

## DOMESTIC FERRET ISSUES IN CALIFORNIA

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#### UPDATE

[RESULTS OF THE APRIL 6, 2000 FISH AND GAME COMMISSION HEARING ON THE REQUEST OF CALIFORNIANS FOR FERRET LEGALIZATION FOR COMMISSION CONSIDERATION TO AMEND SECTION 671, TITLE 14, CCR, REGARDING THE LEGALIZATION OF FERRETS](#)

#### Animal Importation Restrictions

California has long maintained strong laws on animal importations to protect [agricultural interests](#), [public health and safety](#), wild populations of the imported species, the welfare of imported animals, themselves, and the natural resource wealth of the State. The first California regulation restricting imported animals was adopted by the State Board of Horticulture in 1895 to protect the State's resources ([Laycock, 1966](#), p. 220).

California "*is home to the [largest food and agriculture economy in the nation](#)" and "*is one of the most [biologically diverse](#) areas in the world.*" Therefore, the introduction of [exotic, alien, or invasive species](#) is a serious concern in California. We have seen increasing threats to endangered wildlife by the expanding population of non-native [red fox](#) in recent decades. Also, recent introductions into California of detrimental animals such as the [northern pike](#) (mid 1980s), [Chinese mitten crab \(1993\)](#), [European green crab \(1989\)](#), and the potential invasion by [zebra mussels](#), have heightened public awareness of how damaging and expensive introduced species can become.*

History and legal status of domestic ferrets in other states in the U.S. (see [1996-97 Nationwide Survey](#))

#### Non-native Terrestrial Vertebrates in California

"*Hawai'i, California and Florida have the most severe problem with exotic species.*" Of the 183 species of breeding terrestrial (non-marine) mammals of California, 22 species (12%) are not native to the State ([Table 2](#)). Compared with other states in the nation, temperate-climate states like California support relatively large

numbers of established breeding species of non-native mammals and other plant and animal species.

"Particularly hard hit are Hawaii and Florida, owing to their [geographic location, mild climate, and their reliance on tourism and international trade](#)". Of the 20 species of mammals in [Hawaii](#), 19 (95%) are alien species, and at least 23 non-indigenous land mammals are established in Florida, representing 27% of the land-mammal fauna of that state; at least three others have apparently been extirpated ([Layne, 1997](#)).

Compared with California, other states (except for Hawaii and Florida) each typically support fewer than half the number of established species of alien mammals and have lower percentages of alien mammals among their terrestrial fauna [e.g., [Alaska](#), [Washington](#), [Nevada](#), [Colorado](#), [Oklahoma](#), [South Dakota](#), [Illinois](#), [Mississippi](#), [New Jersey](#)]. In [Texas](#), 12 (8.5%) of the 141 terrestrial mammals are not native.

**Pet, Menagerie, and Ornamental Animals.** Most of the more than 50 non-native species of terrestrial mammals, birds, reptiles, and amphibians that now breed in the wild in California are kinds that were imported for pet, menagerie, or ornamental purposes and eventually escaped or were purposely released ([Table 3](#)).

**Feral Domestic Animals.** California is now home to feral breeding populations of many types of domestic animals that had been released or escaped into the wild. Of the 22 species of non-native mammals that now exist in established breeding populations in California, 9 (over 40%) are from domestic stock: domestic rabbit, house cat, horse, burro, cattle, domestic sheep, swine, domestic goat, and fallow deer ([Table 4](#)).

**Sport and Commercial Mammal and Bird Introductions.** Although many established non-native mammal species may now be legally sport hunted (e.g., aoudad, wild pig, and fallow deer), the only huntable species that possibly was imported for that purpose was the Virginia opossum. Some unregulated opossum introductions of the early 20th century likely were intended for hunting. The legally released [blackbuck](#) antelope is an established mammal species that was introduced into California with the original intention of its becoming a sport-hunted animal. However, the game ranch plan was not implemented, and this species has not become a game animal. Additionally, some varieties of native species or previously established non-native ones were imported for hunting (e.g., wild boar and Rocky Mountain elk). Among the more than two dozen established non-native bird species in California, four were introduced expressly for hunting purposes: ring-necked pheasant, chukar, wild turkey, and white-tailed ptarmigan. Introductions of these mammal and bird species occurred before 1975.

