inspection fees or attempt to channel insects only through certain ports of entry into or out of the U.S. are guaranteed failures.

As an example of government incompetence, let's discuss a little butterfly that occurs in the alpine tundra of the southwest Colorado mountains. The federal government recently budgeted \$210,000 for a "recovery plan" for the butterfly *Boloria improba acrocneuma* (the Uncompahgre Fritillary) which was full of various useless studies, but not one cent was allocated to transfer adults from a booming colony to the only colony of the 10 known colonies that needed recovering (USFWS claimed the Uncompahgre Peak site to be extinct in 1990 and 1991, but later recanted and explained that these colonies exploded to 704 butterflies in 1992 and 288 in 1993); they have rerouted hiking trails away from the two best colonies with the result that ptarmigans--formerly scared away by hikers--can now occupy each colony and peck peck peck the butterfly larvae to death all summer long; they persist in claiming *acrocneuma* is a distinct species despite the

predominant scientific opinion that it is a subspecies of *Boloria improba* that ranges to Scandinavia; they have failed to mount a proper helicopter survey for new colonies using qualified lepidopterists; they failed for nearly 8 years to believe my finding that the butterfly flies earlier than late July, until one of their consultants found the butterfly on July 3; they still fail to believe that the butterfly flies lower than 13000'; the less-competent persons they hired to do survey work have found in over 10 years of poor effort only one of the 5 new colonies that I found in 1980 (I am the scientist who first studied the butterfly's biology); and those persons published a ridiculous paper stating that the butterfly has become inbred since the last Ice Age and is doomed to extinction and should be permitted to go extinct (not one cent for transplanting adults, even though a transplant from the Wind River Mts.' *Boloria improba harryi* subspecies would completely cure that kind of inbreeding); they claimed for years that only three colonies exist--there are actually a dozen or more--and still amazingly believe that specimens found 80 miles from those three colonies (from San Luis Peak and S of Marshall Pass) are not from a colony despite the fact that the butterfly does not disperse more than a few hundred meters; they claim that seven of the colonies where only a few adults were seen are not viable colonies, even though the Uncompahgre Peak colony declined to zero seen in 1990-1991 but then exploded in 1992-1993. Butterflies aren't as easy to see as birds and mammals, and this butterfly is very local and only about 10% of the butterflies near a person fly when that person walks by, and adults may fly at a location only every two years, so a colony is easy to miss. The USFWS evidently believed that collectors were harming the butterfly's population, even though the population declined only after collecting stopped (they evidently weren't concerned that the person who originally found it in 1978 caught 40 in one day and killed them to pin into collections).

Some U.S. Fish & Wildlife employees claimed that collecting caused *Boloria improba acrocneuma* to become rare before it was listed as a threatened species. But the facts suggest otherwise, as two other causes seem to be responsible for the decline: foot stomping by the original discoverer, and drought. Only the odd-year flights declined in the early 1980s, and the main decline probably happened between 1979 and 1981, because the odd-year flight was common on Uncompahgre Peak in 1979 but very uncommon in 1983. During 1980, the original discoverer did a mark-recapture experiment on Mt. Uncompahgre, in which he walked about the small site for over a week and captured and marked the adults. The foodplant of the caterpillars is willow (*Salix reticulata nivalis*) that grows only one or two inches tall in an astroturf-like mat completely covering the ground, which must be stepped on to catch the butterflies, and it so happens that the caterpillars of the odd-year butterflies rest among the willow mat during the even years such as 1980 when that person did the mark-recapture study. Calculations show that the boot-trampling covered an area equal to half the entire area of foodplant. The bottom line is that during his 1980 week-long trampling of the site, he might have killed many of the larvae that would have produced 1981 adults. This alone could have caused the colony to decline in odd-years.

