33. HUMBOLDT MARTEN

Today's Item **Information** ☐ **Action** ☒

Determine whether listing Humboldt marten as endangered under the California Endangered Species Act (CESA) is warranted, pursuant to Section 2074.2 of the Fish and Game Code.

Summary of Previous/Future Actions

• Received petition	Jun 8, 2015
• FGC transmitted petition to DFW	Jun 18, 2015
• Published notice of receipt of petition	Jul 24, 2015
• Approved DFW's request for 30-day extension	Oct 7-8, 2015; Los Angeles
• Received evaluation and recommendation	Dec 9-10, 2015; San Diego
• **Determine whether listing may be warranted**	**Feb 10-11, 2016; Sacramento**
• If species moved to candidacy, status report due	Feb 2017; TBD

Background

On Jun 8, 2015, FGC received a petition from the Environmental Protection Information Center (EPIC) and Center for Biological Diversity (CBD) to list the Humboldt marten as an endangered species under CESA. At its Feb 10-11, 2016 meeting in Sacramento FGC will consider the petition, DFW's evaluation and other information submitted to the Commission.

Significant Public Comments

1. Letter from EPIC supporting the petition.
2. Letter from CBD supporting the petition.

Recommendation

FGC staff: Accept the petition for further evaluation.

DFW: There is sufficient information to indicate that the petitioned action may be warranted; accept the petition for further evaluation.

Exhibits

1. Petition to list Humboldt marten
2. DFW evaluation report
3. Letter from EPIC, received Jan 28, 2016
4. Letter from CBD, received Jan 28, 2016
5. DFW presentation

Motion/Direction

1a. Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2074.2 of the Fish and Game Code, finds the petitioned action to list the

Humboldt marten as an endangered species may be warranted based on the information in the record before the Commission, and *therefore designates the Humboldt marten as a candidate for endangered species status*.

OR

2b. Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2074.2 of the Fish and Game Code, finds that the petition to designate the Humboldt marten as an endangered species and other information in the record before the Commission *does not provide sufficient information to indicate that the petitioned action may be warranted*.

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FGC - 670.1 (3/94)

A PETITION TO THE STATE OF CALIFORNIA FISH AND GAME COMMISSION

For action pursuant to Section 670.1, Title 14, California Code of Regulations (CCR) and Sections 2072 and 2073 of the Fish and Game Code relating to listing and delisting endangered and threatened species of plants and animals.

I. SPECIES BEING PETITIONED:

Common Name: Humboldt Marten

Scientific Name: *Martes caurina humboldtensis*

II. RECOMMENDED ACTION:

(Check appropriate categories)

a. List x☐ b. Change Status ☐

As Endangered X ☐ from _____

As Threatened ☐ to _____

Or Delist ☐

III. AUTHOR OF PETITION:

Name: Environmental Protection Information Center, Center for Biological Diversity

Address: 145 G Street, Suite A, Arcata, CA 95521

Phone Number: (707) 822-7711

I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signature: _____

Date: June 1, 2015

Before the California Fish and Game Commission

Petition to List the Humboldt Marten (*Martes caurina humboldtensis*) as an Endangered Species under the California Endangered Species Act

Environmental Protection Information Center and Center for Biological Diversity

June 1, 2015

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Notice of Petition

For action pursuant to Section 670.1, Title 14, California Code of Regulations (CCR) and Sections 2072 and 2073 of the Fish and Game Code relating to listing and delisting endangered and threatened species of plants and animals.

I. SPECIES BEING PETITIONED

Common Name: Humboldt Marten
Scientific Name: *Martes caurina humboldtensis*

II. RECOMMENDED ACTION: List as Endangered

The Environmental Protection Information Center and the Center for Biological Diversity submit this petition to list the Humboldt marten as an Endangered Species throughout its range in California pursuant to the California Endangered Species Act (California Fish and Game Code §§ 2050 et seq., "CESA"). This petition demonstrates that the Humboldt marten clearly warrants listing under CESA based on the factors specified in the statute.

III. PETITIONERS

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The Environmental Protection Information Center is a non-profit environmental advocacy organization with over 37 years of history protecting forests and species diversity in northwest California. www.wildcalifornia.org.

The Center for Biological Diversity is a non-profit conservation organization with more than 775,000 members and online activists dedicated to the protection of endangered species and wild places. www.biologicaldiversity.org.

I. Executive Summary

The Humboldt marten (*Martes caurina humboldtensis*) is a slender forest carnivore in the weasel family which is so rare that until recently it was thought to be extinct. Historically the Humboldt marten was abundant in coastal old-growth forests. This subspecies was once so common that it was regularly taken by trappers for its attractive fur. Due to historic trapping, drastic loss of old-growth forests from logging, and other stressors described below, the Humboldt marten has been extirpated from 95 percent of its historical range in California and from the vast majority of its range in Oregon. Only three populations remain. In northern coastal California, the sole remaining extant population likely totals around 40 individuals and is reproductively isolated from other coastal martens in Oregon and other subspecies of marten further inland. Oregon's two known populations, located in central and southern coastal Oregon, are likewise thought to be reproductively isolated and small in number. The isolated small populations compound the other stressors on the population, seriously endangering the Humboldt marten with extinction in California.

This petition summarizes the natural history of the Humboldt marten, its population status, and the ongoing threats to the subspecies and its habitat. Further, this petition demonstrates that, in the context of the CESA's six listing factors, the California Fish and Game Commission should list the Humboldt marten as endangered. Finally, this petition addresses existing management activities and recommends future management actions for the conservation of the Humboldt marten.

II. CESA Listing Process

Recognizing that certain species of plants and animals have become extinct "as a consequence of man's activities, untempered by adequate concern for conservation," (Fish & G. Code § 2051 (a)), that other species are in danger of extinction, and that "[t]hese species of fish, wildlife, and plants are of ecological, educational, historical, recreational, esthetic, economic, and scientific value to the people of this state, and the conservation, protection, and enhancement of these species and their habitat is of statewide concern" (Fish & G. Code § 2051 (c)), the California Legislature enacted the California Endangered Species Act.

The purpose of CESA is to "conserve, protect, restore, and enhance any endangered species or any threatened species and its habitat." (Fish & G. Code § 2052). To this end, CESA provides for the listing of species as "threatened" and "endangered." The Commission is the administrative body that makes all final decisions as to which species shall be listed under CESA, while the CDFW is the expert agency that makes recommendations as to which species warrant listing.

For the purposes of CESA, a "threatened" species means "native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by this chapter. (Fish & G. Code § 2067). For the purposes of CESA, an "endangered" species means "a native species or subspecies of a bird, mammal, fish, amphibian, reptile, or plant which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease." (Fish & G. Code § 2062).

The listing process may be set in motion in two ways: "any person" may petition the Commission to list a species or the CDFW may on its own initiative put forward a species for consideration. (Fish & G. Code § 2072.7). In the case of a citizen proposal, CESA sets forth a process for listing that contains several discrete steps. Upon receipt of a petition to list a species, a 90-day review period ensues during which the Commission refers the petition to CDFW, as the relevant expert agency, to prepare a detailed report. The CDFW's report must determine whether the petition, along with other relevant information possessed or received by the Department, contains sufficient information indicating that listing may be warranted. (Fish & G. Code § 2073.5).

During this period interested persons are notified of the petition and public comments are accepted by the Commission. (Fish & G. Code § 2073.3). After receipt of CDFW's report, the Commission considers the petition at a public hearing. (Fish & G. Code § 2074). At this time the Commission is charged with its first substantive decision: determining whether the petition, together with CDFW's written report, and comments and testimony received, present sufficient information to indicate that listing of the species "may be warranted." (Fish & G. Code § 2074.2).

This standard has been interpreted by courts as the amount of information sufficient to "lead a reasonable person to conclude there is a substantial possibility the requested listing could occur." (*Natural Resources Defense Council v. California Fish and Game Comm.* (1994) 28 Cal.App.4th 1104, 1125). If the petition, together with CDFW's report and comments received, indicates that listing "may be warranted," then the Commission must accept the petition and designate the species as a "candidate species." (Fish & G. Code § 2074.2).

III. Population and Trends

Historically, Humboldt martens were common (Slauson et al. 2001). However, Humboldt martens in the coastal forests of Oregon and California have experienced significant declines, greater than those experienced by martens in the Sierra and Cascade mountains, because the narrow coastal forests are "more accessible to trappers, more accessible to logging, more rapidly affected by fragmentation of habitat and populations, and are composed of proportionately little late successional reserves or wilderness areas" (Slauson and Zielinski 2004, p. 63).

The Humboldt marten was thought to be either extremely rare or extinct (Kucera et al. 1995) until the late 1990's, when martens were detected at two of 468 track plate stations within the range of the Humboldt marten by Zielinski and Golightly (1996). Prior to the redetection, Zielinski and Golightly (1996) were unable to verify a single marten detection within the historical range of the Humboldt marten since the 1940's. Despite extensive survey efforts, martens have only been redetected in the north-central portion of their former California range and in central and southern coastal Oregon (Slauson and Zielinski 2007, Douglas and Holley 2009, Slauson et al. 2009b).

The Humboldt marten population is perilously small. The lone extant population of Humboldt marten in California appears to have declined by more than 40 percent from 2000–2008. Slauson et al. (2009a) report:

> "The change between 2000–01 and 2008 marks a significant decline in site occupancy, equaling a change in occupancy rate (λ) = 0.58 (SE = 0.13, 95% CI =0.31 to 0.81) or a 42% decline in sample unit occupancy over the 7 year period." (p. 10).

Because the researchers could not access all sites due to fires, the authors report that the decline in occupancy may likely be even higher than the reported 40 percent (Slauson et al. 2009a). Slauson et al. (2009a) estimated the population size in 2000–2001 at 31.5 individuals (95% C.I = 24–40), and in 2008 at 20.2 individuals (95% C.I = 11–30). Because they could not sample all potentially occupied habitat, this number could be an underestimate, and the authors estimate that even under the most optimistic scenario, the population in 2008 was likely somewhere around 40 individuals. Based on their survey results, Slauson et al. (2009a) concluded that immediate conservation actions are needed for the remnant California population. Based on subsequent surveys in 2012, Slauson et al. estimate that species abundance did not change in that time period. (USFWS 2015). In sum, based on the best available science, it is likely that there are less than 100 coastal Humboldt martens in California.

Less is known about the Oregon populations. According to the USFWS' 2015 Species Report:

> [M]artens in coastal Oregon are currently known from two populations; one in central coastal Oregon and one in southern coastal Oregon. Slauson et al. stated that these two populations are small and isolated due to natural distribution of suitable habitat, historical and contemporary effects of timber harvest, and historical effects of fur trapping. Further, stated that marten populations in coastal Oregon and California have declined. Zielinski et al. reported that the number of martens harvested in coastal Oregon counties has declined since the 1940s. By the 1970s, martens were considered very rare along the Oregon coast. Abundance estimates for the two coastal Oregon populations are not available. Marten surveys in unsurveyed portions of coastal Oregon began in mid-2014, but the area surveyed to date represents a small amount of the currently available suitable habitat found within the CCO_EPA and SCO_EPA. Additional presence\absences surveys are required to accurately delineate the distribution of these two populations, and grid-based surveys are required to estimate abundance. Because U.S. Highway 101 runs the entire length of the range of martens in coastal Oregon and northern coastal California, scientists expect densities of road kills to reflect the abundance of martens. The best available data indicate an absence of reported marten road kills along coastal U.S. Highway 101 in northern coastal Oregon, southern coastal Oregon, and northern coastal California, suggesting low numbers of martens, at least within coastal habitat in the vicinity of U.S. Highway 101 in those regions.(Internal citations omitted).

The USFWS Species Report (2015) concludes, "[T]he fact that the two extant populations in coastal Oregon and single population in northern coastal California are considered to be small and isolated has led species experts (Slauson et al. 2009a, p. 1340) to have serious concerns about the viability of coastal marten populations."

NatureServe (2015) ranks the Humboldt marten as an imperiled subspecies (T2S2) (last reviewed 2011). Kucera (1998) reports that *M. a. humboldtensis* "appears to meet CESA (California Endangered Species Act) criteria for listing as Endangered in its historic range of Del Norte, Humboldt, Mendocino, and Sonoma counties" due to historic trapping, habitat loss caused by logging, and severe population reduction (p. 141). Slauson et al. (2009b) report that they have serious concerns about the viability of coastal marten populations due to small population size, population isolation, and ongoing threats from logging.

IV. Range and Distribution

For the purposes of listing under CESA, we will only discuss the range of the Humboldt marten in California. In California, the Humboldt marten historically occurred in coastal forests from Sonoma County, California, north to Curry County, Oregon (Slauson et al. 2001). Grinnel et al. 1937 described the range of the "well-marked race" as the coastal redwood (*Sequoia sempervirens*) zone from Sonoma County north to the Oregon border (Kucera 1998). There are natural heritage records for this subspecies from Colusa, Del Norte, Glenn, Humboldt, Lake, Mendocino, Siskiyou, Tehama, and Trinity counties in California (NatureServe 2015).

The Humboldt marten has been extirpated from more than 95 percent of its historic range in California (Slauson et al. 2007c). There is now only a single known population of this subspecies in the state (Zielinski et al. 2001, Slauson 2003, Slauson et al. 2007c). Slauson et al. (2007c) define the California study area for the Humboldt marten as portions of the Klamath-Siskiyou and Northern California Coastal Forest ecoregions in Del Norte, Humboldt, and Siskiyou counties, California. Slauson et al. (2009c) estimate that within its potential habitat, the single known California population of this subspecies currently occupies an area of 637 km^2, using minimum convex polygon estimation. Based on a GIS analysis of Slauson's data and more recent unpublished data, the Environmental Protection Information Center (EPIC) estimates the total California range of the subspecies to be approximately 2273 km_2 (Fig. 1).

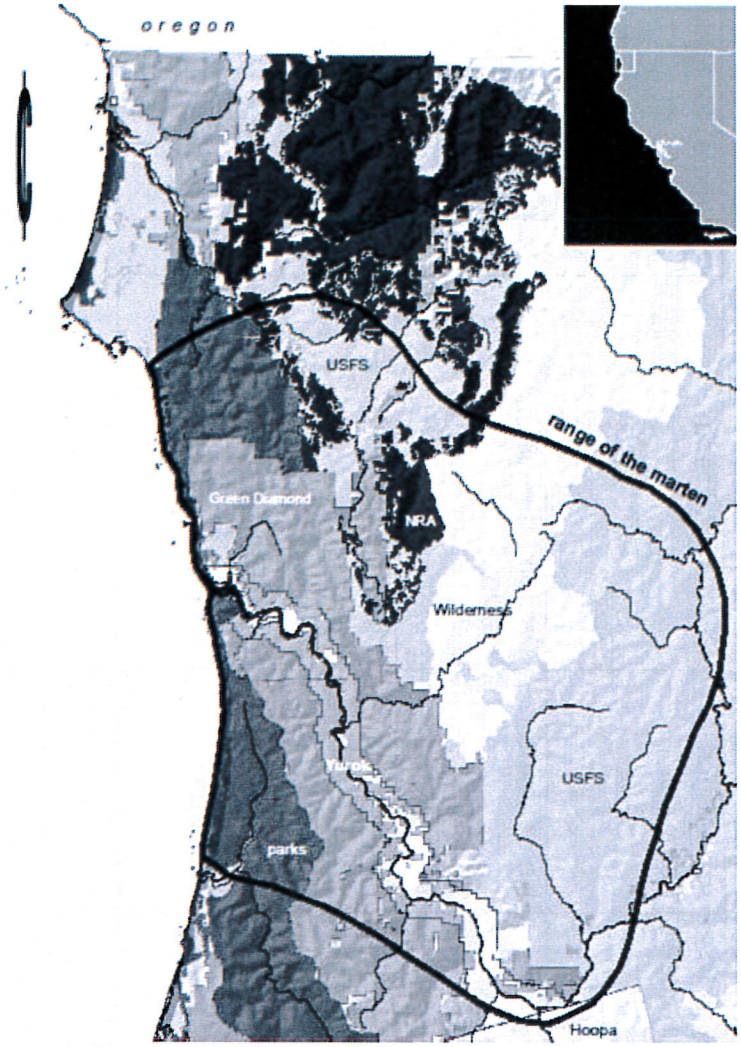

Figure 1. Humboldt Marten California Range and Land Management. Map by EPIC GIS.

V. Abundance

Table of distribution, abundance, and trend for the three extant population areas of the Humboldt marten in coastal Oregon and northern coastal California. Adapted from USFWS (2015).

Extant Population[1]	Total Area of Extant Population Area	Percent of Entire Historical Range	Abundance Estimate	Population Trend	Source(s) for Estimate
Central Coastal Oregon	4,150 km^2 (1,602 mi^2)	7	No estimate	Presumed to be in decline[2]	Zielinksi et al. (2001); Slauson and Zielinski (2009)
Southern Coastal Oregon	4,696 km^2 (1,813 mi^2)	8	No estimate	Presumed to be in decline[2]	Zielinksi et al. (2001); Slauson and Zielinski (2009)
Northern Coastal California	812 km^2 (313 mi^2)	1.4	<100 individuals	Declining 2001–2008; unchanged 2008–2012[3]	Slauson et al (2009a)

[1] All three marten populations in coastal California and Oregon are native. No known marten reintroductions have occurred in the analysis area.

[2] Both populations are believed to be in decline mainly on a reduction in the number of matens legally trapped and anecdotal sightings over time. However, current population numbers are unknown.

[3] The populations declined by approximately 42 percent between 2001 and 2008, based on a comparison of occupancy estimates from systematic grd-based surveys conducted in 2000–2001 and 2008. Preliminary occupancy estimates from 2012 are similar to 2008 values (Slauson, unpublished data).

VI. Life History

Species Description

The marten is a forest-dwelling carnivore and a member of the weasel family (*Mustelidae*). Although martens are in the mustelid family with skunks and other species with powerful musk glands, the marten produces odors only weakly perceptible to humans (Buskirk and Ruggiero 1994). Martens have medium length glossy fur that ranges from tan to chocolate in color, an irregular cream or amber colored gular (throat) patch, lighter shaded fur on their underside, and darkly furred legs and tail. They are slender with a fox-like face, and large triangular-shaped ears that extend beyond the top of the head (Strickland et al. 1982). Of the two subspecies that occur in California, the Humboldt marten is darker with richer golden tone overall and with less orange and yellow in the throat patch (Grinnell and Dixon 1926, Buskirk and Zielinski 1999). It also has a smaller skull, and smaller and less crowded premolars and molars than the Sierra subspecies (Ibid.). One male Humboldt marten captured in mid-fall that had molted into winter pelage had brighter overall reddish brown coloration, dense fur on its underside, and dense fur around the pads of the feet (Slauson et al. 2002). Martens have five toes on each foot, all of which touch the ground, and semi-retractable claws (Buskirk 1994).

Adult American martens weigh from 500–1400 grams and are 500–680 mm long (Buskirk and McDonald 1989). Sexual dimorphism is pronounced, with males being 20–40 percent larger than females. Live capture data of 14 martens in the range of the Humboldt subspecies in coastal northwestern California show that martens in this geographic location are on the smaller end of the size range with an average weight of 889 grams for males (SD = 100), and an average weight of 598 grams for females (SD = 39) (Slauson et al. 2002).

Taxonomy

Marten taxonomy is in a state of flux. Petitioners believe that the best available science indicates that the Humboldt marten is a subspecies of *Martes caurina*.

The USFWS Species Report (2015) summarizes the current state of marten taxonomy:

> A single species of marten, the American marten (*Martes americana*), was historically recognized as occurring across a broad range in North America, including the boreal forest region, montane coniferous forests, and Atlantic and Pacific coastal forested regions of North America. The Pacific marten (*M. caurina*) was recently split from the American marten based on genetic and morphological differences. The Pacific marten occurs largely in montane and coastal coniferous forests west of the Rocky mountain crest in North America, while the American marten occurs to the north and east of the Rocky mountain crest. The genetic split between these two species of martens is thought to have originated from the persistence of marten populations in two disjunct glacial refugia during the last glacial period.
>
> In Oregon, two subspecies of martens have been historically recognized, with *M. caurina caurina* occurring in the Coast Range and Cascades Mountains of central and western Oregon and *M. c. vulpina* occurring in the Blue Mountains of northeastern Oregon. Two subspecies of Pacific marten occur in California.

> The Humboldt marten (*M. c. humboldtensis*) occurs along the northern coast, whereas the Sierra marten (*M. c. sierrae*) is found in the interior mountains of northwestern California, the Cascade Mountains in northern central California, and the Sierra Nevada Mountains of eastern California.
>
> The Humboldt marten was historically distributed throughout the coastal coniferous forests of northern California from northwestern Sonoma County northward to the Oregon border. Recent phylogenetic analyses using mitochondrial DNA (mtDNA) support the distinctiveness of the Humboldt marten subspecies, based on the presence of distinct haplotypes shared by historical museum specimens and martens currently occupying portions of the historical range in northern coastal California. Marten populations in coastal Oregon, which were historically described as *M. c. caurina*, also share these haplotypes, leading Slauson et al. (2009a) to suggest that martens in the Coast Range of Oregon may also be *M. c. humboldtensis*. Furthermore, preliminary results of a subspecific genetic evaluation of the Pacific marten by Schwartz et al. (In prep.)—using nuclear DNA (nDNA) and samples from substantially more martens than used by Slauson et al. (2009a)—also indicate that coastal Oregon and northern coastal California marten populations represent a single evolutionary clade calling into question the separation of the original subspecies range boundaries (i.e., M. c. humboldtensis in northern coastal California and M. c. caurina in coastal Oregon) at the California-Oregon border. (Internal citations omitted).

In sum, the best available science indicates that the coastal martens of California and Oregon are part of a discrete evolutionary clade. This genetic divergence, together with observed morphological differences between coastal California martens and other subspecies and presence in unique coastal forests, lends to the conclusion that the coastal martens of coastal California and Oregon are a subspecies of *M. caurina*.

Life History

The life history traits of martens make recovery from population decline difficult. For a mammal of their size, martens have relatively late sexual maturity and low reproductive capacity. The predicted time to sexual maturity for a 1-kg mammal is five months (Taylor 1965), but most female martens first mate at 15 months of age and don't produce their first litters until 24 months (Strickland et al. 1982). During periods of environmental stress, pregnancy rates for marten can be as low as 50 percent, and females less than two years of age may not ovulate (Thompson and Colgan 1987). Martens produce only one litter per year, which is lower than the predicted frequency of 1.4 liters per year for similar sized mammals (Calder 1984). Litter size ranges from one to five with an average of 2.85 (Strickland and Douglas 1987), which is also low for a mammal its size (Calder 1984). Litter size is likely age-dependent, and peaks at age six. Senescence occurs at twelve years or greater, with decreased litter size beginning at twelve years (Mead 1994). Marten population densities are low, and are only about one-tenth the expected based on body size (Buskirk and Ruggiero 1994, Kucera 1998).