### **Restrictions on the Importation and Possession of Domestic Ferrets**

Importation and possession of domestic ferrets have been restricted California since 1933, when the first State law restricting the importing of animals into the California was passed. The animals restricted under that law are included on a list that the Legislature originally called the "Wild Bird and Animal" list, which was later changed to the "Wild Animal" list. The [law](#) and [regulations](#) together list animals, or groups of animals, representing thousands of species, including those that are taken from the wild, as well as captive-bred animals and many kinds of domesticated animals. The Department of Fish and Game does not have the authority to remove an animal from the list of restricted species. The [Fish and Game Commission](#) has authority to authorize the Department to issue permits for possessing restricted species for specific purposes, such as public exhibition, research, and sheltering.

For more detailed information on the history of ferret restrictions and legalization efforts in California, see "Potential risks associated with the legalization of exotic predators such as the ferret (*Mustela putorius furo*) in California." - [Moore, T.G., and D.A. Whisson](#), 1998. Proc. 18th Vertebr. Pest Conf.

California has [Agriculture inspection stations](#) at state borders to detect illegally imported plant and animal products before they can get into the State. Persons attempting to import ferrets, or any other restricted animals, without the appropriate permits will be turned back, or they must relinquish the animals to California Department of Food and Agriculture inspectors before entering the State. The owners may authorize the Department to give relinquished ferrets to the California Domestic Ferret Association for adoption outside California.

## The 1933 California Law Prohibiting Importation of Ferrets

The sections of the original 1933 statute and regulation relating to prohibiting importation of animals, including the domestic ferret, are as follows:

Excerpts:

*"Chapter 76, Statutes of 1933, Section 1, provides as follows:*

*"Section 1. It is unlawful to import or transport alive into this State, except as provided in Section 2, any wild bird or animal of the following species or groups: . . . weasel, Mustela nivalis; stoat, Mustela erminea; ferret, Mustela furio (sic); mongoose, Herpestes mungo, and all other species of the genus Herpestes . . ."*

*"REGULATION 1. TOTALLY EXCLUDED SPECIES*

*"The Fish and Game Commission absolutely prohibits the importation of the following wild birds and animals, and permits for their importation will not be issued under any circumstances: . . . weasel, stoat, ferret and fitch; mongoose of any kind . . ."*

Notes:

Section 2 described the process for applying to the Fish and Game Commission for permits to import any species listed in Section 1 and not specifically excluded in Regulation 1. The excluded animals in Regulation 1 were domestic rabbits, if importers provided evidence of domesticity, and tree squirrels, flying squirrels, and chipmunks for zoological gardens.

These sections were accompanied in the 1933 rules by a guide, "*Descriptions of Some Birds and Animals Covered by this Act*," which identified the ferret as, "*FERRET Mustela furo*," referred to it as ". . . *the domestic ferret*", and included "*Other names: Polecat; polecat ferret; fitch.*"

In recent years, groups promoting pet ferret legalization in California have claimed that the domestic ferret was mistakenly included in this original 1933 list of restricted wild animals.

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### Links to California Laws and Regulations Regarding Domestic Ferrets

#### *Laws and Regulations*



- CALIFORNIA FISH AND GAME CODE, Sections 2116-2126  
[Click here to go to the [California Law](#) web site, then select "Fish and Game Code", and search for this suggested 'keyword': 2116-2126.]
- CALIFORNIA CODE OF REGULATIONS, TITLE 14, [Section 671](#)

### Recent Proposed Legislation Regarding Ferrets

For many years, ferret owners and enthusiasts have been lobbying for a [change in California law](#) to allow importation and ownership of ferrets for pet purposes. Assembly Bill [AB 2497 \(Goldsmith\)](#) was introduced in 1994, and a nearly identical bill, Senate Bill [SB 55 \(Kopp\)](#), was introduced in 1995. However, both failed passage. [AB 363 \(Goldsmith\)](#) was introduced in 1997 to legalize ferrets, but it also failed passage. On February 23, 1999, another ferret legalization bill, Assembly Bill [AB 854 \(Cunneen\)](#), was introduced.