But the best proof that collecting didn't harm the Uncompahgre Fritillary is that the Forest Service put a guard on the Uncompahgre Peak colony from about 1984 onward to keep collectors away, and the Bureau of Land Management put a guard on the Redcloud Peak colony from about 1985 onward to keep collectors away. Yet, while collectors were excluded, the even-year Uncompahgre Peak colony declined to 208 in 1988 then plummeted to zero adults seen in 1990, but then exploded to 704 in 1992! And while collectors were absent, the odd-year Uncompahgre Peak colony declined to zero seen in 1991, but then exploded to 288 in 1993, while the Redcloud Peak colony increased to 1384! Obviously these butterflies were still present during the years when "zero" were seen, but were not common enough to be seen. A third colony was never collected at all, yet it exploded from 3 seen in 1987, 2 in 1988, and 4 in 1991, to 292 in 1992 and "1612" (surely an overestimate) in 1993! The apparent reason why these butterflies declined, then exploded in 1992-1993, is that there was a moderate drought causing a decline, then precipitation increased and the butterfly multiplied. The butterfly occurs only in the San Juan and southern Sawatch Ranges, because these mountains have more precipitation than other Colorado mountain ranges, so it makes sense that precipitation--not collectors--caused this butterfly to decline and then to explode. This butterfly also illustrates how you can't "manage" insect populations, which explode and decline due to factors like weather that humans cannot control, and collecting is not known to harm them. The person who gathered these data for USFWS (Amy Seidl) didn't see any adults in 1990 and 1991 at Uncompahgre Peak, so if she had been a collector she wouldn't have been able to collect any of them then (obviously you can't collect what you can't see), yet we know they must have been present because they exploded there in 1992 and 1993 and this sedentary butterfly does not migrate and it rests among vegetation a lot. Insects are just hard to find compared to deer, because they are small and inconspicuous, and that--together with their much greater abundance than deer--is why collecting doesn't harm them.

As it turned out, there was no reason to transplant adults of the Uncompahgre Fritillary from one colony to another to repopulate it, because the Uncompahgre Peak site--declared "extinct" by USFWS in 1990 and 1991--exploded in 1992 and 1993. This is a good thing, because the federal Endangered Species people have administered some of their programs like ghoulies, watching over dying animals without using transplants to repopulate colonies (as they placed the last three Dusky Seaside Sparrows--all males--into a cage to die rather than release them at the nearest subspecies to mate with females there and preserve their genes), and their laws enforce the prohibition of transplanting for restoration by jailing any private person or conservation organization who attempts a transplant (they would be prosecuted for catching and "harassing" the animals).

Transplants are very easy to do with insects. Transplants cost only a few hundred dollars or less to implement (almost as easy as collecting and planting plant seeds), versus the millions of dollars that are being spent to transplant just a few dozen wolves to Idaho and Yellowstone, and the millions more that will be required to transplant wolves to southwestern Colorado. So USFWS must use transplants to actively try to restore insects, or at least must permit private individuals or organizations to transplant them. There are many people who would volunteer to transplant them. Various U.S. state and federal governments, specifically Fish & Game Departments, have an incredibly shocking record of transplanting of alien fish, fish that have exterminated much of the native fish fauna. Governments believe that a million past transplants of alien fish--at the cost of the decimation or near-extinction of most native fish (including four Colorado natives that were endangered by introductions of alien fish, namely the Colorado Squawfish and Humpback Chub and Razorback Sucker and Bonytail)--are not enough, while they hypocritically believe that one simple transplant of *B. improba* from one colony to another--that would also eliminate the inbreeding that their consultants claim is driving it extinct--should not be attempted. Basically, governments have enthusiastically transplanted fish but not insects, because fishermen pay money to governments, while entomologists do not. Some enterprising journalist could unravel a truly shocking tale of woe in just one state's fish stocking program: in Colorado the state must have conducted 100,000 stockings of various lakes and streams with transplanted and reared alien fish over the last century, with the result that the native Cutthroat Trout was nearly exterminated, along with the four fish cited above, and a bad foreign disease Whirling Disease was introduced into most of the waters in the state. The gruesome tale, if every fully told, will be truly shocking to read.

Now, instead of complaining, we need to get to work to devise better laws, as follows. But first we have to explore what's wrong with the Endangered Species Act.

Fixing the Endangered Species Act as Applied to Insects

The Endangered Species Act needs considerable fixing if it is to have any usefulness for insects. Here's what must be done. Notably, qualified scientists—not government bureaucrats--should decide which species were endangered or threatened. Weak subspecies would not be designated endangered/threatened. Qualified scientists should set up plans for helping the species, so these plans might actually help the species by transplanting animals to new habitat. Hunting restrictions that have no effect would not be used.

1) Endangered/Threatened Species status must be accompanied by PRESERVATION OF HABITAT. For insects to survive, they must have habitat. If their habitat is developed, insects die, because--except for a few common species--they cannot migrate to a new locality. On the other hand, if their habitat remains intact, they can survive just fine, despite collecting or bad weather. These facts have become obvious after hundreds of years of insect study. But as noted above, insects differ greatly from deer: if you destroy a natural area, the insect population will go extinct, but the deer will just walk someplace else and live, and you can manage the numbers of deer by adjusting hunting licenses, but you can't "manage" the numbers of boom and bust insect populations at all.