Reproduction

Martens mate from late June to early August, with most mating occurring in July (Markley and Bassett 1942). Ovulation may be induced by copulation (Mead 1994). Like other species of Carnivora, marten undergo delayed implantation, and the active pregnancy period is only 27

days (Strickland et al. 1982). The onset of active gestation is controlled by photoperiod (Enders and Pearson 1943), and coincides with the development of mammaries (Mead 1994). Martens give birth in March and April, with newborn kits weighing approximately 28 grams (Strickland et al. 1982). Kits are weaned at 42 days, which is later than the predicted age for weaning of a 1-kg mammal of 28 to 34 days (Blaxter 1971, Millar 1977). At 50 days, young martens emerge from their dens and begin foraging independently (Hauptman 1979, Strickland et al. 1982). Juveniles disperse from early August to October. Martens are promiscuous, with both males and females having several mates, though it is unknown if multiple matings result in litters of multiple paternity (Strickland et al. 1982). Consistent with other polygynous Carnivora, only maternal care has been reported and includes establishing and maintaining the natal den, moving kits among alternative den sites, and grooming, nursing and bringing food to the young (Mead 1994). Martens produce an average of slightly less than three young per female with one litter per year (Strickland et al. 1982, p. 602). For a mammal of their size, martens have low reproductive rates and high longevity suggesting a slow recovery from population-level impacts (Buskirk and Ruggiero 1994, p. 16).

Longevity

Martens can live up to 14.5 years in the wild (Strickland and Douglas 1987); however, as found in the USFWS Species Report (2015), "it appears that in the wild most North Americans marten, and presumably coastal martens, live less than 5 years." There are numerous mortality factors for marten including predation, exposure, accidents, collision with automobiles, disease, and trapping. Bull and Heater (2001) reported that of 22 documented marten deaths in northeastern Oregon, 18 were killed by predators, 3 by exposure (hypothermia), and one in a collar-related accident. Of the 18 predator mortalities, 8 martens were killed by bobcats, 4 by raptors, 4 by other martens, and 2 by coyotes. Predation avoidance has likely influenced marten evolution and "led coastal martens to select for highly complex forest structure and avoid areas lacking overhead and escape cover." (USFWS 2015). Mortality rates were approximately equal for males and females, though predation rates are generally higher for females, which are smaller (Slauson et al. 2009). Accidents may include falling out of trees and drowning (Buskirk and Ruggiero 1994).

Diet

The marten is an opportunistic predator with a diverse diet that includes mammals, birds, carrion, eggs, insects, and vegetation (fruits, berries, nuts, fungi, lichens, grass, etc.) (Buskirk and Ruggiero 1994, p. 18; Martin 1994, p. 301). Voles (*Microtus* spp. and *Clethrionomys* spp.), squirrels (*Tamiasciurus* spp. and *Spermophilus* spp.), and chipmunks (*Tamias* ssp.) are important food items for martens across their range (Martin 1994, p. 298). In the Sierra Nevada of California, mammals were the most important food item with microtine rodents the most frequent prey throughout the year and chipmunks and squirrels increasing in importance during the summer (Zielinski et al. 1983, p.388). Seasonal variation in diets is universal with the importance of soft mast, such as berries of *Vaccinium* and *Rubus* peaking in the fall (Buskirk and Ruggiero 1994, p. 19). Two key prey species in the winter diet, red-backed voles (*Clethrionomys californicus* and *C. gapperi*) and Douglas squirrel (*Tamiasciurus douglasii*), are closely associated with late-successional (mature and old-growth age classes) forest conditions (Slauson 2003, p. 6).

The USFWS 2015 Species Report notes:

> Many of the key prey species of the Humboldt marten reach their highest densities in forest stands with old-growth structural features where their key

food resources—conifer seed crops and fruiting bodies of ectomycorrhizal fungi—reach their greatest abundances. The density of ericaceous (i.e., members of the plant family Ericaceae or heather family) shrub layers has also been shown to be positively correlated with chipmunk density in coastal Oregon. Physical complexity on or near the forest floor, typically provided by coarse woody debris, is directly related to predation success for martens; when this complexity is reduced (e.g., by logging), predation success declines due in part to the increased vigilance prey exhibit when physical complexity is reduced. (Internal citation omitted).

Home Range

The USFWS Species Report (2015) describes the Humboldt marten's home range:

> Pacific and American martens exhibit strong habitat selection at the home range scale, suggesting that this scale of selection most directly influences an individual's fitness. Martens establish home ranges to encompass their year-round resource needs as well as, during the breeding season, access to members of the opposite sex. Theoretically, home range size for a predator is a function of prey density and habitat quality; smaller home ranges typically represent better habitat conditions. Marten home ranges are often positioned to maximize the composition of high quality habitat and minimize low quality habitat. Individual Pacific and American marten home ranges typically include a high proportion (≥70 percent) of high quality late-successional forest habitat Females, due to their solitary role raising young, have unique needs and must have access to reliable and nearby prey resources to support the energetic demands of lactation and providing food for kits. In northern coastal California, 97 percent (38 of 39) of a typical female's within-home range resting and active locations occurred in the core old-growth and late-mature riparian habitat patches. For males, 30 of 39 (77 percent) within-home range resting and active locations occurred in the core old-growth and late-mature riparian habitat patches.
>
> There is an inverse relationship between the amount of high quality habitat and marten home range size. As the amount of low quality habitat (e.g., recent clear-cuts or partial harvests) increases, home range size increases. Accordingly, in our review of home range area studies of Pacific martens in California and Oregon, the largest home ranges we encountered (i.e., greater than 10 km2 (3.9 mi2)) were from individuals occupying intensively logged landscapes.
>
> Home ranges of Pacific martens in the Sierra Nevada Mountains of California in largely unlogged forest landscapes averaged 3–5 km^2 (1.2–1.9 mi^2) for males and 3–4 km^2 (1.2–1.5 mi^2) for females. Limited telemetry data from coastal martens suggests that home ranges for adult males (n =3) are of similar size (3–4 km^2; 1.2–1.5 mi^2). Telemetry data and habitat selection analysis at coastal marten detection sites reveal that home ranges include large patches (median >1.5 km^2 (0.6 mi^2)) of the most favored habitat: old-growth, old-growth and late-mature, and serpentine habitat. (Internal citations omitted).

The USFWS Species Report (2015) provides the most up-to-date information on the home range size, selection, and dynamics of the Humboldt marten.

VII. Type of Habitat Necessary for Survival

Martens are one of the most habitat-specific mammals in North America, and are thus highly vulnerable to habitat loss and degradation (Harris 1984, Buskirk and Ruggiero 1994, Slauson 2003). Martens are very strongly associated with closed-canopy, old growth forests with complex structure on or near the ground (Buskirk and Powell 1994, Buskirk and Ruggiero 1994, Bull et al. 2005). Martens are known to avoid younger forests and open areas such as clear-cuts (Drew 1995, Buskirk and Ruggiero 1994, Slauson et al. 2007). Martens avoid fragmented areas, and will not cross large areas with low canopy closure (Hargis and McCullough 1984, Bissonette and Sherburne 1993, Thompson and Harestad 1994, Hargis et al. 1999).

Numerous studies demonstrate the preference of martens for unlogged, old-growth habitat (Spencer et al. 1983, Wynne and Sherburne 1984, Snyder and Bissonette 1987, Koehler et al. 1990, Lofroth 1993, Buskirk and Ruggiero 1994, Raphael and Jones 1997, Ruggiero et al. 1998, Bull et al. 2005). For example, radio-collared martens in northeastern Oregon demonstrated a strong preference for old, unlogged stands with greater than 50 percent canopy closure, canopy layers, and high density of logs and dead trees (Bull et al. 2005). Martens specifically avoided harvested stands, early structural classes, and areas with low densities of dead trees (Ibid.). Younger forests and forests where old-growth loss has been extensive simply do not provide adequate habitat for martens—"The [Humboldt] marten does not occur in extensively logged redwood forests and currently only occurs in conifer-dominated, late-mature and old-growth forests with dense shrub cover or near-coast serpentine communities with dense shrub cover." (Slauson et al. 2003).

The Humboldt marten population documented in Slauson's 2003 study used two distinct types of fog-influenced coastal low-elevation forests—old-growth Douglas-fir (*Psuedotsuga menzesii*) dominated forests, and mixed-conifer forest occurring on serpentine soils with Douglas-fir, Sugar pine (*Pinus lambertiana*), Western white pine (*P. monticola*), and Lodgepole pine (*P. contorta*) (Slauson 2003). The more recent documentation of Humboldt marten presence in a third type of fog-influenced coastal low-elevation forest—old growth redwood forest—is consistent with both the earlier results and with the historical record (Grinnel et al. 1937, Kucera 1998, Slauson et al. 2001, Slauson and Holden 2009).

Serpentine soils have low levels of essential nutrients and high concentrations of detrital elements which creates a harsh growing environment and results in open and rocky sites with rich plant diversity, slow-growing woody plants, and stunted trees (Slauson et al. 2007). Serpentine areas provide lower quality habitat for martens than old-growth habitats (Slauson et al. 2009). In both serpentine and non-serpentine areas, the Humboldt marten occupies areas with dense, spatially extensive shrub cover comprised of shrub species associated with older forest habitats and importantly, not associated with shrub species that occur in areas of clearcuts and re-growth (Slauson et al. 2007). (*Ibid.*).

Martens select habitat at three spatial scales—microhabitat, stand, and home range, with a fourth scale, landscape, serving as an upper constraint on habitat selection (Bissonette et al. 1997, Slauson 2003). At all of these scales, martens demonstrate strong preference for old growth habitats.

Microhabitat - Resting and Denning Structures

The USFWS Species Report (2015)) describes microhabitat characteristics preferred by the Humboldt Marten:

> Rest structures are used daily by martens between foraging bouts to provide thermoregulatory benefits and protection from predators. Reuse rates for individual rest structures are low and selection for structure type changes seasonally to meet thermoregulatory needs, such that multiple resting structures meeting seasonal requirements are required across the home range. Large-diameter live trees, snags, and logs provide the main types of resting structures for martens. Of 55 rest structures used by Humboldt martens in the summer and fall, 37 percent were snags, 23 percent downed logs, and 17 percent live trees. Martens typically select the largest available structures for resting and denning. Rest structures used by Humboldt martens averaged 95 cm (37 in.) diameter-at-breast-height (dbh) for snags, 88 cm (35 in.) maximum diameter for downed logs, and 94 cm (37 in.) dbh for live trees. These woody structures were found in the oldest forest development stages. Most resting locations—the actual place in the structure the marten used for resting—occurred in tree cavities (33 percent), on platforms (33 percent) created by broken top snags or large live branches, or in chambers (28 percent) created by log piles or rock outcrops. In coastal Oregon and northern coastal California, rest structures providing cavities or chambers will likely become seasonally important during the rainy period of the year; late fall through late spring.
>
> Denning structures used by female martens to give birth to kits are called natal dens, and the subsequent locations where they move their kits are referred to as maternal dens. Pacific and American martens appear to be more selective of habitat conditions at den sites than at resting sites. Ruggiero et al. (1998) found that both the characteristics of the den structures and the characteristics of the stands they were found in influenced den-site selection. This is likely due to the importance of high quality foraging habitat in close proximity to den sites, allowing females to simultaneously maximize the energy they gain from foraging during lactation and minimize the time spent away from kits, especially when they are dependent on their mothers for thermoregulation. The most common den structures used by Pacific and American martens are large diameter live and dead trees with cavities. No natal dens and only three maternal dens (all from the northern coastal California population) have been described for the coastal marten. Two of the maternal dens were cavities in the broken tops of a 66 cm (26 in.) dbh golden chinquapin and 113 cm (44 in.) dbh Douglas-fir, and the other was a cavity in a 115 cm (45 in.) dbh Douglas-fir snag. All three maternal dens were located in the same old-growth, Douglas-fir dominated stand encompassing a creek and riparian habitat. (USFWS 2015). (Internal citations omitted).

The marten therefore requires structurally complex forest characteristics at the microhabitat level, especially snags and trees with cavities.

Forest Stand Characteristics

At the stand scale, which consists of several hectares, martens prefer old-growth stands with structural features that fulfill their life-history requirements such as resting and denning structures, abundant prey populations, access to mates, etc. (Buskirk and Powell 1994, Katnik et al. 1994, Slauson et al. 2007). Bull et al. (2005) compared habitat characteristics in 2,558 plots in occupied and unoccupied areas in northeastern Oregon and found that marten use stands with 50–74 percent canopy closure more than stands with less than 50 percent canopy closure ($P < 0.01$), and that stands used by martens had more canopy layers, a longer distance to an opening, and higher densities of snags, logs, and large trees than unused areas. Importantly, they found that stands with no harvesting activity were used more, and that stands with *any* harvesting activity were used less than expected based on availability ($P < 0.01$; emphasis added).

In non-serpentine stands, Humboldt martens used late-successional stands highly disproportionate to their availability, used late-mature stands similar to availability, and made little or no use of all other seral stages (Slauson et al. 2007, p. 462). All earlier seral stages were selected against, probably because of the lack of one or more key structural features (Slauson 2003, p. 62).

Home Range Scale

Humboldt martens select the largest available patches of old-growth, old-growth and late-mature, or serpentine habitat (Slauson et al. 2007), similar to home-range selection for other marten subspecies which also select for the largest available forest patches (Chapin et al. 1998). Slauson et al. (2007) developed habitat models for Humboldt marten and found that a 20-ha increase in old-growth patch size was associated with a 19-26 percent increase in marten occurrence, after accounting for the amount of serpentine habitat. They conclude, "The best models suggest that home range areas with larger patch sizes of old-growth, old-growth plus late-mature, or serpentine habitat within a 1-km radius of each sample unit are important for marten occurrence. Martens disproportionately used sample units within these largest patch sizes."

Slauson et al. (2007) also found that mixed-scale models from both the stand and home range scales best explained Humboldt marten occurrence compared to one scale alone. Because martens are negatively associated with logging activities at the microhabitat, stand, and home-range scale, it follows that logging at the landscape scale, which is comprised of tens to hundreds of square kilometers, inevitably negatively influences marten occurrence.

Landscape Scale

Loss and fragmentation of mature forest at the landscape scale and the resultant changes in landscape pattern constrain marten movement and demography (Bissonette et al.1989, Fredrickson 1990, Phillips 1994, Chapin 1995, Chapin et al. 1998, Hargis 1996, Slauson 2003). Martens avoid landscapes where more than 25–30 percent of mature forest has been lost (Bissonette et al. 1997, Hargis et al. 1999, Potvin et al. 1999, Slauson 2003). Fragmented forests and small patches of old growth are not adequate to ensure the long-term viability of marten populations. Slauson et al. (2009a) found that Humboldt martens may occasionally occupy patches of old growth forest that are less than 50 ha, but that these patches do not provide the same value to martens as larger patches: "The biggest difference between sites with stable marten occupancy versus unstable occupancy, in our study, was

the size of the patch of Old Growth forest that encompassed them, with larger patches having more stable marten occupancy."

Slauson et al. (2009a) documented a sharp decline in Humboldt marten sample unit occupancy in sample units where the old-growth vegetation type is highly fragmented and in serpentine areas, and found that sample units with more old growth in their vicinity were more likely to have stable marten occupancy between 2000–01 and 2008 (Slauson et al. 2009a). Old growth patches encompassing sample units where marten occupancy remained constant between 2000-01 and 2008 were approximately 40 percent larger on average than patches that became unoccupied in 2008 (Slauson et al. 2009a). The authors calculated the probability of extinction for the marten based on old-growth patch size and found that martens were less likely to go extinct in sample units with more old growth. For example, a 30 hectare increase in the amount of old growth resulted in a 37 percent decrease in the probability of extinction.

As summarized by the USFWS (2015):

> Compared to other species closely associated with late-successional forest, American and Pacific marten populations, including the coastal marten, are very sensitive to the loss or fragmentation of high quality habitat at the landscape scale. Martens exhibit a progression of responses to timber harvest as the proportion of habitat affected by intensive logging practices increases, including (but not limited to) activities such as clear cutting, partial harvest, and shelterwood cutting. The combination of habitat loss and fragmentation of remnant suitable habitat effectively lowers the density of martens by reducing the number of home ranges that can be supported. (USFWS 2015) (Internal citations omitted).

Patch size and degree of connectivity have important implications for martens attempting to recolonize unoccupied stands. Highly fragmented forests may contain suitable habitat patches that are so separated by open areas that martens cannot make use of the habitat that is available (Buskirk and Powell 1994, p. 289). The more highly fragmented mature forest becomes, the lower the carrying capacity for martens (Thompson and Harestad 1994, p. 360).

VIII. Factors Affecting Ability to Survive and Reproduce

The Humboldt marten warrants listing under CESA. As described in this section, the Humboldt marten is threatened by all six factors identified by CESA as indicators that listing is warranted. The six listing factors to be addressed, as identified by CESA include:

(1) Present or threatened modification or destruction of its habitat;
(2) Overexploitation;
(3) Predation;
(4) Competition;
(5) Disease; or
(6) Other natural occurrences or human-related activities.

1. Present or Threatened Modification or Destruction of Habitat

Timber Harvest and Logging

As noted elsewhere in this petition, the Humboldt marten has been extirpated from the vast majority of its historic range. The primary cause of marten population decline and extirpation is loss of old-growth coniferous forests (Yeager 1950, Archibald and Jessup 1984, Thompson and Harestad 1994, Bull et al. 2005). Logging, by its very nature, necessarily threatens martens and their habitat because martens select the largest and oldest trees available at the microhabitat, stand, home range, and landscape scale (Wilbert 1992, Buskirk and Ruggiero 1994, Gilbert et al. 1997, Raphael and Jones 1997, Ruggiero et al. 1998, Bull et al. 2005, Slauson et al. 2007, 2009).

The USFWS Species Assessment (USFWS 2015) discusses the impacts of timber harvest activities on marten habitat:

> Historically, in California, a primary reason for the range reduction of the coastal marten was likely the result of habitat loss due to logging of late-successional forests during the last century. Redwood accounted for approximately 35 percent of the conifer forests in the historical range in California. Zielinski et al concluded that the effect of past and current timber harvest in the redwood region is the most plausible reason for the continued absence of the coastal marten throughout most of northern coastal California. Similar to northern coastal California, much of coastal Oregon is privately owned and the majority of late seral coastal forest stands have been harvested over the past century, especially in stands nearest to the coast. Little or no suitable marten habitat occurs in these privately owned areas adjacent to the coast. Most currently suitable coastal marten habitat near the coast in Oregon and California is federally owned. (USFWS 2015) (Internal citations omitted).

The majority of coastal forests on private lands have been logged at least once. Private forests in the range of the Humboldt marten are logged primarily by clear-cutting, and are currently managed under short rotation even-aged silvicultural regimes (60-70 years) which create structurally simplified, early to mid-seral landscapes that do not support martens (USDA 1992, Bolsinger and Waddell 1993, Lettman and Campbell 1997, Thornburg et al. 2000).

The USFWS Species Assessment (USFWS 2010) describes the importance of late-successional forests and forest structures for the marten:

> Humboldt martens use structural features of late-successional forests, such as large diameter live trees, snags, and logs. Most resting structures used by Humboldt martens require more than a century to develop. Loss of these elements can reduce the suitability of forested areas for martens. The probability of detecting Humboldt martens increased with increasing maximum patch size of late-successional forest. The minimum patch size to identify potential Humboldt marten home range areas is 445 ac (180 ha) of late-successional forest with dense shrub cover. Little habitat with the necessary structural characteristics for Humboldt martens is expected to regenerate over the next several decades. (USFWS 2010, p. 17) (Internal citations omitted).

The USFWS 2010 Species Assessment Report further describes the negative effects of timber harvest on the marten and marten habitat:

> [R]eduction in the total amount of late-successional forest is only one of the timber harvest-related threats facing the Humboldt marten. The continued simplification of the structure of forests and their fragmentation into smaller, more isolated, patches is also a concern. For example, RNSP contain approximately 41,400 ac (16,700 ha) of late-successional coast redwood forest. This includes 41,100 ac (16,600 ha) in stands greater than 0.5 ac (0.2 ha) and 362 ac (146 ha) of isolated late-successional trees surrounded by mature tree buffers. Late-successional forests in RNSP are fragmented with only three stands containing more than 5,000 ac (2,023 ha). The majority (83%) of the late-successional stands in RNSP are 100 ac (40 ha) or smaller with 31% of the stands less than 5 ac (2 ha) in size. RNSP also contains over 50,000 ac (20,235 ha) of second growth forest most of which was harvested between 1950 and 1978. (USFWS 2010, p. 17) (Internal citations omitted).

Federal lands in the range of the Humboldt marten have been managed under the Northwest Forest Plan since 1994. NWFP land allocations within the occupied Humboldt marten area include matrix, wilderness, Late Successional Reserves (LSRs), and administratively withdrawn areas. Matrix lands and LSRs are available for future timber harvest, while wilderness and administratively withdrawn areas are generally not. Approximately 38% of the occupied range occurs on public or private lands currently available for timber harvest.

The USFWS 2010 Species Assessment describes the challenges with relying on public lands to conserve the Humboldt marten:

> Public lands are disjunct and represent only a small proportion of the total area of coastal forest in northern California, with most forestland in industrial or non-industrial private ownership. Public lands in coastal northwestern California include state parks, one national park, a Bureau of Land Management conservation area, and portions of the Six Rivers and Klamath National Forests. Humboldt martens were detected proportionately more frequently on lands managed by the Forest Service than on private timberlands. Greater than 80% of the private timberlands in the 2000- 2001 Humboldt marten study area were logged prior to surveying and martens appeared to avoid all but the edge of this landscape (USFWS 2010, p.17) (Internal citations omitted).

Sufficient evidence exists to indicate that the petitioned action 'may be warranted' in light of the threats posed by timber harvest activities on federal and non-federal lands. Timber harvest and logging are a present and ongoing threat to the survival and conservation of the Humboldt marten, especially in light of the marten's extremely small population size in California and the isolation of this population. Existing forest management regimes fail to take into account the needs of the Humboldt marten. (*See also Inadequacy of Regulatory Mechanisms, and Impacts of Existing Management Efforts*).

Impacts of Fire, Fire Suppression, and Post-fire Salvage Logging on Marten Habitat

Over the long-term, wildfire plays a role in developing the habitat components on which martens depend, such as snags and dense shrubs, but because the marten's habitat has been so severely reduced due to logging, fires can pose a threat to the subspecies. Due to its

critically low population size and restricted range, fire can potentially result in short-term loss and fragmentation of suitable habitat (Slauson and Zielinski 2004). Slauson (2003) identifies the risk of being extirpated by a stochastic event as a "major challenge" to the persistence and restoration of the Humboldt marten (p. 71). Commercial timber harvest (including salvage logging) and fire suppression have exacerbated the threat posed to the marten by fire by fragmenting landscapes.

