



EXTINCTION

AND THE

ENDANGERED SPECIES ACT

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SUMMARY

One hundred eight U.S. species are known to have become extinct in the first 21 years following the creation of the Endangered Species Act. We analyzed the conservation histories of these species and found that 23 species became extinct after they were placed on the endangered species list, but the majority of extinctions (85) involved species that were not on the endangered species list.

There were lengthy delays in the listing process for 83 (77%) of the species that became extinct: 29 of these species became extinct before a listing process was initiated, 42 became extinct during a delay in the listing process, and eleven listed species became extinct after a delay in the listing decision.

The use of the candidate list as a tool to defer listings for many years was particularly dangerous: 24 species became extinct after being placed on the candidate or warrant-review list. Listing petitions were routinely ignored to the detriment of the species: 17 species became extinct while their listing petition was under a long-delayed review.

If extinction is the ultimate criteria by which to judge agency implementation of the ESA, the failure has been spectacular. In many cases it has been purposeful. The agency has knowingly delayed listings to avoid political controversy even when it knew the likely result would be the extinction of the species. Full support and implementation of the endangered species listing program is necessary to avoid unnecessary future extinctions.

METHODS

We surveyed published literature, government reports, conservation databases, and field researchers to identify all species that became extinct or missing after the creation of the Endangered Species Act in December 1973 and before January 1, 1995. We defined “extinct or missing” as not having been recorded in ten years despite survey efforts. For convenience, we use the term “extinct” to mean “extinct or missing” throughout the text and we do not distinguish “extinct” species from “missing” species. We use the terms to acknowledge the difficulty of determining absolute extinction. We did not classify any species as extinct if it was observed after 1994. Ten years is the minimum time required to make a reasonably certain assertion about whether a species may be extinct or missing.

Each species was assigned a year indicating when it was last observed. In most cases, we confirmed literature and database reports with field researchers. Imprecise dates were normalized: “1980s” would be classed as 1985, “late 1980s” would be classed as “1988,” and “early 1980s” would be classed as 1982. In most instances, however, precise dates were available.

¹ This paper would not have been possible without the contributions of dozens of scientists who made their field notes available to augment published records. Dr. Johnathan Price of the Smithsonian Institution provided a very helpful review of the first version of the paper.

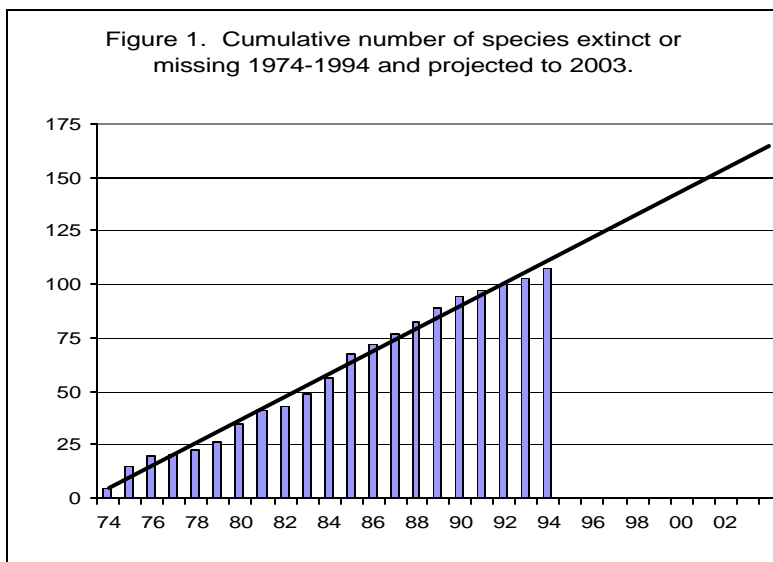
We reviewed the conservation history of each species, identifying when and if each was 1) discovered, 2) listed as an endangered species, 3) formally proposed for listing, 4) petitioned for listing, 5) placed on the federal candidate list, 6) placed on the C.I.T.E.S. list, 7) known to be endangered, and 8) appeared on list of imperiled species. The federal endangered species list has precursors dating back to 1966, but the modern Endangered Species Act and all of its significant protection mechanisms came into existence on December 28, 1973. We therefore consider 1974 as the first possible year of ESA listing. While conservation reports and lists prior to 1974 are noted, all potential listing delays are measured from 1974 forward.