There are thousands of proven cases of habitat loss causing extinction of insects. When you wipe out an insect's habitat, it instantly goes extinct there, like the two entire subspecies of butterflies that were wiped out by the growth of San Francisco, because most insects cannot travel far to another suitable location. There are dozens of places near my house where I used to find nice butterflies, where they exist no more because of house construction. Preserve insects' habitat and you preserve them; destroy their habitat and you destroy them with it. Insects need HABITAT, not harmful regulations that only destroy the science of entomology. Government officials like to blame collectors of insects, when they should be blaming the destruction of the HABITAT of the insects.

Therefore, government regulations that do not preserve habitat for insects are just USELESS GARBAGE that cause difficulties for entomologists for no good reason. The Endangered Species Act provides paper regulations that eat up money and order people around and punish them for harmless activities like studying and collecting insects, yet provides no money for habitat, so is virtually useless for insects. The only possible benefit of declaring an insect an endangered species would be to prevent development of land the insect lives on, but how often does that work? The Act is seldom helpful on government lands because government lands are rarely developed. The only exceptions might be a rare federal reservoir such as the canceled Two Forks Reservoir in Colorado that would have drowned the butterfly *Hesperia leonardus montana* (a butterfly that is immune to harm from collecting, as its population was estimated as 130,000), and forest cutting that is said to harm the Spotted Owl in a small part of its Mexico-to-Canada range. In contrast, butterflies are nearly always helped by cutting forest, such as the butterfly *Phyciodes batesii batesii* which has become extinct in most of the Appalachians evidently because of overgrowth of forest due to 90 years of fire suppression, and some development of its open savannah habitat; and the butterfly *Erebia theano*, which is common on grassy spots near Rollins Pass in Colorado where sparks from old steam train engines burned adjacent forest, but is now facing extinction at those spots as the forest grows thick and chokes out its grass. Private lands are often developed, but at the present time, when the landowner looks at the maps printed in the Federal Register showing the locations of the endangered insect on his land, he can just hire a bulldozer and wipe out the species so he won't have to lose the money he could earn by development. And congress will probably pass some kind of "takings" legislation to compensate landowners for the loss of the ability to develop land containing an endangered species (in the first attempt, the U.S. House of Representatives passed the Takings legislation

March 3, 1995), which, with the unavailability of funds for compensation to landowners due to the virtual bankruptcy of our federal government, will mean that the Endangered Species Act will be essentially useless for insects.

Unless money can be legislated to purchase habitat for endangered/threatened insects, insects should just be removed from the Endangered Species Act completely. If government does not have the money or the gumption to preserve the land that insects need, then government should not have anything to do with insects at all. Only the Nature Conservancy actually buys habitat to preserve insects, so only they offer help to insects. Money now wasted by governments in administering current laws that apply badly to insects, should be given to the Nature Conservancy instead.

2) Distinctive species must receive much more protection than weak subspecies. The current Endangered Species Act is a LUDICROUS JOKE, because it gives very weak subspecies the SAME status as very distinct species! Unknowledgeable legislators and bureaucrats fail to realize that subspecies are not species, that some subspecies are barely more than worthless synonyms of other subspecies, and that hundreds of names originally proposed as "species" and "subspecies" names are now considered to be worthless synonyms (I ought to know, I have named about 50 subspecies myself, and at least one of them proved to be a worthless synonym). Those readers who are not biologists may think that every named biological creature is equally worthy of conservation. Wrong! The real facts are that every individual animal is a little different genetically from every other individual (except for identical twins), so every group of animals differs a little from every other group, even if they look absolutely identical. Thus the animals at one locality are a bit different genetically from those of another locality, so if some incompetent biologist wanted to, he could name the animals from every locality a different subspecies. Biologists are running out of very-distinctive creatures to name and classify, so they are looking more and more closely at well-known species and are naming subspecies that are less and less distinct. Some biologists are called "splitters" because they name new subspecies that other people do not think are significantly distinct. These splitters can name worthless subspecies because there are thousands of scientific journals, and science publishing is a "vanity press", meaning that these journals charge the authors a fee of \$15-\$100 "page charges" per printed page to print the author's scientific paper, so if the splitter shops around among enough journals and pays enough money, he can get his worthless subspecies published in a scientific journal. Other biologists are called "lumpers" because they do not recognize the name of any subspecies that is not very distinct. Synonyms are names of species or subspecies that the person who named them thought were distinct, but which later were found to be the same as species or subspecies that were already named. The list of butterflies of North America shows about as many synonyms as there are subspecies, because hundreds of subspecies were named that were so weak that few people believed they were valid at all except the person who named them, and they were then listed as useless synonyms. There is in fact a continuum from worthless synonyms, to very weak subspecies that a few people think are valid but most people consider to be worthless synonyms, to weak subspecies, to valid subspecies, to distinctive subspecies that some people think might even be species, to species that some people think are just subspecies, to valid species, to very distinct species that have no close relatives.