As an alternative to ferret legalization bills, [AB 409 \(Machado\)](#), as amended July 15, 1998, would have given the Fish and Game Commission in cooperation with the Department of Food and Agriculture and the California Department of Health Services, sole authority to regulate the importation, transportation and possession of all "restricted" animals, including the ferret. ([Committee Analysis](#)). This bill also failed passage.

For any current or prior Assembly or Senate bill, go to the California [Bill Information](#) site to find the bill's text, status, committee analyses, history, and committee vote records.

### Public Health and Safety Issues

- [California Compendium of Rabies Control, 1999 \(.pdf\)](#) - California Department of Health Services
- [California Laws and Regulations Relating to Rabies\(.pdf\)](#)
- [Constantine and Kizar \(1988\)](#). "Pet European ferrets: a hazard to public health, small livestock and wildlife". [This report has frequently been cited by some pet ferret advocates as a primary source of wildlife misinformation promoted by the Department of Fish and Game. In actuality, the document was prepared by California Department of Health Services, and only eight paragraphs of that 65-page document addressed wildlife-related matters. The vast majority of the document addresses the main purpose of the report, that is, to compile data on public health and safety issues, mainly ferret attacks on humans and cases of rabid ferrets.]
- [Hitchcock \(1994\)](#). "The European ferret, *Mustela putorius*, its public health, wildlife and agricultural significance".
- Link to [other](#) health issues

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### Threat to Poultry

Given the opportunity, free-roaming domestic ferrets are a threat to poultry. [Bissonnette \(1950\)](#) wrote, "*Like weasels, ferrets and polecats will kill far more than they can eat if they get loose in a chicken coop.*" According to [Dolensek and Burn \(1976\)](#), ferrets once raised in the thousands in Ohio "*...became a plague for poultry farmers...*" [King \(1990\)](#) wrote that in New Zealand, ferrets can be occasionally seen near poultry runs, and [Lever \(1985\)](#) reported that feral ferrets preyed on domestic poultry on the Island of Mull. [Lewington \(1988\)](#), in describing the nature of the ferrets, wrote, "*Ferrets must be kept away from poultry.*" [Mannix \(1967\)](#), in describing the hunting behavior of ferrets he saw being used to hunt rats in a chicken coop, wrote that the hens on their high perches were safe from the hunting ferrets, because ferrets can not climb the board walls. He reported that ferrets trained for ridding would not bother the adult poultry but will kill baby chicks.

Links to other Department of Fish and Game information on domestic ferrets:

- [Annotated Bibliography](#)
- [A Review of National and California Population Estimates of Pet Ferrets](#)
- [1996-97 Nationwide Survey](#)

Links to California ferret organizations:

- [Ferrets Anonymous](#)
- [California Domestic Ferret Association](#)
- [Californians for Ferret Legalization](#)

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### Restrictions on the Importation and Possession of Pet Animals and Domestic Animals

Ferrets, fur-ranch foxes, gerbils, elands, and monk (or Quaker) parakeets are some of the kinds of domesticated animals that are included on California's list of restricted "wild animals." Some of these animals are legal to own in many other states. Other domesticated animals, such as domestic dogs, some wolf-dog crosses, domestic cats, hybrids of domestic cats, and most species of livestock, are specifically excluded from these California restrictions ([Table 5](#)).

Many animals that are legal to own as pets in other states are not legal to be imported or possessed as pets in California ([Table 6](#)).

### **California Wildlife at Risk from Introductions of Small, Non-native Carnivores**

California animals that would be vulnerable to ferret predation are mainly rabbit-size and smaller ground-dwelling mammals, birds, amphibians, and reptiles, especially those inhabiting natural areas adjacent to developed areas, "[islands](#)" of remnant natural environments in the sea of human-modified landscapes, and offshore islands. Among these are State- or federally listed threatened or endangered species. In many of the critically important habitats of these listed animals, a serious threat is presented by free-roaming pets, especially [cats](#); by non-indigenous animals, such as opossums and especially [non-native red foxes](#); and by native predators that thrive in urban settings. Indigenous species evolved as part of ecosystems that did not have introduced predators, and these imported sources of competition, predation, and disease seriously add to the habitat degradation and other human impacts in natural areas. In some areas, the number of individuals of non-native predatory species may far outnumber those of native predator species.