RESULTS AND DISCUSSION

There are approximately 200,000 known species in the United States (Stein *et al.* 2000). A natural background rate of one extinction per million species per year (Wilson 1992) would predict four known extinctions between December 1973 and December 1994. We identified 107. This very high extinction rate is of particular concern since it occurred in the first twenty years after the creation of the Endangered Species Act. The ESA was supposed to stop or at least decrease the number of extinctions. Do the data indicate that the ESA is not working? Or that it is not being implemented? To answer these questions, we examined the conservation history of all 107 species to determine what role, if any, the ESA played in efforts to stop their decline and extinction. We also reviewed the geographic distribution of extinct species.

NUMBER OF EXTINCTIONS

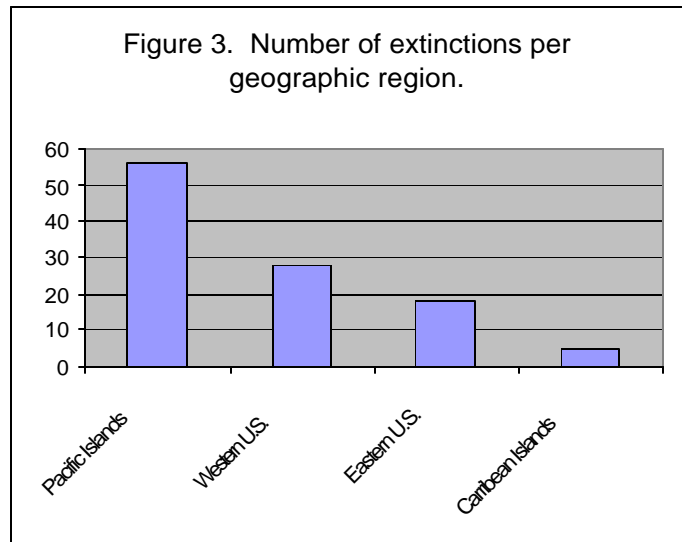
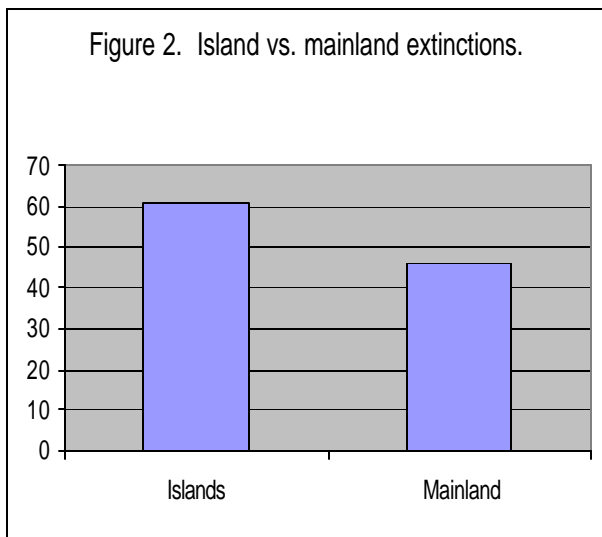
We identified 108 species that are known to have become extinct or missing between 1974-1994 (see **Appendix A**). The number of species which actually became extinct during this time is unknown but is certainly much greater. Annual rates were highly variable and did not appear to follow any temporal trends. If the same rate of species disappearance occurred during 1994-2003, approximately 165 species will eventually be known to have disappeared since the Endangered Species Act was created in December, 1973 (figure one). Again, the actual number of extinctions is certainly greater than this.