The USFWS 2010 Species Assessment also describes the potential hazards to the marten resulting from fire suppression activities:

> [T]he Humboldt marten is also threatened by fire suppression activities. Fuels management projects designed to lower fire risks, such as mechanical treatments have the potential to negatively affect Humboldt martens and their habitat by reducing important features such as shrubs, canopy cover, snags, or logs. Significant loss of the shrub layer due to fuels reduction projects may reduce habitat suitability, due to reduction in prey abundance or improved access by competitors. (USFWS 2010) (Internal citations omitted).

Post-fire salvage logging and hazard tree removal occurs on both federal and non-federal lands within the range of the Humboldt marten and can fragment marten habitat and eliminate important structure such as snags and large dead trees. While the impact of post-fire logging on the Humboldt marten has not yet been examined, recent science on the closely-related Pacific fisher shows that the fisher can utilize and may *prefer* higher-severity post-fire areas. (Hanson 2013, 2015). While a fire may remove shrub and canopy cover in the short term, post-fire forests contain high snag, shrub, and downed large woody debris density, providing a complex structural environment. This "complex early seral forest" is "rich in native biodiversity and wildlife abundance," including small mammals, a staple of the marten's diet. (Hanson 2013, 2015). Post-fire logging removes structural complexity, degrading the habitat potential of post-fire forests.

On federal lands, salvage logging and other fuels management activities can occur in all land allocations with the exception of wilderness areas. (USFWS 2010, p. 20). On non-federal lands, salvage logging and hazard tree removal activities are primarily conducted pursuant to emergency exemption notifications. While emergency exemption notices must be filed with the California Department of Forestry and Fire Protection ("CAL FIRE"), approval of such emergency timber operations notifications is not subject to the normal provisions of the California Environmental Quality Act ("CEQA") review process. Rather, emergency exemption notification approval is considered to be a ministerial action, thus leaving CAL FIRE with little to no discretion. The emergency exemption process also excludes the possibility of public review and comment. (*See also Inadequacy of Regulatory Mechanisms, and Impacts of Existing Management Activities*).

In summary, the Humboldt marten is threatened by past, ongoing, and proposed habitat loss and modification due to logging and timber harvest, wildfire, fire suppression activities, and post-fire salvage logging. The existence and extent of these threats clearly demonstrates that listing of the Humboldt marten under CESA is warranted.

Collisions with Vehicles

Vehicular collisions are also a significant threat to the Humboldt marten, particularly given the small and isolated populations. As stated in the USFWS Species Report (2015):

> Collision with vehicles is a known source of mortality for the coastal marten currently and [is] expected to continue into the future given the presence of roads within the range of the species. Collisions with vehicles may negatively affect the viability of the three coastal marten populations if annual roadkill mortality rates, in combination with all other sources of mortality, exceed annual juvenile recruitment rates. Based on their small body size, we expect that nearly all coastal martens struck by vehicles will either die immediately from blunt force trauma, or soon thereafter from severe injuries. A small proportion of coastal martens may survive a vehicle strike, but would likely be physically impaired, potentially increasing the probability of mortality from another source such as predation, disease, or starvation. For example, a broken limb from a vehicle strike would reduce the foraging capability of a coastal marten, which relies on swift movements to catch highly mobile prey through rugged terrain and into trees. If the injured coastal marten is an adult female that is caring for dependent kits, her reduced ability to acquire adequate prey may lead to one or more of the kits starving.

The lack of highway structures to facilitate free movement and connectivity of habitats for the Humboldt marten is a significant barrier to marten survival and dispersal. Vehicular collisions pose a significant threat to the Humboldt marten.

2. Overexploitation

As found in the USFWS Species Report (2015):

> Extensive unregulated fur trapping conducted over a long period of time can lead to a species range reduction, the extirpation of populations, or extinction of the species. Unregulated coastal marten fur trapping beginning in the late 1800s led to a marked reduction in the species distribution across coastal Oregon and northern coastal California by the late 1920s (see details below). Localized trapping may also negatively affect populations through removal of individual coastal martens that are vital to the long-term viability of the population (e.g., reproductive adult females). Population level effects of coastal marten trapping have not been studied, but coastal marten population growth is most significantly affected by a reduction in marten survival rates . . .Therefore, for small coastal marten populations, the loss of only a few adult martens each trapping season could reduce the likelihood of long-term population viability into the future, especially when combined with mortalities from other sources such as roadkill, disease, predation, and exposure to toxicants. Annual juvenile recruitment (estimated at 50 percent for the coastal marten; Slauson et al. In prep. (a)) may offset losses due to legal trapping. However, annual mortality rates from other sources are either unknown (e.g., roadkill, disease, exposure to toxicants) or derived from a relatively small area and small sample size of martens.
>
> By the late 1800s and early 1900s, European settlers began trapping for the fur trade industry. By the early 1900s, annual harvest totals of martens in the analysis area were already in decline, signaling stress on populations from trapping. Accounts of individual trappers taking 35 and 50 martens in single winters within the California portion of the analysis area indicate the impact individual trappers had on marten populations. The sharp decline in annual harvest rates prompted Dixon to call for the closing of the marten trapping

season in California or fear of their extirpation. However, marten trapping continued and further reduced populations, resulting in excessive harvest of coastal marten populations that will take many years to recover and likely resulting in the loss of genetic variation .

The number of martens harvested in coastal Oregon counties has declined since the 1940s, and by the 1970s martens were considered very rare along the Oregon coast. Historical trapping of coastal martens for fur is considered by researchers as the likely cause of the marked contraction in coastal marten distribution and reduction in population size that was observed in coastal Oregon and northern coastal California in the early 20th century. The trapping season for martens was closed in 1946 in the California portion of the analysis area; however, decades of protection from trapping have not resulted in the recovery of coastal marten populations in northern coastal California.

Currently, trapping for martens is illegal in California. However, it is legal to trap other mammals that may occur within occupied coastal marten habitat in northern coastal California (e.g., bobcat, gray fox). . . .

In contrast to California, trapping of coastal marten for their fur is currently legal in Oregon. Coastal marten trapping records for the Oregon portion of the analysis area peaked in the 1940s and in no decade since have coastal marten harvest levels reached ≥15 percent of the 1940s total coastal marten harvest. Currently, the harvest of marten in the Oregon Coast range is rare. For example, three coastal marten were trapped within the entire Oregon portion of the analysis area (and area of 36,348-km2 (14,034 mi2)) during the 2013 trapping season. A total of 36 martens (mean = 2.7 harvested per year; range = 0–5; standard deviation = 1.90) were harvested within coastal Oregon counties between 1969 and 1995. We excluded martens harvested from 1969 to 1995 in Lane (310 martens harvested) and Douglas counties (167 harvested) since both of these counties extend from the coast to the Oregon Cascades. Although most martens harvested in those two counties were likely from the Oregon Cascades, the actual proportion harvested within the Coast Range is unknown, but expected to be similar to the small number harvested in other coastal counties during that time frame.

The low number of coastal marten trapped in the Oregon portion of the analysis area in the recent past could be due to low marten densities in the two extant population areas in coastal Oregon, or possibly due to low trapping effort. Few Oregon trappers (4 to 8) have pursued marten in recent years, with most marten captures occurring in the Cascade Range of interior Oregon, which is outside the historical range of the coastal marten. The three coastal martens (two males and one female) harvested during the 2013 trapping season were all captured within 2 km (1.2 mi.) of the coast between 8 and 17 km (5 and 11 mi) north of Coos Bay, Coos County, Oregon). The proximity of all three harvested coastal marten to one of the more heavily [human] populated areas (i.e., Coos Bay, Oregon) in the [central coastal Oregon extant population area] suggests that trapping activity might be more prevalent near human population areas that are readily accessible by vehicles, such as via U.S. Highway 101 that traverses the [central coastal

Oregon extant population area] north to south near the coastline. (USFWS 2015). (Internal citations omitted).

While the threat posed to the Humboldt marten by accidental capture and poaching in California may be small, any loss to the marten population in California is significant due to the small population size and population isolation of the marten in California. Incidental trapping of Humboldt martens remains a threat to the survival and conservation of the species, and is yet another factor which demonstrates that listing under CESA is warranted.

3. Predation

Predation is a significant threat to the Humboldt marten. Predation is a primary source of marten mortality. Bull and Heater (2001) report that of 22 documented marten deaths in their study in northeastern Oregon, 18 of the martens were killed by predators (82 percent). Martens face many predators including bobcats, foxes, coyotes, mountain lions, great horned owls, goshawks, and Pacific fishers. (Buskirk and Ruggiero 1994, Bull and Heater 2001, Slauson et al. 2009).

Habitat degradation and fragmentation caused by logging increases the threat of predation for martens by favoring generalist predators which fare better in logged landscapes (Slauson et al. 2009). As found by Slauson and Zielinski (2007), the distribution of mesocarnivores in redwood forests has changed over the last 80 years; fisher and gray foxes have expanded their distributions into Humboldt marten habitat concurrent with the dramatic decline of the marten. Slauson and Zielinski (2010) have further found that roads may be facilitating the increased presence of mesocarnivores in dense-shrub landscapes that martens prefer. Higher predation rates attributable to habitat fragmentation and degradation may suppress marten populations. Slauson et al. (2009) found a higher decline in Humboldt marten sample unit occupancy from 2001–2008 in serpentine habitats and in sample units where old-growth is more fragmented and the risk of predation is increased.

Slauson et al. (2009) also found that sample unit occupancy declined more dramatically in units occupied by only female martens than in units with dual-gender or male-only occupancy. Because body size of female martens is generally 40 percent smaller than males, females are likely more vulnerable to predation from larger-bodied mesocarnivores associated with early seral and fragmented landscapes (*Ibid.*). Due to the extensive loss and fragmentation of old-growth forest habitats in coastal forests in California and Oregon and the resulting habitat conditions which favor marten predators, the Humboldt marten faces heightened predation threat. (*Ibid.*).

In summary, while predation is a natural stressor, human activities such as vegetation management contribute to this stressor and amplify it, and it therefore represents a significant threat to the Humboldt marten.

4. Competition

The USFWS 2010 Species Assessment identifies environmental fluctuations due to variations in predation, disease, and food supply as a threat to the Humboldt marten as a consequence of its small population size in California. (USFWS 2010, p. 22). No data or studies have been produced to assess the impacts of inter-species competition on the Humboldt marten. However, given the precariously small population size, the threat of ongoing and habitat loss and fragmentation that results in favorable conditions for generalist predators, and the effects of climate conditions and drought on availability of preferred prey

species, competition for space and food with other mesocarnivores and other predators, competition is likely a currently a limiting factor for the ability of the Humboldt marten to survive and reproduce. The potentially detrimental effects of inter-species competition is yet another reason demonstrating that listing under CESA is warranted.

5. Disease

The threat posed to the Humboldt marten by disease has not been studied, but given the subspecies' small population size, is potentially critical. As concluded by the USFWS, "The outbreak of a lethal pathogen within one of the three coastal marten populations could result in a rapid reduction in population size and distribution, likely resulting in a reduced probability of population persistence, given the small size of these populations." (2015).

Martens are susceptible to several mesocarnivore diseases and parasites including but not limited to rabies, plague, distemper, toxoplasmosis, leptospirosis, trichinosis, sarcoptic mange, canine adenovirus, parvovirus, and herpes virus, West Nile virus, and Aleutian disease (Strickland et al. 1982, Banci 1989, Green et al. 2008, IERC 2008). Though little information on the threat posed to the Humboldt marten by disease is available, many of the diseases to which it is susceptible are known to cause mortality in carnivores (e.g. Brown et al. 2008). Brown et al. investigated pathogen exposure in the Pacific fisher, a closely-related species, on the Hoopa Valley Indian Reservation. The Reservation is located near occupied marten habitat, only 9km (5.6 mi) south. Of the 15 fishers found dead on the Reservation, two had been exposed to the canine distemper virus and six to canine parvovirus. Secondary infections resulting from intra-species fighting or encounters with other larger predators may also cause mortality.

In summary, disease has the potential to be a threat due to the extremely small population size of the marten. While further study of susceptibility of the Humboldt marten to disease is required, it is clear that the threat of adverse impacts of disease to such a small population is a factor that demonstrates that listing under CESA is warranted.

6. Other natural occurrences or human-related activities.

The Humboldt marten is threatened by several additional natural occurrences and human-related activities. These include: (a) Inadequacy of Regulatory Mechanisms (b) Toxic Exposure; and (c) Climate Change. This petition addresses each of these additional factors which demonstrate that listing of the Humboldt marten under CESA is warranted.

(a) Inadequacy of Regulatory Mechanisms

Existing regulatory mechanisms are not adequate to protect and restore the habitat the marten needs to survive. Much marten habitat is currently available for logging, and further loss or degradation of its limited suitable habitat could push the Humboldt marten to extinction. Marten conservation will require landscape management to enlarge and reconnect suitable patches of habitat (Slauson et al. 2007). Conservation measures that aim only to maintain current marten habitat conditions will not ensure the Humboldt marten's long-term persistence (Slauson 2003).

There are no laws or regulations in California that adequately address the needs of the Humboldt marten on state, federal, non-federal, or tribal lands. Though the marten is protected from fur trapping in California, there are currently no regulatory mechanisms that adequately protect habitat for the Humboldt marten in the state.

The vast majority of coastal old-growth forests in California have been logged, causing drastic loss and fragmentation of marten habitat (Slauson 2003). Logging negatively affects martens at the microhabitat, stand, home range, and landscape scale. (*See also Kind of Habitat Necessary for Survival*). To this day, there are no laws or regulations that prohibit marten habitat loss and fragmentation due to logging of old growth or late successional forest stands on federal, non-federal or tribal lands.

Federal Lands

The Humboldt marten occurs on federal lands managed by the U.S. Forest Service and the National Park Service. The Forest Service manages the majority of the marten's range (Slauson et al. 2007, EPIC 2010). The range of the Humboldt marten includes the Six Rivers National Forest and Klamath National Forest in California, the Siskiyou National Forest in southwestern Oregon, and the Siuslaw National Forest in the central Oregon Coast Range. In California (Region 5), the marten is a Forest Service Sensitive Species, and was recognized as a priority species in Fiscal Year 2007.

Sensitive Species status, even as a priority species, does not afford the marten or its habitat the protection it needs to survive. Sensitive Species are not necessarily afforded any regulatory habitat protection; rather the agency is only required to analyze the impacts of its actions on the marten under the National Environmental Policy Act (NEPA). This requirement in no way mandates the agency to select an environmentally benign alternative or to try to mitigate the adverse impacts of projects. Moreover, any protections afforded the marten under the Sensitive Species program are discretionary. Discretionary mechanisms are not adequate to protect the marten on National Forest lands because National Forests are managed to meet multiple objects including providing access to recreation opportunities for the public and serving as an economic development resource for the regions where they occur (e.g. Six Rivers National Forest 2010).

Much of the marten's range on National Forests is managed under the Northwest Forest Plan (USDA/USDI 1994a, 1994b). The NWFP created seven types of land allocations including Congressionally Reserved Areas, Late-Successional Reserves, Managed Late-Successional Areas, Adaptive Management Areas, Administrative Withdrawn Areas, Riparian Reserves, and Matrix lands, each with different management guidelines. Though matrix lands harbor some of the remaining old growth forest in the range of the marten, these lands were intended to provide for commercial timber harvest rather than to provide wildlife values. Slauson (2003) detected martens on 8 of 31 sample units in matrix lands, where the potential for timber harvest poses a dire threat to its persistence. Of the land managed by the Forest Service in the range of the Humboldt marten surveyed by Slauson et al. (2007), 20 percent was designated as matrix land that is currently available for logging. Sixteen percent of the matrix land has already been logged (Slauson et al. 2007).

Under the NWFP, LSRs were intended to support viable populations of late successional and old growth associated species, but some rare species, including the marten, are not effectively protected by the reserve system. Moreover, logging is not prohibited on LSRs and therefore the potential for logging on these lands is a further threat to the marten. Of the FS land in the range of the Humboldt marten surveyed by Slauson et al. (2007), 40 percent was designated as Late Successional Reserve. Late Successional Reserves are not necessarily in late-seral condition, but are in theory being managed to develop mature forest conditions over time. These reserves do not necessarily provide habitat benefit to the marten currently because the conditions which marten prefer may take centuries to develop. Slauson (2003)

detected martens at 13 of 66 sample units in Late Successional Reserves. Thirteen percent of the Late Successional Reserves in the marten's range have been logged (Slauson et al. 2007).

Though the status of the marten was considered during the planning process for the NWFP, the process "did not include significant review of existing data or collection of new data" concerning the marten (Zielinski et al. 2001). The marten was given the second poorest score among mammals by the Forest Ecosystem Management Scientific Analysis Team for likelihood of remaining well distributed, with only a 67 percent likelihood of remaining well distributed within the range of the northern spotted owl (USDA/USDI 1994). Even this bleak projection, however, was overly optimistic, and Slauson et al. (2009a) conclude that the Northwest Forest Plan has not proven adequate to protect the Humboldt marten:

> In reality, the situation is far worse, martens on federal lands in the Coast Range of California are restricted to a single refugia and have been extirpated from a significant portion (>95%) of their historical range. Within their last stronghold, measures including the protection of Riparian Reserves, Late-Successional Reserves, northern spotted owl and marbled murrelet conservation measures, do not completely protect the population (p. 3). (*Ibid.*).

Slauson et al. (2009a) report that at least 38 percent of the distribution of martens in coastal California occurs outside of NWFP reserves, and the reserves themselves may not contain suitable old growth habitat, as discussed above.

The Forest Service also manages the Siskiyou Wilderness, which is administered by the Six Rivers, Klamath and Siskiyou National Forests. The proportion of the marten's range which is designated as wilderness is not sufficient in and of itself to provide enough habitat to ensure long-term marten persistence for several reasons.

First, designated wilderness makes up only a small portion of the marten's range. EPIC (2010) estimates that 14 percent of the California range of the Humboldt marten consists of designated wilderness. Of the FS land in the range of the Humboldt marten surveyed by Slauson et al. (2007), 18 percent was designated as wilderness.

Second, not all vegetation types in the Siskiyou Wilderness support martens. Slauson (2003) detected martens at only 3 of 23 sample units in wilderness. Much of the Siskiyou Wilderness is composed of higher elevation vegetation such as white-fir and hardwood-dominated stands which are not preferred by the Humboldt marten (Slauson 2003).

In addition, the Forest Service manages the Smith River National Recreation Area, which is part of the Six Rivers National Forest. Occurrence in the NRA is not adequate to protect the Humboldt marten because management of National Recreation Areas prioritizes recreational opportunities over wildlife values. Though the habitat of the marten in the NRA is not vulnerable to timber harvest, it remains vulnerable to other threats. EPIC (2010) estimates that the Smith River NRA makes up 9 percent of the California range of the Humboldt marten.

The Humboldt marten also occurs on federal lands managed by the National Park Service. The Redwood National Parks complex consists of a series of parks managed by the National Parks Service and California State Parks including Prairie Creek, Jedediah Smith, and Del Norte Coast Redwoods State Parks. Martens were not known to be extant in the parks until

2009 when a marten was detected in Prairie Creek Redwoods State Park via a remote sensing camera (Slauson and Holden 2009). Habitat in the parks is not sufficient to ensure the survival of the Humboldt marten because the parks make up only a small portion of the marten's range, the parks do not currently support a significant marten population (Slauson et al. 2003), and because habitat conditions in the parks are not currently optimal for marten.

The Parks also may not be sufficiently connected to currently occupied habitat to provide for marten dispersal (Slauson et al. 2003). Even though habitat in the parks is not vulnerable to logging, the marten may be vulnerable there to other threats such as recreational disturbance and vehicle collisions. EPIC (2010) estimates that 10 percent of the California range of the Humboldt marten is on land managed by Redwood National and State Parks. (*Ibid.*).

In sum, there are no existing regulatory mechanisms at the federal level which are adequate to provide for the long-term survival of the Humboldt marten.

Non-federal Lands

Logging operations on non-federal lands in California are governed by the California Forest Practice Act of 1973 (California Public Resources Code 4511 et seq.), and the associated California Forest Practice Rules ("CFPRs") (California Code of Regulations, Title 14, 895 et seq.).

There are no existing regulatory mechanisms that protect the Humboldt marten's habitat on non-federal lands in California. EPIC (2010) estimates that approximately one-third of the California range of the marten is owned by Green Diamond Resource Company and is managed as industrial timberland. Of the private land in the Slauson et al. (2007) Humboldt marten study area, 83 percent has been logged, primarily by clearcutting.

Martens are "faring worse" on non-federal lands than on federal lands (Zielinski et al. 2001, p. 488). Slauson et al. (2007) detected martens at only 2 of 36 (5.5%) sample units on private timberlands, whereas martens were detected at 24 of 123 (19.5%) sample units on lands administered by the Forest Service where less than 15 percent of the area has been logged.

There are currently no regulations contained in the CFPRs that adequately protect the Humboldt marten or its habitat. Title 14, California Code of Regulations, 919.16 requires that non-federal landowners provide CAL FIRE with stand structure information for late successional forest stands as defined (*Ref:* 14 CCR 895.1) in order to allow the Department to assess potentially significant adverse impacts per CEQA. However, such information is only required if the proposed harvest will "significantly reduce the amount and distribution of late successional forest stands or their functional wildlife value so that it constitutes a significant adverse impact on the environment as defined in Section 895.1 [of the CFPRs]." (Title 14, California Code of Regulations 919.16(a) [939.16(a), 959.16(a)]). What's more, there are no specified protective or mitigation measures to offset any potentially significant adverse impacts to late successional forest stands contained in the CFPRs. Rather, the CFPR process for assessing impacts to late successional forest stands is simply a paper exercise that does not result in any on-the-ground protection for these critical forest types.

Finally, at this time, there are no state or federally-approved plans that would protect the Humboldt marten or its habitat on non-federal lands such as Habitat Conservation Plans, Native Communities Conservation Plans or Safe Harbor Agreements. The primary non-federal landowner in the range of the Humboldt marten, Green Diamond Resource Company, has a Habitat Conservation Plan and an associated Incidental Take Permit to cover its

activities relative to the Northern Spotted Owl (NSO) (*Strix occidentalis caurina*). This HCP does not specifically provide protections for late successional forest habitats being utilized by the marten. Thus, the conservation strategy built into the Green Diamond Resource Company HCP for the NSO provides little, if any, protection for the Humboldt marten or its habitat on the property.

In sum, there are no specified regulatory protections contained in the CFPRs for non-federal lands that would specifically address the needs of the Humboldt marten. The existing regulatory mechanisms on non-federal lands are woefully inadequate, and are a primary reason demonstrating why the Humboldt marten warrants listing under CESA.