In these wildlife habitats, predatory pets and non-native species can be detrimental to vulnerable prey species even if the predators are not part of a breeding population; e.g., a lone individual or one or more sterilized ones. Even the occasional abandoned or wandering ferret in a wildlife area or other open-space setting would become a problem for land management agencies, municipalities, and to private landowners, because it would necessitate verification, removal, and disposal, which involve time and expense.

In local areas that are critically important as nesting or gathering sites for small, vulnerable prey animals, ferrets may not be noticed by land managers (see the section on the difficulty of [detecting](#) ferrets). For example, at the Seal Beach National Wildlife Refuge, Orange County, one of the largest remaining populations of the endangered [light-footed clapper rail](#) population was nearly eliminated by introduced red foxes [before](#) conclusive evidence was gathered in the early 1980s implicating this predator as the cause. This predatory species had been first seen in this refuge only a few years earlier.

Wildlife species that would be most at risk from ferret predation are those that dwell at least part of their lifetime at or near ground level or in burrows. Ferrets survive in areas that have available water, where extremely high temperatures are not common, where prey is dependably available, and where predation on ferrets is not a limiting factor. These conditions are not available in much of California, since many inland areas are too hot and dry in summers or have scarce populations of potential prey during winters. However, in milder areas of the State, and especially in the coastal counties, ideal conditions exist for ferret survival. Habitat fragmentation creates isolated, remnant wildlife habitats containing relic populations of vulnerable, prey species, many of them threatened or endangered. Some fragments become so small, isolated, or otherwise modified that coyotes can no longer use the areas. As a result, smaller predators that reside or move into the area are released from what was formerly a serious threat to their own survival by the larger predator ([Soulé et al., 1988](#)). These smaller native predators, free-ranging pets, and other non-native predators may thrive in these remnant wildlife habitats, to the detriment of remaining prey species. Abandoned or stray individuals, or local breeding populations of ferrets, would be an added stress in such remnant habitats.

Many species of California wildlife, especially those in urban, coastal areas, are vulnerable to predation or competition from native and introduced species of small predatory animals, which often exist in unusually high population densities.

#### **Ground-nesting Birds**

Vulnerable ground-nesting bird species include waterbirds of the coastal areas. Among them are the [State and federally listed endangered California least tern](#), [clapper rails](#), and the [federally listed threatened](#) coastal population of the [western snowy plover](#). The California least tern formerly nested in large colonies along the state's shoreline. By 1970, they had nearly disappeared. Owing to [protection and management](#) efforts in recent decades, this tern now survives in a few dozen remaining nesting areas. Most of these areas are adjacent to developments, and as a result, breeding pairs are continually threatened by urban predators, including pets. Therefore, [intensive monitoring and management](#) of colonies and nesting sites are needed annually.

## Burrow Dwellers

In urbanized upland areas of California, the [burrowing owl](#), a California Bird Species of Special Concern, is particularly vulnerable to predation because it [nests in burrows](#) in mostly flat, open areas, lands that have been heavily developed. In the South San Francisco Bay area, for example, burrowing owls are threatened by "[rapid conversion of open lands to urban uses. . .](#)"

*"Habitat destruction and alteration has also led to indirect negative impacts on Burrowing Owls, including an increased frequency of mammalian predators . . ." "Due to their small body size and ground nesting habits, Burrowing Owls are vulnerable to a large number of mammalian, avian, and reptilian predators." (Sheffield, 1997, pp. 402-404).*

Another burrow-dwelling species is the [mountain beaver](#), *Aplodontia rufa*, of the [Pacific Northwest states](#). "*The mountain beaver is not a real beaver. It's a little-known, very fascinating rodent which occupies a unique taxonomic and ecological niche. It lives underground in burrows and is seldom seen above ground.*" In a small area near the coast in Mendocino County, California, lives the [Point Arena mountain beaver](#), *Aplodontia rufa nigra* [[photo](#)]. [Predation by domesticated animals](#) is one of threats to this Federal endangered species.

Throughout most of California, especially where the land has been disturbed for various agricultural and urban developments, the [California ground squirrel](#), *Spermophilus beecheyi*, is an extremely common burrow-dwelling rodent. Where abundant, the ground squirrels could provide a readily available food supply, which would enhance survival prospects for feral ferrets.