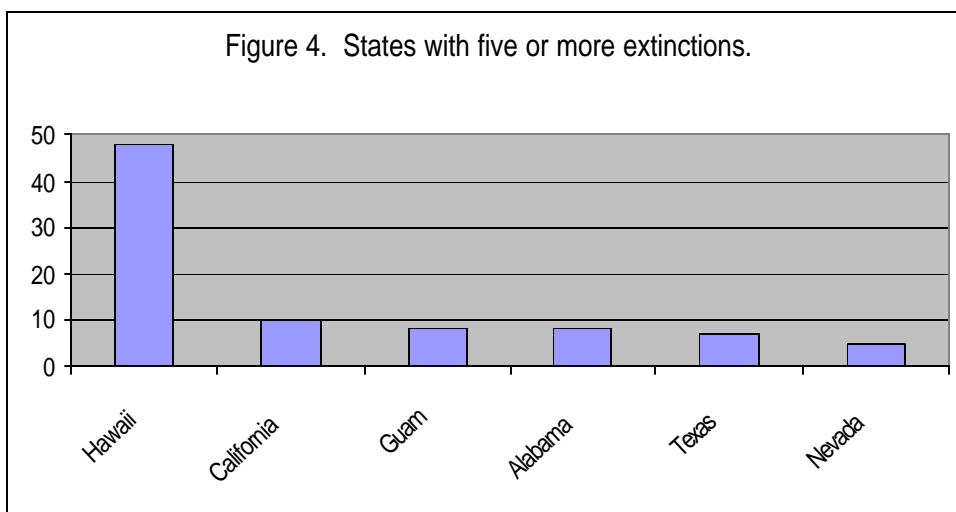
GEOGRAPHIC DISTRIBUTION

As island biogeography theory would predict, more extinctions occurred on islands than on the mainland (figure two). The trend is even more significant if one considers that the islands have a vastly smaller combined land mass and far fewer total species than the mainland. Thus a far greater percentage of island species are going extinct, and there are far more extinctions per landmass on islands than on the mainland.

At the broad regional level, Pacific islands suffered almost half of all extinctions and the western U.S. suffered a little over a quarter (figure three).

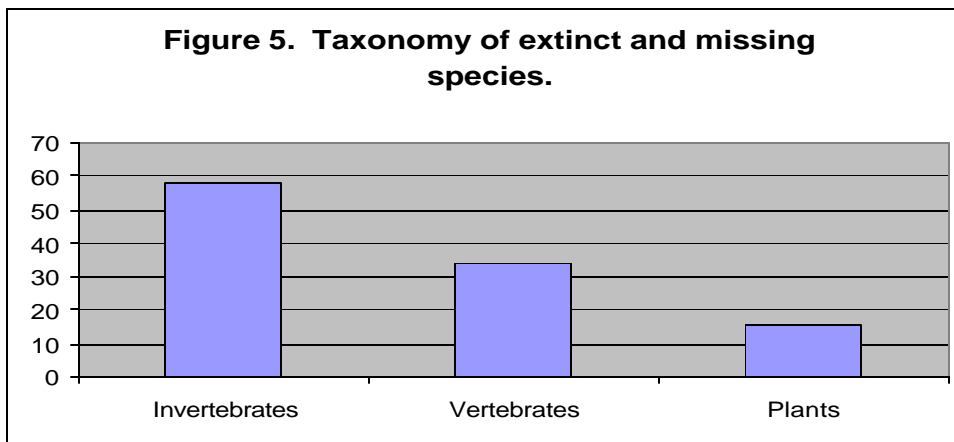


At the state level, Hawaii had the greatest number of extinctions with other Pacific island and southern states forming a second tier (figure four).