Tribal Lands

EPIC (2010) estimates that approximately 9 percent of the California range of the marten lies within the boundaries of the Yurok reservation, and less than one percent within the Hoopa reservation. (EPIC and CBD 2010, p. 32). While the Yurok Reservation lies almost entirely within the marten's range, most of the reservation is in non-Tribal ownership, including a significant portion owned by Green Diamond. There are no publicly available data on the status of the marten on Tribal lands, thus making it difficult to assess the efficacy of what, if any, protective or regulatory mechanisms are being applied there.

Summary of Existing Regulatory Mechanisms

In conclusion, there are no existing regulatory mechanisms which adequately protect the Humboldt marten's habitat on federal or non-federal lands. The lack of meaningful regulations or other conservation measures further demonstrates that the Humboldt marten is under threat and therefore warrants listing under CESA.

(b) Toxicant Exposure

Toxicant exposure is an emerging and significant threat to the survival and conservation of the Humboldt marten. Although there have been no direct studies of the potential effects of toxicant exposure on the Humboldt marten, information extrapolated from research on the effects of toxic exposure on other forest-dwelling animals demonstrates that such exposure is likely a threat to the marten.

Toxic chemicals are utilized in both domestic and agricultural settings and are usually intended to suppress populations of rodents, insects, mollusks, and other agricultural and urban pests, but can have inadvertent negative impacts on humans, pets, and other non-target animals (Erickson and Urban 2004, Albert et al. 2010, Mnif et al. 2011, Gabriel et al. 2012). Widespread secondary exposure to pesticides has been reported for raptors, carnivores, and other wildlife that consume poisoned rodents around farms and human dwellings (Albert et al. 2010, Murray 2013). Researchers have generally assumed that pesticides pose little threat to wildlife outside of agricultural and urban areas (Gabriel et al. 2013). However, a recent publication reported that 79% of fishers tested in two study areas on federal and tribal forest lands in California had been exposed to anticoagulant rodenticides (ARs), including four that died from lethal toxicosis (Gabriel et al. 2012; note: at least two more fishers in California died from AR poisoning following publication of this study: Gabriel et al. 2013). Most fishers in the study had been exposed to multiple AR compounds (range = 1–4, mean = 1.6).

ARs detected in fishers in northwestern California include brodifacoum, bromadiolone, chlorophacinone, diphacinone, and warfarin (Gabriel et al. 2012). Brodifacoum and bromadiolone are classified as second-generation anticoagulant rodenticides (SGARs). SGARs were introduced in the 1970s due to widespread development of resistance among rodents to first-generation anticoagulant rodenticides (FGARs), such as warfarin, chlorophacinone, and diphacinone (Buckle et al. 1994). ARs have also been detected in a dead NSO recovered in Mendocino County (Calforests 2014) and 34 of 84 (40%) barred owls tested for exposure in Humboldt County (Gabriel et al. 2014).

Strong circumstantial evidence implicates pervasive illegal outdoor marijuana cultivation as the primary source of pesticide exposure for forest predators in California (Gabriel et al. 2012, 2013, Thompson et al. 2014).

Large quantities of ARs, particularly SGARs, are often spread across large areas in and around illegal outdoor marijuana grow sites (Gabriel et al. 2012, Thompson et al. 2014). Gabriel et al. (2012) noted that thousands of pounds of pesticides were found at illegal outdoor marijuana grow sites in California in 2008 and that 150 pounds of pesticide were found during a single three-week eradication operation on the Mendocino National Forest in 2011. Three sites raided in Humboldt County in 2013 contained a total of at least 17 pounds of SGAR bait, which researchers estimated was sufficient to kill 2,753 woodrats, 14 fishers, or five spotted owls (Humboldt County Sheriff's Office press release). Other pesticides, such as organochlorine, organophosphate, and carbamate insecticides, some of which are banned in the U.S., are also frequently found at illegal outdoor marijuana grow sites (HSVTC 2012, Thompson et al. 2014). Pesticides are often applied along with large quantities of fertilizer at the base of marijuana plants grown outdoors (Thompson et al. 2014), suggesting that marijuana and surrounding plants may be taking up pesticidal compounds from the soil. If this occurs, then rodents and insects may accumulate pesticides through consumption of plants as well as pesticidal bait. Investigation of pathways of pesticide exposure for the marten, as well as levels of exposure and potential physiological, behavioral, and population impacts, is needed.

In summary, the potential impacts of toxic exposure on the precariously small Humboldt marten population in California is a present and ever-increasing threat. The explosion of outdoor marijuana growing and the associated use of toxic chemicals for pest suppression serve as yet another indicator that listing of the Humboldt marten under CESA is warranted.

(c) Climate Change

The Humboldt marten is threatened by global climate change. Currently the climate in Humboldt marten habitat is characterized by moderate temperatures, high annual precipitation, and summer fog which support dense and continuous tree and shrub cover (Slauson et al. 2007). A change in any of these parameters resulting from climate change would threaten the survival of the Humboldt marten. As described in the Species Report:

> Increased temperatures and decreased rainfall projected by climate change models within the analysis area in the short-term future (approximately 40–50 years) may result in loss, degradation, or fragmentation of suitable coastal marten habitat. Potential direct impacts to suitable coastal marten habitat include conversion of suitable forest types (i.e., moist coniferous or mixed conifer-hardwood forests) to unsuitable (for coastal martens) forest types, such as hardwood forests, and loss of the mesic, shade-tolerant shrub layer required by the coastal marten. Potential indirect impacts of climate change include the creation of an open understory due to the loss of the mesic shrub

> understory mentioned above, which is preferred by coastal marten predators such as gray fox and bobcat, and thus may increase predation rates. Another potential indirect impact of climate change is the effect of a warmer and drier climate on the frequency, size, and severity of future wildfires potentially resulting in the loss, degradation, or fragmentation of suitable habitat and possibly direct mortality of coastal martens when severe wildfires burn through extant population areas; especially the SCO_EPA and CA_EPA where fire frequency, size, and intensity are currently a stressor on coastal marten populations. As mentioned above, coastal marten populations are already small and isolated and suitable habitat is already fragmented and greatly reduced from historical levels. Therefore, further habitat loss, degradation, or fragmentation from climate change could threaten the future viability of coastal marten populations and reduce the likelihood of reestablishing connectivity between extant populations. (USFWS 2015, at p. 57).

Climate change is therefore a threat to the conservation of the Humboldt marten.

IX. Degree and Immediacy of Threat

The entire Humboldt marten population is extremely low; less than 50 individuals are believed left in California and an unknown, but presumed small and declining number, remain in Oregon. Population size is the best predictor of extinction probability. It is likely that the extant populations of Humboldt marten are below the population size needed to maintain long-term population viability, especially considering each population is reproductively isolated. Populations of at least several hundred reproductive individuals are needed to ensure the long-term viability of vertebrates with several thousand individuals being a desirable goal for many vertebrate species (Primack 1993, pp. 335–336). For a mammal their size, martens have low reproductive rates suggesting a slow recovery from population-level impacts (Buskirk and Ruggiero 1994, p. 16).

The precariously small size of the population of the Humboldt marten is a significant and immediate threat to the survival and conservation of the species. Small isolated populations are inherently vulnerable to extinction for the following four main reasons: (1) genetic problems due to loss of genetic variability, inbreeding, loss of heterozygosity, and genetic drift; (2) demographic fluctuations due to random variations in birth and death rates; (3) environmental fluctuations due to variation in predation, competition, disease, and food supply; and (4) natural disturbances resulting from single events that occur at irregular intervals, such as fires, storms, or droughts (Primack 1993, p. 255). The smaller a population becomes the more likely the factors described above in section VIII will individually or cumulatively reduce the population size even more and drive the population to extinction (Primack 1993, p. 274).

Slauson et al. (2009a) found that the probability of extinction for the Humboldt marten in their study area was higher than the probability of colonization, and that conservation actions to benefit the remnant population are therefore needed <u>immediately</u>. Conservation actions based solely on measures to maintain current habitat conditions for the Humboldt marten will not ensure its long-term persistence (Slauson 2003, p. 71). Given the marten's extremely small population size in California, its isolation from other populations in Oregon, its declining population status, limited range, and the variety and magnitude of threats to its continued survival, it clearly warrants CESA protection. The protection provided under CESA is necessary to prevent the Humboldt marten's extinction in California. *California Forestry Assn. v. California Fish & Game Commission* (2007) 156 Cal.App.4th 1535, 1551 ("the term "range"

as used in [CESA] refers to a species' California range").

X. Impact of Existing Management Efforts

There are currently no species-specific protective measures or management plans for the Humboldt marten. The lack of adequate protections and appropriate management planning is a primary reason why the Humboldt marten is under threat, and therefore warrants listing under CESA. Information on species and land management activities that are impacting populations of the Humboldt marten, including land classifications and uses within the range of the marten are described in the Inadequacy of Regulatory Mechanisms section, as are protective measures being taken.

Current research on the Humboldt marten is ongoing through the multi-stakeholder Humboldt marten Conservation Group, which includes independent researchers, the U.S. Fish and Wildlife Service, the Forest Service, Tribes, and Green Diamond Resource Company. To date, there is not any formal report, or other document that has been made publically available as a result of the Conservation Group's activities.

XI. Suggestions for Future Management

Hamlin et al. (2010) collected and synthesized the primary components of a conservation and management strategy for the Humboldt marten:

- Maintain all currently occupied habitat.
- Restore habitat to increase and reconnect suitable habitat patches in the vicinity of the known population (Slauson and Zielinski 2004, p. 63).
- Increase the overall size of suitable patches toward the mean size of 447 ac (181 ha) (Slauson et al. 2007, p. 466).
- Restore functional landscape connectivity to enable recolonization of suitable, but currently unoccupied habitat (Slauson and Zielinski 2003, p. 13) and establish connectivity with habitat corridors between populations.
- Establish high priority restoration areas that enlarge small suitable patches, such as late-successional conifer-dominated stands and serpentine stands with dense shrub cover, so that they exceed the minimum patch size occupied by martens [greater than 205 ac (83 ha)]. This will reconnect suitable patches currently separated by unsuitable habitat.
- Restore or maintain dense, productive shrub layers and reduce road densities in the short-term and accelerate development of late-successional stand conditions, such as large diameter live trees, multilayered canopy, and large snags and logs over the long-term (Slauson et al. 2007, p. 466).
- Develop specific stand recommendations to manage early-seral conifer stands with lower tree densities to encourage maintenance of a productive shrub layer and increase tree growth rates (Slauson 2003, p. 71).
- Protect currently suitable resting and denning structures and plan for the future recruitment of new structures (Slauson and Zielinski 2009, p. 43).
- Establish additional populations within the historical range.

XII. Availability and Sources of Information

Literature cited in this petition is listed below. A disk with many of the critical documents cited will be send via U.S. Mail to the Commission along with a paper copy of the petition.

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XIII. Detailed Distribution Map

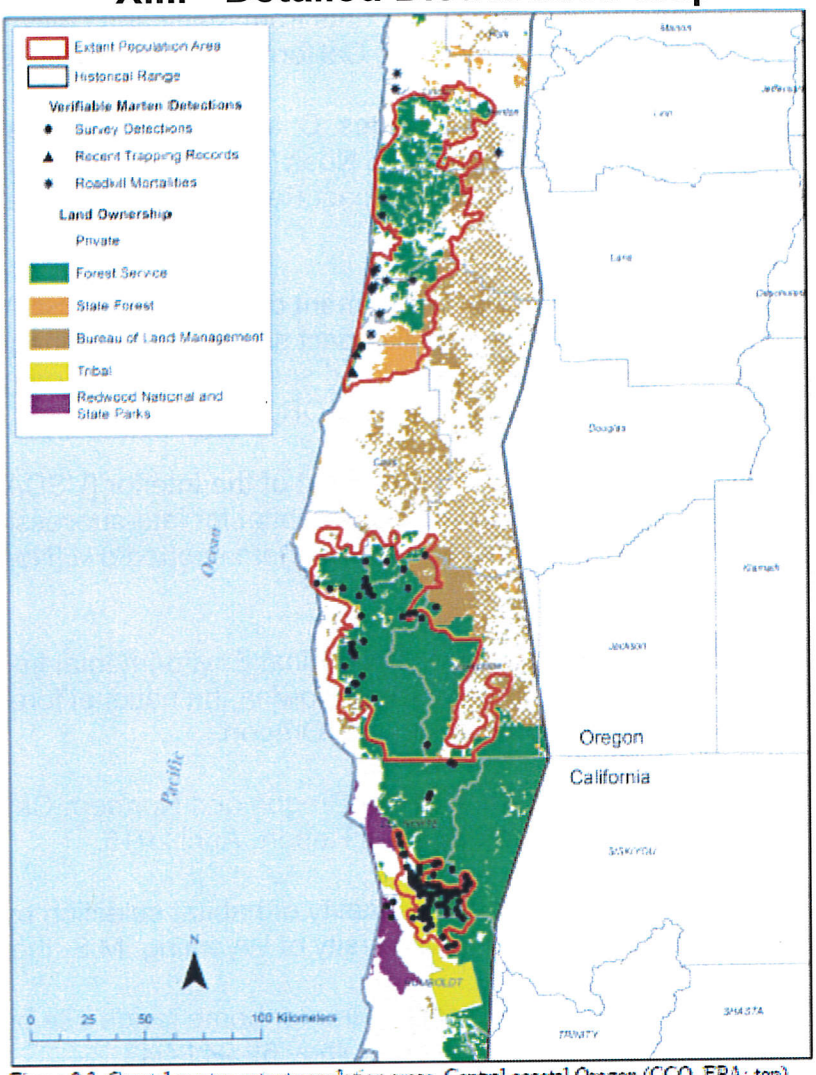

Figure 8.3. Coastal marten extant population areas. Central coastal Oregon (CCO_EPA; top), southern coastal Oregon (SCO_EPA; middle), and northern coastal California (CA_EPA; bottom).

State of California
Natural Resources Agency
Department of Fish and Wildlife

REPORT TO THE FISH AND GAME COMMISSION

EVALUATION OF THE PETITION FROM THE ENVIRONMENTAL PROTECTION INFORMATION CENTER AND THE CENTER FOR BIOLOGICAL DIVERSITY TO LIST THE HUMBOLDT MARTEN (*MARTES CAURINA HUMBOLDTENSIS*) AS ENDANGERED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT

Keith Slauson photo used with permission

Prepared by
California Department of Fish and Wildlife

October 13, 2015

I. Executive Summary

The Environmental Protection Information Center (EPIC) and the Center for Biological Diversity (CBD, collectively Petitioners) submitted a petition (Petition) to the Fish and Game Commission (Commission) to list the Humboldt marten (*Martes caurina humboldtensis*) as endangered pursuant to the California Endangered Species Act (CESA)(Fish & G. Code, § 2050, et seq.).

Pursuant to Fish and Game Code Section 2073.5 and Section 670.1 of Title 14 of the California Code of Regulations, the Department of Fish and Wildlife (Department) has prepared this evaluation report for the Humboldt marten petition (Petition Evaluation). The Petition Evaluation is an evaluation of the scientific information discussed and cited in the Petition in relation to other relevant and available scientific information possessed by the Department during the evaluation period. The Department's recommendation as to whether to make Humboldt marten a candidate for listing under CESA is based on an assessment of whether the scientific information in the Petition is sufficient under the criteria prescribed by CESA to determine that listing of the Humboldt marten may be warranted.

In completing its Petition Evaluation, the Department has determined there is sufficient scientific information to indicate that the petitioned action may be warranted. Therefore, the Department recommends the Commission accept the Petition for further consideration under CESA.

After reviewing the Petition and other relevant information, the Department makes the following findings:

I. Population Trend. The population of Humboldt martens in California has declined from an unknown "fairly numerous" number in the early 20th century to a present population which likely numbers less than 100 individuals.

II. Range. The Petition and other available information indicate the Humboldt marten's range in California is substantially reduced from its historical extent.

III. Distribution. Humboldt martens are unevenly distributed within the bounds of their California range. Whether changes in distribution have occurred over time is unknown.

IV. Abundance. Information in the Petition and other information available to the Department indicate that historically martens were far more abundant than they are today.

V. Life History. The Petition contains sufficient information on the relevant life history traits of Humboldt marten.

VI. Kind of Habitat Necessary for Survival. The Petition and other information available to the Department indicate that Humboldt martens are dependent on specialized habitats for their survival and reproduction, and those habitats are limited on the landscape.

VII. Factors Affecting the Ability to Survive and Reproduce. The Petition contains sufficient information to conclude that Humboldt martens are subject to a variety of threats that have the potential to adversely affect their ability to survive and reproduce.

VIII. Degree and Immediacy of Threat. The Petition contains sufficient information to conclude the degree and immediacy of some threats have the potential to adversely affect Humboldt martens at the population level.

IX. Impacts of Existing Management. The Petition contains sufficient information to conclude that existing management efforts alone are unlikely to maintain a self-sustaining population of Humboldt martens in California.

X. Suggestions for Future Management. The Petition contains sufficient information to conclude that additional management efforts may be necessary to maintain a self-sustaining population of Humboldt martens in California.

II. Introduction

A. Candidacy Evaluation

CESA sets forth a two-step process for listing a species as endangered. First, the Commission determines whether a species is a candidate for listing by determining whether "the petition provides sufficient information to indicate that the petitioned action may be warranted." (Fish & G. Code, § 2074.2, subd. (a)(2).) Within 10 days of receipt of a petition, the Commission must refer the petition to the Department for evaluation (Fish & G. Code, § 2073.) The Commission must also publish notice of receipt of the petition in the California Regulatory Notice Register. (Fish & G. Code, § 2073.3, subd. (a).) Within 90 days of receipt of the petition, the Department must evaluate the petition on its face and in relation to other relevant scientific information and submit to the Commission a written evaluation report with one of the following recommendations (Fish & G. Code, § 2073.5, subd. (a)(1)-(2)):

- Based upon the information contained in the petition, there is not sufficient information to indicate that the petitioned action may be warranted, and the petition should be rejected; or
- Based upon the information contained in the petition, there is sufficient information to indicate that the petitioned action may be warranted, and the petition should be accepted and considered.

If the petition is accepted for consideration, the second step requires the Commission to determine, after a year-long review of the subject species based on the best scientific information available to the Department, whether listing as endangered is or is not actually warranted. (Fish & G. Code, § 2074.6, subd. (a) and 2075.5.)

In *Center for Biological Diversity v. California Fish and Game Commission* (2008) 166 Cal.App.4th 597, the California Court of Appeals addressed the parameters of the Commission's discretion in its application of the threshold candidacy test. The court began its discussion by describing the candidacy test previously set forth in *Natural Resources Defense Council v. California Fish and Game Commission* (1994) 28 Cal.App.4th 1104, 1114:

> As we explained in *Natural Resources Defense Council* [citation], "the term 'sufficient information' in section 2074.2 means that amount of information, when considered

> with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted." The phrase "may be warranted" "is appropriately characterized as a 'substantial possibility that listing could occur.'" "Substantial possibility," in turn, means something more than the one-sided "reasonable possibility" test for an environmental impact report but does not require that listing be more likely than not.

(*Center for Biological Diversity*, at pp. 609-610.) The court acknowledged that "the Commission is the finder of fact in the first instance in evaluating the information in the record." (*Id.* at p. 611.) However, the court clarified:

> [T]he standard, at this threshold in the listing process, requires only that a substantial possibility of listing could be found by an objective, reasonable person. The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department[.] (*Ibid*.)

B. <u>Petition History</u>

On June 8, 2015, the California Fish and Game Commission received Petitioners' Petition to list Humboldt marten as endangered under CESA. On June 18, 2015, the Commission referred the Petition to the Department for evaluation. The Department requested of the Commission, and was granted, a 30-day extension to the 90-day Petition evaluation period. This is the first time the Humboldt marten has been petition for listing under CESA.

The Humboldt marten was petitioned for listing under the federal Endangered Species Act (ESA) by the same Petitioners in 2010. In April 2015 the United States Fish and Wildlife Service (USFWS) found that listing the coastal distinct population segment (DPS) of the Pacific marten as threatened or endangered under the ESA was not warranted (80 FR 18742). Importantly, the USFWS evaluated coastal Oregon populations of Pacific marten (*Martes caurina caurina*) and the California Humboldt marten population collectively as one DPS when making its determination.

The Department evaluated the sufficiency of the scientific information presented in the Petition it received, using information in the Petition as well as other relevant scientific information available at the time of review. Pursuant to Fish and Game Code section 2072.3 and Section 670.1(d)(1) of Title 14 of the California Code of Regulations, the Department evaluated whether the Petition includes sufficient scientific information regarding each of the following petition components:

- Population trend;

- Range;
- Distribution;
- Abundance;
- Life history;
- Kind of habitat necessary for survival;
- Factors affecting ability to survive and reproduce;
- Degree and immediacy of threat;
- Impacts of existing management;
- Suggestions for future management;
- Availability and sources of information; and
- A detailed distribution map.

C. Humboldt Marten Description and Ecology

The Humboldt marten is a carnivorous mammal (order Carnivora, family Mustelidae), classified as a subspecies of Pacific marten (*Martes caurina*), a species occurring west of the Rocky Mountain Divide which was recently split from the American marten (*Martes americana*, Dawson and Cook 2012). The taxonomy of martens in the Pacific Northwest is currently unsettled, and some recent genetic evidence suggests that Humboldt martens and martens in coastal Oregon currently classified as *M. caurina caurina* are closely related, and should all be classified as Humboldt marten (Slauson et al. 2009a, USFWS 2015 p.5). California is also home to the closely related Sierra marten subspecies (*M. caurina sierrae*), which ranges throughout the Sierra Nevada and northern interior mountains and is not the subject of this Petition (figure 1). Humboldt martens historically occupied the coastal mountains of California from Sonoma County north to the Oregon border from sea level to 915m (3,000 ft.) within 80 km (50 mi.) of the coast, (Grinnell and Dixon 1926, Zielinski et al 2001, USFWS 2015). The current distribution is limited to areas of Humboldt, Del Norte, and Siskiyou Counties, encompassing less than 5% of the probable historical range (figure 1, Slauson et al. 2009b, USFWS 2015).