What does this technical stuff have to do with the Endangered Species Act? Simple. Numerous weak butterfly subspecies have made the Endangered Species list that are a ludicrous joke, while other butterflies that are more worthy of conservation are not even on the list. As examples among butterflies, we have the "endangered" *Euphydryas editha bayensis* which made the list only when most of its range was split into another subspecies *Euphydryas editha luestherae*, and only after the Endangered Species Office cowed to a lawsuit filed by people who were making money off federal NSF grants to study the butterfly; these two subspecies are so weakly differentiated that for 100 years 50 lepidopterists never saw any difference and still cannot see any; butterflies like those occur along most of the California Coast Range, and the whole species *Euphydryas editha* is widespread all over western U.S. Another butterfly *Glaucopsyche lygdamus palosverdesensis* is only a slight intergrade between two other parent subspecies (*Glaucopsyche lygdamus australis* & *Glaucopsyche lygdamus incognitus*), and has no distinctive characteristics of its own and is thus just a hybrid population (quality scientists think that a valid subspecies should have some traits that are not just intermediates of the traits of adjacent subspecies); the species ranges all across North America from Pacific to Atlantic and north to the arctic, and because the parent subspecies are still widespread and common, if they come into contact in the future they will interbreed and create a new hybrid *palosverdesensis* population anew even if it is extinct! *Plebejus anna lotis* from Mendocino California has made the list, even though the butterflies from the Warner Mts. on the other side of California are very similar. *Callophrys mossii bayensis* has made the list, even though there are several other local unnamed California populations of the species *Callophrys mossii* that are just as distinct. There are many more examples: a recent wave of 150 new subspecies names of butterflies, representing the gamut from distinct valid taxa to complete synonyms, will no doubt be swallowed hook line and sinker by our federal Uncle Sucker Endangered Species Office.

Actually, protection should be removed from weak subspecies, because every population is at least a little different genetically from every other population anyway. Nobody disputes that we should protect truly distinct species like bald eagles (which were actually saved by the ban of DDT, not by the Endangered Species Act). But when we get into very weak subspecies such as weak subspecies of gophers that can only be identified by a few people in the world, with sophisticated statistical measurements of skull measurements of dozens of dead gophers in museums, and then only if you give those few people the locality where the specimens were collected, then you have an Endangered Species Act that is a LUDICROUS JOKE.

3) I have heard that the government considered giving protection to creatures that are only being considered for threatened/endangered status. This is a bad idea. Until a creature is studied by someone qualified to judge--not just an incompetent government bureaucrat with no knowledge of biology--there is no justification for putting it on any list. There have been some problems in the past with creatures disappearing while the government was considering their status, but that is no fault of the existing law, it is the fault of incompetent government bureaucrats who failed to properly investigate the case, who failed to ask qualified biologists about the rarity and vulnerability of the creature, who failed to act when they were told by everyone that the creature was worthy of conservation (sometimes because politicians told them to delay the matter) or not worthy of conservation, who failed to ask qualified biologists whether the creature was a valid subspecies, etc. The solution to this problem is this:

4) Either improve the quality of biological expertise of the government people who do endangered species work (which would be exceedingly difficult given the current government personnel practices and soaring government deficits), or, as I propose below, have insect societies rather than the government do the scientific work required to determine whether a species is worthy of special protection measures. The people that work on endangered species in government now are rather incompetent. I hate to say this, but it is true. They delay 10 years to declare a taxon a threatened or endangered species when it is obvious that it is one. They write up hundred-page "recovery plans" which budget zero dollars to transplant adults to a colony to recover it that was then thought to be extinct (example the Uncompahgre Fritillary butterfly in Colorado discussed above, which had \$209,000.00 budgeted in its "recovery" plan). The federal people who work on butterflies are just bureaucrats, and as a result are setting up lousy regulations and are doing the work on endangered species poorly.