## Island Wildlife

Island ecosystems are [highly vulnerable](#) to species introductions and extinctions. The eight Channel Islands off southern California and the Farallon Islands offshore of San Francisco Bay have been occupied by an array of introduced mammals. For example, more [introduced](#) mammal species now exist on Santa Catalina Island than [native](#) ones. Introductions of European rabbits, domestic pigs and other ungulates, cats, and other animals, have caused or contributed to major ecological damage on all of the islands, have endangered the survival of endemic island animals and plants, have extirpated some species from individual islands, and have caused the extinction of many plant species. "*Feral goats, pigs, rabbits, and cats have been [eliminated](#) from some of the Channel Islands, allowing native plant and animal communities to begin to recover...*" Efforts are still underway to eradicate or intensively control non-native species to protect the remaining natural values of these islands. [Controlling or eliminating non-native species](#) on islands and [preventing new introductions](#) are essential for the protection of vulnerable seabird colonies and an array of threatened and endangered plants and animals.

Animals existing only on these islands ("endemic" species) are particularly vulnerable to introduced carnivores and other mammalian imports. Among the vulnerable endemic mammals of the Channel Islands are the [Island fox](#) and the [Island spotted skunk](#). The fox is ferret size and the skunk is even smaller. Both would be vulnerable to competition by ferrets for food or for space.

The Channel Islands, the [Farallon Islands and other marine islands](#) are critically important to the survival of many species of ground-nesting and burrow-nesting seabirds that would be vulnerable to predation by ferrets and other small introduced predators. Among these are the [Cassin's auklet](#), *Ptychoramphus aleuticus*, and the [Xantus' murrelet](#), *Synthliboramphus hypoleucus*. According to National Audubon Society, the plight of the

Xantus' murrelet is described as follows, "*Highly restricted breeding range, world population concentrated in 4 major colonies. Extremely [vulnerable to introduced predators](#) such as cats and black rats, nearly or completely extirpated from some islands due to these predators.*"

## Other Small Animals

In parts of California, the native **brush rabbit** and [Audubon's cottontail](#) would be vulnerable to ferret predation. The nearly extinct, State-listed Threatened [riparian brush rabbit](#), *Sylvilagus bachmani riparius*, exists only in a small State Park and would be particularly vulnerable to new predators or [pets](#) in the park.

Small native carnivores of California could be impacted by the presence of the ferret from disease transmission or direct competition for available prey. Some of these native carnivores, which are the same size as, or smaller than, a ferret, are the [spotted skunk](#) and the [Island spotted skunk](#), [long-tailed weasel](#), [American mink](#), [ringtail](#), and [Island fox](#).

The 30 or so known sites where the federally and State-listed Threatened **Alameda whipsnake**, *Masticophis lateralis euryxanthus*, still survives "*face a gauntlet of [threats](#).*" "*In situations where Alameda whipsnake habitat has become fragmented, isolated, and otherwise degraded by human activities, [increased predatory pressure](#) may become excessive, especially where alien species, such as rats (*Rattus species*), feral pigs (*Sus scrofa*), and feral and domestic cats (*Felis domestica*) and dogs (*Canis familiaris*) are introduced. These additional threats become particularly acute where urban development immediately abuts Alameda whipsnake habitat.*" - U.S. Fish and Wildlife Service, 1997.

The federally and State-listed Endangered **Santa Cruz long-toed salamander**, *Ambystoma macrodactylum croceum*, occurs only in a small area of central coastal California separated from the [main range](#) of the species. Agriculture, roads, and other land developments have restricted the salamanders to a few remnant wetlands. "*[Urban predators](#) are also a potential problem; as humans encroach on salamander habitat, the numbers of raccoons, skunks, and housecats, all of which may harass or kill salamanders, increase.*" - U.S. Fish and Wildlife Service. 1996.

## Assessments of Risks Posed by Domestic Ferrets to California Wildlife

Links to other sites regarding assessment of risks to wildlife in California:

"Potential risks associated with the legalization of exotic predators such as the ferret (*Mustela putorius furo*) in California." - [Moore, T.G., and D.A. Whisson](#), 1998. Proc. 18th Vertebr. Pest Conf.