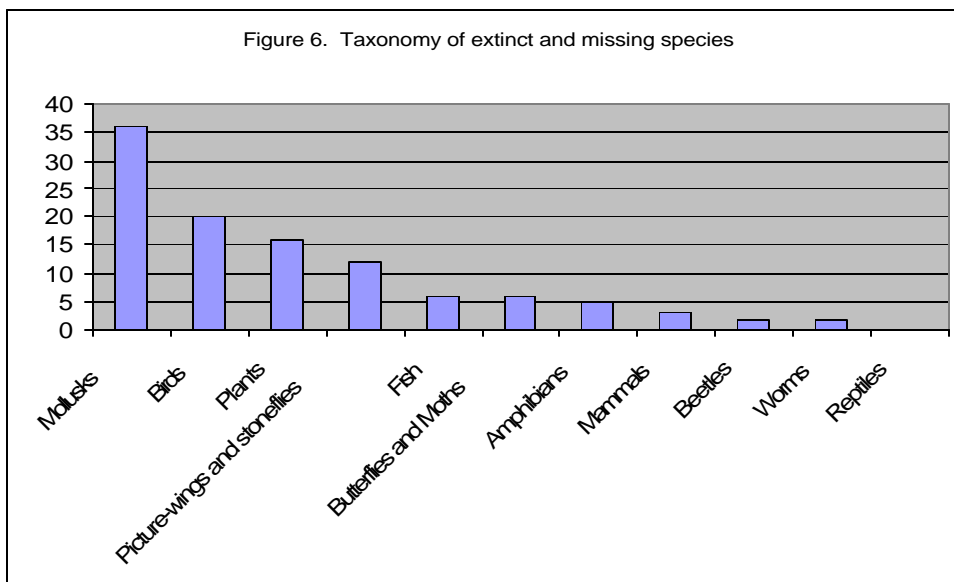


TAXONOMY

As invertebrates are more numerous than vertebrates or plants, and have received relatively little conservation attention, we hypothesized that they would suffer a greater number of extinctions. This was the case (figure five). For similar reasons, we expected plant extinctions to outnumber vertebrate extinctions. This was not the case. We suggest three explanatory hypotheses. 1) Plant disappearances may be underreported due to a lack of conservation attention or a longer lag-time between disappearance and reporting. Plants can survive as unnoticed seed material, thus their absence for short periods of time is less alarming, and less likely to be reported, than the absence of vertebrates. 2) The vertebrate disappearance rate appears to have been biased by intensive survey efforts for rare birds on Hawaii, Guam, and to a lesser extent, the mainland (figure six). If similar survey efforts had been conducted for plants, invertebrates, and non-avian vertebrates, it is likely that all would show greater extinction levels. 3) Vertebrates may actually have disappeared at a faster rate between 1974-1994.



Mollusks, especially Southeastern mussels and Hawaiian snails, suffered the greatest number of extinctions (see figure six). Birds, plants, and picture-wings and stoneflies formed a second tier.



EXTINCTION OF UNPROTECTED SPECIES

Seventy-nine percent (85 species) of the extinctions happened to plants and animals that were not on the endangered species list. Thus in the vast majority of cases, the agencies managing the ESA—the U.S. Fish and Wildlife Service and NOAA Fisheries (formerly National Marine Fisheries Service)—failed to implement its most basic function. These species were not listed and thus were not protected by the ESA’s prohibition on take and extinction. They did not have critical habitat or recovery plans. They did not receive federal recovery funds. Indeed, it was legal to drive them extinct.

It should be noted, however, that it is not possible for the agencies to know about and put every imperiled species on the endangered list. There is little they can do for species that go extinct immediately after being discovered, and even less for species that are “discovered” after they go extinct. Five species were not seen after their first discovery and nine became extinct within two years of the ESA being created. We don’t believe the agencies had sufficient time to recognize and act upon the imperilment of these species.

Eighteen species were placed on the endangered list after they became extinct (Table 1). All 18 suffered lengthy listing delays and clearly should have been listed prior to becoming extinct.

- Two birds from the U.S. Territory of Guam—the Guam broadbill and Guam bridled white-eye—were known to be approaching extinction before the ESA was created. When over five years passed with no federal effort to list them, the governor of Guam petitioned the U.S. Fish and Wildlife Service to do so in 1979. Instead of listing them, however, the agency placed them on the federal candidate list. The candidate program is essentially a waiting room for imperiled species that have not yet been placed on the endangered list. It confers no legal protection to the species. The species were finally listed in 1984, almost eleven years after the creation of the ESA, but they were both extinct by then. The white-eye was last seen in 1983 and the broadbill in 1984. See *Case Study One* for more detailed information on these and other extinct Guam birds.
- At the request of Congress, the Smithsonian Institution petitioned the U.S. Fish and Wildlife Service to list the four-angled pelea as an endangered species in 1975. In 1976 the agency formally proposed to protect the Hawaiian plant. Then two years passed without further action, prompting the Smithsonian to submit a second petition in 1978. Instead of listing the pelea, however, the agency placed it on the federal candidate list in 1980. After 14 years of candidacy, the pelea was finally listed as an endangered species in 1994. Unfortunately, it was last seen in 1991.
- Other species suffered lengthy delays to even get on the candidate list. The Ochlockonee moccasinshell, a freshwater mussel from Georgia, was first acknowledged as an imperiled species in 1968 and appeared as such in a 1971 Department of Interior publication. Yet it was not placed on the candidate list until 1994, 21 years after the ESA was created. It was already extinct by then, having last been seen in 1993. It was placed on the endangered list in 1998 in the vain hope that it would be rediscovered.

Sixty-seven species never made it onto the endangered species list (Table 2):

- The Smithsonian Institution petitioned the U.S. Fish and Wildlife Service in 1975 to list Hoffman’s jewelflower. The agency proposed listing in 1976 but did not complete the action,

spurring a second petition by the Smithsonian in 1978. Instead of listing, the agency placed it on the candidate list in 1980. The jewelflower has not been seen since 1984. It never made it onto the endangered list.