The New Law

The U.S.—and all other countries around the world—desperately needs the following new national law regarding all phases of the study and commerce and conservation and collection of insects. This law is based on science and ethics rather than deer-saving hysteria. The law recognizes that habitat preservation rather than impossible "management" of numbers is the key to insect conservation. The law corrects the current blunders in the Endangered Species Act as it applies to insects. The law deregulates the study of dead insects, and overrides all other laws in granting entomologists the right to study and collect (and exchange/sell) insects anywhere on public lands (and private lands with permission of owner) without restriction, as long as the collected insects are not endangered/threatened and are properly labeled with locality and date and made available for study by scientists.

Collecting insects is harmless, as explained above. The only conceivable harm of collecting insects would be to small colonies of highly-local colonial butterflies with restricted ranges that are desirable to collectors, and the record shows that even these colonies are rarely if ever harmed by collecting. But to make sure that these colonies can be protected from even the remotest possibility of harm through development or any other cause including collecting, and because federal employees lack competence in entomology (and thus designate some insects as endangered that are not, or fail to designate others that are), and because endangered species have been treated as political footballs by the federal government, insect societies should be given the responsibility of making lists of those truly distinct insects that exist in just a few small locations and are highly colonial and thus are vulnerable to disturbance. These species should be called Vulnerable Species. These societies would draw up rules for each species and each colony (for instance one colony should be purchased if someone will donate the money, at another colony none could be collected, or only males could be collected and only if the colony is abundant that day, etc.). A way might even be found to make violations of the regulations a misdemeanor fine of up to several thousand dollars. The Endangered Species Office then would have to choose its species from the lists put together by those societies, so we would no longer be burdened by the incompetent blunders of that agency. Lepidopterists maintain a "grapevine" network of rapid data exchange concerning unusual findings and rare species, and governments are decades behind in their knowledge; these lists should not be created by incompetents.

This new law must replace all other laws regarding the collection and commerce and study of insects. It must recognize the difference between weak ssp. and distinct species. It must permit unrestricted commerce in insects within the U.S. and into and out of the U.S., while giving governments the right to regulate transport of those live insects that are likely to escape and multiply and become pests (crop pests, beetles that carry fungus that can devastate our elm and American Chestnut trees, termites, mosquito vectors of human diseases, etc.). The law must permit seizure of foreign insects only if they were illegally collected endangered species, or if they are live pests. This law must recognize the ease of rearing insects, and permit private individuals/organizations to breed and transplant insects to restore colonies, and it must permit the practice of "insect farming" of endangered species for conservation benefits (either the animals reared are transplanted to establish new colonies, or are sold and the money used for purchase of habitat, or--as in New Guinea birdwing farms--the farms preserve the habitat and thus the species).

In 2005, some legislators (Richard Pombo etc.) are attempting to revise the Endangered Species Act, but they are not dealing with the concerns of my current article; they are mainly concerned with shielding landowners from the loss of use of their land if an endangered species is found upon it. While that is a legitimate concern, the rest of the Act must be

reformed too. And if congress really wanted to be fair to landowners, they would actually pay landowners who took ordinary land and converted it into good habitat occupied by an endangered species.

Here's the new law:

A New National Law on Conservation and Collection of Insects

Detailed Wording of the Suggested New Law:

INSECT STUDY, COMMERCE, AND CONSERVATION LAW (INCLUDING DEAD INSECT DEREGULATION)

Effect on Existing Laws. This law overrides ALL existing federal, state, and local legislation applicable to insects, including the Lacey Act and the Endangered Species Act, except as noted below. It also overrides ALL future laws that are applicable to insects, unless Congress specifically indicates in future legislation that it is modifying the present act. This law also applies to all insects existing in collections now and in the future.

Application of Law to the Animal Kingdom. This law covers all insects--all species of the class Insecta--and all other Arthropods (scorpions, spiders, mites, horseshoe crabs, millipedes, centipedes, crayfish, crabs, barnacles, sowbugs, etc.), except those aquatic species that are harvested for food, such as shrimp, crabs, and lobsters, which will continue to be regulated by existing fisheries laws.