"Ferrets: a Selective Overview of Issues and Options." - [Kenneth W. Umbach, K.W., Ph.D.](#) California Research Bureau, California State Library, CRB Note, Vol. 4, No. 3, May 30, 1997 ([.pdf](#)).

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## THE THREAT OF ALIEN SPECIES

In recent years there has been an increasing awareness among conservation biologists, environmental organizations, and governmental conservation agencies of the enormous costs, to the environment and the economy, from imported species that have become established in the United States and other nations; that the costs are growing; and the threat of even more introductions is increasing.

"...given the increase in extent and speed of global trade and transportation and given our increasing knowledge of biology, really only two rules apply to introduced species:

1. Any species can be successfully introduced.

2. Any ecosystem can be invaded by introduced species." - [Essays in Wildlife Conservation, Ch. 7, P.B. Moyle \(ed.\)](#)

*"Introduction of Non-Native Species. After habitat destruction, the invasion of non-native species is the greatest threat to rare and native species and ecosystems. Non-native species alter habitat by changing the vegetation, competing with native species, and preying on native species. Hawai`i, California and Florida have the most severe problem with exotic species."* - [Wildlife Need Wild Places](#)

A need for stronger federal and state regulations for restricting non-indigenous plants and animals was identified by the Congressional Office of Technology Assessment, in its 1993 review of issues and estimated costs to society and the environment, entitled [Harmful Non-Indigenous Species in the United States](#). (Proponents of pet ferret legalization often state or imply that the Office of Technology Assessment (OTA) report "concluded" that the ferret is not a threat. In fact, the OTA report did not address the ferret and made no conclusion about the species. The document did not discuss, or even list, all non-indigenous organisms in the United States. The document mentioned only a few hundred examples of the estimated more than 4,500 non-indigenous species introduced into the U.S. Ferrets were not mentioned in the document, but neither were feral domestic pigeons. That report did not mention most of the more than 50 known non-indigenous terrestrial vertebrate (amphibian, reptile, bird, and mammal) species now existing as wild breeding populations in California. The OTA report estimated that at least 4,500 species of non-indigenous organisms from outside the United States have (by 1993) established free-living populations in the U.S., resulting in billions of dollars in damages.

*"With more than 30,000 non-indigenous species (NIS) in the United States, the fraction that is harmful does not have to be large to inflict significant damage to natural and managed ecosystems and cause public health problems. Our study reveals that economic damages associated with NIS effects and their control amount to approximately \$122 billion/yr ."* - [David Pimentel, et al., 1998](#), Cornell University. (also, featured in *Scientific American Explore!*: [Costly Interlopers](#), February 15, 1999).

Nearly half of all imperiled vertebrate species in the world are [threatened by alien species](#). More than three quarters of the world's imperiled birds are threatened by alien species, more than a third of the reptiles, more than a quarter of the mammals, and more than a quarter of the amphibians.

Although island species are most vulnerable to the introduction of non-native organisms, [nearly half of the imperiled birds of the continental U.S. are threatened by alien species](#).

In assessing *"the relative importance of habitat destruction, alien species, pollution, overexploitation, and disease"* in the U.S., Wilcove et al. (1998) found that *"... habitat loss is the top-ranked threat (in terms of the number of species it affects) for all species groups. Competition with or predation by alien species is the second-ranked threat in the overall analysis, affecting 49% of imperiled species."* - [Quantifying threats to imperiled species in the United States](#)

*"Special attention should be paid to the eradication of mammalian feral predators from areas where there are populations of breeding birds or other important populations of wild fauna. Predatory mammals are especially difficult, and sometimes impossible to eradicate, for example, feral cats, dogs, mink, and ferrets."* - [IUCN Position Statement on Translocation of Living Organisms, 1987](#)

["Global Economy Spreading Destructive Species: The Invisible Threat of Bioinvasion"](#) - by Chris Bright, Worldwatch Briefing, 1998

[1999 Presidential Executive Order on Invasive Species](#)

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## ALIEN SPECIES AND HABITAT FRAGMENTATION

*"While habitat loss and degradation are obvious threats to species survival, habitat fragmentation is a less obvious but more insidious threat. Habitat fragmentation has two parts: (1) a decrease in the habitat type and (2) the apportionment of the remaining habitat into smaller, more isolated pieces. The problems that arise from*