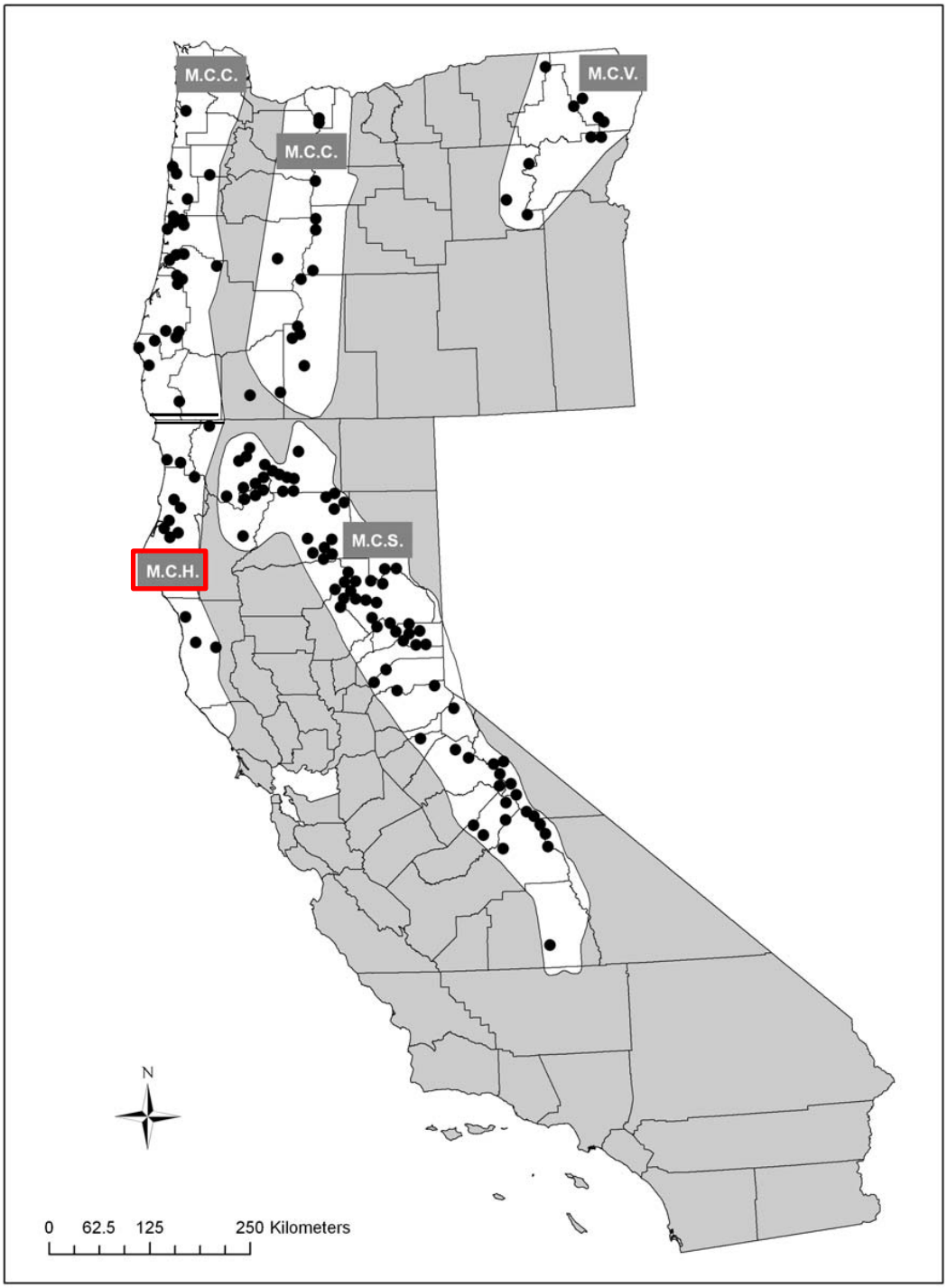

Figure 1. Historical range and distribution of Pacific marten subspecies occurring in Oregon and California. Range boundaries (white polygons) and historical records of occurrence (black circles) are modified from Zielinski et al. (2001, p. 480). Subspecies: *M. c. humboldtensis* (M.C.H.), *M. c. sierrae* (M.C.S.), *M. c. caurina* (M.C.C.), *M. c. vulpina* (M.C.V.). Source: USFWS 2015. Used with permission.

Martens appear elongated and low to the ground as do other members of the weasel family, though larger and stockier than long-tailed weasels (*Mustela frenata*), and with longer tail and body fur than similarly sized minks (*Neovison vison*). Pelage (fur) is brown (varying from yellowish buff to nearly black), with a contrasting lighter patch on the throat and chest. Bushy tails constitute more than 1/3 of the overall body length. Overall body lengths range from 45-70cm (18-28 in.) and weights range from 0.4-1.25 kg (0.88-2.76 lbs.), with males averaging 15% longer than females and up to 65% heavier than females (Powell et al. 2003, Clark et al. 1987). Humboldt martens differ from Sierra marten by having darker, richer golden fur, reduced throat patch, more extensive dark fur on feet, legs, and tail, smaller skulls, narrower faces (rostra), and differences in dentition (Grinnell and Dixon 1926, Grinnell et al. 1937, USFWS 2015).

North American martens are polygamists, with females producing their first litter at around 24 months of age (Markley and Basset 1942). Parturition typically occurs in March or April, with litters averaging 2-3 kits (Strickland et al. 1982). Marten young begin dispersing from their natal range as early as August, and may continue through the following summer (USFWS 2015). The average dispersal distance of North American martens is typically short, less than 15km (9.3 mi., Ibid.). The number of kits that survive to reproductive age is unknown. In California, Pacific martens seldom survive longer than 5 years in the wild (USFWS 2015). Martens are intrasexually territorial (i.e. adults exclude members of the same sex from their territories, but not members of the opposite sex, Powell et al. 2003), with marten home ranges in the Sierra Nevada varying from 170 - 733 ha (420 - 1,811 ac.) for males and from 70 - 580 ha (173 - 1,433 ac.) for females (Buskirk and Zielinski 1997). The limited available information on Humboldt marten home ranges suggests they are similar in size to Sierra marten home ranges (USFWS 2015).

Humboldt marten are strongly associated with two distinct habitat types: late successional conifer stands with dense shrub layers where abundant live and dead standing and downed tree structures are used for resting, denning, and escape cover; and serpentine soil communities of various seral stages with variable tree cover, dense shrubs, and rock piles and rock outcrops used for resting, denning, and escape cover. Large patches of late successional conifer forests or serpentine soil formations appear to be necessary for Humboldt marten occupancy (Slauson et al. 2007). The diet of Humboldt martens consists primarily of small mammals, berries, birds, insects and reptiles. Chipmunks (*Tamias spp.*), red-backed voles (*Myodes californicus*), Douglas's squirrels (*Tamiasciurus douglasii*) and flying squirrels (*Glaucomys sabrinus*) constitute 85 percent of the mammalian biomass in the diet during the summer and fall. Diets shift seasonally, with berries consumed more frequently in the summer and fall (Slauson et al. 2007).

Known predators of martens in western North America include coyote (*Canis latrans*), red fox (*Vulpes vulpes*), bobcat (*Felis rufus*), and great horned owl (*Bubo virginianus*). Fishers are also known to kill martens, and the distribution of fisher populations may limit the distribution of marten (USFWS 2015, Krohn et al. 2004).

II. Sufficiency of Scientific Information to Indicate the Petitioned Action May Be Warranted

A. Population Trend (pp. 4-5)

1. Scientific Information in the Petition

The Petition states that Humboldt martens were historically common, but had become so rare by the late 1990's that some believed the subspecies was extinct before they were detected again in 1996, and no verifiable detection records of Humboldt martens have been found for the period of 1945-1995 (citing Slauson et al. 2001, "Kucera et al. 1995" which is not listed in the literature cited section of the Petition but appears to refer to Kucera and Zielinski 1995 based on content, Zielinski and Golightly 1996, Slauson et al. 2009b, Slauson and Zielinski 2004). The Petition states that the extant population in California is likely less than 100 individuals and the population appears to have declined by over 40% over the period of 2000-2008, and then remained unchanged during the period of 2008-2012 (citing Slauson and Zielinski 2009, but based on content presumably referring to Slauson et al. 2009b and USFWS 2015). Additionally, the Petition states the size of the coastal population of martens in Oregon is unknown, but believed to be small. The Petition also references USFWS (2015) which notes that experts have serious concerns about the viability of the three extant populations of coastal martens (two in Oregon and one in California, citing Slauson et al. 2009a). The Petition further indicates that Kucera (1998) reported concern for Humboldt marten based in part on severe population declines, and Slauson et al. (2009b) expressed concern for the viability of coastal marten populations due to small population size, population isolation, and ongoing threats.

2. Other Relevant Scientific Information

In addition to the sources cited in the Petition, Grinnell et al. (1937) stated that Humboldt martens were "fairly numerous" in "earlier years" (p. 209), however, apparent declines in the Humboldt marten population, at least locally, were noted as early as the 1920s (pp. 209-210). Grinnell et al. (1937) report a tale of one trapper capturing 50 Humboldt martens in a single winter. Although it is impossible to quantify the statement that the species was once "fairly numerous", one can reasonably infer that the number of martens present at that time was larger than the population present in the 1990s when no detections of the species had been recorded for the previous 50 years (Zielinski and Golightly 1996).

3. Conclusion

The Petitioners cite relevant literature regarding the population trend of Humboldt martens in California. While no quantitative data exist regarding the population in the era of European American settlement, qualitative statements suggest the species was not uncommon (Grinnell et al. 1937). The Petitioners reference and accurately represent the findings and conclusions of the only known rigorous

quantitative estimate of the species' population in California derived from occupancy rates (i.e. Slauson et al. 2009b) which found a significant decline in occupancy between the 2000 -2001 field season and the 2008 season. This resulted in an estimate of less than 100 martens in northwestern California. Based upon the Petition and other information available to the Department, it appears the population of Humboldt marten in California has declined from an unknown "fairly numerous" number in the early 20th century to a present population estimate of fewer than 100 individuals.

B. Range and Distribution (pp. 6-7)

1. Scientific Information in the Petition

The Petition describes the historical range of Humboldt marten in California as coastal forests from Sonoma County north to Curry County Oregon (referencing Grinnell et al. 1937, Kucera 1998, and Slauson et al. 2001), and notes records of the species from Colusa, Del Norte, Glenn, Humboldt, Lake, Mendocino, Siskiyou, Tehama, and Trinity Counties from NatureServe (2015). The Petition states that Humboldt martens have been extirpated from 95% of their historic range in California (Slauson et al. 2007), and are now limited to an area approximately 2,273 km^2 (877 mi^2) (Petitioners state the estimate is based on analysis of Slauson et al 2009c data, however it appears the estimate was based on Slauson et al. 2009a).

2. Other Relevant Scientific Information

The Department possesses historical records of Humboldt marten from Del Norte, Humboldt, Siskiyou, Trinity, Tehama, Mendocino, Lake, Colusa, and Glenn Counties (California Natural Diversity Database [CNDDB] query August 8, 2015, fig. 2). Colusa and Glenn Counties are included due to a single record attributed to Snow Mountain near where Colusa, Glenn, and Lake Counties intersect. There are some experts who question whether the Humboldt marten historically occurred in Lake County because historical records from the area are attributed to trapper reports which are known to sometimes refer to the locations of the trapper's camps rather than the locations animals were taken, and because the habitat in Lake County today is dissimilar to the habitat known to be occupied by Humboldt marten in northwestern California (Slauson and Zielinski 2007, Greg Schmidt pers. comm. 7/23/15, USFWS 2015). However, trappers interviewed by Twining and Hensley (1947) reported that martens had formerly been taken as far south as Hull Mountain in northern Lake County and Fort Ross in Mendocino County, suggesting that historical records from this area may be accurate. All historical CNDDB observation records appear to be less than 100 km (<60 mi.) from the coast. The historical range described by Grinnell et al. (1937) was roughly 22,000 km^2 (8,500 mi^2), although not all of the habitat within the bounds of the historical range would have been suitable or occupied. Within the historical range, the distribution of marten record locations is uneven, with concentrations of records from northern Lake and east-central Mendocino County, an area southeast of Eureka, and near the intersection of Del Norte, Humboldt, and Siskiyou counties (fig. 2). Whether these concentrations reflect the relative density of martens within the range or are artifacts of uneven trapping or survey efforts is unknown. By the 1940s a significant decline in Humboldt marten trapping returns and a retraction of the southern

end of the range had been noted (Twining and Hensley 1947). Zielinski et al. (2001) conducted an exhaustive review of historical coastal marten records including published reports, museum specimens, unpublished notes of naturalists and trappers, and interviews of tribal members and others. Based on their review they concluded that a significant reduction in occupied range has occurred.

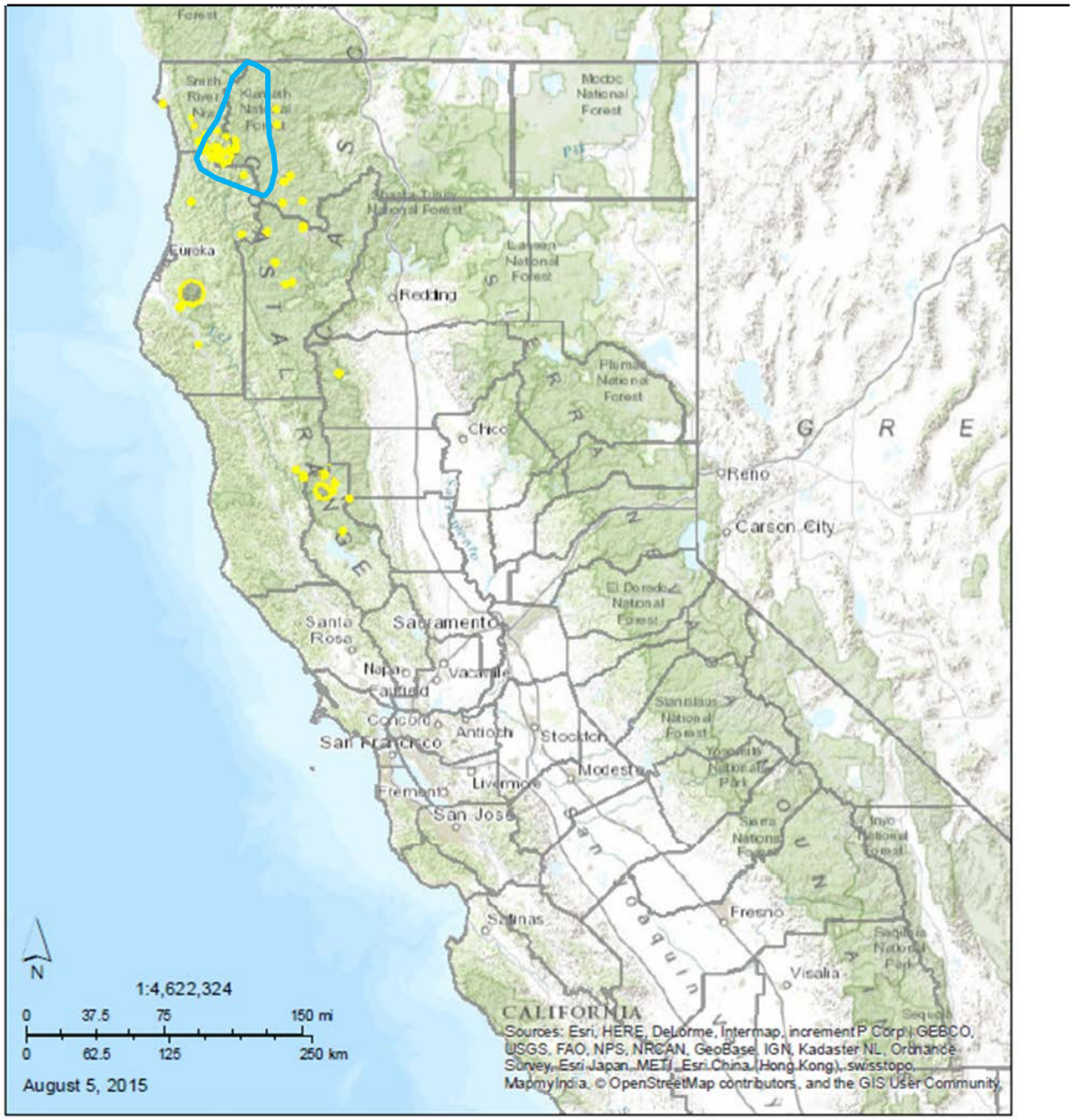

Figure 2. Humboldt marten occurrence records from the California Natural Diversity Database 1889-2004. Blue polygon represents approximate contemporary range in California (Humboldt marten records from database and literature 1995-2015).

The Department is aware of Humboldt marten records only from southern Del Norte, northern Humboldt, and extreme eastern Siskiyou Counties since 1995 (CNDDB query August 8, 2015) despite the fact that surveys during that period covered a much larger portion of the historical range (USFWS 2015). The occupied range (as of year 2008) as circumscribed by a minimum convex polygon drawn around detection locations was recently found to be 627 km^2 (242 mi^2) by Slauson et al. (2009b). Since that time, the known occupied range has expanded slightly with two detections of Humboldt martens in Prairie Creek Redwoods State Park in 2013, a few kilometers from the coast (CDFW 2014). Although there have been recent surveys at over 3,000 locations and 50,000 survey nights, no comprehensive range-wide survey has been conducted for this species (USFWS 2015).

3. Conclusion

Humboldt marten historically ranged from Sonoma County north to the Oregon border within 96 km (60 mi.) of the coast. The size of the historical range described by Grinnell et al. (1937) was roughly 22,000 km^2 (8,500 mi^2), and the area known to be occupied by Humboldt marten in northern California since 1995 is slightly larger than 627 km^2 (242 mi^2, Slauson et al. 2009b). Humboldt martens are distributed unevenly within their range. Based upon the Petition and other information available to the Department, the current range of Humboldt marten in California is clearly substantially reduced from the historical range.

C. <u>Abundance</u> (p. 8))

1. Scientific Information in the Petition

The Petition presents information on the abundance of Humboldt marten in California in a short table listing the estimate of Slauson et al. (2009b) of less than 100 individuals in north coastal California.

2. Other Relevant Scientific Information

The study referenced by the Petitioners is the only known estimate of Humboldt marten abundance in California.

3. Conclusion

The only known estimate of Humboldt marten abundance in California is less than 100 individuals. Historical estimates of abundance do not exist, but anecdotal information on trapping success, and the much larger historical range (Grinnell et al. 1937, Twining and Hensley 1947, Zielinski et al. 2001) could reasonably lead one to conclude that historically martens were more abundant and more widely distributed. Based upon the Petition and other information available to the Department, current abundance of less than 100 individuals leads the Department to conclude that listing marten may be warranted.

D. Life History (pp. 9-13)

1. Scientific Information in the Petition

The Petition describes the physical appearance of Humboldt martens and the morphological differences between Humboldt martens and the Sierran subspecies of martens. The Petition then describes the current accepted taxonomy of Humboldt marten (*M. caurina humboldtensis*) and the results of recent genetic investigations that found both Humboldt martens and martens in coastal Oregon (currently classified *as M. Caurina caurina*) shared unique genetic signatures, suggesting Humboldt martens and coastal Oregon martens share an evolutional lineage, and calling into question the separation of the two subspecies (Slauson et al. 2009a, USFWS 2015).

In describing the life history of Humboldt martens the Petitioners emphasize the traits that limit martens' (all North American marten species) ability to quickly repopulate following a population decline: late sexual maturity (24 months to first litter [Strickland et al. 1982]), low pregnancy rates during times of environmental stress (as low as 50% [Thompson and Colgan 1987]), a single litter per year (Calder 1984), small litter size (ranging from 1-5, averaging 2.85 [Strickland and Douglas 1987]), and relatively low population densities for an animal or their size (Buskirk and Ruggierro 1994, Kucera 1998). Reproductive cycle and longevity are then described in detail.

Home range size and composition are described as well as the relationship between habitat quality and home range size. The Petitioners, citing USFWS (2015), described the strong habitat selection exhibited by martens at the home range scale, with Pacific and American marten home ranges typically including 70% or more late successional forest habitat. The Petitioners note an inverse relationship between habitat quality and home range size, with the largest Pacific marten home ranges in California and Oregon occupying the most intensively logged landscapes (USFWS 2015).

2. Other Relevant Scientific Information

See life history information under Section I above.

3. Conclusion

The Petition accurately describes the appearance of Humboldt martens (see section I of this report for description), and the current taxonomic understanding of the subspecies. The reproductive biology of martens is well described and supported by appropriate literature. Home range size and composition is also accurately described and referenced.

E. Kind of Habitat Necessary for Survival (pp. 13-16)

1. Scientific Information in the Petition

The Petition emphasizes the highly habitat-specific nature of North American martens and their vulnerability to habitat loss and degradation (citing Harris 1984, Buskirk and Ruggiero 1994, Slauson 2003). Petitioners describe the strong association of martens to closed-canopy old-growth forests with complex structure near the ground (Buskirk and Powell 1994, Buskirk and Ruggiero 1994, Bull et al. 2005), the avoidance of young forests and open areas (Drew 1995, Buskirk and Ruggiero 1994, Slauson et al. 2007), and unwillingness to cross large areas with low canopy closure (Hargis and McCullough 1984, Bissonette and Sherburne 1993, Thompson and Harestad 1994, Hargis et al. 1999). The Petition describes the preference of martens for unlogged, old-growth stands with high canopy cover, multiple canopy layers, and high tree and log densities over harvested stands, early seral stages, and stands with few dead trees (citing Spencer et al 1983, Buskirk and Ruggiero 1994, Raphael and Jones 1997, Bull et al. 2005, and others). Regarding Humboldt martens specifically, the Petition quotes Slauson et al. (2003): "The [Humboldt] marten does not occur in extensively logged redwood forests and currently only occurs in conifer-dominated, late-mature and old-growth forests with dense shrub cover or near-coast serpentine communities with dense shrub cover."

The Petition describes three types of coastal conifer forest used by Humboldt marten in California: Old-growth Douglas-fir forests, mixed conifer forests on serpentine soils, and old-growth redwood forests (Slauson 2003, Slauson and Holden 2009). Serpentine soils are described as sites where the mineral composition of the soil creates a harsh growing environment for most plants and results in open, rocky sites with stunted trees (citing Slauson et al. 2007). The Petition further states that in both serpentine soil forests and non-serpentine soil forests, Humboldt martens occupy large areas of dense shrub cover associated with older forest habitats, and are not associated with shrub species that occur in areas of clear cuts and regrowth (Slauson et al. 2007).

The Petition states that martens select habitat at four spatial scales: microhabitat (resting and denning sites), stand, home range, and landscape, and at all scales there is a strong preference for old-growth habitats (no reference).