Habitat-Based Conservation, and Deregulation of Collecting. Insect conservation shall be based on preserving habitat, rather than punishing entomologists for harmless studies or collecting. Anyone shall have the right to study and collect any insect on any public lands, whether federal, state, county, or municipal, without restriction, and without filling out any permits or paying any fees, as long as this collecting shall be done in such a manner as to not cause permanent damage to the insects' habitat or its population, and as long as the collected insects are not considered endangered, and (for federal and state lands) are properly labeled with locality and date and made available for study by scientists ("availability" shall mean attempting to identify the insects, by sending them to experts if needed, and providing the identification and locality and date of collection to scientists who are studying those insects or that public area). Mass collecting of insects for sale on public lands, without properly labeling them, such as the collecting of scorpions for paperweights or the collection of fireflies for the manufacture of light-producing chemicals, shall be permitted only if that insect species is very common in the area collected; and such collection shall be done in such a manner as to not cause permanent damage to the insects' habitat or its population, as noted above. Anyone shall have the right to study and collect any insect on any private lands, as long as permission of the owner of the land is obtained, unless the insect has both been declared an Endangered Species and federal funds have been appropriated for purchase of private lands habitat.

Only one exception shall be allowed to this right to study and collect: A National Park/National Monument shall have the right to prohibit collecting of insects within its borders, in order to promote the illusion that the Park is totally pristine from human disturbance, ONLY IF that Park is managed to be in a natural state, including not allowing any other native animals or plants to be killed (allowing no fishing or hunting of wildlife even if it wanders out of the park, and no mosquito or fly extermination, etc.) and not allowing suppression (firefighting) of natural wildfires or construction of reservoirs, etc.

Transport of Insects. Anyone shall have the right to transport dead insects anywhere in the U.S., and into and out of the U.S., without restriction or permit or fee, unless those insects were illegally collected endangered/threatened species. Dead insects in collections cannot be seized and are not subject to any restrictions, unless they were illegally collected endangered species.

Anyone shall have the right to transport live insects anywhere in the U.S., and into and out of the U.S., without restriction or permit or fee, unless those insects were illegally collected endangered species, or unless those live insects are pests (which might escape and cause damage to crops, buildings, other human constructs or enterprises, or could cause damage to populations of native plants or animals). The transport of such live pest insects shall be restricted by existing agricultural laws designed to exclude insect pests and retard their spread. Specifically, any government shall have the right to seize and destroy shipments of live insect pests, or seize and destroy living or dead materials that are likely to contain pests; and permits shall be issued to import/transport these pests if live individuals are necessary for scientific study of the control or biology or taxonomy of these pests, provided that sufficient safeguards are followed to prevent the escape of these pests from laboratory facilities. Live insects that are not being shipped can be seized and destroyed within the U.S. if they are pests being housed in structures inadequate to prevent their escape and if the resulting escape is likely to cause damage. The personnel who enforce the laws excluding live pests shall be able to use practical means to exclude pests (for example, the importation of soil can be banned if the soil might include harmless insects as well as harmful pests; and the importation of fruit can be banned if the fruit might include harmless insects as well as harmful pests).

Live insects that cannot live or become pests in the U.S. (example: insects adapted to and restricted to tropical rain forests that cannot live in any part of the continental U.S and are being transported to the colder parts of U.S. where they cannot survive if they escape) shall have no restrictions or permits or fees governing their transport.

People or organizations who are damaged by the escape of living insect pests, may sue to recover damages under existing civil court laws.

Endangered Species of Insects. The following regulations modify the Endangered Species Act as it applies to insects:

Designation of an insect as a Vulnerable Species shall be done not by the federal government, but by scientific societies devoted to the study of insects. The insect society with the greatest membership devoted to the study of each insect order shall designate its Vulnerable Species (for example the Lepidopterists' Society shall designate the Vulnerable Species of Lepidoptera, which are moths and butterflies), unless membership falls below 50, in which case the Entomological Society of America shall designate the Vulnerable Species. Insect orders without a society to study them shall be handled by the Entomological Society of America. Each Vulnerable Species shall be designated as Vulnerable, or removed from the Vulnerable list, only after study of its status by experts, and the submission of its case (with a summary of the experts' findings) to the society membership for a vote on whether to recognize it as a Vulnerable Species. If designated a Vulnerable Species by the society, the society shall draw up regulations for protecting the species, which should include whatever measures would best protect it, and may include recommendations of which areas should be purchased, limits on how many females and males can be collected from each colony, or a rule that collecting will be allowed only if the yearly population is common, programs for raising the species to transplant to found new colonies, programs for raising the species for sale to provide money to purchase critical habitat, or any other recommendation that promotes the conservation of the species. The society can also provide for misdemeanor penalties for the violation of these regulations, which may include a fine of up to \$2000.