*habitat fragmentation include smaller populations due to small amounts of habitat, isolation of populations in the fragmented parts, and potential increase in predators, competitors and parasites. As a result, habitat fragmentation is one of the greatest threats to species and the ecosystems they rely upon for survival."* - [Wildlife Need Wild Places](#)

*"The inescapable consequences of population growth and habitat loss are increasing fragmentation and isolation of remaining natural habitat and ultimately, reduction of the natural world into a series of ecological reserves."* - [Buffer Zones for Ecological Reserves in California: Replacing Guesswork with Science](#) - P. Kelly and J. Rotenberry

The loss and degradation of native California habitats is substantial - [Noss, et al.](#) (Endangered Ecosystems of the United States, pp. 60-61). For examples, there has been a 99% loss of native grassland; 90-98% decline of Sacramento River riparian and bottomland forests; 91% loss of wetlands of all types; 70-90% loss of presettlement southern California coastal sage scrub; 89% loss of riparian woodland statewide; 94% loss of inland wetlands. Eighty percent of the State's coastal wetlands have been converted to urban or agricultural uses, and there has been a 62% loss of salt marshes.

*"Continental species are experiencing an unprecedented level of habitat fragmentation as a result of human activities. Suitable habitat becomes fragmented into small patches located in a "sea" of disturbed land. These small patches function very much like isolated islands in a real sea. Species located in these habitat fragments become more vulnerable to extinction because of the same factors that doom their island cousins."* - [Bagheera's In the Wild](#)

In discussing 'Island Biogeography', [M. Soulé and R. Noss](#) (1998) wrote, "*Small habitat remnants were recognized as being relatively vulnerable to many other dissipative phenomena--edge effects, and invasions of exotic plants, animals, and pathogens (Soulé and Wilcox 1980)--hastening the local extirpation of species and ecosystem disintegration.*"

[Predation rates increase](#) in fragmented habitats.

*"Another frequent consequence of the absence of large carnivores is a remarkable increase in abundance of smaller predators (mesopredators), largely because the top carnivores would normally prey upon and inhibit the foraging of their smaller counterparts. Several studies have suggested that this "demographic release" of mesopredators such as house cats, foxes, and opossums causes severe declines in many songbirds and other small prey animals (Soulé et al. 1988, Palomares et al. 1995, Côté and Sutherland 1997, Terborgh et al. 1999). Studies by Crooks (1997 and pers. comm.) in isolated remnants of scrub habitat in southern California are showing that the presence of coyotes, the top carnivore in these fragments, is associated with the restriction of house cats to the edges of the fragments."* - [Michael Soulé and Reed Noss](#), Rewilding and Biodiversity: Complementary Goals for Continental Conservation (1998).

[Introduction of alien predators](#) (including pets, such as dogs and particularly domestic cats) from housing developments at the reserve-urban interface would be detrimental to wildlife in such reserves.

*"Human development has altered California's rural, suburban, and urban landscapes, abruptly changing the amount and type of food, water, cover, or space available to its wildlife residents. By themselves, changes in habitat can have a profound effect on well-established relationships within an ecosystem. When a predator alien to this disrupted environment is introduced, the non-native has an unnatural advantage because the native species are struggling to survive and have no effective way to defend against this new predator."* - [Managing Non-native Species in California, The Red Fox](#)

*"Many California ecosystems are stressed because habitat is being consumed, fragmented, and degraded at an alarming pace—lost to the roads, businesses, homes, and other developments that drive California's economy and lifestyles. Add the burden of a non-native predator to these ecosystems and the very survival of some native species is jeopardized."* - [Managing Non-native Species in California, The Red Fox](#)

[What are mainland islands?](#) In New Zealand, "*Mainland island habitats (mainland islands) are a relatively new and exciting area of conservation management, the aim of which is to protect and restore habitats on the mainland through intensive management of introduced pests. They are referred to as mainland "island" habitats because they are manageable areas, isolated by means of fencing, geographical features or more commonly, intensive management.*"

Pet-free subdivisions: covenant with landowners restricting domestic pets in new developments adjacent to sensitive wildlife habitats. - [The Royal Forest & Bird Protection Society, NZ](#)



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