The Petitioners' description of Humboldt marten microhabitat associations is excerpted directly from USFWS (2015) with citations omitted. Regarding resting structures, the Petition states that rest structures are used daily by martens to provide thermoregulatory benefits and protection from predators. Rest structures are re-used infrequently, and the type of structures used varies seasonally, so multiple structures are required within a home range. Large diameter trees, snags, and logs are the most frequently used rest structures, with martens typically selecting the largest available structures. Humboldt marten rest structures average 95 cm (37 in.) diameter at breast height (dbh) for snags and 88 cm (35 in.) diameter at the larger end for logs. Live trees averaged 94cm (37 in.) dbh. Within these structures, martens typically use cavities, platforms, or chambers created within log piles or rock outcrops. The Petition states there are two types of dens used by Humboldt marten: natal dens where kits are born, and maternal dens to which kits are later moved. Pacific and American marten den site selection appears to be based on the characteristics of the structure as well as the surrounding stand, with females likely selecting for den sites in proximity to quality foraging sites. Cavities within large

trees and snags are most commonly used by denning Pacific and American martens. Three maternal dens from California Humboldt marten have been described, but no natal dens. Two dens were in cavities within the broken tops of a 66 cm (26 in.) dbh golden chinquapin (*Chrysolepis chrysophylla*) and a 113 cm (45 in.) Douglas-fir, and the third den was in a cavity in a 115 cm (45 in.) dbh Douglas-fir snag. All were located within the same old-growth Douglas-fir dominated riparian stand.

The Petition describes the forest stand scale as an area of several hectares containing the structural features required by martens for resting, denning, foraging and mating; and states that martens prefer old-growth stands (citing Buskirk and Powell 1994, Katnik et al. 1994, and Slauson et al. 2007). The Petition references Bull et al.'s 2005 study in northeastern Oregon where the authors found Pacific martens used stands with 50-74% canopy cover more than stands with <50% canopy cover, used stands with more canopy layers than in unused stands, used stands with a greater distance to forest openings more than stands with a shorter distance to openings, and used stands with higher densities of snags, logs, and large trees than unused stands. Additionally, Bull et al. (2005) found that martens used stands with no timber harvesting history more often than stands with any harvesting history, and that martens used stands with harvesting history less than expected based on availability. Specifically referring to Humboldt martens in non-serpentine soil stands the Petition states that martens used late successional stands more than expected based on their availability, used late-mature stands similar to availability, and made little use of all other seral stages (citing Slauson et al. 2007), and that earlier seral stages are not likely selected because they lack one or more key structural features (citing Slauson 2003).

At the home range scale the Petition states that Humboldt martens select the largest available patches of old-growth and late-mature, or serpentine habitat (citing Slauson et al. 2007). The Petition refers to Slauson et al.'s (2007) habitat models which found a 19-26% increase in the probability of Humboldt marten occurrence in an old-growth habitat patch for each 20 ha (49 ac.) increase in patch size, and the authors' conclusion that "The best models suggest that home range areas with larger patch sizes of old-growth, old-growth plus late-mature, or serpentine habitat within a 1-km radius of each sample unit are important for marten occurrence. Martens disproportionately used sample units within these largest patch sizes." The Petition also relates Slauson et al.'s (2007) finding that mixed-scale models which consider both the stand and home range scales explained Humboldt marten occurrence better than single scale models. The Petition then states that, because Humboldt martens are negatively associated with logging activities at the microhabitat, stand, and home range scales, logging at the landscape scale (tens to hundreds of km^2) inevitably negatively influences marten occurrence as well.

At the landscape scale, the Petition states loss and fragmentation of mature forest constrain marten movement and demography (Bissonette et al. 1989 [does not appear in Petition literature cited], Frederickson 1990, Phillips 1994, Chapin 1995, Chapin et al. 1998, Hargis 1996 [does not appear in Petition literature cited], Slauson 2003), and martens avoid landscapes where 25-30% of mature forest has been lost (Bisonette et al. 1989, Hargis et al. 1999 [does not appear in Petition literature cited], Potvin et al. 1999, Slauson 2003). The Petition states that fragmented forests and small patches of old-growth do not ensure the long term viability of marten populations. Citing Slauson et al. (2009b), the

Petition states that although Humboldt martens occasionally occupy old-growth forest patches <50ha (124 ac.), occupancy is stable only in larger patches. Further, Slauson et al. (2009b) found declines in sample unit marten occupancy from 2000 -2001 to 2008 in units with highly fragmented old-growth and in serpentine soil areas. The authors calculated that a 30 ha (74 ac.) increase in the amount of old-growth in a sample unit resulted in a 37% decrease in the probability of extinction in that unit. The Petition includes an excerpt from USFWS (2015) which emphasizes the high sensitivity of American and Pacific martens to landscape scale habitat loss and fragmentation created by timber harvesting, and the fact that habitat loss and fragmentation effectively lowers the number of marten home ranges a landscape can support. The Petition's landscape habitat associations section concludes with the statement that patches of suitable habitat in highly fragmented forests may be effectively unavailable to martens if martens cannot cross open areas to reach them. Therefore fragmented landscapes have a lower marten carrying capacity (citing Buskirk and Powell 1994, Thompson and Harestad 1994).

2. Other Relevant Scientific Information

The Petitioners' description of American and Pacific marten preferred habitat types are generally accurate. The term "old-growth" used by the Petitioners can be imprecise. Slauson (2003) uses the term in reference to specific structural attributes of Douglas-fir (*Psuedotsuga menziesii*) and tanoak (*Lithocarpus densiflora)* stands, but other cited authors used terms such as "old structure, unlogged stands" (Bull et al. 2005), and "late successional stands" (Buskirk and Ruggiero 1994) rather than old growth to describe stands favored by martens. Important structural features of these old forests stands, whether termed "old-growth," late successional," or "late seral," include: multiple canopy layers including different tree species , canopy openings which allow the development of dense vegetation on the forest floor, the presence of snags and coarse woody debris on the ground, and the absence of major stand-altering disturbance by humans (Bolsinger and Waddell 1993).

The Petition quotes Slauson et al. (2003), which in turn references Slauson (2003) which was in press at that time. The published version of Slauson (2003) does not contain as strong of a statement about Humboldt marten "only" using late-mature and old-growth forests, and in fact includes reference to marten use of three earlier seral stage stands where structural diversity was present (two were pole sized stands with heavy shrub cover adjacent to old growth stands, and one was a mid seral stand with a large component of larger trees). Additionally, Slauson (2003) contrasts his findings with Baker's (1992) finding that coastal martens on Vancouver Island, B.C. preferentially selected for 10-40 year old stands and against mature and old growth stands, speculating that one reason for the use of the younger stands in the Vancouver study area was the presence of a great deal of residual large woody structure remaining on the site following timber harvest (e.g. large stumps and logs).

The Petitioners' statement regarding the shrub species Humboldt marten are associated with is incomplete. Slauson et al. (2007) wrote that Humboldt martens favor a shade-tolerant, long-lived, mast producing shrub community composed of salal (*Gaultheria shallon*), huckleberry (*Vaccinium spp*.), rhododendron (*Rhododendron macrophyllum*), shrub oak (*Quercus vaccinifolia*), and tanoak, and noted

that this community does not include the shade-intolerant, short lived species such as *Ceanothus spp*. shrubs that occupy more xeric (dry) sites, and dominate sites following logging and other disturbances.

The Petitioners' discussion of microhabitat use is directly excerpted from USFWS 2015, however the three Humboldt marten maternal dens described were all used by the same female in the same year (Slauson and Zielinski 2009). Whether the habitats selected reflect the availability of structures and stands within her territory or her preferences as an individual, or whether they reflect the preferences of all Humboldt martens is impossible to discern. The discussion of Humboldt marten stand scale habitat use referred to a disproportionate use of late-successional stands while the authors (Slauson et al. 2007) used the term old-growth rather than late-successional. The Petitioners' discussion of Slauson et al.'s (2007) Humboldt marten habitat modeling emphasizes forest seral stage and old-growth patch size. Slauson et al.'s (2007) habitat modeling identified percent shrub cover as the most important predictor of Humboldt marten occurrence in both the stand scale and mixed stand and home range scale models.

The Petitioners' statement that logging at the landscape scale inevitably negatively influences marten occurrence is not supported by references. It is unclear whether the Petitioners are positing that any logging within the landscape will render the landscape unsuitable to martens, or whether they are stating that logging an entire landscape would be detrimental to marten. The latter is a logical conclusion based on scientific evidence, the former is not supported by the literature. Whether or not Humboldt martens can occur within a matrix of logged and unlogged habitat patches has not been directly addressed by any information source available to the Department, and would likely depend on the spatial scale, arrangement, and intensity of the logging. In the Petitioners' discussion of landscape scale habitat loss and fragmentation, many of the references cited are from studies of American and Pacific martens in other parts of North America, for example: Frederickson (1990) in Newfoundland, Phillips (1994) in Maine, and Potvin et al. (1999) in Quebec. Slauson (2003) references these studies, but makes no direct statement about constraint of Humboldt marten movement or demography due to landscape patterns.

3. Conclusion

The Petitioners' description of Humboldt marten habitat at the microhabitat, stand, home range, and landscape scales is generally accurate and well supported by literature. Although it is necessary to include references to other North American marten species and subspecies habitat associations due to the paucity of literature on the Humboldt marten subspecies, it is not always clear in the Petition when Humboldt martens specifically are being discussed, or whether information from martens in distant ecosystems (e.g. eastern deciduous forests) can be extrapolated to Humboldt martens. Additionally the critical association of Humboldt martens with extensive dense shrub layers is underemphasized.

F. Factors Affecting Ability to Survive and Reproduce (pp. 14-29)

1. Scientific Information in the Petition

The Petition states the Humboldt marten is threatened by all six of the factors that must be examined by the Commission per Title 14 of the California Code of Regulations section 670.1 when considering whether listing a species as threatened or endangered is warranted:

- present or threatened modification or destruction of its habitat;
- overexploitation;
- predation;
- competition;
- disease;
- other natural events or human-related activities.

Present or Threatened Modification or Destruction of Habitat

Timber Harvest and Logging:

The Petition states that logging threatens Humboldt marten and the species' habitat because it removes the largest and oldest trees available at all habitat scales (citing multiple studies), later noting that the structural features associated with old forests such as large trees, snags, and logs can take >100 years to develop, and little such habitat is expected to regenerate in the next several decades (citing USFWS 20015). The Petition then includes an excerpt from USFWS (2015) which states that the habitat loss and degradation from historical and current logging is the most plausible reason Humboldt marten are absent from much of their historic range, with most of the remaining suitable habitat located on federally owned land (citing Zielinski et al. 2001). The Petitioners go on to state that the majority of coastal forests in private ownership have been logged at least once, primarily by clear-cutting with short rotations of 60-70 years, which creates structurally simplified early seral forests that do not support martens (citing the following references from within Slauson et al. 2007: USDA 1992, Bolsinger and Waddell 1993, Lettman and Campbell 1997, Thornberg et al. 2000). The Petition notes that timber harvesting not only reduces the total amount of late successional forest, it also fragments it into smaller, more isolated patches, providing the example of the Redwood National and State Parks complex containing only three patches of late successional forest >= 2,023 ha (5,000 ac.), with most patches <=40 ha (100 ac., citing USFWS 2015).

Fire Suppression and Salvage Logging:

The Petition states that wildfire can threaten the already small Humboldt marten population by reducing and fragmenting the available habitat (citing Slauson and Zielinski 2004), and notes Slauson (2003) stated that stochastic (random, unpredictable) events such as wildfire present a major challenge to the persistence of Humboldt marten. The Petition states timber harvest and fire suppression exacerbate the threat of wildfire to marten by further fragmenting landscapes. Referencing USFWS (2015) the Petition states that vegetation management activities designed to reduce the risk of wildland fire by removing shrubs, reducing canopy cover, and removing snags and logs potentially negatively effects marten by removing required habitat structures, and removing shrub cover which can reduce prey abundance and improve access for competitors. The Petitioners state that on federal lands salvage

logging and fuels management activities can occur on all land allocation categories except for wilderness areas (Hamlin et al. 2010), and on private lands salvage logging plans are exempt from normal review procedures and automatically approved by the California Department of Forestry and Fire Protection (Cal Fire) through a ministerial process.

Overexploitation

This section of the Petition consists of numerous excerpts from USFWS (2015) and a summary statement that the threat posed to Humboldt marten in California by accidental trapping capture and poaching may be small, but the small, isolated nature of population makes any additional source of mortality significant. Important points from the USFWS excerpts include:

- There have been no studies on the population level effects of coastal marten trapping, but the loss of even a few adult martens, especially when combined with other mortality sources, could reduce the likelihood of long-term population viability.
- Early trapping of Humboldt marten was intensive, with accounts of individual trappers taking 35-50 martens in a single winter. By the early 1900s annual harvest of coastal martens was already declining, prompting Joseph Dixon to call for closing the trapping season in California to prevent an extirpation, however marten harvest continued until a partial closure was enacted in northwestern California in 1946, depleting populations and likely reducing genetic variation within the remaining population (Dixon 1925, Zielinski et al. 2001).
- Currently, trapping marten is illegal in California, though martens may occasionally be trapped inadvertently by trappers targeting other fur bearing species.
- Trapping of coastal martens remains legal in neighboring Oregon, although only three coastal martens were taken in 2013.

Predation

The Petition identifies predation as a major threat to Humboldt marten, stating that predation is the primary source of marten mortality, citing Bull and Heater's (2001) study of Pacific marten in northeastern Oregon which attributed 18 of 22 documented mortalities to predation. The Petition then identifies bobcats (*Lynx rufus*), foxes (*Vulpes* spp.), coyotes (*Canis latrans*), mountain lions (*Puma concolor*), great horned owls (*Bubo virginianus*), goshawks (*Accipiter gentilis*), and Pacific fishers (*Pekania pennanti*) as marten predators (citing Buskirk and Ruggiero 1994, Bull and Heater 2001, and Slauson et al. 2009). The Petition notes that habitat degradation and fragmentation caused by logging increases the threat to martens from predation by habitat generalist predators (citing Slauson et al. 2009), and that in redwood forests over the last 80 years fishers and gray foxes (*Urocyon cinereoargentus*) have expanded their ranges into Humboldt marten habitat as martens have declined (citing Slauson and Zielinski 2007b). Citing Slauson and Zielinski (2010, not listed in Petition literature cited) the Petitioners state that roads may facilitate the presence of larger mesocarnivores in the dense shrub habitats preferred by martens. The Petition states that Slauson et al. (2009) found the greatest declines in Humboldt marten sample unit occupancy between 2001 - 2008 in serpentine soil habitats and where old-growth was more fragmented, possibly due to higher predation rates. The Petition notes

that female martens may be more susceptible to predation by other mesocarnivores due to their smaller body sizes (citing Slauson et al. 2009b).

Competition

The Petition states that no data or studies have been produced to assess the impacts of competition between Humboldt marten and other species, but posits that competition for food and space with other predators is currently a limiting factor for the ability of the species to survive and reproduce, and notes that the USFWS (Hamlin et al. 2010) stated that one of the risks to small populations such as the Humboldt marten is environmental fluctuations in food supply.

Disease

The Petition states that although the threat to Humboldt marten from disease has not been studied, disease is a potential threat to Humboldt martens because of their extremely small population size, quoting the USFWS (2015): "The outbreak of a lethal pathogen within one of the three coastal marten populations could result in a rapid reduction in population size and distribution, likely resulting in a reduced probability of population persistence, given the small size of these populations." The Petition lists several diseases American and Pacific marten are known to be susceptible to, including: rabies, plague, distemper, toxoplasmosis, leptospirosis, trichinosis, sarcoptic mange, canine adenovirus, parvovirus, herpes virus, West Nile virus, and Aleutian disease (citing Strickland et al. 1982, Banci 1989, Green et al. 2008, Brown et al. 2008, Zielinski 1984 – not listed in Petition literature cited), and notes Brown et al. (2008) found dead fisher within the range of Humboldt marten had been exposed to canine parvovirus and canine distemper.

Other Natural Events or Human-related Activities

Vehicle Strikes:

The Petition states that vehicle collisions are a significant threat to Humboldt marten, particularly given their small, isolated populations. Citing USFWS (2015), the Petition states that collisions with vehicles are a known source of mortality for coastal martens, and may negatively affect population viability if roadkill mortalities combined with other sources of mortality exceed annual recruitment rates. Additionally, animals damaged by vehicle strikes would likely be more susceptible to other sources of mortality, such as disease, starvation, or predation.

Inadequacy of Existing Regulatory Mechanisms:

The Petitioners state that although Humboldt marten are protected from trapping in California, there are no regulatory mechanisms in place to protect Humboldt marten habitat from logging which could remove, degrade, and fragment habitat to the point that the species is driven to extinction. The Petitioners further state that conservation of the species will require management to enlarge and reconnect suitable habitat patches because merely aiming to maintain current habitat will not assure marten persistence (citing Slauson et al. 2007, Slauson 2003).

The Petition states that the Humboldt marten occurs on federal lands managed by the U.S. Forest Service and the National Park Service, but the Forest Service manages the majority of the marten's

range on the Six Rivers and Klamath National Forests. On Forest Service lands in Region 5 (California), the Humboldt marten is designated as a Sensitive Species and a Priority Species. As a Sensitive Species, management projects subject to the National Environmental Policy Act (NEPA) must analyze impacts to the species; however, there is no requirement to minimize or mitigate impacts to the species. The Petition further states that much of the Humboldt marten's range on National Forest land is managed under the Northwest Forest Plan (USDA and USDI 1994) which manages land according to seven allocations: Congressionally Reserved Areas, Late Successional Reserves, Managed Late Successional Areas, Adaptive Management Areas, Administratively Withdrawn Areas, Riparian Reserves, and Matrix lands. The Petitioners note that Matrix lands units are intended for timber harvest, yet Slauson (2003) detected Humboldt marten on Matrix lands in 8 out of 31 sample units, and 20% of Slauson et al.'s (2007) analysis area was designated as Matrix land available for logging with 16% of the Matrix land already logged. The Petition further states that Late Successional Reserves (LSR) are intended to support viable populations of late successional and old-growth dependent species such as Humboldt martens, however logging is not prohibited in this land allocation class, and not all LSR is currently in a late successional condition, but rather managed to grow into late successional habitat and therefore may not currently provide Humboldt marten habitat. The Petitioners note that 40% of Slauson et al.'s (2007) study area was designated LSR, with martens detected in 13 of 66 sample units in LSR, and 13% of LSR in the marten's range has been logged (Ibid.). The Petition states that the Humboldt marten was given only a 67% likelihood of remaining well distributed within the range of the northern spotted owl (*Strix occidentalis caurina*) by the Northwest Forest Plan scientific analysis team (USDA and USDI 1994), and Slauson et al. (2009b) concluded that the Northwest Forest Plan does not completely protect the extant population, with 38% of the Humboldt marten distribution outside of NWFP reserves.

Based upon an approximated range of Humboldt marten in northern California created by buffering known marten detections with the maximum marten dispersal distance (Petition figure 1, Lindsay Holm pers. comm. 8/21/15), Petitioners estimate that only 14% of the California Humboldt marten range is contained within the Siskiyou Wilderness, which the Petition states is an insufficient percentage to ensure long term survival of the species. The Petition goes on to state that not all of the Wilderness area is composed of vegetation suitable for martens, for example, Slauson (2003) detected marten on only 3 out of 23 sample units located in Wilderness. The Petition notes that the Forest Service also manages the Smith River National Recreation Area (SRNRA) which is not vulnerable to logging. Although Petitioners estimate that the SRNRA makes up 9% of the Humboldt marten's range in California, management of the area prioritizes recreation over wildlife values.

The Petition notes that National Park Service land in the Humboldt marten range includes the Redwood National Parks Complex managed by the National Parks Service and California State Parks, consisting of Redwood National Park, Prairie Creek Redwoods State Park, Jedediah Smith Redwoods State Park, and Del Norte Coast Redwoods State Park. Petitioners estimate that 10% of the California range of Humboldt marten is made up of these parks. The Petitioners state that although a marten was detected in Prairie Creek Redwoods State Park in 2009 (Slauson and Holden 2009), the parks do not support a significant marten population (Slauson et al. 2003), and habitat in the parks is not extensive enough to support a viable population of Humboldt martens and is not currently in optimal condition for martens.

The Petition notes that non-federal lands in California are governed by the California Forest Practice Act of 1973 (Pub. Resources Code, § 4511 et seq.) and associated Forest Practice Rules (FPR)(Cal. Code Regs., tit. 14, § 894 et seq.), and states that there are no regulations within the FPRs that adequately protect Humboldt marten or its habitat. Section 919.16 requires landowners to provide Cal Fire with stand information when late successional forest stands are proposed for harvesting if the harvest will "significantly reduce the amount and distribution of late successional forest stands or their functional wildlife value so that it constitutes a significant adverse impact on the environment", but there are no specified protective or mitigation measures to offset potentially significant impacts. The Petition notes that on nonfederal lands in the Humboldt marten range there are currently no Habitat Conservation Plans, Native Communities Conservation Plans, or Safe Harbor Agreements in place covering the species. Petitioners estimate that approximately one third of the Humboldt marten range in California is owned by Green Diamond Resources Company and managed as industrial timberland. The Petition states that Slauson et al. (2007) estimated 83% of the private land in their study area had been logged, primarily by clear cutting, and detected martens at only 2 of 36 sample units on private lands. The Petitioners conclude that the existing regulatory mechanisms in place on nonfederal lands are do not adequately protect the species or its habitat.

Petitioners estimate that approximately 9% of the California range of Humboldt marten is on the Yurok Reservation, and less than 1% is on Hoopa Reservation. The Petition states that most of the Yurok Reservation is within the Humboldt marten range; however, most of the reservation is in non-tribal ownership, including Green Diamond Resource Company. The Petitioners state that there are no publicly available data on the status of marten on tribal lands so it is unknown what protective measures may be in place.

Toxicant Exposure:

The Petition identifies toxicant exposure as an emerging significant threat to Humboldt marten survival and conservation. It further states that although there have been no studies of the issue specific to Humboldt martens, information from studies of toxicant exposure in other forest carnivores can be extrapolated to martens. The Petition states that Gabriel et al. (2012) recently found that 79% of fishers on forest lands in California tested positive for exposure to anticoagulant rodenticides (ARs), most showing signs of exposure to multiple ARs (range = 1-4 rodenticides, mean = 1.6). The Petition notes that at least six fishers have died from rodenticide poisoning in recent years (Gabriel et al. 2012, Gabriel et al. 2013). The Petitioners state that ARs detected in fishers from northwestern California include brodifacoum, bromodiolone, chlorophacinone, diphacinone, and warfarin; and brodifacoum and bromodiolone are considered second-generation anticoagulant rodenticides which were introduced when rodents developed resistance to first-generation compounds in the 1970s. The Petition states that strong evidence indicates pervasive illegal outdoor marijuana cultivation is the primary source of these ARs in California (citing Gabriel et al. 2012, 2013, Thompson et al. 2014), and additionally, other highly toxic pesticides, some of which are banned in the United States have been found at illegal marijuana grow sites (citing Thompson et al. 2014). The Petition concludes that toxicant exposure is a current and increasing threat to the small Humboldt marten population.