Only distinct species or very distinctive subspecies (or a set of weak subspecies that together constitute a very distinctive subspecies, which set is treated as one subspecies for the purpose of determining its vulnerable status) can achieve Vulnerable Species status; weak subspecies cannot become Vulnerable Species. Species/subspecies which are vulnerable only in part of their worldwide range, and not vulnerable in a substantial area elsewhere, cannot become Vulnerable Species.

No federal funds shall be budgeted for these insect societies to use for determining whether the insects are Vulnerable Species, since these societies have existing expertise. If a species is poorly studied and experts cannot be found to properly determine whether a species is vulnerable or not, the species will be assumed to be not vulnerable. If no insect society is willing to consider that a particular insect species is vulnerable, then it shall be assumed that the species is too poorly studied to warrant designation as vulnerable at that time. As scientific studies progress and development proceeds, the vulnerable status of a species can be reassessed.

Only insect species that have been declared Vulnerable by these insect societies can also be designated as Endangered or Threatened Species by the federal government under the Endangered Species Act.

Species which are medical pests (suck human blood, are parasites of humans, transmit diseases to humans, etc.) or are economic pests (causing damage to agricultural crops, termites, roaches, etc.) cannot achieve Endangered/Threatened Species status.

Endangered/Threatened insects shall be regulated by the guidelines drawn up by the insect society when it is designated a Vulnerable Species, instead of the regulations of the federal Endangered Species Act or the Endangered Species Office. Depending on the guidelines drawn up by the insect society for that Vulnerable Species, "insect farming" (defined as rearing adults from immatures under more-or-less artificial conditions designed to minimize mortality of the insects) of Vulnerable and Endangered/Threatened insects shall be legal, farmed insects can be released elsewhere to establish new colonies, or can be sold and the money used to purchase critical habitat of that species or other Vulnerable Species. Because of the ease of rearing and transplanting insects, volunteers are encouraged to locate sites where the Vulnerable Species is currently absent but is likely to survive if introduced, and are encouraged to transplant the insect to those sites.

If the federal government provides no money for purchase of private land habitat for insect species that it has declared Endangered/Threatened, then Endangered Species Act regulations shall not legally apply to that insect on private land.

Here's a sample letter that I hope the reader will use to write his elected legislators,
to appeal for passage of this new insect law:

(Name/address of
Concerned Citizen)
(date)

(Representative Richard Pombo
2411 Rayburn House Office Building
Washington DC 20515-0511
or other legislators of your choice)

Dear Senator or Representative (name):

I understand that you are holding hearings on revising the Endangered Species Act. As a concerned citizen, I have learned that the act has huge flaws, and must be fixed! So I am writing to offer suggestions on how to fix it.

In brief, here's what the act needs: 1) the designated "species" must be actual distinct species, not barely-distinct subspecies; 2) qualified scientists must decide which species are endangered or threatened, not government bureaucrats who have totally bungled the process; 3) qualified scientists must set up recovery plans, so we could save most insects and plants for instance by simple transplanting; 4) insects and plants require habitat preservation rather than useless hunting restrictions, so land preservation (by The Nature Conservancy etc.) would be emphasized.

Actually, all of the federal laws that affect the study of insects are bad, so I hope you will take this opportunity to fix those laws too. We need a new law that will cover all aspects of the study and commerce and conservation of insects, including endangered species, to get rid of the misguided current government regulations which only retard the study of entomology and waste money and serve absolutely no useful purpose. Parts of this law will deregulate the study of dead insects. This law will improve the conservation of insects. Federal laws and regulations--designed for deer but misapplied to insects--are now crippling the entire science of entomology.

Here are the two laws we need: 1) fixing the Endangered Species Act, and 2) a new law on the conservation and collecting of insects. Enclosed is a copy of the new **INSECT STUDY, COMMERCE, AND CONSERVATION LAW (INCLUDING DEAD INSECT DEREGULATION)** that fixes all these problems. I hope you will seriously consider it, and turn it into legislation.

Thank you for your efforts in fixing these laws. Let me know if I can provide further help.

Sincerely,

(name of concerned citizen)

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