- The cardinal honey-eater is bird from the U.S. territory of Guam. The Governor of Guam petitioned the U.S. Fish and Wildlife Service to list the honey-eater in 1979. It was placed in the candidate program instead of being listed in 1982. It went extinct in 1984—15 years after the ESA was created—without ever having received the Act’s protection.

EXTINCTION OF PROTECTED SPECIES

Twenty-one percent of the extinctions (23 species) involved species already on the endangered species list (Table 3). Listing delays contributed to the extinction of these species as well.

Eleven appeared on the predecessor lists to the ESA, and thus by law were automatically listed as endangered species in 1974. There was no opportunity to delay listing, and thus there was no delay. Nonetheless, they had declined to such low levels prior to being protected that it was not possible to save them. For these species, it was not listing, but the creation of the ESA that came too late. The longjaw cisco, for example, was virtually extinct in 1974 and was not seen after 1975. The ESA was created decades too late to stop its decline in Lakes Michigan, Huron, and Erie. Similarly, the Kauai 'O'o (a Hawaiian bird) was rarely seen after 1974, and was never observed nesting after 1973.

Twelve species were listed after 1974 at the discretion of the U.S. Fish and Wildlife Service (Table 4). Listing delays for these species were thus possible. They occurred in every instance. The ESA requires that a final listing decision be made within two years of a petition being filed; we thus use two years as the standard for determining whether listing was delayed. None of the species were listed within two years of being petitioned, put on the candidate list, or known by the agency to be imperiled.

- Curtus's pearlymussel, a freshwater mussel from the Tombigbee River in Alabama and Mississippi, was identified as an imperiled species in a 1971 Department of Interior publication, yet it was not listed as an endangered species until 1987. It was virtually gone by then. It was only seen twice after listing, and both times it was dead. After 1990 it was never seen again. The listing process for this species and two other mussels shows that the Fish and Wildlife Service purposefully delayed the listing in order to avoid a political conflict with a major dam construction project even though the dam had been identified as the greatest threat to the species' existence. After the dam was complete and out of reach of the ESA, the species were listed. Two were already extinct. Curtus's pearlymussel went extinct immediately afterward. See *Case Study Two* for more information on this and the extinction of other southeastern mussels.
- The Golden coqui, a Puerto Rican frog, was known by the early 1970s to have severely decreased populations, but endangered listing was delayed until 1977. By then it was too late to save it, it was not seen again after 1981.

LISTING DELAYS

Lengthy listing delays were the rule, not the exception. Eighty-three (77%) of the 108 extinctions involved a delay of more than two years between the time the species was identified as imperiled and the time it was listed or became extinct.

83 Extinct species experienced significant delays in gaining protections
42 became extinct during a long delayed listing process
29 became extinct with no listing process initiated
12 were listed after a long delay and were too depleted to survive

Forty-two species became extinct while in a delayed listing process (Table 5):

- A petition was filed in 1980 to list the Amak Island song sparrow, an Alaskan bird, as an endangered species. Instead of processing the petition, the Fish and Wildlife Service placed the species on the candidate list in 1982. It languished there without protection until 1988, when it went extinct.
- The U.S. Fish and Wildlife declared in 1977 that the Valdina farms salamander, a species unique to one cave in Texas, likely required ESA protection. Five years passed without further action and it was placed on the candidate list in 1982. There it sat until a local water agency diverted a river into the salamander's cave, driving it extinct in 1987. Had the species been listed shortly after being identified as imperiled in 1977, the water diversion would not have been permitted.

Twenty-nine species became extinct without the benefit of any listing process being initiated even though they were known to be imperiled at least two years prior to their extinction (Table 6):

- The High Rock Spring tui chub was a unique fish living in three interconnected high desert springs on the northern California-Nevada border. It was known to be imperiled by the early 1970s, but was not put on the candidate list until 1991. It was already extinct by then. It disappeared in 1989 after the California Department of Fish and Game allowed exotic predatory fish to be introduced into the spring system. The springs on the Nevada side of the border were pumped dry. Neither action would have been permitted had the chub been listed as an endangered species.
- The San Gabriel Mountains blue butterfly lived in a single wet meadow in the Angeles National Forest in southern California. It had been known to be imperiled since the early 1970s, but was not put on the candidate list until 1989. By 1985 it had already disappeared due to the diversion of water from the meadow.