Climate Change:
The Petition states that the Humboldt marten is threatened by global climate change which could change the current climate characterized by moderate temperatures, high annual precipitation, and summer fog which supports dense conifer tree and shrub cover (citing Slauson et al. 2007). The Petition then presents an excerpt from USFWS (2015), summarized below:

> Increased temperatures and decreased precipitation projected in the range of coastal marten over the next 40-50 years may cause the loss, degradation, or fragmentation of suitable coastal marten habitat. Suitable marten habitat (moist conifer and mixed conifer-hardwood forests) may be replaced by unsuitable hardwood forests, and the dense, shade-tolerant shrub layer required by marten may be lost. These vegetation transitions would create conditions more favorable to marten predators such as gray fox and bobcat and increase predation rates. Additionally, climate changes could result in more frequent, larger, higher severity wildfires in the Humboldt marten range, potentially causing marten mortality and destroying, degrading, and fragmenting marten habitat. Such habitat effects could threaten the viability of Humboldt marten populations which are already small and isolated (key references cited for this section in USFWS 2015 include: Pierce et al. 2013, Littell et al. 2013, Cayan et al. 2012, DellaSalla et al. 2013, Johnstone and Dawson 2010, Lawler et al. 2012).

2. Other Relevant Scientific Information

Present or Threatened Modification or Destruction of Habitat
The Petitioners' statements about the strong habitat associations of Humboldt marten are generally accurate and well supported by literature (e.g. Slauson 2003, Slauson et al. 2007). The impacts of logging, forest management, and salvaging logging on the vegetative structure required by marten is likewise well supported by the citations provided by the Petitioners.

Overexploitation
Due, in part to Dixon's (1925) recommendation, marten trapping was banned by the California Fish and Game Commission in 1946 in District 1 ½, which includes Humboldt, Del Norte, and western Siskiyou and Trinity counties (Twining and Hensley 1947). Today trapping of all martens is prohibited throughout the state (CCR Title 14, §460). Although it is possible that Humboldt martens could be inadvertently trapped by trappers pursuing legal furbearers, trapping in California is highly regulated, and trappers must pass a Department examination demonstrating their skills and knowledge of laws and regulations prior to obtaining a license (CFGC §4005). Additionally, only use of live-traps is permitted for commercial and recreational take of fur bearers and trappers are required to check traps daily and release non-target animals (CFGC §3303, §4004). With the passage of Proposition 4 in 1998, body-gripping traps (including snares and leg-hold traps) were banned in California for commercial and recreational trappers (CFGC § 3003.1). Martens incidentally captured by trappers must be immediately released (CFGC § 465.5(f)(1)).

Predation

The Petitioners' references to Slauson and Zielinski (2007b) referring to the gray fox and fisher expanding their distributions into Humboldt marten habitat can be further informed by Slauson et al. (2007, p.466), who stated that the dense ericaceous shrub layer found in occupied Humboldt marten habitat likely excluded larger bodied predators like gray fox and fisher which were rarely detected in their study area yet fairly common in nearby areas where shrub cover has been reduced or fragmented by forestry practices. To expand on the Petitioners' reference to Bull and Heater (2001), the authors attributed 44% of marten predation to bobcats, 22% to raptors (birds of prey), 22% to other martens, and 11% to coyotes. In a study of Humboldt martens begun in 2012, nine martens have been found dead to date, and all nine mortalities were attributed to bobcat predation (USFWS 2015). Additionally, all nine mortalities occurred in the more fragmented serpentine soil forest habitat, suggesting a link between habitat quality and predation rates (Ibid.). Finally, Slauson et al. (2009b) hypothesized that predation was the likely cause of the 42% decline in Humboldt marten occupancy in their study area between 2001 - 2008.

Competition

The Petitioners speculate that competition for food and space with other predators is currently a limiting factor for Humboldt marten populations, however this speculation is not supported by literature. The USFWS coastal marten species report (2015) does not identify competition as a significant stressor on coastal martens. Additionally, species with very specific habitat associations such as Humboldt marten would be expected to use their preferred habitat more efficiently than would habitat generalist species (Ricklefs 1990, p. 742, Zabala et al. 2009).

Disease

Although Strickland et al. (1982, p. 607) found that American martens in their central Ontario study tested positive for toxoplasmosis, Aleutian disease (a carnivore parvovirus), and leptospirosis; none of the diseases was considered to be a significant mortality factor for martens. Similarly, although Zielinski (1984) discovered antibodies to plague (*Yersinia pestis*) in four of 13 Sierra martens in the Sierra Nevada, he noted martens only appear to show transient clinical signs of the disease. Conversely, the Petition underemphasizes the potential threat to Humboldt marten from canine distemper virus which is known to cause high rates of mortality in wild mustelid populations (members of the weasel family which includes fishers and martens), and was found in wild fisher from the Hoopa Reservation within or near the range of Humboldt martens (Williams et al. 1988, Brown et al. 2008, Deem et al. 2000). The USFWS (2015) states that canine distemper has the potential to greatly reduce the size and distribution of one or more of the small extant coastal marten populations.

Other Natural Events or Human-related Activities

Vehicle Strikes:

There have been no recorded roadkill Humboldt martens in California since 1980 (USFWS 2015). Of nine Humboldt marten mortalities detected between 2012-2014 by researchers, none were killed by vehicle collisions. In southern Oregon where 14 roadkill martens have been recorded since 1980, roadkills are not likely to constitute a significant population level impact (USFWS 2015).

Inadequacy of Existing Regulatory Mechanisms:
Humboldt marten range in California likely also extends into the Shasta-Trinity and Siskiyou National Forests. In addition to National Park and U.S. Forest Service federal land ownership, a small percentage of the range is owned and managed by the U.S. Bureau of Land Management. Although not explicitly stated in the Petition, it can be inferred that logging of designated Matrix lands could not only directly remove Humboldt marten habitat, but perhaps more importantly fragment remaining patches of late seral forest rendering them unavailable to dispersing martens.

A small proportion of the Humboldt marten range occurs within the Redwood State and National Parks. Although the General Plan/General Management Plan governing the management of the parks does not identify specific management action for Humboldt marten, 32.6% of the Park lands are managed as primitive zones where no development or facilities construction occurs and visitor use is limited to foot traffic on existing trails. Additionally, 55.4% of the Park lands are managed as backcountry zones where the preservation and restoration of the natural environment is emphasized, and modification of the environment related to visitor use is limited. Where suitable marten habitat exists within these management zones, it is likely maintained and protected from significant modification and degradation (USDI NPS and State Parks 2000, USDI NPS 2000).

The California Forest Practice Rules specify that an objective of forest management is the maintenance of functional wildlife habitat in sufficient condition for continued use by the existing wildlife community within planning watersheds. This language may result in actions on private lands beneficial to martens (Cal Code Regs., Title 14, § 897, subd. (b)(1)(B).). Nevertheless, information about what constitutes the "existing wildlife community" is frequently lacking in timber harvest plans, and specific guidelines to retain habitat for martens are not provided in the Forest Practice Rules. Further, this guidance would at best conserve habitat where Humboldt martens are known to exist, but would not be expected to result in the creation of additional habitat. Habitat suitable for martens may be retained within Watercourse and Lake Protection Zones (Cal. Code Regs., tit. 14, § 916 et seq.). Watercourse and Lake Protection Zones are defined areas along streams where the Forest Practice Rules restrict timber harvest in order to protect in-stream habitat quality for fish and other resources. Harvest restrictions and retention standards vary according to the presence of anadromous and other fish species, but these zones may encompass 15 m - 45 m (50-150 ft) on each side of a watercourse, 30 m - 91 m (100-300 ft) in total width depending on side slope, location in the state, and the watercourse's classification. Generally, within Watercourse and Lake Protection Zones, at least 50% of the tree overstory and 50% of the understory canopy covering the ground and adjacent waters must be retained in a well distributed multi-storied stand composed of a diversity of species similar to that found before the start of timber operations. For watersheds that fall within Anadromous Salmonid Protection rules (Cal. Code Regs., tit. 14, §§ 916.9, 936.9, and 956.9), the 13 largest trees per acre (live or dead) must be retained.

Toxicant Exposure:
The Petitioners' extrapolation of information on toxicant exposure from other forest carnivores to Humboldt marten, particularly from other forest mustelids such as fisher, is appropriate due to the similar use of habitats and prey species, and because of similarities in physiology and metabolism. The

distinction the Petitioners make between first generation ARs and second generation ARs is important because first-generation compounds generally require several doses to cause intoxication, while second-generation ARs, which are more acutely toxic, often require only a single dose to cause intoxication and persist in tissues and in the environment (Gabriel et al. 2012).

Climate Change:
Miller et al. (2012) reported that the number of fires per year, mean fire size, maximum fire size, and area burned all increased in northwestern California over the period of 1910-2008, and that observed changes in the local climate explained much of the fire trends. Although no trend in percent of high severity fires over time was detected, the authors did note that spikes in high severity fires occurred in years when region-wide lighting strikes caused multiple ignitions. This research demonstrates that the effects of a changing climate may already be impacting Humboldt marten habitat, and highlights the link between climate patterns and wildfire trends in northwestern California forests. In the summer of 2015 the Nickowitz fire burned approximately 2,800ha (7,000 ac.) in and adjacent to the current known range of Humboldt martens (InciWeb 2015). In addition to wildfire-mediated habitat changes resulting from changes in climate, other studies have projected changes in forest disease, insect damage, and other disturbance events which could affect marten habitat quality or availability (USFWS 2015). Finally, Lawler et al. (2012) suggested that martens (all North American species) will be highly sensitive to climate change and will likely experience the greatest impacts at the southernmost latitudes and lowest elevations within their range.

3. Conclusion

Present or Threatened Modification or Destruction of Habitat
Humboldt martens have specific habitat associations which include large trees for structure and cover, and a dense shrub understory. Logging and forest management to reduce fire threat can remove and degrade these requisite features thereby destroying, fragmenting and degrading Humboldt marten habitat. Additionally, modification of marten habitat from these activities may increase the probability of predation by marten predators. These habitat impacts have the potential to reduce Humboldt marten populations by increasing predation rates and decreasing the extent and quality of available habitat.

Overexploitation
Trapping pressure on Humboldt martens was intense during the late 1800s and early 1900s, and likely resulted in significant declines in population size as well as a reduction in range. It is unlikely that trapping currently threatens Humboldt martens in California due to a ban on trapping martens and a ban on lethal traps as well as requirements that licensed trappers check traps daily and release non-target animals.

Predation
Predation is a significant source of Humboldt marten mortality. What is unknown is whether predation rates are greater than Humboldt marten faced historically, or so high that marten recruitment does not exceed the combined mortality rate of predation and all other causes.

Competition
Although the Petitioners state that competition is a significant threat to Humboldt marten populations the statement is largely speculative due to a paucity of information on the subject. Others, including the USFWS (2015) have not identified competition as a significant threat to the species.

Disease
Disease could pose a potential threat to Humboldt marten populations. Martens are known to be vulnerable to several diseases and parasites, including canine distemper which is known to cause high mortality rates in wild mustelid populations and is known to be present in the vicinity of the Humboldt marten population. However, marten mortality rates from disease are unknown. Additionally, it is unknown whether mortality from disease, combined with all other mortality sources exceeds marten recruitment rates.

Other Natural Events or Human-related Activities
Vehicle Strikes:
The Petitioners are correct that vehicle strikes could impact Humboldt marten populations if roadkill mortalities combine with other sources of mortality to exceed recruitment rates; however, as the USFWS (2015) points out, vehicle strikes alone are not likely to constitute a significant threat to Humboldt marten populations in California as there have been none reported since 1980.

Inadequacy of Existing Regulatory Mechanisms:
The Petition correctly states that Humboldt marten are not specifically protected by regulation on public or private lands (with the exception of protection from trapping in California). Federal land use allocations provide varying levels of protection to Humboldt marten habitat. State and private lands are regulated by the California Forest Practice Act which includes some provisions that require disclosure of impacts and retention of trees and canopy, but requires no specific protections for marten.

Toxicant Exposure:
Although no studies specific to Humboldt marten currently exist, studies of toxicant effects on closely related fishers do exist. Toxicants appear to be widespread on the northwestern California landscape and may increase if marijuana cultivation continues to spread. Toxicant exposure possibly impacts Humboldt martens; however, the nature and magnitude of the impact on the California population is unknown.

Climate Change:
Climate change is likely to negatively impact Humboldt marten habitat through increasing temperatures, decreasing precipitation, and decreasing fog extent. These changes are expected to eventually result in

changes to the vegetation communities that constitute marten habitat in northwestern California. Additionally, climate change appears to have increased the extent of wildfire in the region which can destroy and fragment marten habitat.

G. Degree and Immediacy of Threat (p. 29)

1. Scientific Information in the Petition

The Petition states that there is a significant and immediate threat to the survival and conservation of Humboldt marten, largely due to the small size of the extant population and risks of extinction inherent to small populations, and due to the compounding effects of a small population combined with the other identified threats. The Petition's section on urgency states that there are believed to be less than 50 individuals in California and an unknown, but small and declining number in Oregon, while populations of at least several hundred reproductive individuals are required to ensure the long term viability of vertebrate species, with several thousand individuals being the goal (citing Primack 1993). Additionally, the Petition states martens have a low reproductive rate, making recovery from population-level impacts slow (citing Buskirk and Ruggiero 1994). The Petition states that small, isolated populations are inherently vulnerable to extinction for four main reasons: 1. genetic problems due to loss of genetic variability, inbreeding, loss of heterozygosity, and genetic drift; 2. demographic fluctuations due to random variation in birth and death rates; 3. environmental fluctuation due to variation in predation, competition, disease, and food supply; and 4. natural disturbances that occur at irregular intervals such as drought, fires, and severe storms (citing Primack 1993). The smaller the population size the more likely other threats will drive it to extinction (again citing Primack 1993). The Petition cites Slauson and Zielinski (2009, but based on content appears to be referring to Slauson et al. 2009a), who found that the probability of extinction in their study area was higher than the probability of colonization, and stated that conservation actions were needed immediately to ensure the Humboldt marten's persistence.

2. Other Relevant Scientific Information

The Petition discusses the threat inherently posed to Humboldt marten due to the small, isolated nature of their population. Small population size increases the risk of extirpation through demographic, environmental, and genetic stochastic events (random changes over time), particularly if the population is isolated, and through the deleterious effects associated with low genetic diversity (Traill et al. 2007, Traill et al. 2010). Demographic stochasticity can cause unbalanced age or sex ratios resulting in reduced capacity to breed. Genetic stochasticity can result in the loss of adaptive genes from the population or the proliferation of maladaptive genes. Additionally, small populations are less able to weather and recover from random catastrophic events in the environment. The Petition here uses a Humboldt marten population figure of less than 50 individuals, but elsewhere a figure of less than 100 individuals (see Abundance section above), however the discrepancy is of little import as either figure is well below the population size experts believe to be required to ensure long-term viability of a species (e.g. Traill et al. 2007, Traill et al. 2010, Flather et al. 2011). Regarding the Petitioners' comments about

the minimum population size needed to ensure long-term viability, Flather et al. (2011) noted that generalized minimum population recommendations across taxa are not supported by the historical record. The authors do agree that the population sizes required to sustain individual species over the long term are likely to be in the thousands, not hundreds.

The Petitioners' reference to Slauson et al.'s (2009a) extinction and colonization probabilities requires clarification. Slauson et al. (2009a) were referring to the probability of extinction and colonization at a given sample unit within their study area, not extinction and colonization at the population level.

3. Conclusion

The Petitioners correctly point out the inherent risk of extinction to small isolated populations. This inherent risk can compound the risks of other identified threats in terms of immediacy and degree.

H. Impact of Existing Management Efforts (P. 30)

1. Scientific Information in the Petition

The Petition states that there are no existing species-specific protective measures in place for Humboldt marten. It notes that there is currently a multi-agency Humboldt marten Conservation Group in place.

2. Other Relevant Scientific Information

For a discussion of existing management efforts see the discussion of existing management efforts under "Other Natural Events or Human-related Activities" in the Threats section above.

3. Conclusion

As stated above under "Other Natural Events or Human-related Activities" Humboldt martens are not specifically protected by any existing regulations or management plans, although they likely benefit from protections and management efforts aimed at protecting other resources. In the absence of specific actions to manage, restore, and enhance Humboldt marten habitat, existing management is unlikely to prevent the extinction of this species.

I. Suggestions for Future Management (p. 30)

1. Scientific Information in the Petition

The Petition reproduces the management strategy for Humboldt marten from the USFWS 2010 Humboldt marten Species Assessment (Hamlin et al. 2010):

- Maintain all currently occupied habitat.

- Restore habitat to increase and reconnect suitable habitat patches in the vicinity of the known population (Slauson and Zielinski 2004, p. 63).
- Increase the overall size of suitable patches toward the mean size of 447 ac (181 ha) (Slauson et al. 2007, p. 466).
- Restore functional landscape connectivity to enable recolonization of suitable, but currently unoccupied habitat (Slauson and Zielinski 2003, p. 13) and establish connectivity with habitat corridors between populations.
- Establish high priority restoration areas that enlarge small suitable patches, such as late-successional conifer-dominated stands and serpentine stands with dense shrub cover, so that they exceed the minimum patch size occupied by martens [greater than 205 ac (83 ha)]. This will reconnect suitable patches currently separated by unsuitable habitat.
- Restore or maintain dense, productive shrub layers and reduce road densities in the short-term and accelerate development of late-successional stand conditions, such as large diameter live trees, multilayered canopy, and large snags and logs over the long-term (Slauson et al. 2007, p. 466).
- Develop specific stand recommendations to manage early-seral conifer stands with lower tree densities to encourage maintenance of a productive shrub layer and increase tree growth rates (Slauson 2003, p. 71).
- Protect currently suitable resting and denning structures and plan for the future recruitment of new structures (Slauson and Zielinski 2009, p. 43).
- Establish additional populations within the historical range.

2. Other Relevant Scientific Information

Continued research into the ecology and demography of Humboldt marten is needed to increase the understanding of the species' biology, distribution, vital rates, habitat associations, and the ecology of their predators and prey species. Of particular importance is a better understanding of the relationship between habitat types and demographic rates. Additionally, although there have been extensive surveys for this species in recent years, many areas remain that have not been surveyed, or have not been intensively surveyed. Where the geographic boundary lies between the ranges of Humboldt martens and Sierra martens is currently unknown. Identifying the boundary more precisely would refine future estimates of the extent of available habitat and of population size. It is also important to determine whether Humboldt martens in California and the coastal martens of southern Oregon are members of the same subspecies or separate subspecies in order to more fully understand the potential threats to the species related to small population size and genetic isolation. Finally, the need for and feasibility of facilitated translocations and population augmentations from captive breeding should be studied.

3. Conclusion

The suggested management actions are appropriate for recovering Humboldt marten; however additional research on Humboldt marten genetics, distribution, ecology, and demography is also necessary to plan and implement the recovery of the species, and facilitated translocations and population augmentations should be carefully considered.

J. Detailed Distribution Map

The Petition reproduces figure 8.3 from USFWS (2015) showing the known extant Humboldt marten distribution in California.

IV. Status of the Species

The Humboldt marten population in California likely numbers less than 100 individuals. Although quantitative data is nonexistent, qualitative information suggests they were more common in the state in the early 1900s. The Humboldt marten range in California appears to have declined over the last century as well. The available literature indicates that the species requires specific habitats which are currently limited in distribution and fragmented. Although the degree and immediacy of the factors potentially threatening the persistence of the species are unknown, available information suggests that Humboldt martens may be threatened by historical habitat loss and fragmentation, exposure to toxicants, the effects of climate change, diseases, and the risks inherent to small populations.

Having reviewed and evaluated relevant information, including the material referenced in the Petition and other information in the Department's possession, the Department believes there is sufficient scientific information available at this time to indicate that the petitioned action may be warranted. (See Fish & G. Code, § 2073.5, subd. (a)(2); Cal. Code Regs. tit. 14, § 670.1, subd. (d).)

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Keeping Northwest California wild since 1977

Sent via email to fgc@fgc.ca.gov *on date shown below*

January 28, 2016

California Fish and Game Commission
1416 Ninth Street, Suite 1320
Sacramento, CA 95814

Dear Responsible Officials,

On behalf of the Environmental Protection Information Center (EPIC), and our 24,099 members and supporters, please accept these comments regarding EPIC's petition to list the Humboldt marten, (*Martes caurina humboldtensis*) as an endangered species under the California Endangered Species Act (CESA). The petition contains sufficient information to indicate that the petition action may be warranted and the petition should be accepted and considered. Furthermore, the petition demonstrates that the Humboldt marten clearly warrants listing as endangered under CESA.

The Humboldt marten was thought to be extinct for around fifty years until 1996, when researchers found a small population of martens in Northern California living within the historic range of the sub-species in Humboldt and Del Norte Counties. Since that time, martens have continued to be detected in California; however the species is not doing well. The only known California population of the Humboldt marten has declined more than 40 percent between 2001 and 2012 and has not rebounded since and likely totals around 40 individuals.

EPIC staff concurs with the Department of Fish and Wildlife's petition evaluation, which "determined that there is sufficient scientific information to indicate that the petitioned action may be warranted." Further, as highlighted by the Department, "existing management efforts alone are unlikely to maintain a self-sustaining population of Humboldt martens in California, [and] additional management efforts may be necessary to maintain a self-sustaining population of Humboldt martens in California."

Based on scientific findings presented in the petition to list the marten, it is clear that after being extirpated from more than 95 percent of their historic range, Humboldt martens are on the verge of extinction in California. EPIC is calling upon the Fish and Game Commission to fulfill its statutory obligations as outlined below.

CESA was adopted to provide improved protection for species rendered threatened or endangered due in large part to man's activities. Under CESA, any "bird, mammal, fish, amphibian, reptile, or plant" may be listed as "endangered" or "threatened" if it is in serious danger of becoming extinct, or likely to become extinct without additional protection, respectively. CESA provides for interested parties to petition the Commission to list a particular species or subspecies as endangered or threatened.

At this stage in the listing process, the Commission shall make a finding, based on the petition, the department's written report, written comments received, and oral testimony provided during the public hearing, whether there exists "sufficient information to indicate that the petitioned action may be warranted." Cal. Govt. Code § 2704.2(e). "Sufficient information" has been described as "that amount of information, when considered with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted." *Natural Resources Defense Council v. Fish & Game Commission*, 28 Cal. App. 4th 1104 1119 (1994). "May be warranted" has been characterized to mean "there is a substantial possibility the requested listing could occur." *Id*. at 1125. "Substantial possibility, in turn, "means something more than the one-sided 'reasonable possibility' test for an environmental impact report but does not require that listing be more likely than not." *Center. for Biological Diversity v. California Fish & Game Commission*, 166 Cal. App. 4th 597, 610 (2008).

While the Commission is offered discretion to determine whether sufficient information is provided in the petition and the Status Report from the Department, "[t]he Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision." *Id*. at 611. Additionally, mere reasonable doubt as to whether listing should occur is not sufficient; there must be an absence of any substantial possibility of listing to reject a petition at the candidacy determination stage.

In conclusion, EPIC staff contends that the petition to list the Humboldt marten contains all required elements and overwhelming evidence to support listing the species as Endangered under the California Endangered Species Act. We call upon the California Fish and Game Commission to fulfill its duty to uphold the public trust doctrine and make the legally defensible and ethical decision to list the Humboldt marten as "endangered" under the California Endangered Species Act.

Thank you for the opportunity to comment on this matter for the Humboldt marten and for future generations.

For the wild,

Amber Shelton
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CENTER *for* BIOLOGICAL DIVERSITY

VIA ELECTRONIC MAIL

January 28, 2016

Fish and Game Commissioners
c/o Michael Yaun, Acting Executive Director
1416 Ninth Street, Room 1320
Sacramento, CA 95814
fgc@fgc.ca.gov

Re: Agenda Item 33 (Consider the petition, Department's evaluation report, and comments received to determine whether listing the Humboldt marten as a threatened or endangered species may be warranted)

Dear Commissioners and Acting Executive Director Yaun,

We are writing to support a "status review" for the Humboldt marten (also referred to as the coastal marten) under the California Endangered Species Act (CESA). The Petition we submitted (along with EPIC), and the Department's subsequent Petition "Evaluation," clearly indicate that listing "may be warranted".

At this stage in the CESA listing process, you are being asked to consider whether listing the marten "may be warranted". In *Center for Biological Diversity v. California Fish and Game Commission*, the Court of Appeals held that the CESA "may be warranted" standard is a low threshold that uses an objective, reasonable person:

> The term "sufficient information" in section 2074.2 means that amount of information, when considered with the Department's written report and the comments received, that would lead a reasonable person to conclude the petitioned action may be warranted. The phrase "may be warranted" is appropriately characterized as a substantial possibility that listing could occur. "Substantial possibility," in turn, means something more than the one-sided "reasonable possibility" test for an environmental impact report but does not require that listing be more likely than not.

Center for Biological Diversity v. Fish & Game Com. (2008) 166 Cal.App.4th 597, 609.

Applied to CESA's definitions of endangered and threatened species, a petition to list a species must be accepted, and a status review conducted, if a reasonable person would conclude that there is a substantial possibility that listing *could* occur – *i.e.*, that the species could be in "serious danger" of becoming extinct throughout all or a significant portion of its range because of habitat loss, change in habitat, overexploitation, predation, competition, or disease, or it could be likely to become in serious danger of extinction within the foreseeable future.

Further, the Court of Appeals made plain that, once a petition makes a prima facie showing that the "may be warranted" standard has been met, contradictory evidence does not negate that showing unless the evidence "persuasively, wholly undercut some important component of that prima facie showing." 166 Cal.App.4th at 612. As explained by the Court of Appeals:

> The Commission is not free to choose between conflicting inferences on subordinate issues and thereafter rely upon those choices in assessing how a reasonable person would view the listing decision. Its decision turns not on rationally based doubt about listing, but on the absence of any substantial possibility that the species could be listed after the requisite review of the status of the species by the Department under section 2074.6.
>
> A counter showing or argument that raises only a conflicting inference about a portion of the showing in favor of the petition, unless that counter inference is very strong, will not, for an objective, reasonable person, diminish the possibility that listing could occur to an "insubstantial" level.

Id. at 611, 612.

Applying the principles set forth in *Center for Biological Diversity v. California Fish and Game Commission*, CESA's "may be warranted" threshold easily has been triggered with respect to the marten. Indeed, the predicament martens on California's north coast currently face could hardly be more dire – as the Petition, and the Department's Evaluation, discuss:

- **"The population of Humboldt martens in California has declined from an unknown 'fairly numerous' number in the early 20th century to a present population which likely numbers less than 100 individuals."**
- **Its "range in California is substantially reduced from its historical extent."**
- **They "are dependent on specialized habitats for their survival and reproduction, and those habitats are limited on the landscape."**

Moreover, just the fact that the DFW Evaluation supports a "status review" indicates that the "may be warranted" standard has been met here.

Thank you for taking the time to consider the Petition and Evaluation, and these comments, and we look forward to a status review, and protection for, the martens.

Respectfully submitted this 28th day of January, 2016,

_____

Justin Augustine
Attorney, Center for Biological Diversity

Humboldt Marten

Petition Evaluation

Daniel Applebee, Senior Environmental Scientist

February 11, 2016

Presentation Overview

- Listing History
- Petition Evaluation and listing factors
- Department Recommendation:

  Advance to candidacy

Listing History

- **June 8, 2015** – Department received petition from The Environmental Protection Information Center and the Center for Biological Diversity to list Humboldt marten as Endangered under CESA

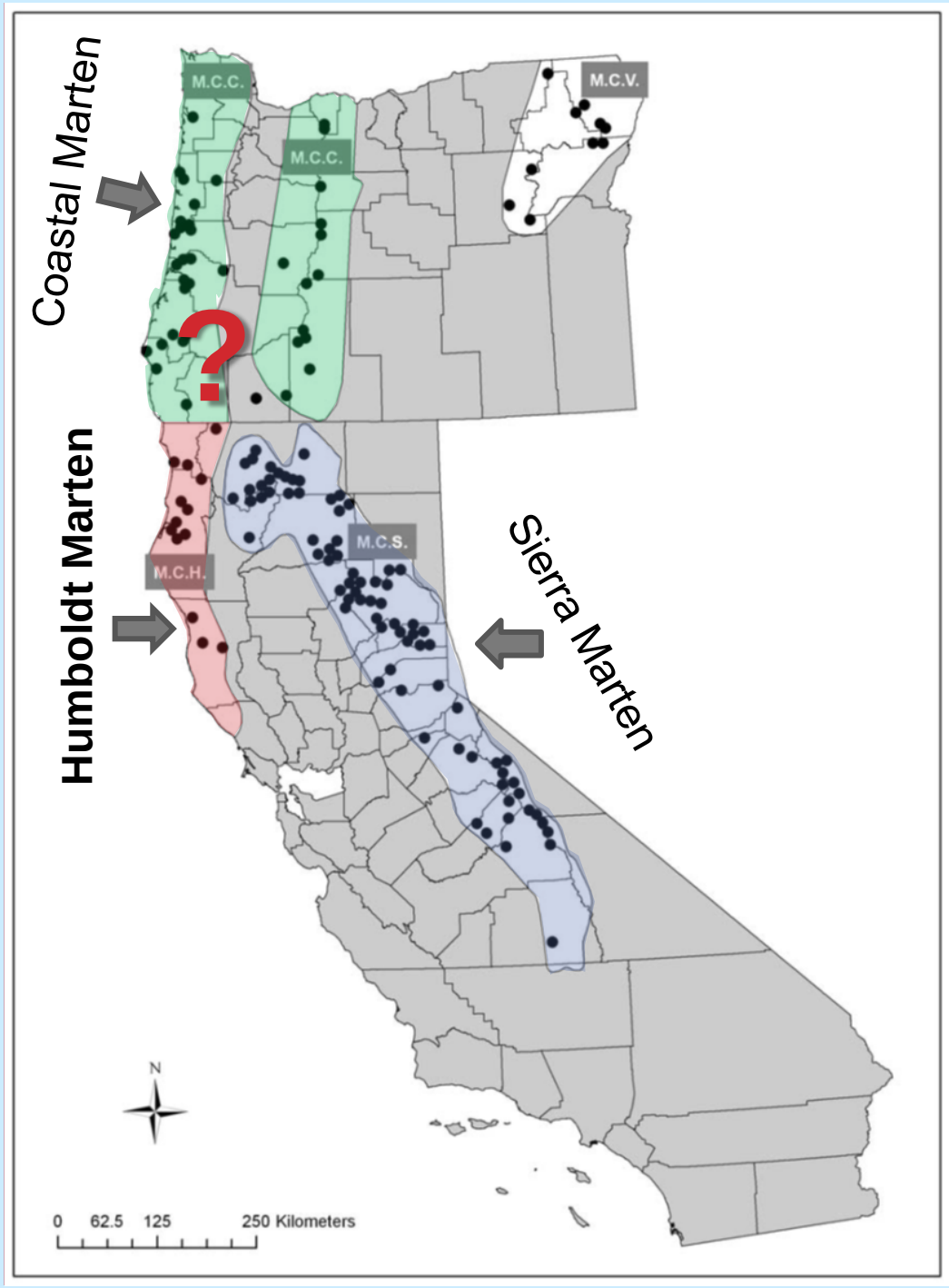
- USFWS (2010 - 2015) – Reviewed petition from same petitioners to list Humboldt marten under ESA and determined listing is not warranted at this time.

Species Description

- Carnivorous mammal in the weasel family
- Smaller than a fisher, larger than a long-tailed weasel
- One of several subspecies of Pacific marten
- Yellowish to dark brown fur, with contrasting throat patch
- Subtle physical differences from Sierra martens

Range

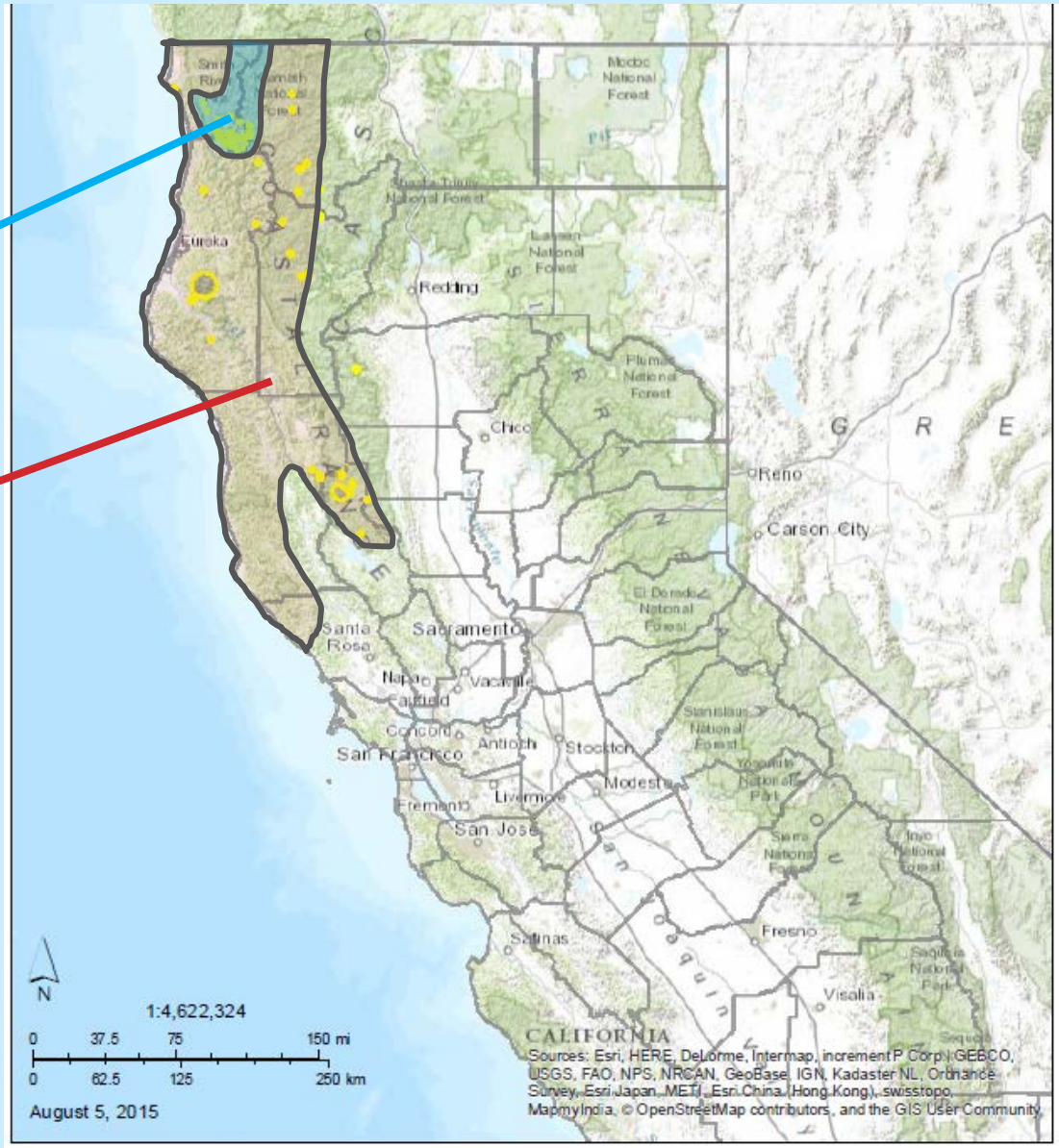
- California is home to Humboldt martens and Sierra martens
- Humboldt marten and coastal martens in Oregon genetically similar
- Distinction between Humboldt and coastal marten subspecies may not be supported by science



Range Trend

Contemporary Range

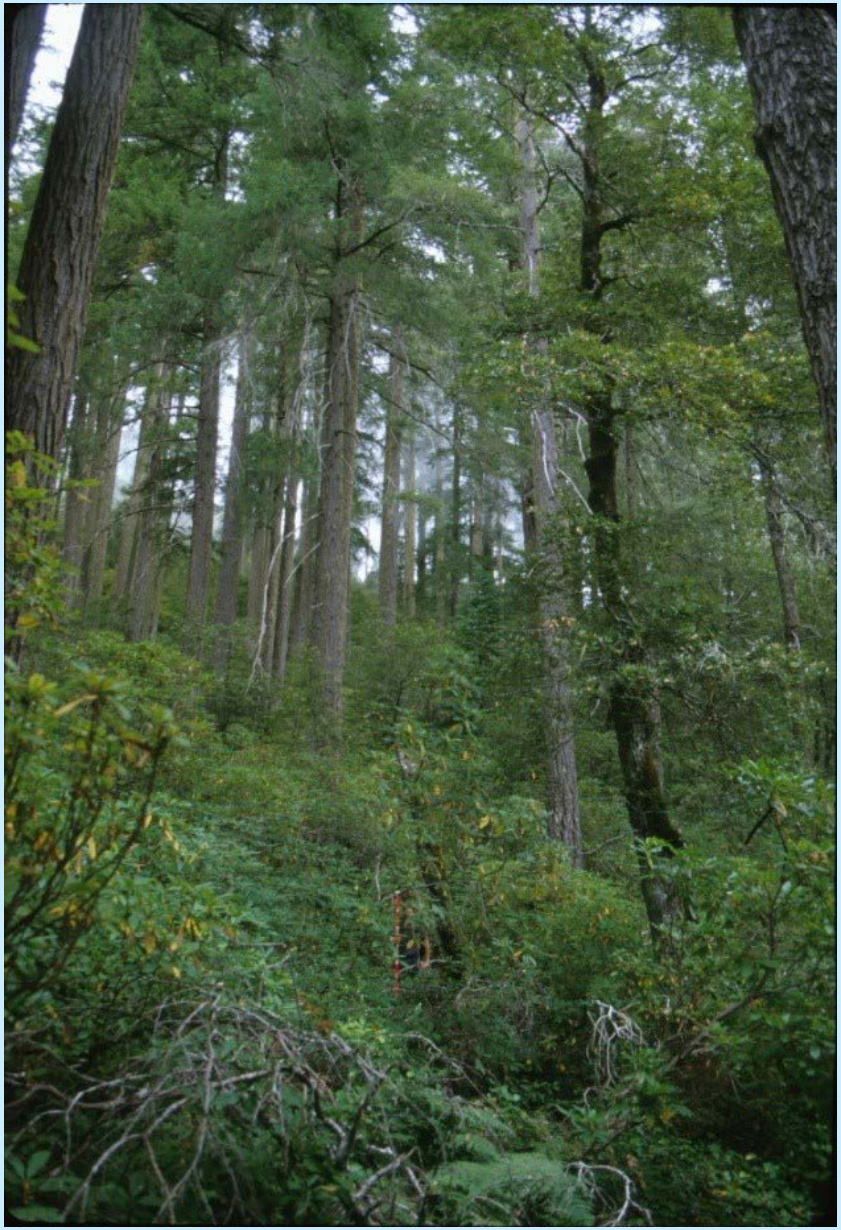
Historical Range



Life History

- Humboldt marten diet primarily small mammals, also berries, insects, and birds.
- Sexually mature at 24 months
- Average 2-3 kits per year
- Dispersal distance typically <15 km
- Pacific martens in CA typically survive <5 years in wild
- Predators include fishers, coyotes, bobcats, and great horned owls

Habitat



- Douglas-fir and redwood forests
- Sparse Douglas-fir stands on rocky serpentine substrates also used
- Dense shrub layer critically important
- Structural elements needed for cover and dens (tree cavities, logs, rock piles)

Population and Trend

- No historical population estimates exist
- Historically described as “fairly numerous”, one trapper took 50 Humboldt martens in a single winter
- Local population declines noted as early as 1920s
- Population appears to have declined by 40% between studies in 2000 and 2008, but remained stable 2008 - 2012
- California population estimated to be less than 100 individuals

Threats

- Habitat modification
- Predation
- Disease
- Toxicant exposure
- Climate change
- Small population

THREATS
Habitat Modification

Timber harvest, forest fuel reduction treatments, and post-fire timber salvage:

- Removes tree structures used for cover, rest, and denning
- Reduces forest canopy cover
- Reduces and fragments shrub cover
- Increases risk of predation?

Google earth
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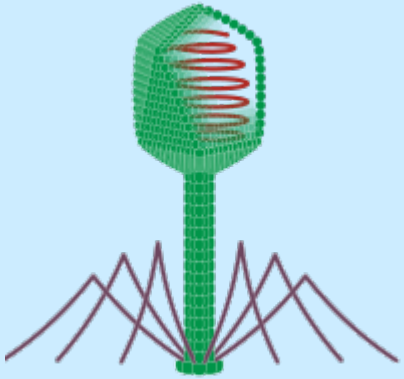
THREATS
Predation

- Bobcat
- Fisher
- Gray Fox
- Coyote
- Great Horned Owl

Photo: Chris Stermer, CDFW

THREATS
Disease



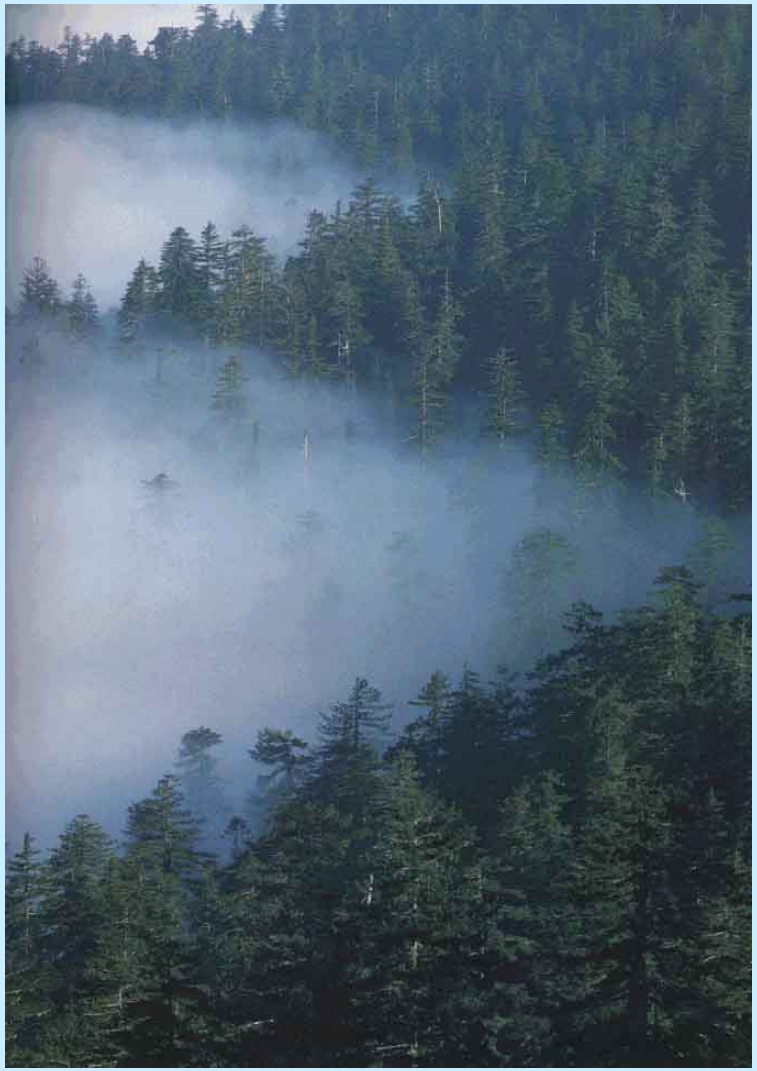
- Rabies
- Trichinosis
- Sarcoptic Mange
- Canine Adenovirus
- Herpes Virus
- West Nile Virus
- **Canine Parvovirus**
- **Canine Distemper Virus**

THREATS
Rodenticides

Studies of closely related fishers in area found:

- Rodenticides widely distributed on landscape
- 13 fisher mortalities in CA since 2009
- 85% of CA fishers exposed
- Sublethal effects of toxics
  - Susceptible to predation
  - Susceptible to vehicle strikes

THREATS
Climate Change



- Models Predict Increasing Temperature, Decreasing Precipitation, and Decreased Fog Intrusion
- Vegetation Change
- Increased Wildfire Frequency and Extent

THREATS
Risks Inherent to Small Populations

- Stochastic Environmental Events
  - Wildfire, Disease Outbreaks, Food Supply
- Genetic Effects
  - Loss of Diversity and Adaptive Genes, Accrual of Mutations
- Unbalanced Sex Ratios
- Slow Population Recovery

Existing Management

- Majority of range owned and managed by USFS under various Land Management Allocations:
  Late Successional Reserves, Managed Late Successional, Wilderness Areas, Matrix Lands, etc.

- Approx. 30% is private timberland regulated by California Department of Forestry and Fire Protection (Cal Fire)

- Approx. 10% Redwood National and State Parks

THE YUROK TRIBE

Future Management

- Habitat Protection and Restoration
- Manage for Corridors Between Habitat Patches
- Research and Surveys
  - Relationship to Oregon Populations
  - Location of Boundary Between Sierra and Humboldt Subspecies
  - Relate Vital Rates to Habitat Types
- Explore Facilitated Translocation

Conclusion

- **California population very small**
- **California range greatly reduced from historical times**
- **Threatened by:**
  - Predation
  - Habitat modification
  - Diseases
  - Toxicants
  - Climate changes
  - Risks associated with small populations

Department Recommendation

Based on its review of the Petition and relevant available information, the Department finds the petitioned action may be warranted, and recommends that the **Commission accept the Petition for further consideration.**

Thank You / Questions

Daniel Applebee
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