Twelve species were listed after long delays in the listing process (Table 4). Most became so depleted during the delay that there was no hope of saving them by the time they were listed. This group is discussed above.

NO LISTING DELAYS

25 species experienced no listing delays
11 were automatically listed when the ESA was created in 1974
9 became extinct in 1974-1975 before the agencies had time to act
5 became extinct immediately after being discovered

Only 25 of the 108 extinctions involved no delay in the listing process (Table 7). However, the peculiar circumstance of these species made delay impossible. In all cases where discretion existed, delays occurred.

Eleven species were listed as endangered species in precursors to the ESA. They were automatically placed on the ESA list in 1974. This group is discussed above.

Nine species went extinct in 1974-1975. The agencies did not have sufficient time to develop proposed and final listing rules for them. The standard timeline for this process is two years.

Five species were only seen once and never again. They became extinct so fast that the agencies did not have time to study and prepare a listing rule for them.

CONCLUSIONS

One-hundred-eight species became extinct in the first twenty one years of the Endangered Species Act. This is far in excess of the four species that would have been expected to go extinct from natural causes. If extinction is the ultimate criteria by which to judge ESA implementation, the failure has been severe.

The primary failure was not that endangered species went extinct. Only 21% of the extinctions involved species that were on the endangered list. Protection for all of these species was delayed either by the Endangered Species Act being created too late, or there being too long a lag-time between the creation of the Act and the protection of the species. All were at extremely low population levels when listed and thus were virtually unsavable.

The vast majority of extinctions (79%) involved species that were not on the endangered list. While a small number went extinct so fast, it was not possible to put them on the list, most could have been protected had the U.S. Fish and Wildlife acted more swiftly. Placement of species on the endangered species list is the first line of defense against extinction. There was a systematic and in several cases purposeful failure to invoke this defense. Long delays—often for more than a decade, sometimes for more than twenty years—contributed to the extinction of both unlisted and listed species. Seventy-seven percent of extinctions involved significant delays in the listing process. In every instance where agency discretion permitted delay, delay occurred.

The use of the candidate list as a tool to defer listing for many years was particularly dangerous: 24 species became extinct after being placed on the candidate or warrant-review list. Listing petitions were also routinely ignored: 17 species became extinct while their listing petition was under review.

Reviewers of the ESA listing program, including the U.S. General Accounting Office, the Department of Interior Inspector General, the Congressional Research Service, the U.S. Congress, and scientists both inside and outside the agency have repeatedly pointed out that the program has been hampered by chronic underfunding, political intervention, and lack of leadership. The situation, however, has gotten worse, not better. Under the current Bush Administration the annual rate of listing has reached its lowest point in the history of the ESA. Budget requests and allocations continue to fall far short of the funds identified by the U.S. Fish and Wildlife Service. Political pressure continues to slow protection for imperiled species. And just as importantly, the program lacks leadership and drive. The agency is almost entirely lacking a sense of urgency and a desire to reform, revamp and accelerate the process.

We recommend the following:

- Fully fund the U.S. Fish and Wildlife Service to list all species currently on the candidate list and designate critical habitat for all species that require it. This can be done in five years with an annual budget of \$31 million per year.
- A proposal to list all current candidates should be immediately issued as a matter of policy. The Fish and Wildlife Service has already declared that these species warrant listing proposals. There is no need to engage in a lengthy, expensive listing process that will certainly result in another decade of delay for many of the current candidates. Once the listing proposal is issued, the agency can develop a schedule to complete individual listing rules.
- The agencies should return to the multi-species listing rules of the 1990s. They resulted in the highest annual listing rate in the history of the ESA. The shift back to single species rules has slowed, complicated, and driven up the cost of the program.
- The candidate list has become an extinction waiting room. Species regularly spend 15 or 20 years on the list, and twenty-seven species have become extinct on the candidate list. Regulations should be adopted to require that all candidates receive a final listing decision within five years of being put on the list.
- Listing petitions have been routinely ignored, contributing to the extinction of 17 species. Previously, conservationists could sue to enforce the listing requirements of the ESA. This caused a dramatic increase in the annual listing rate between 1990 and 1996. However, the Clinton administration established regulations in 1996 that effectively prevented conservationists from enforcing this aspect of the ESA. The annual rate of listing immediately began to drop, and under the Bush administration descended to the lowest level in the history of the ESA. Citizen enforcement worked well; policies eliminating it should be rescinded.

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